

Attachment 7: BRFSS 2019 Weighting Documentation

and Comparability Technical Documentation

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# BRFSS Overview and Weighting Documentation

## Background

The Behavioral Risk Factor Surveillance System (BRFSS) is a collaborative project between all of the states in

the United States (US) and participating US territories and the Centers for Disease Control and Prevention (CDC).

The BRFSS is administered and supported by CDC's Population Health Surveillance Branch, under the Division

of Population Health at the National Center for Chronic Disease Prevention and Health Promotion. The BRFSS

is a system of ongoing health-related telephone surveys designed to collect data on health-related risk behaviors, chronic health conditions, and use of preventive services from the noninstitutionalized adult population (≥ 18 years) residing in the United States.

The BRFSS was initiated in 1984, with 15 states collecting surveillance data on risk behaviors through monthly

telephone interviews. 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. During 2019, All 50

states, the District of Columbia, Guam, and Puerto Rico collected BRFSS data. In this document, the term

“state” is used to refer to all areas participating in the BRFSS, including the District of Columbia, Guam, and

the Commonwealth of Puerto Rico. New Jersey was unable to collect enough BRFSS data in 2019 to meet the

minimum requirements for inclusion in the 2019 annual aggregate data set.

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. Factors assessed by the BRFSS included health status,

healthy days/health-related quality of life, health care access, exercise, inadequate sleep, chronic health

conditions, oral health, tobacco use, e-cigarettes, alcohol consumption, immunization, falls, seat belt use,

drinking and driving, breast- and cervical cancer screening, prostate cancer screening, colorectal cancer

screening, and HIV/AIDS knowledge. Since 2011, the BRFSS has been conducting both landline telephone and cellular telephone-based surveys. All the responses were self-reported; proxy interviews are not conducted

by the BRFSS. In conducting the landline telephone survey, interviewers collect data from a randomly selected

adult in a household. In conducting the cellular telephone survey, interviewers collect data from adults

answering the cellular telephones residing in a private residence or college housing. Beginning in 2014, all

adults contacted through their cellular telephone were eligible, regardless of their landline phone use (i.e.,

complete overlap).

The BRFSS field operations are managed by state health departments that follow protocols adopted by the

states, with technical assistance provided by CDC. State health departments collaborate during survey

development and conduct the interviews themselves or use contractors. The data are transmitted to CDC for

editing, processing, 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. 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 specific examples of how state officials use the finalized

BRFSS data sets, please refer to the appropriate state information on the BRFSS website.

Health characteristics estimated from the BRFSS pertain to the noninstitutionalized adult population—aged 18

years or older—who reside in the United States. In 2019, an optional module was included to provide a measure

for several childhood health and wellness indicators, including asthma prevalence for people aged 17 years or

younger. BRFSS respondents are identified through telephone-based methods. According to the 2018 American

Community Survey (ACS), 98.5% of all occupied housing units in the United States had telephone service

available and telephone non-coverage ranged from less than 1.0% in Delaware to 2.5% in Montana.2

 It is estimated that 4.0% of occupied households in Puerto Rico did not have telephone service.2

 The increasing percentage of households that are abandoning their landline telephones for cellular telephones has significantly eroded the population coverage provided by landline telephone-based surveys to pre-1970s levels. The preliminary results (January to June 2019) from the National Health Interview Survey (NHIS) indicate that 58.4% of adults were wireless-only.3

 Using a dual-frame survey including landline and cellular telephones improved the validity, data quality, and representativeness of BRFSS data. 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 cellular telephone 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-gender that improves the degree and extent to which the BRFSS sample properly reflects the socio-demographic make-up of individual state. The 2019 BRFSS raking method includes categories of age by gender, detailed race and ethnicity groups, education levels, marital status, regions within states, gender by race and ethnicity, telephone source, renter or owner status, and age groups by race and ethnicity. In 2019, 50 states, the District of Columbia, Guam, and Puerto Rico collected samples of interviews conducted by landline and cellular telephone.

# The BRFSS Design

## The BRFSS Questionnaire

Each year, the states—represented by their BRFSS coordinators and CDC—agree on the content of the

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 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 questionnaire has three parts:

1. Core component: A standard set of questions that all states use. Core content includes queries about current

health-related perceptions, conditions, and behaviors (e.g., health status, health care access, alcohol

consumption, tobacco use, fruits and vegetable consumptions, HIV/AIDS risks), as well as demographic

questions. The core component includes the annual core comprising questions asked each year and rotating core

questions that are included in even- and odd–numbered years.

