BRFSS Overview

Background

The Behavioral Risk Factor Surveillance System (BRFSS) is a collaborative project among US states and participating US territories and the Centers for Disease Control and Prevention (CDC). The BRFSS is administered and supported by CDC, within its National Center for Chronic Disease Prevention and Health Promotion.

BRFSS's objective is to collect uniform state-specific data on health risk behaviors, chronic diseases and conditions, access to health care, and use of preventive health services related to the leading causes of death and disability in the United States. State health departments use the BRFSS data for a variety of purposes, including identifying demographic variations in health-related behaviors; designing, implementing, and evaluating public health programs; addressing emergent and critical health issues; proposing legislation for health initiatives; and measuring progress toward state health objectives.[1] For historic examples of how state officials have used the finalized BRFSS datasets, please refer to the BRFSS website.

The BRFSS was initiated in 1984, with 15 states collecting surveillance data on risk behaviors through monthly telephone interviews of noninstitutionalized adults residing in each state. Over time, the number of states participating in the survey increased; BRFSS now collects data in all 50 states as well as the District of Columbia and participating US territories. In this document, the term "state" is used to refer to all areas participating in the BRFSS, including the District of Columbia, Guam, the Commonwealth of Puerto Rico, and the US Virgin Islands.

Since 2011, the BRFSS has been conducting surveys using both landline phones and cell phones. All responses are self-reported; the BRFSS does not conduct proxy interviews. In conducting the landline survey, interviewers collect data from a randomly selected adult in a household. In conducting the cell phone survey, interviewers collect data from adults answering the phone who reside in a private residence or college housing. Beginning in 2014, all adults contacted through their cell phone were eligible, regardless of their landline phone use (i.e., complete overlap). According to the 2023 American Community Survey, 99.2% of all occupied housing units in the United States had telephone service available, and telephone noncoverage ranged from less than 1.0% in several states to 1.3% in New Mexico and West Virginia.[2] An estimated 2.0% of occupied households in Puerto Rico did not have telephone service.[2] The increasing percentage of households that are abandoning their landline phones for cell phones has significantly eroded the population coverage provided by landline surveys to pre-1970s levels. The preliminary results (July to December 2024) from the National Health Interview Survey indicate that 78.0% of adults were wireless-only.[3] Using a dual-frame survey including landline and cell phones improved the validity, data quality, and representativeness of BRFSS data.

The BRFSS field operations are managed by state health departments that follow protocols adopted by the states, with technical assistance provided by CDC. States are responsible for conducting interviews and collecting data for all respondents in their state. The data are transmitted to CDC for post data collection processes such as editing, weighting, and analysis. An edited and weighted data file is

provided to each participating state health department for each year of data collection, and summary reports of state-specific data are prepared by CDC.

In 2011, a new weighting methodology called iterative proportional fitting (or "raking")[4] replaced the poststratification method to weight BRFSS data. Raking allows incorporation of cell phone survey data and permits the introduction of additional demographic characteristics (e.g., education level, marital status, home renter/owner) in addition to age, race/ethnicity, and sex. These additional characteristics improve the degree and extent to which the BRFSS sample properly reflects the sociodemographic makeup of individual states. The 2024 BRFSS raking method includes categories of age by sex, detailed race and ethnicity groups, education levels, marital status, regions within states, sex by race or ethnicity, telephone source, renter or owner status, and age by race or ethnicity.

During 2024, 50 states, the District of Columbia, Guam, Puerto Rico, and the US Virgin Islands collected BRFSS data. (During 2024, however, Tennessee was unable to collect enough data to meet the minimum requirements to be included in the 2024 public data set.) Factors assessed by the BRFSS in 2024 included health status and healthy days, exercise, oral health, alcohol consumption, chronic health conditions, demographics, disability, cancer screenings, tobacco use, immunizations, health care access, and HIV/AIDS (core sections). Optional module topics for 2024 included prediabetes and diabetes, arthritis, shingles and HPV vaccination, cognitive decline, caregiver health, cancer survivorship (type, treatment, pain management), adverse childhood experiences, sugar-sweetened beverages, and tobacco cessation. In 2024, an optional module was included to provide a measure of asthma prevalence for people aged 17 years or younger. Refer to the ***2024 BRFSS Questionnaire*** for the full list of topics and offerings.

