

# METHODS

Montana BRFSS, 2012

## Sampling Design

Montana’s sampling frame in 2012 contained seven strata. Since 2000, Montana’s BRFSS sample has been stratified based on county population density and proportion of American Indians/Alaska Natives, Montana’s largest minority population. Stratum I consists of six counties containing high population density and a high proportion of American Indians/Alaska Natives; Stratum II consists of 41 counties with relatively low population density and a low proportion of American Indians/Alaska Natives; and Stratum III consists of six counties with relatively high population density and a low proportion of American Indians/Alaska Natives. These three strata allow the potential for oversampling households of American Indians/Alaska Natives and are used strictly for sampling, rather than analytical purposes.

In 2002, CDC began the Selected Metropolitan/Micropolitan Area Risk Trends (SMART BRFSS) in order to analyze the data from selected metropolitan and micropolitan statistical areas (MMSAs).<sup>1</sup> The Montana BRFSS began participating in SMART BRFSS in 2004 and added a fourth stratum (Stratum IV) that includes Yellowstone and Carbon Counties – Billings, Montana’s largest

MMSA with a minimal sample size of 500. Starting in 2006, Montana BRFSS added two additional strata (Stratum V and Stratum VI) to the sampling frame to be rotated among Montana’s other MMSAs so that each MMSA has two consecutive years of data collected approximately every four to five years. In 2012, the MMSAs that achieved a sample size of at least 500 included: Billings, Great Falls, Missoula, Kalispell, and Havre.

YEAR	Billings	Great Falls	Missoula	Bozeman	Butte	Helena	Kalispell	Havre
2008	x			x	x			
2009	x			x	x		x	
2010	x					x	x	
2011		x	x			x		
2012		x	x					x
2013				x	x			x
2014	x			x	x			
2015	x					x	x	
2016		x				x	x	
2017		x	x					x
2018			x	x				x
2019	x			x	x			
2020	x				x	x		

\* This schedule will be followed if funding remains sufficient and as long as no additional communities reach MMSA status. Should a new MMSA be identified it will be added to the rotation.

Beginning in 2003, Montana’s dataset has been weighted for regional analyses based on the state’s five health planning regions (HP1 – HP5) to report regional health information for public health planning purposes (see Appendix A for map of health planning regions). In 2010, an additional stratum (Stratum VII) was added to further increase the proportion of American Indians/Alaska Natives respondents statewide.

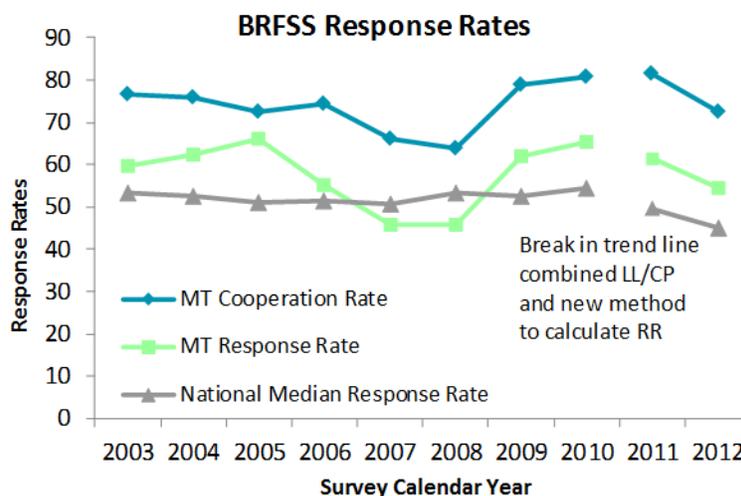
Based on CDC protocol, the sample is selected using a Disproportionate Stratified Sampling (DSS) design.<sup>2</sup> In the DSS design, the universe of all Montana telephone numbers is disproportionately stratified by telephone blocks. This means all landline telephone numbers are based on phone bank density, listedness (i.e., known household number in phone bank) and population density of American Indians/Alaska Natives. Phone numbers are randomly dialed using this list-assisted methodology. High density or listed household numbers are sampled at a rate of 1.5 over low density or unlisted numbers. This random-digit-dialing approach serves to lower costs and improve interviewer efficiency in sample usage.

