

OBJECTIVES AND DESIGN OF THE BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM

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I. INTRODUCTION

By the early 1980s, it was evident from scientific research that personal health behaviors played a major role in premature morbidity and mortality, but no data were available on a state-specific basis. This was viewed as a critical deficiency, since state health agencies have the primary role of targeting resources to reduce behavioral risks and their consequent illnesses, and national data may not be appropriate for any given state.

At about the same time, telephone surveys emerged as an acceptable method for determining the prevalence of many health risk behaviors. Telephone surveys were especially desirable at the state and local level, where the necessary expertise and resources for conducting area probability sampling for in-person household interviews were not likely to be available. As a result, surveys were developed to monitor state-level prevalence of the behavioral risks associated with premature morbidity and mortality among adults. Behavioral data were thought to be especially useful for planning, initiating, supporting, and evaluating health promotion and disease prevention programs.

Initial point-in-time state surveys were conducted in 29 states from 1981-1983. In 1984, the Behavioral Risk Factor Surveillance System (BRFSS) was established by CDC, with 15 states participating in monthly data collection. Although designed to collect state-level data, a number of states from the outset stratified their samples to allow them to estimate prevalence for regions within their respective states. By 1994, all 50 states and the District of Columbia were participating; as of 1998, Puerto Rico also was collecting monthly data and the Virgin Islands and Guam were conducting point-in-time surveys.

A standard questionnaire was developed at CDC for states to use to provide data that could be compared across states. The initial survey primarily included existing questions from national surveys such as the National Health Interview Survey. The basic questionnaire was designed to last no more than ten minutes so that states could add their own questions. In general, the BRFSS gathers information on health behaviors related to the leading preventable causes of death, including physical inactivity, injury, weight control, alcohol consumption, tobacco use, and HIV-AIDS. It also collects data on preventive health practices such as mammography use.

For data collection, states were historically

encouraged by CDC to use cluster designs based on the Waksberg method; however, even for the initial 29 point-in-time surveys, there was state variability; nine of these states used simple random samples. Currently, the vast majority of states use disproportionate stratified sampling (DSS).

One important characteristic of the BRFSS is its flexibility. It permits states to add questions of their own design, but is uniform enough to allow state-to-state comparisons for certain questions. Participating states use these data for many purposes. Among these are to identify demographic variations in health-related behaviors, target services, address emergent and critical health issues, propose legislation for health initiatives, and to measure progress towards state and national health objectives. The system's broad network for information gathering also enables states to evaluate their disease prevention and health promotion efforts.

Key features of the BRFSS:

- ▶ with small resources (federal awards to states average about \$60,000), data are continuously collected in all 50 states, DC, and one territory
- ▶ data remain available to states
- ▶ flexible system that has avoided becoming tradition-bound and more rigid with growth
- ▶ timely and relevant data

II. QUESTIONNAIRE

Criteria for including items in the BRFSS questionnaire:

- ▶ Relationship of the variable to personal behaviors linked to promoting health, preventing disease, and/or reducing health risks
- ▶ Suitability of the question for telephone interviewing
- ▶ Pertinence of the variable to national health objectives or other priority health issues
- ▶ Need to measure the variable over time
- ▶ Need to have state-specific data
- ▶ Degree to which alternative data sources are unsatisfactory
- ▶ Degree to which the prevalence of the variable

- ▶ will be adequate for planned analyses
- ▶ Relationship of the variable to other questionnaire topics
- ▶ Validity of questions
- ▶ Financial and/or technical resources available for support of the question
- ▶ Effect on questionnaire length, considering both the total number of questions and the proportion of respondents to be queried

The questionnaire has three parts: 1) the core component, consisting of the fixed, rotating, and emerging core; 2) optional modules; and 3) state-added questions.

Core component. The *fixed core* is a standard set of questions asked by all states. It includes queries about current behaviors that affect health (e.g., tobacco use, alcohol consumption) and questions on demographic characteristics. The *rotating core* is comprised of two distinct sets of questions, each asked in alternating years by all states, that address different topics. The *emerging core* is a set of up to five questions that are added to the fixed and rotating cores. Emerging core questions typically focus on issues of a "late breaking" nature and do not necessarily receive the same scrutiny that other questions receive prior to being added to the instrument. These questions are part of the core for one year and are evaluated during or soon after the year concludes to determine their potential value in future surveys.

Optional CDC modules. These are sets of questions on specific topics (e.g., smokeless tobacco, arthritis) that states elect to use on their questionnaires.

State-added questions. These are questions developed or acquired by participating states and added to their questionnaires.