The BRFSS Design

The BRFSS Questionnaire

The BRFSS questionnaire consists of a core component, optional modules, and state-added questions. Many questions are taken from established national surveys, such as the National Health Interview Survey or the National Health and Nutrition Examination Survey. This practice allows the BRFSS to take advantage of questions that have been tested and allows states to compare their data with those from other surveys. Any new core or module questions that states, federal agencies, or other entities propose as additions to the BRFSS must go through cognitive testing and field testing before they can become part of the BRFSS questionnaire. In addition, a majority vote of all state representatives is required before questions are adopted. The BRFSS guidelines—agreed upon by the state representatives and CDC—specify that all states ask the core component questions without modification. They may choose to add any, all, or none of the optional modules and may add questions of their choosing as state-added questions. The shared input of the states and the CDC ensures that the questions remain salient to all BRFSS data users.

The questionnaire has three parts:

1. Core component: Core content includes queries about current health-related perceptions, conditions, and behaviors (e.g., health status, health care access, alcohol consumption, tobacco use, HIV/AIDS risks), as well as demographic questions. The core component includes some questions asked each year and rotating questions that are asked in even- or odd-numbered years. Some portions of the core component appear every 3 or 4 years.

2. Optional BRFSS modules: Optional modules are sets of questions on specific topics (e.g., social determinants, prediabetes and diabetes, cognitive decline, caregiver topics, screenings for different types of cancer, cancer survivorship, and sexual orientation) that states can elect to use on their questionnaires.

3. State-added questions: Individual states develop or acquire state-specific questions and add them to their BRFSS questionnaires. CDC does not edit, evaluate, track, or report responses from these questions.

The BRFSS supported 26 modules in 2024, but to keep the surveys at a reasonable length, states limited their module use and state-added questions by using only the ones most helpful to their state programs. Because different states have different needs, question totals vary widely between states. The BRFSS implements a new questionnaire in January and usually does not change it significantly for the rest of the year. The flexibility of state-added questions, however, does permit additions, changes, and deletions at any time during the year.

The 2024 list of optional modules is available on the BRFSS website. To allow for a wider range of questions in optional modules, up to three split versions of the questionnaire may be used by each state. For additional information on split-version questionnaires, see the **2024 module data tables**, published with this yearly release.

Annual Questionnaire Development

The governance of the BRFSS includes a representative body of state health officials, elected from among the BRFSS coordinators in each geographic region, called the State BRFSS Coordinators Working Group. During the year, the State BRFSS Coordinators Working Group meets with CDC's BRFSS program management to discuss potential changes and additions to the questionnaire. Before the beginning of the calendar year, CDC provides states with the text of the core component and the optional modules that the BRFSS will support in the coming year. States select their optional modules and ready any state-added questions they plan to use. Each state then constructs its own questionnaire. The order of the questioning is always the same—interviewers ask questions from the core component first, then they ask any questions from the optional modules, and then the state-added questions. This content order ensures comparability across states and follows the BRFSS guidelines. Generally, the only changes that the standard protocol allows are limited insertions of state-added questions on topics related to core questions. In some cases other changes may be permitted under special circumstances, such as adding questions on emerging health issues during the middle of the year. CDC and state partners must agree to these exceptions. In some cases, however, states have not been able to follow all set guidelines. Users should refer to the yearly **Comparability of Data** document, which lists the known deviations.

Once each state finalizes its questionnaire content—consisting of the core questionnaire, optional modules, and state-added questions—the state prepares a hard copy or electronic version of the instrument and sends it to CDC. States use the core components and optional modules of the questionnaire without changes for one calendar year, and CDC archives a copy on the BRFSS website. If a significant portion of any state's population does not speak English, states have the option of translating the questionnaire into other languages. Currently, CDC provides a Spanish version of the core questionnaire and optional modules. Specific wording of the Spanish version of the questionnaire may be adapted by the states to fit the needs of their Spanish-speaking populations.