2. Optional BRFSS modules: These are sets of questions on specific topics (e.g., pre-diabetes, diabetes, sugar sweetened beverages, excess sun exposure, caregiving, shingles, cancer survivorship) that states elect to use on

their questionnaires. Generally, CDC programs submit module questions and the states vote to adopt final

questions that can be included as optional modules. For more information, please see the questionnaire section

of the BRFSS website.

3. State-added questions: Individual states develop or acquire these questions and add them to their BRFSS

questionnaires. CDC does not edit, evaluate, or track or report responses from these questions.

The BRFSS supported 23 modules in 2019, but states limited modules and state-added questions to only the

most useful for their state program purposes, in order to keep surveys at a reasonable length. Because different

states have different needs, there is wide variation between states in terms of question totals each year. 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 list of optional modules used on both the landline telephone and cellular telephone surveys is

available on the BRFSS website. In order to allow for a wider range of questions in optional modules, combined

landline telephone and cellular telephone data include up to three split versions of the questionnaire. A

split version is used when a subset of telephone numbers for data collection still followed the state sample

design, and administrators used it as the state’s BRFSS sample, but the optional modules and state-added

questions may have been different from other split-version questionnaires. For additional information on split

version questionnaires, see the 2019 module data appendix table, published with this yearly release.

## Annual Questionnaire Development

The governance of the BRFSS includes a representative body of state health officials, elected by region. During

the year, the State BRFSS Coordinators Working Group meets with CDC’s BRFSS program management.

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 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. 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 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 Hispanic 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, one 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 2018. Fifty-one projects used a

disproportionate stratified sample (DSS) design for their landline samples. Guam and Puerto Rico used a simple

random-sample design.

In the type of DSS design that states most commonly used 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 and all possible combinations of the last 2 digits. 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 2019 BRFSS sampling

frame is the Telecordia database of telephone exchanges (e.g., 617-492-0000 to 617-492-9999) and 1,000 banks

(e.g., 617-492-0000 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 consists of people

residing in a private residence or college housing who have a working cellular telephone.

In the sample design, states begin with a single stratum. 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 2019, 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 Mexico, New York, North Carolina,

North Dakota, Ohio, Oklahoma, Pennsylvania, Puerto Rico, Rhode Island, South Carolina, South Dakota,

Tennessee, Texas, 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 of age) in a given year are removed.

State health departments may directly collect data from their states or they may use a contractor. In 2019, seven state health departments collected their data in-house and the remainder contracted with other data collectors. The CDC provided samples purchased from Marketing Systems Group, Inc. (MSG) to all 53 states and

territories.

# Data Collection

Interviewing Procedures

In 2019, 53 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 is dependent upon 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. All BRFSS surveillance sites

have 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 2019

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,

the 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, and 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, 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 with output lists of

errors or warns users 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

• \_HCVU651.

• \_AGE80

• \_FLUSHOT7

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. Some are

based only on combined codes, while others require sorting and combining of particular codes from multiple

variables.

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 non-interviews (a non-interview response results when an interview ends prior to this question and an

interviewer codes the remaining responses as refused) and missing responses due to skip patterns in the

questionnaire. This code, however, may capture some questions that were supposed to have answers, but for

some reason do not have them, and appeared as a blank or another symbol. Combining these types of responses

into a single code requires vigilance on the part of data file users who wish to separate (1) results of respondents

who did not receive a particular question and (2) results from respondents who, after receiving the question,

gave an unclear answer or refused to answer it.

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 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 (NUMPHON2), and the number of adults aged 18 years and older in the

respondent’s household (NUMADULT). For cellphone respondents, both NUMPHON2 and NUMADULT are

set to 1. The formula for the design weight is

Design Weight = \_STRWT \* (1/NUMPHON3) \* 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 based on quartiles. 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

(gender by age group, race or ethnicity, education, marital status, tenure, gender 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 gender, 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

gender, 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 gender. These population estimates are used as the population totals for a state across all

margins. The 5-year year American Community Survey PUMS data set (2014–2018) 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).

