DISCUSSION

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Producers and consumers of survey data (whether derived from a sample or census) have long been concerned with errors of measurement, particularly those that may produce bias in the survey estimates. It has also been well recognized that independent and random response errors would contribute to the variance of estimates and would be mirrored in the ordinary variance estimation schemes, except for finite population effects. The papers presented at this session summarize and extend some of the recent developments in these areas.

In reviewing the present papers and some of the material to which they refer, I have been impressed by four main points. These are:

1. Considerable ingenuity and care have been devoted to the development and application of models of "response variance," particularly by the staff of the U. S. Bureau of the Census. Large-scale applications of these models have been made in connection with the Re-interview Program of the Current Population Survey and the 1961 Canadian Census of Population. The models, by themselves, demonstrate that the effects of correlated "response variability" decrease only slowly with sample size, and that ordinary sample variance estimates are understatements of true variability. Furthermore, studies of response variance appear to be able to pinpoint areas in which there are difficulties in the measurement process.

2. Numerous large-scale validation studies have been carried out in several areas. Dr. Guthrie has referred to those in the economic area. The National Center for Health Statistics has also published accounts of validation studies relating to material collected by interview in the National Health Interview Survey -- e.g. on the accuracy of reported hospitalizations. It appears to me that all of these efforts can only serve to improve the available data on a particular subject, and that these concerns are becoming more and more widespread.

3. On the negative side, I have also been impressed by the fact that validation studies usually come up with highly qualified conclusions, indicating ways in which a particular type of data can be "improved", and warning that the results cannot be applied in an unqualified way to other situations and circumstances. In this respect, I can't see that we are any nearer a theory of non-sampling errors, to which Dr. Guthrie refers, than we were 10 or 15 years ago. The individual or organization conducting a single survey can draw somewhat upon this accumulated experience, but can in no way guarantee results "free from measurement bias," any more than he can produce one hundred per cent coverage of sample cases.

4. Dr. Madow has presented us with a penetrating discussion of these problems, and has contributed the details of a model by means of which a survey may, as an integral part of its design, contain its own small validation study. This is, of course, particularly welcome in view of the previously noted fact that generalizations from a specific validation study to a new survey are extremely difficult to make. It is also true, however, that even small validation studies are expensive, and although validation results may be better than ordinary measurements, they will probably never be perfect. Dr. Guthrie's paper illustrates these points very well.

In conclusion, I would simply like to call attention to the fact that, contrary to what some may believe, not even all of the formal statistical problems associated with sample survey design and analysis are as yet solved. We do have a large body of theory with which to produce efficient estimates of population parameters. We have, however, yet to produce completely satisfactory bridges between sampling and estimation techniques (stratification, two-stage sampling, ratio estimation, etc.) and standard techniques of analysis (analysis of variance, regression, nonparametric approaches, etc.)