Sample Description

In a telephone survey such as the BRFSS, a sample record is one telephone number in the list of all telephone numbers the system randomly selects for dialing. To meet the BRFSS standard for the participating states' sample designs, each state must be able to justify sample records as a probability sample of all households with telephones in the state. All participating areas met this criterion in 2024. Fifty-one states used a disproportionate stratified sample (DSS) design for their landline samples. Guam, Puerto Rico, and the US Virgin Islands used a simple random-sample design.

In the type of DSS design most commonly used by each state in the BRFSS landline telephone sampling, the BRFSS divides telephone numbers into two groups, or strata, which are sampled separately. The high-density and medium-density strata contain telephone numbers that are expected to belong mostly to households. Whether a telephone number goes into the high-density or medium-density stratum is determined by the number of listed household numbers in its "hundred block" or set of 100 telephone numbers with the same area code, prefix, and first 2 digits of the suffix . BRFSS puts numbers from hundred blocks with 1 or more listed household numbers (1+ blocks, or banks) in either the high-density stratum (listed 1+ blocks) or medium-density stratum (unlisted 1 + blocks). The BRFSS samples the two strata to obtain a probability sample of all households with telephones.

Cellular telephone sampling frames are commercially available, and the system can call random samples of cellular telephone numbers, but doing so requires specific protocols. The basis of the 2024 BRFSS sampling frame is the Telecordia database of 1,000 banks (1,000 consecutive telephone numbers, e.g. 617-492-000 to 617-492-0999). The vendor uses dedicated cellular 1,000 banks, sorted on the basis of area code and exchange within a state. The BRFSS forms an interval—K—by dividing the population count of telephone numbers in the frame—N—by the desired sample size—n. The BRFSS divides the frame of telephone numbers into n intervals of size K telephone numbers. From each interval, the BRFSS draws one 10-digit telephone number at random. The target population (aged 18 years and older) for cellular telephone samples in 2024 consists of people residing in a private residence or college housing who have a working cellular telephone.

To provide adequate sample sizes for smaller geographically defined populations of interest, however, many states sample disproportionately from strata that correspond to sub-state regions. In 2024, the 47 states with geographic stratification were Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Puerto Rico, Rhode Island, South Carolina, South Dakota, Texas, US Virgin Islands, Utah, Vermont, Virginia, Washington, and Wisconsin. As a precaution to protect the confidential

responses provided by the respondent, specific variables (such as sub-state geographic identifiers, detailed race or ethnicity, and older than 80 years) in a given year are removed from all public use datasets.

State health departments may directly collect data from their state residents, or they may use a contractor. In 2024, 10 state health departments collected their data in-house and the remainder contracted with data collectors. In 2024, the CDC provided samples of all cellular and landline numbers purchased from Marketing Systems Group, Inc. (MSG) to all 54 states and territories.

Data Collection

Interviewing Procedures

In 2024, 54 states or territories used Computer-Assisted Telephone Interview (CATI) systems. CDC supports CATI programming using the Ci3 WinCATI software package. This support includes programming the core and module questions for data collectors, providing questionnaire scripting of state-added questions for states requiring such assistance, and contracting with a Ci3 consultant to assist states. Following guidelines provided by the BRFSS, state health personnel or contractors conduct interviews. The core portion of the questionnaire lasts an average of 17 minutes. Interview time for modules and state-added questions depends on the number of questions used, but generally, they add 5 to 10 minutes to the interview.

Interviewer retention is very high among states that conduct the survey in-house. The state coordinator or interviewer supervisor conducts repeated training specific to the BRFSS. Contractors typically use interviewers who have experience conducting telephone surveys, but these interviewers are given additional training on the BRFSS questionnaire and procedures before they are approved to work on the BRFSS.

The BRFSS protocols require evaluation of interviewer performance. During 2024, all BRFSS surveillance sites had the capability to monitor their interviewers. Interviewer-monitoring systems vary from listening to the interviewer only at an on-site location to listening to both the interviewer and respondent at remote locations. Some states also use verification callbacks in addition to direct monitoring. Contractors typically conducted systematic monitoring of each interviewer a certain amount of time each month. All states had the capability to tabulate disposition code frequencies by interviewer. These data were the primary means for quantifying interviewer performance.