Each year, states and CDC agree on the content of the core components and optional modules. For comparability, many of the questions are taken from established national surveys. This allows the BRFSS to take advantage of questions that may have been tested and allows states to compare their data with those from other surveys. BRFSS protocol specifies that all states ask the core component questions without modification; they may choose to add any or none of the optional modules; and states may add question(s) of their choosing at the end of the questionnaire. New questions on optional modules and on the fixed, rotating, or emerging core are required to have undergone cognitive testing.

Although CDC supports about 18 optional modules annually, it is not feasible for a state to use them all. States are selective with their choices of modules and state-specific questions to keep the questionnaire at a reasonable length (total number of questions used in states ranges from 90 to 160). New questionnaires are implemented in January, and the core components and

optional modules remain unchanged throughout the year. However, the flexibility of state-added questions does permit additions, changes, and deletions at any time during the year for these questions.

The core component is asked first, optional modules are asked next, and state-added questions last. If a significant portion of the state population does not speak English, states have the option of translating the questionnaire into other languages; presently, CDC provides a Spanish language version of the questionnaire. CDC provides states with CATI programming, edit programming, and annual data tables for questions on the core and for selected optional modules.

Before 1993 the content of the core and optional components of the questionnaire was determined by CDC and the states one year at a time. Each year, changes were proposed, debated, and agreed upon. A long-term plan for the content of the questionnaire was adopted in 1992 and implemented in 1993. The plan divided the core into a fixed and a rotating section. The topics included on the fixed and rotating cores are shown in Table 1.

In years that rotating topics are not used in the core, they are supported as optional modules. At least once a year staff within the Behavioral Surveillance Branch convenes a meeting of state and CDC program staff (the BRFSS Working Group) to discuss the questionnaire and other issues related to the BRFSS. The long-term questionnaire plan, the content of the core, and the optional modules are reviewed annually by CDC and the Working Group. Based on recommendations from the BRFSS Working Group, a draft questionnaire and proposed optional modules are prepared for review and discussion by all BRFSS coordinators at the annual BRFSS conference. CDC reviews this input, consults with the BRFSS Working Group, arranges for cognitive testing of new or substantially revised existing questions, field tests a prototype questionnaire, and releases to the states the final draft of the core and optional modules by September of each year.

III. STATE COORDINATORS AND INTERVIEWERS

Historically, as new states joined the BRFSS system, start-up training was provided by a CDC Project Officer with considerable experience with the BRFSS. Once start-up training was provided, the state assumed responsibility for training new coordinators and other staff. CDC project officers supplement state-provided training for new coordinators with briefings during site visits.

Interviewer retention is very high among states that conduct the survey using state health department staff. When a new interviewer is hired, the Coordinator or a supervisor usually conducts the training. This material covers seven basic areas: overview of the BRFSS, role descriptions for staff involved in the interviewing process, the questionnaire, sampling, codes and dispositions, survey

TABLE 1: BRFSS TOPICS FROM 1993-2000

Fixed Core		Rotating Core I (1993, 1995, 1997, 1999)		Rotating Core II (1994, 1996, 1998, 2000)	
Topic	No. Questions	Topic	No. Questions	Topic	No. Questions
Health status	4	Hypertension	3	Physical activity	10
Health insurance	3	Injury	5	Fruits & vegetables	6
Routine check-up	1	Alcohol	5	Weight control	6
Diabetes	1	Immunizations	2		
Smoking	5	Colorectal screening	4		
Pregnancy	1	Cholesterol	3		
Women's health	10				
HIV/AIDS	14				
Demographics	14				
Total: Women	53	Total:	22	Total:	22
Men	42				

follow-up, and practice sessions.

Contractors typically use interviewers who have experience conducting telephone surveys. These interviewers are given additional training on the BRFSS questionnaire and procedures before they are certified to work on BRFSS. When a state has a new contractor who has not had prior experience with BRFSS, a CDC Project Officer participates in the initial training of the contractor's interviewing staff.

The format of ongoing training for interviewers varies, and is determined by states. Some states meet with their interviewers to discuss procedures at the beginning of every monthly interviewing period; others have a formal quarterly meeting. CDC does not specify skill requirements for state coordinators. About 60% of coordinators have either masters or doctoral degrees.

States are required to conduct call back verifications on a 5% sample of completed interviews. In addition, they are expected to monitor interviews. Thirty states currently have systems connected to the telephones that enable monitoring of the respondent and the interviewer; ability to practice electronic monitoring varies because of state laws. Contractors typically conduct somewhat more systematic monitoring. Each interviewer is monitored a certain amount of time every month. The monitoring is usually documented and shared with the interviewer. States that conduct in-house interviewing are usually not as systematic. BRFSS coordinators typically listen to interviewers at random and provide feedback if a problem is identified. Turnover among BRFSS interviewers is minimal compared to the turnover of interviewers in general. University-based contractors that

rely heavily on students are subject to greater turnover.

IV. BRFSS SAMPLE DESIGN

Population. The target population for the BRFSS is the non-institutionalized civilian population age 18 years and older with telephones in each participating state or territory.

