

# THE CAROLINA HEALTH SURVEY: A CONTINUOUS STATEWIDE SAMPLE SURVEY

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## ABSTRACT

BASED ON THEIR EXPERIENCES WITH THE (SOUTH) CAROLINA HEALTH SURVEY, THE AUTHORS CONTRAST ONE-TIME SURVEYS WITH A CONTINUOUS SURVEY THAT CONSISTS OF CROSS-SECTIONAL SURVEYS AT THREE-MONTH INTERVALS. ADVANTAGES AND DISADVANTAGES OF A CONTINUOUS SURVEY ARE DISCUSSED. POSSIBLE ADVANTAGES INCLUDE THE CHANCE TO TRY OUT NEW METHODS, THE OPPORTUNITY TO REALIZE ECONOMIES OF SCALE, THE ABILITY TO DETECT STATEWIDE OR REGIONAL TRENDS, AND THE CHANCE TO PROVIDE TIMELY FEEDBACK TO OTHER PROGRAMS. DISADVANTAGES INCLUDE INTERVIEWER "BURNOUT", LACK OF OPPORTUNITY TO EXPLOIT "CRASH PROGRAM" PSYCHOLOGY, AND RELATIVELY HIGH EXPENSES IN SOME CATEGORIES, SUCH AS INTERVIEWER TRAVEL. THE CAROLINA HEALTH SURVEY IS ALSO COMPARED TO NATIONWIDE CONTINUING SURVEYS, SUCH AS THOSE THAT COMPRISE THE U.S. NATIONAL HEALTH SURVEY.

## 1. INTRODUCTION

The Carolina Health Survey forms a part of the South Carolina Department of Health and Environmental Control's (DHEC's) High Blood Pressure Control Program, which is designed to encourage new initiatives and to coordinate existing programs for control of high blood pressure in South Carolina. The Survey's role is to help evaluate the results of that program, as well as to provide timely "feedback" to DHEC over the life of the Project, thus enabling DHEC to concentrate its resources where they will do the most good. Although similar surveys and control programs have been planned or implemented in several other states, South Carolina's survey is unique. It was planned from the start as a continuous health survey, similar in many respects to the Federal health surveys in the National Health Survey, such as the Health Interview Survey, the Health Examination Survey, and the Health and Nutrition Examination Survey.

In this paper, we first briefly describe the design, organization, and history of the Carolina Health Survey. Next, we compare the Survey to the Federal surveys just mentioned, and contrast some of its features to those of conventional "one-shot" cross-sectional surveys. Finally, we offer several comments on the merits and drawbacks of large-scale continuous statewide sample surveys.

The Carolina Health Survey (CHS) was originally planned as a series of independent, successive cross-sectional surveys at one-month intervals of the civilian, non-institutionalized population of adults in South Carolina. Its basic objective was to gather information on the health status of the target population, particularly data relating to blood pressure, and data on the prevalence, awareness, treatment and control of hypertension. Each one-month survey constituted a sample period; for accurate estimates of--say--the prevalence of hypertension, data from several

periods could be pooled, and for demonstrating trends, the estimates from several successive periods could be plotted against time. In this manner, data from the Survey could be used to track trends, identify geographic areas or socio-demographic groups that required concentrated attention by DHEC, and provide a "baseline" to evaluate the long term success of DHEC's and others' interventions. Over several sample periods, enough data would become available to provide estimates for broad regions of the state and for HSA's. In the long run, enough data would become available to obtain estimates for simple parameters in most of the state's health districts, and even in the more populous counties.

The sample for each period was drawn independently of the others. A multistage cluster sampling procedure was used. Primary sampling units were the 1960 Census Enumeration Districts, pooled or broken up as necessary to insure roughly equal numbers of housing units. For each sample psu's (out of approximately three thousand in the state) was drawn. The psu's chosen were then mapped in the field and divided into roughly homogeneous clusters of about fifty housing units apiece. An average of about two clusters per Enumeration District was then chosen, and these clusters were mapped in detail in the field. Finally, a systematic sample of eight housing units per cluster was chosen. All adults (eighteen years or older) in these housing units were then counted as eligible for inclusion in the sample. No substitutions were allowed; interviewers were instructed to make up to five attempts to locate and interview each person selected for the sample before giving up. Field testing of the questionnaire and interview procedures took place in mid-1978, and regular interviewing began in the autumn of that year.