States conducted telephone interviews during each calendar month. They made calls 7 days per week, during both daytime and evening hours. They followed standard BRFSS procedures for rotation of calls over days of the week and time of day. Detailed information on interview response rates is available in the BRFSS 2024 **Summary Data Quality Report**.

Data Processing

Preparing for Data Collection and Data Processing

Data processing is an integral part of any survey. Because states collect and submit data to CDC each month, BRFSS performs routine data processing tasks on an ongoing basis. Once the final version of the new questionnaire becomes available each year, CDC staff take steps to prepare for the next cycles of data collection. These steps include developing edit specifications, programming portions of the Ci3 WinCATI software, programming the editing software, producing telephone sample estimates as

requested by states and ordering the sample from the contract vendor. CDC produces a Ci3 WinCATI data entry module for each state that requests it. CDC staff also must incorporate skip patterns, together with some consistency edits, and response-code range checks into the CATI system. These edits and skip patterns serve to reduce interviewer, data-entry, and skip errors. Developers prepare data conversion tables that help processors read the survey data from the entry module and call information from the sample tracking module, and combine information into the final format for that data year. CDC also creates and distributes a Windows-based editing program that can perform data validations on files with proper survey result formats. This program helps users by outputting lists of errors or warnings about conditions of concern that may exist in the data.

CDC begins to process data for the survey year as soon as states (or their contractors) begin submitting data to the data management mailbox. Data processing continues throughout the survey year. CDC receives and tracks monthly data submissions from the states. Once data are received from a state, CDC staff run editing programs and cumulative data quality checks and note any problems in the files. A CDC programmer works with each state until any problems are optimally resolved. CDC staff generate data quality reports and share them with state coordinators, who review the reports and discuss any potential problems. Once CDC receives and validates the entire year of data for a state, processors run several year-end programs on the data. These programs perform some additional, limited data cleanup and fixes specific to each state and data year and produce reports that identify potential analytic problems with the data set. Once this step is completed, data are ready for assigning weights and adding calculated variables. Calculated variables are created for the benefit of users and can be noted in the data set by the leading underscore in the variable name. The following calculated variables are examples of results from this procedure:

- _RFSMOK3
- _TOTINDA
- _HCVU654
- _AGE80
- _FLSHOT7

For more information, see the **Calculated Variables and Risk Factors in Data Files** document. Several variables from the data file are used to create these variables in a process that varies in complexity. Each respondent answer is entered into the data set as a numeric code. Some processes are based only on combined response codes from a single variable (such as grouping age responses), while others require sorting and combining of particular codes from multiple variables (such as using height and weight to calculate Body Mass Index).

Almost every variable derived from the BRFSS interview has a code category labeled “refused” and assigned values of 9, 99, or 999. These values may also be used to represent missing responses. Missing responses may be due to incomplete or non-interviews (a non-interview response results when an interview ends prior to this question and an interviewer then codes the remaining responses as refused) and missing responses due to skip patterns in the questionnaire. This code, however, may capture some questions that should have been asked, but for some reason do not have responses, and appeared as a blank or another symbol. Data-users should take care when analyzing information from responses which include missing and/or refusal codes.

Weighting the Data

The BRFSS is designed to obtain sample information on the population of interest (i.e., the adult US population residing in different states). Data weighting helps make sample data more representative of the population from which the data were collected. BRFSS data weights incorporate the design of the BRFSS survey and characteristics of the population. BRFSS weighting methodology comprises 1) design factors or design weight, and 2) some form of demographic adjustment of the population—by iterative proportional fitting or raking.

The design weight accounts for the probability of selection and adjusts for nonresponse bias and non-coverage errors. Design weights are calculated using the weight of each geographic stratum (_STRWT), the number of phones within a household (NUMPHON4), and the number of adults aged 18 years and older in the respondent's household (NUMADULT). For cellphone respondents, both NUMPHON4 and NUMADULT are set to 1. The formula for the design weight is

Design Weight = _STRWT * (1/NUMPHON4) * NUMADULT

The stratum weight (_STRWT) accounts for differences in the probability of selection among strata (subsets of area code or prefix combinations). It is the inverse of the sampling fraction of each stratum. There is rarely a complete correspondence between strata (which are defined by subsets of area code or prefix combinations) and regions—which are defined by the boundaries of government entities.

