

Error Control in Surveys: Some Informal Remarks

*Tore Dalenius*¹

Devoting a special issue of JOS to the problems of non-sampling errors in surveys (including censuses) is commendable for several reasons. The special issue allows us to take stock of our endeavors to develop measures for control of these errors. We are given reason to question whether these measures are being put to good use, and this leads us to the question of what lies ahead. In Sections 1–3, I present some informal remarks about these points.

1. Measures for Error Control – The Present Situation

It should not be viewed as presumptuous if we survey statisticians claim that, by and large, our endeavors to build a firm basis for error control in surveys, and especially control of non-sampling errors, have been successful. In support of this claim, we may point to the advances for the error control in various survey operations: data collection (handling non-response), coding (schemes for automated coding), and editing (schemes for imputation). Moreover, we may point to the development of methods and theory for total survey design (known as survey models or alternatively as mixed-error models).

We may also feel justified in claiming that these and other advances have been made with considerable rapidity. We must not, how-

ever, overlook that our endeavors toward control of the non-sampling errors have to a considerable extent been made possible by the preceding advances in the control of the sampling errors, and especially the development of methods and theory for probability sampling.

But we must be careful not to be too smug in thinking that there is no need for further advances in error control. We must be aware of the fact that in some areas, including some to which we have already paid attention, there may indeed be need for additional improvements. I will give two examples.

The first example concerns the formalization of the notion of “relevance.” We already know that it is better to have an approximate solution to the right problem than an exact solution to the wrong problem. But how do we find and recognize the right problem? And how do we express (conceptualize) relevance in *measurable* terms?

The second example concerns measuring the usefulness of statistics as a function of their timeliness. Again, we already know that sometimes a timely estimate with a possibly large error (for example a “preliminary estimate”) may be preferable to an untimely estimate (for example a “final estimate”) with a small error.

These two examples reflect the present survey environment. In Section 3 of this note, I will consider the possible impact of changes in the survey environment.

¹ Brown University, Providence, R.I., U.S.A.

2. Use of Non-sampling Error Measures

Are the measures available being put to good use? This question may appear uncalled for, given the way the problem of non-sampling errors is addressed in, for example, population censuses in some developed countries. The great interest in evaluation studies suggests that the answer to the question should be an emphatic "yes."

But for some other types of surveys, the answer may be "no," in some cases even an emphatic "no." Regrettably, a common practice is to provide a *quantitative* estimate of the sampling error (possibly computed by the wrong formula) and add a *qualitative* statement about other sources of error, for example, "Practical difficulties ... may introduce other sources of error." It goes without saying that this practice may be misleading indeed: it surely does not suggest to the reader that these other errors may in fact overshadow the sampling error!

There are undoubtedly many explanations of this state of affairs. I will elaborate on only one of them. Error control is inherently costly. Those who control the budget for a survey – they are not necessarily survey statisticians by training – may find the budget prepared by a survey statistician "financially infeasible." A superficial assessment of the survey design may then suggest to them that a sizeable saving can be achieved by eliminating error control without jeopardizing the purpose of the survey.

In conclusion, I state that we should view the above example as an expression of the need for both awareness and a radical improvement of survey practice.

3. The Future of Error Control in Surveys

If asked to prepare an agenda for future work on error control in surveys, I would give high priority to the following two topics: improving the training in survey methodology; and preparing for changes in the survey environment.

3.1. Improving the training in survey methodology

Today's university-based training leaves in my view something to be desired. Two major shortcomings are that the training does not deal with the whole spectrum of tasks associated with survey designs, and it does not provide realistic exercises.

The focus of today's training is typically on sample design, while the spectrum of statistical tasks encompasses the following points:

- a. Formulating the objectives of the survey.
- b. Charting the survey situation (conditions to be met, resources available, special circumstances to take into consideration).
- c. Measurement design (questionnaire design).
- d. Sample design (sampling schemes and estimation procedures).
- e. Total error control (survey models).
- f. Error control of the various survey operations (data collection, coding, editing).
- g. Control of invasion of privacy.
- h. Documentation.

As part of their training students should participate in the design and execution of actual surveys.

We should also consider the need for further training of those who are already survey statisticians; a program for their training would draw upon the points suggested above.

3.2. Preparing for changes in the survey environment

I will limit my discussion to one kind of change, viz., a much more extensive use of data in administrative records. This will actualize questions about the quality of the data, especially if data from such records are used as proxies for data collected directly from the data subjects. Some of the methods used today for error control in "regular" surveys may not be applicable to proxies.