Interviewing did proceed more slowly than anticipated. Instead of a month, it took approximately one and a half months to complete each sample period. Furthermore, it proved uneconomical and impractical to work with complete surveys at one-month intervals. When the authors assumed responsibility for Survey operations in April, 1979, they decided to combine field operations for two or three sample periods at a time, while continuing to select the samples independently of one another. This simplified variance estimation by allowing data from concurrent "sample periods" to be treated as independent, except for interviewer effects and similar effects. It also helped cut field costs by reducing interviewer travel time and simplifying scheduling of the interviews.

Between late 1978 and early 1980, field work was completed for eight sample periods, and data gathered on over 7,200 adults. Analyses of these data are in progress.

In January, 1980, the authors were informed that DHEC's finances would no longer permit collection of data from the field. These financial

constraints, and DHEC's need to allocate more funds to intervention activities dictated termination of sampling until the follow-up survey in 1981-82. The need for this decision may be made clear by the following considerations. Originally, the high blood pressure coordination and intervention programs in all four of the states that were funded first were to have lasted just three years, including baseline and follow-up surveys, as well as the intervention activities. South Carolina's survey was unique, since it would remain in the field and collect data throughout the entire life of the project. The extra cost of the continuous survey was roughly equal to the cost of its second year of operation. But when the length of these projects was extended to five years, the additional cost of South Carolina's continuous survey tripled. While the idea of continuous sampling may have been attractive, it was simply too expensive for the resources that were available.

## 2. COMPARISONS WITH THE NATIONAL HEALTH SURVEYS

The comparisons made here will be broken down by areas of comparison. The following abbreviations will be used: HIS for the Health Interview Survey, HES for the Health Examination Survey, and CHS for the Carolina Health Survey.

**GOALS:** These are important in judging the success of a survey. A survey whose objective is simply to gather information will be evaluated differently than one whose objective is to determine the success or failure of a public health program.

As indicated earlier, the main goal of the CHS was twofold: First, to provide timely guidance to the intervention programs associated with the Department of Health and Environmental Control, and second, to help evaluate the High Blood Pressure Control Program at the close of its five-year contract period.

Rather similar goals were set in the charge to the task force out of which the ideas for HANES developed (3):

1. "The development and implementation of a survey design which will permit the use of health data as an objective test of programs to improve nutritional status";
2. "A continuing monitoring of national nutritional status and related health problems so that the evaluation of trends and programs over time will be possible and so that we will have a better basis of allocation of scarce program resources."

By contrast, the goals for HIS and HES were more general. The charge of the developers of HIS was to develop a continuing national morbidity study whose purpose (1)

"would be to obtain data on the prevalence and incidence of disease, injuries, and impairments, on the nature and duration of the resulting disability, and on the amount and type of medical care received."

The purpose of HES were(2)

1. "to provide statistics on the medically defined prevalence in the total U.S. population of a variety of specific diseases, using standardized diagnostic criteria";
2. "to secure distributions of the general population with respect to certain physical

and physiological measurements."

The secondary objectives of the South Carolina survey are similar to those of HIS and HES, but focus more strongly on hypertension and related variables.

**TIME FRAME:** Any statewide continuing survey that, like CHS, is designed in great measure to serve as an evaluation tool for other programs, will be bound by their time frames, and is unlikely to continue for more than a few years unless it can diversify and locate other funding sources. The Federal surveys--HIS, as well as HES and its successor HANES--continue over decades, although they change considerably over time. This allows much more time for developing and trying out all aspects of these surveys--their questionnaires, sample designs, field procedures, and estimation techniques.

**SAMPLING PLAN AND ESTIMATION PROCEDURES:** There appear to be few reasons why these would have to be fundamentally different for a nationwide and for a statewide continuing household survey. With some exceptions, a sampling plan or estimation procedure that is feasible on a nationwide basis might often be adaptable for use on a statewide basis.

Both the Carolina Health Survey and the Federal surveys have used multi-stage sample procedures, and have estimated totals and proportions by weighting sample values by the reciprocals of sample selection probabilities and empirical response rates. Techniques for estimation standard errors have varied, as has the degree to which a self-weighting sample was sought or obtained. The earlier cycles of HES used samples of around 7,000 individuals, and were therefore comparable in sample size to the Carolina Health Survey. Many characteristics of interest are uncommon enough so that only broad regional estimates for them are possible. For South Carolina's survey, this means estimates for HSA's or the larger health districts, but not for counties. For the Federal surveys (even HIS and HANES, which use sample sizes several times greater), this usually means estimates for broad geographic regions, but not for individual states.