BRFSS calculates the stratum weight (_STRWT) using the following items:

- Number of available records (NRECSTR) and the number of records users select (NRECSEL) within each geographic strata and density strata.

- Geographic strata (GEOSTR), which may be the entire state or a geographic subset (e.g., counties, census tracts).

- Density strata (_DENSTR) indicating the density of the phone numbers for a given block of numbers as listed or not listed.

Within each _GEOSTR*_DENSTR combination, BRFSS calculates the stratum weight (_STRWT) from the average of the NRECSTR and the sum of all sample records used to produce the NRECSEL. The stratum weight is equal to NRECSTR/NRECSEL.

The complete overlapping sample frames required an adjustment to address the respondent's probability of selection in both the landline and cell phone sample frame. A compositing factor was calculated for dual users in landline and cell phone sample frames. The design weight is adjusted by the compositing factor for the records in the overlapping sample frames and later truncated within geographic region using the mean plus/minus 1.96 times the standard deviation to calculate the truncation limits. The adjusted and truncated design weight was used as the raking input weight.

BRFSS uses iterative proportional fitting, or raking, to adjust for demographic differences between those persons who are sampled and the population that they represent. After combining landline and cellular telephone data, BRFSS performs raking by adjusting one or a combination of demographic categories at a time in an iterative process until a convergence of a set value is reached. The BRFSS rakes the design weight to 8 margins (sex by age group, race or ethnicity, education, marital status, tenure, sex by race or ethnicity, age group by race or ethnicity, and phone ownership). If the state had geographic regions, it

includes 4 additional margins (region, region by age group, region by sex, and region by race or ethnicity). If the state had at least 1 county with 500 or more respondents, the BRFSS includes 4 additional margins (county, county by age group, county by sex, and county by race or ethnicity). BRFSS, therefore, uses the adjusted and truncated design weight for raking and produces _LLCPWT—the final weight assigned to each respondent.

The population estimates obtained for building the target totals for raking are from similar sources used in previous years. Intercensal population estimates were purchased from Claritas, LLC at the county-level for age, race or ethnicity, and sex. These population estimates are used as the population totals for a state across all margins. The 5-year American Community Survey PUMS data set (2019–2023) was used to obtain estimates for margins 3, 4, and 5 (education, marital status, tenure). The noninstitutionalized adults were weighted by the person-level weights to generate the population estimates. The percentages were then used in the raking margins. The telephone ownership estimates for margin 8 were taken from the state wireless estimate percentages produced by the National Center for Health Statistics (NCHS) and released in June of 2024.

Calculation of a Child Weight

The BRFSS calculates the design weight for child weighting from the stratum weight times the inverse of the number of telephones in the household and then multiplies by the number of children:

Child Design Weight = _STRWT * (1/NUMPHON4) * CHILDREN

CHIILDWT = BRFSS rakes the child design weight to 5 margins including age by sex, race or ethnicity, sex by race or ethnicity, age by race or ethnicity, and phone ownership.

_CLLCPWT is the weight assigned for each child interview.

References

1. Remington PL, Smith MY, Williamson DF, Anda RF, Gentry EM, Hogelin GC. Design, characteristics, and usefulness of state-based behavioral risk factor surveillance: 1981-87. *Public Health Rep*. 1988;103(4):366–375.

2. Federal Communications Commission USA. *Universal Service Monitoring Report*. 2024; p 74. DOC-408848A1.pdf

3. Blumberg SJ, Luke JV. *Wireless Substitution: Early Release of Estimates from the National Health Interview Survey, July-December 2024* National Center for Health Statistics. June 2025. https://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless202506.pdf.

4. Battaglia MP, Frankel MR, Link MW. Improving standard poststratification techniques for random-digit-dialing telephone surveys. *Surv Res Methods*. 2008;2(1):9.