Coverage. Telephone coverage is known to be at least 95% in the U.S., but is lower for some groups, including minorities and those with lower socioeconomic status. No direct method of compensating for non-telephone coverage is employed by the BRFSS. Post-stratification weights by age/race/sex categories are used in the BRFSS, and this may partially correct for any bias caused by non-telephone coverage.

BRFSS Samples. The BRFSS surveys in each state and territory employ random digit dialing (RDD) methods of sampling. Specific sampling methods vary among states as indicated in Table 2. An important tenet of BRFSS sampling methods is that each residential telephone number should have a known, non-zero probability of being in the sample. The BRFSS uses a rigorous, standardized protocol that requires up to 15 call attempts to reach randomly selected adults.

Interviews are conducted each month of the year, usually during a two week period. Each state has a target number of interviews, currently ranging from about 125-405 per month, yielding annual state samples ranging from about 1500-4860, with a total annual sample of approximately 125,000 across all states. States that are interested in making estimates for sub-state areas may sample at different rates in particular stratum to ensure a

minimum sample size per stratum. As shown in Table 2, 3 of the 52 areas (mostly states) are using paper questionnaires; in the others, interviewing is done using computer assisted telephone interviewing (CATI). Of the 52 project areas participating in the 1998 BRFSS, 30 employed contractors that are either universities or commercial survey research groups.

Table 2. 1998 BRFSS Sampling Design Characteristics

Total states/territories*	52
Sample Designs:	
Waksberg cluster	11
Disp. Strat. Sample	38
SRS/Strat. random	3
State Interviews/month	125-405
State Interviews/year	500-4860
Total interviews (est. for all states)	125000
Data collection method:	
CATI	49
Paper	3
Personnel used for interviewing:	
State health department staff	22
Contractors	30

* includes District of Columbia and Puerto Rico

Response Rates. As found in other telephone surveys, response rates vary by state, and rates have been declining in recent years. Median BRFSS CASRO response rates were 71% from 1991 to 1993 but declined to 70% in 1994, 68% in 1995, and 63% in 1996, and 62% in 1997 (CASRO rate in 1997 ranged from 37% to 89%). Participation rates (the percentage of persons reached by telephone who agree to be interviewed) declined from 84% in 1991 to 78% in 1997.

VI. QUALITY ASSURANCE

Oversight by CDC of state BRFSS activities is done through a combination of visits by CDC staff to states, development of written policies on data quality standards and monitoring compliance, and calculating and publishing quality assurance measures.

State site visits are conducted by CDC project officers approximately every 12-18 months. Typically, project officers are public health advisors who have had experience as state public health program managers. During these visits, project officers use the following list of items to assess state BRFSS operations: response rates, mode of data collection, sample size and strategy, review of optional modules and state-added questions, interviewing,

characteristics of the data collection facility, problems observed during monitoring of interviews, verification procedures, interviewer/supervisor training in the past 6 months, number of callbacks to a single number before final disposition, handling of refusals, use of data, and plans for follow-up.

CDC also produces a number of quality measures that are shared with states, including survey efficiency, the number of states with electronic monitoring (in 1997, 30 states used either audio or video monitoring), discrepancy between percent of sample that was female and census estimates (median for 1997: 4.8 percentage points; range: 0 to 11.0), and item nonresponse for demographic and other selected variables. To date, values of these quality assurance data items have almost uniformly been high.

Finally, many methodologic studies have examined the reliability and validity of the BRFSS. The Behavioral Surveillance Branch maintains a bibliography that summarizes the more than 30 BRFSS methodologic studies (list available from the author); the vast majority demonstrate very high reliability and validity for BRFSS data.

VII. DATA DISSEMINATION

The Behavioral Surveillance Branch has a policy to provide timely access to BRFSS data to as diverse an array of public health professionals as possible, while ensuring data quality and respecting the needs of participating states. Specifically, the Branch provides BRFSS data that have been edited and are ready for statistical analysis with weights and uniform variable formats. The first priority is to provide states access to their own data as rapidly as possible.

After all states have had an opportunity to review their own data, the BRFSS data for all states are made available for internal CDC use, usually 6 months after the end of each calendar year. BRFSS data are then made publicly available through publication of an annual summary report, posting data tables on the Internet, and releasing data on CD-ROM products.

VIII. SUMMARY

The BRFSS is a unique data system developed collaboratively by CDC and states to provide ongoing surveillance of adult health risk factors and other health-related factors on a monthly basis. The BRFSS has a strong history of producing valuable and valid, high quality data. With increased emphasis and need for data at the state and even the local level, the BRFSS has become an even more valuable resource. Increased efforts are being made by CDC to provide ready access to BRFSS and to encourage more analysis and use of these data.

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