## 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 residential landline telephones in the household and then multiplies by the number of children:

Child Design Weight = \_STRWT \* (1/NUMPHON3) \* CHILDREN

CHIILDWT = BRFSS rakes the child design weight to 5 margins including age by gender, race or

ethnicity, gender 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 reports

(Washington, D.C.: 1974). 1988;103(4):366-375.

2. Federal Communications Commission USA. Universal Service Monitoring Report. 2019;

https://docs.fcc.gov/public/attachments/DOC-362272A1.pdf

3. Blumberg SJ, Luke JV. Wireless substitution: Early release of estimates from the National Health

Interview Survey, January–June 2019. National Center for Health Statistics. May 2020. Available from:

https://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless202005-508.pdf Accessed July 2020.

4. MP B. Improving Standard Poststratification Techniques for Random-Digit-Dialing Telephone Surveys.

Surv Res Methods. 2008;2(1):9.

# Comparability Documentation for 2019 BRFSS Data

2019 Data Anomalies and Deviations from the Sampling Frame

The BRFSS state-based annual sample designs are fixed for the data collection year beginning in

January in all the states or territories. The samples are drawn quarterly and screened monthly to provide

a representative sample for monthly data collection. The intent of the monthly sample is to use it for 1

month, but in most states, it took more than 1 month to complete data collection using the monthly

sample. In several instances, states used their monthly sample during a period of several months. This

deviation will disproportionately affect analyses based on monthly (rather than annual) data. California

continued to receive its sample quarterly rather than monthly, allowing staff to keep their sample active

across three or more months. Michigan received the first quarterly sample of 2019 and then changed to

a monthly sample for the remainder of 2019.

Several states conducted fewer than 12 monthly data collections during the year. The following states

did not collect landline data for one or two months, as noted: Maryland (January), Montana (January),

and Nevada (December). Some states did not collect landline data for three or more months: Arkansas

(January, February, March), DC (January, February, March, April), Georgia (January, February,

March, July, August, September), Idaho (January, February, March), New Hampshire (January,

February, September), North Carolina (April, May, August), North Dakota (August, September,

November, December), and Puerto Rico (July through December).

The following states did not collect cellphone data for one or two months, as noted: Kansas

(December), Maryland (January), Montana (January), Nevada (December), North Dakota (March,

April), Wisconsin (December), Guam (December). Some states did not collect cellphone data for three

or more months Arkansas (January, February, March), DC (January, February, March, April), Georgia

(January, February, March, July, August, September), Idaho (January, February, March), New

Hampshire (January, February, September), North Carolina (April, May, August), and Puerto Rico

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(October, November, December).

Twenty-seven states, DC, Guam, and Puerto Rico were unable to close out their 2019 sample by

December 31, 2019 and continued data collection into early 2020.

The US Virgin Islands did not collect data in 2019.

New Jersey collected data only in September and did not meet requirements of a minimum of six

months of data collection to be included in the 2019 aggregate data set.

DC began data collection in May. Georgia collected data in April, May, and June and then again in

October, November, and December. Idaho began data collection in April. The months of data collection

missed in both situations will likely affect seasonal estimates, i.e. influenza. Although both met

minimum requirements to be included in the public-use data set, please consider the differences in

collection when comparing estimates across years.

In order to improve efficiency in calling, a new precall status on the cell phone sample was added

beginning in November. The cell phone numbers with the PRECALL status = 9 (temp out of service)

were not required to be dialed as part of the sample.

Protocol Changes from 2018 Data Collection

1. Cellular Telephone Data

Telephone coverage varies by state and also by subpopulation. According to the 2017 American

Community Survey (ACS), 98.5% of all occupied housing units in the United States had telephone

service available and telephone non-coverage ranged from 1.0% in New Jersey, Rhode Island, and

Washington to 3.0% in DC. It was estimated that 4.0% of occupied households in Puerto Rico did not

have telephone service.

3 The percentage of households using only cellular telephones has been steadily

increasing—58.4% of all adults lived in households with only cellular telephones in 2019.

4 The

increased use of cellular telephones required the BRFSS to begin to include the population of cellular

telephone users in 2011. At that time, all adult cellular telephone respondents who had a landline

telephone were not eligible for the survey. In 2012, the BRFSS changed the screening process. Cellular

telephone respondents were eligible—even if they had landline phones—as long as they received at least

90% of all calls on their cell phones. Beginning in 2014, all adults contacted through their personal

(nonbusiness) phone numbers were eligible regardless of their landline phone use (i.e., complete

overlap).