**QUESTIONNAIRES, FIELD PROCEDURES, AND QUALITY CONTROL:** In these areas, there is little that necessarily must differ in a statewide and in a national continuous survey. One exception was already noted briefly earlier: the longer time frame for the Federal health surveys allows much greater flexibility in questionnaire design. For instance, the HIS questionnaire includes core questionnaire, one-time "add-on" supplements, and cyclical items that recur every three to five years. (1). The Federal surveys have another significant advantage, since the resources of the Bureau of the Census are available to them for designing the sampling plan, drawing the sample, interviewing and supervising the interviewers, and supervising quality control procedures.

## 3. CONTRASTS BETWEEN CONVENTIONAL AND CONTINUOUS SURVEYS

Compared to a conventional cross-sectional survey, or a baseline and a follow-up survey, a

continuous survey offers several potential advantages--and in some cases, pitfalls. We list some of these below, with comments on their application to statewide, rather than national, surveys.

A continuous survey offers a real opportunity to innovate in all areas, from sampling and questionnaire design to field operations and analysis of the results. To exploit these advantages, it is necessary that the survey continue for several years. If the survey is meant to replace separate baseline and follow-up surveys, scope for experimentation is greatly reduced by the need to maintain as great a degree of comparability as possible between data gathered at the beginning and data gathered near the end of the continuous survey.

A continuous survey may be able to realize economies of scale, but only if its scale is rather large to begin with. This implies large samples, long time periods, and considerable expense.

A continuous survey should, over a period of years, acquire efficient, experienced staff and develop smoothly running procedures for collecting and analyzing the data. On the other hand, a one-time survey, or a pair of them, has a better opportunity to complete its assignment before the staff and interviewers "burn out".

A continuous survey should be better able than a pair of single surveys to detect and track trends as they occur. Even so, a couple of years' worth of data will be necessary for all but the most grossly obvious trends to become clearly evident. This casts serious doubt on the ability of a continuous state-wide survey to detect trends early enough in the life of a five-year intervention project for that information to be of any greater use for planning than is the information gathered in a conventional baseline survey.

Some costs may be higher for continuous than for conventional surveys. There appears to be a certain degree of inelasticity in the amount of supervisory manpower required to run a survey. Since a continuous survey probably has a smaller number of interviewers working over a longer time period than does a one-time survey with the same sample size, some components of its administrative costs per completed interview may be greater. Similarly, the slower pace of interviewing in a continuous survey can mean higher travel costs unless these are allowed for in designing the sampling plan--for instance, by using larger clusters than would be required for a one-time survey.

#### 4. CONCLUSIONS

We conclude that continuous population-based surveys do offer certain advantages over one-time surveys, or a pair of them (baseline and follow-up). But the advantages and disadvantages of continuous surveys depend less on the geographic area that they cover than on the amount of time and money available to carry them out. Liberal allowances of time and money appear to be necessary, but difficult to obtain for a statewide survey that serves a relatively narrow purpose in a relatively tight time frame. Finally, some of the advantages of a continuous survey--especially the scope it allows for experimentation--are attenuated or lost when that survey replaces a baseline/follow-up pair of one-time surveys.

#### REFERENCES

In addition to the references given below, the other volumes in Series 1 and 2 of the Vital and Health Statistics Series of the National Center for Health Statistics are of great value in describing the rationale, operating procedures, and analytic techniques used by HIS, HES, and HANES.

1. National Center for Health Statistics: Health Survey Procedure: Concepts, Questionnaire Development, and Definitions in the Health Interview Survey. Vital and Health Statistics. PHS Pub. No. 1000-Series 1-No. 2. Public Health Service. Washington. U.S. Government Printing Office, May 1964.
2. National Center for Health Statistics: Plan and Initial Program of the Health Examination Survey. Vital and Health Statistics. PHS Pub. No. 1000-Series 1-No. 4. Public Health Service. Washington. U.S. Government Printing Office, July, 1965.
3. National Center for Health Statistics: Plan and Operation of the Health and Nutrition Examination Survey. Vital and Health Statistics. PHS Pub. No. 1000-Series 1-No. 10a. Public Health Service. Washington. U.S. Government Printing Office, February 1973.