DISCUSSION

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Three of the papers in this session share a common point of reference: seminal work of Rao and Scott (1981, 1984) and their colleagues on the behavior of chi-square tests of significance under complex sampling. Two of these three papers revisit or recast issues already handled in some form by Rao and Scott. "Identifying Hypotheses Tested by X^2 and G^2 Statistics with Survey Data," by Wilson draws parallels between the performance of the chi-square tests for the cases of simple random samples and complex samples. Problems of timing unfortunately prevent a discussion here of the final version of his paper. "On X^2 Tests From Complex Sample Surveys with Fixed Cell and Marginal Design Effect," by Nguyen and Alexander combines a useful review of degrees of freedom with a discussion of the first-order Rao and Scott correction. Although most of these issues have been adequately dealt with elsewhere, the paper presents these topics in an interesting manner. The first-order correction, is only one of the two general methods proposed by Rao and Scott; the other, based on the Satterthwaite correction, is generally worth the additional effort whenever the necessary data are available.

The contribution of Thomas, Singh, and Roberts, "Size and Power of Independence Tests for R x C Tables From Complex Surveys," is particularly important. Although the authors review a number of previous studies on the relative performance of the Rao and Scott corrections, the jackknifing approach (Fay 1985), and other methods to hypothesis testing for cross-tabulated data from complex samples, their current effort assesses the performance of these methods under a much wider variety of conditions. Indeed, their method of creating samples for the study, which permits the systematic variation of a number of parameters, represents a significant portion of the overall paper, and it should be of separate interest to other researchers in its own right. Their substantive findings are generally consistent with earlier conclusions, and again these conclusions ought to command the attention of practitioners: that there are at least two methods (the Satterthwaite version of Rao and Scott and the jackknifing approach) of hypothesis testing for complex samples that perform exceedingly well under a wide variety of conditions; that a number of other proposals also do well under appropriate conditions; and that these methods are far superior to the consequences of ignoring the effect of the design.

I lack the qualifications to comment with authority on the paper "The Computational Complexity of Some Rounding and Survey Overlap Problems," by Pruhs, but I can state my appreciation of the importance of his results. The issues he addresses have important implications for survey research. Although his findings are negative, that is, he has shown that efficient algorithms to obtain optimal solutions to two problems are essentially out of reach, these conclusions should help to guide research in these areas. As he notes, algorithms to achieve reasonable solutions in some applications are still possible and have been proposed.

Katzoff, Jones, and Curtin, in "Two Empirical Studies of Statistical Methods Applied to Data From Complex Surveys" primarily describe an effort to develop computer software with a particular emphasis on survey design as opposed to analysis. This effort should provide an improved basis for decisions about design. An interesting avenue for further research here would be to investigate alternative options for drawing samples for the simulation studies. For example, the use of a sample of a size comparable to the one discussed in their paper could be expected to have the effect of distorting the relative importance of between-PSU variance relative to within-PSU variance. Allowing some means to vary the importance of these two components would be helpful. The authors deserve considerable encouragement in the undertaking they report.

"Analysis of Hypertension Prevalence Data for the Canadian Population," by Gentleman, and Tomiak is a fine example of analysis of data from a sample survey. Their analysis correlates self-reports with direct measurements of blood pressure. Because blood pressure measurements are subject to some variability over time for the same individual, a variance component model offers an additional perspective that could aid in interpreting the data. Suppose that the reading, S_{it}, for individual i at time t could be represented:

$$S_{it} = \mu + a_i + e_{it},$$

where a_i represents an individual average effect and e_{it} denotes a random effect for individual i at time t. If the random effect is at all large, then it could help to explain some of the discrepancies between the single measurement for the person and the self-reports. For example, possibly respondents may attempt to report something about $\mu + a_i$ rather than to produce a prediction of S_{it}. An errors-in-variables analysis could address some of these questions, but the survey data provide no basis to estimate the separate variance components. Studies of variability based on probability subsamples of the original sample or on auxiliary data would strengthen the interpretation of one-time measurements from health surveys of this sort. Some of the patterns reported on in the paper could also arise from different understandings by respondents of the intended meaning. For example, many of those on medication for high blood pressure may be inclined to report their blood pressure as elevated but actually mean that their blood pressure would be elavated without medication. These minor suggestions not withstanding, their analysis exemplifies the importance of careful analysis of health interview data produced by sample surveys and its utility in assessing patterns of national health.

[1] This paper reports the general results of research undertaken by Census Bureau staff. The views expressed are attributable to the author and do not necessarily reflect those of the Census Bureau.

References

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