Weighting Methodologies

Since 2011, the BRFSS has used the weighting methodology called iterative proportional fitting (IPF) or

raking to weight data. Raking allows incorporation of cellular telephone survey data, and it permits the

introduction of additional demographic characteristics that more accurately match sample distributions

to known demographic characteristics of populations at the state level. (Refer to the BRFSS website for

more information on methodologic changes). Raking adjusts the estimates within each state using the

margins (raking control variables). The raking method applies a proportional adjustment to the weights

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of the cases that belong to the same category of the margin. The iteration (up to 100 times) continues

until a convergence to within a target percentage difference is achieved. Since 2013, up to 16 raking

margins have been used in the following order—county by gender, county by age, county by race or

ethnicity, county, region by race or ethnicity, region by gender, region by age, region, telephone service

(landline, cellular telephone or dual user), age by race or ethnicity, gender by race or ethnicity, tenure

(rent or own), marital status, education, race or ethnicity, and gender by age.

Since 2014, the inclusion of all adult cellular telephone respondents in the survey required an adjustment

to the design weights to account for the overlapping sample frames. A compositing factor was calculated

from each of the two samples (landline and cellular sample) for dual users—individuals who had both

cellular telephone and landline phone. The BRFSS multiplied the design weight by the compositing

factor to generate a composite weight for the records in the overlapping sample frame. Later the design

weight was truncated based on quartiles within geographic region (or state). In 2019, the truncated

weight was adjusted to regional (or state) population and the state phone source proportions prior to

raking. This adjusted weight was used as the input weight for the first raking margin. At the last step of

the raking process, weight trimming was used to increase the value of extremely low weights and

decrease the value of extremely high weights. Weight trimming is based on two alternative methods,

IGCV (Individual and Global Cap Value) and MCV (Margin Cap Value).

Other Issues

As in previous years, the data from an optional module were included if interviewers asked module

questions to all eligible respondents within a state for the entire data collection year. A state may have

indicated the use of an optional module. If the module was not used for the entire data collection year,

the data were moved into the state-added questions section. Several states collected data with optional

modules by landline telephone and cellular telephone surveys.

During the 2019 data collection process, South Carolina included several incorrect skip patterns during

the first six months of data collection. Inappropriate responses were set to missing and records that did

not collect the number of cell phones within the household were coded as partial complete interviews.

A single data collector incorrectly allowed responses of 199, 299, 399 for the fruits and vegetables

section question. The first number references day/week/month and the last two digits are supposed to

be number of times. This implies 101 would be once a day, and 201 would be once a week.

The 199 coding resulted from respondents who said that they ate/drank something every day, but then

did not give the number of times per day. Similar interpretations for the 299 (weekly but not the

number of times per week). These responses were set to missing at the request of the program.

CDC has also provided limited technical support for the survey data collection of multiple (up to three

in 2019) questionnaire versions. A state may ask a subset of its survey sample a different set of

questions following the core, as long as the survey meets the minimum effective sample size (2,500

participants) for a given questionnaire version. States must use the core instrument without making

any changes to it in any of their versions of the overall questionnaire. States can include an optional

module on all versions or exclusively on a single version but, once a state chooses to use an optional

module, the state must ask the module questions throughout the data collection year. The objective of

the multiple-version questionnaire is to ask more questions, on additional topics, within a statewide

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sample. In 2019, 16 states conducted multiple-questionnaire-version surveys on both their landline

telephone and cellular telephone surveys. Data users can find version-specific data sets and additional

documentation regarding module data analysis in the 2019 BRFSS Survey Data and Documentation.

A 2012 change to the final disposition code assignment rules modified the requirements for a partially

complete interview. If a participant terminated an interview during or after the demographics section,

the BRFSS coded it as a partial-complete. The coding of questions was discontinued at the point of

interview termination. When determining which records to include in any analysis, data users should

account for participants’ missing and refused values. Beginning in 2015, questions in the demographic

section were reordered and the definition of partial-complete changed. A partially complete

disposition code was assigned if the interview terminated before completion of the survey and the

selected respondent completed the demographics section through question 9 for a cell phone interview

and question 12 for a landline interview.

More information about survey item nonresponse can be found in the 2019 BRFSS Summary

Data Quality Report and in the respective states’ Data Quality Reports.