For the past decade, CDC has been researching dual frame methodologies in order to include cellular telephones in the BRFSS samples. Approximately one-third of U.S. households rely exclusively on cell phones (Blumberg and Luke 2001; CDC 2012). Because of increased use of cell phone communication across the country, as of 2011 BRFSS collects survey data from both landline and cell phone respondents.

### Survey Administration

Interviews were conducted by University of Nebraska Medical Center with headquarters and call center in Omaha. Interviews were conducted during daytime and evening hours on Monday through Friday and on weekends to ensure that selected individuals had ample opportunity to participate in the survey. Fifteen efforts were made to reach a landline telephone number and five attempts were made to reach a cell phone number at different times of the day and evening and on different days before a number was classified as unreachable. Once a phone number is successfully identified as a residence rather than business, an individual respondent is randomly selected from all adults ages 18 and older living in the household. The selected adult is then invited to be interviewed in accordance with the BRFSS protocol (CDC 2006). In 2012, approximately 724 interviews were completed each month, for a yearly total sample size of 8,679 (6,686 landline and 1,993 cell phones). In addition, at least 10 percent of all interviews were monitored and validated by the quality assurance section of the call center, using the system’s monitoring function to observe and score interviews in progress for quality improvement purposes (CDC 2006).

Measures of data quality are calculated using standards set by the American Association of Public Opinion Research (AAPOR).<sup>3</sup> The weighted AAPOR Response Rate (RR4) is the number of completed and partially completed interviews divided by the number of eligible and likely-eligible residents. The RR4 for combined landline and cell phone calls for Montana in 2012 was 54.4%, one of the top ten BRFSS response rates in the nation. The AAPOR Cooperation Rate (CR2) is the number of completed and partially completed interviews divided by the number of contacted and eligible residents. The CR2 for Montana was 72.3%, placing Montana in the top eight for BRFSS cooperation rates in the nation in 2012. A complete report of the data quality for the 2012 BRFSS is available online.<sup>4</sup>



### Data Weighting and Analysis

Data were weighted to account for the design of the survey and differences in the probability of selection due to the disproportionate sampling method and due to households with different numbers of adults and different numbers of telephones. This adjustment is intended to reduce bias that may result from excluding Montanans without telephone service (non-coverage) or from the varying characteristics of those that choose not to participate in the survey (non-response).

Starting in 2011, CDC's Division of Behavioral Surveillance began using a new weighting method for BRFSS data in order to allow the incorporation of cell phones into the weighting scheme and to more closely match the demographic make-up within each state by using a broader range of demographic subgroups.<sup>5</sup> This method, called raking, ensures that groups which are under- or over- represented in the sample can be accurately represented in the final data set (CDC 2012). For a more complete discussion, see the *2011 Issue 3 Montana Fact[or]s, Changing BRFSS Protocols: Transition to Raking Weights and Incorporation of Cell Phone Sampling* published at [www.brfss.mt.gov](http://www.brfss.mt.gov). **2011 is the baseline year for all future comparisons.**

The demographic characteristics of the 2012 survey respondents are presented in Table C. This table describes the 2012 survey population, including the un-weighted number of respondents, the population estimate, and the weighted percent of respondents by selected demographic characteristics.

### Data Reliability and 95% Confidence Intervals

The precision of a sample statistic (e.g., prevalence) can be estimated by calculating the confidence interval of the statistic; 95% confidence intervals (CI) are presented with the prevalence estimates in this report. As an example, a prevalence estimate for cigarette smoking of 20% with a computed 95% confidence interval of  $\pm 2\%$ , translates to a lower limit of 18% and an upper limit of 22%. We are 95% confident that the interval 18% to 22% includes the true percentage of smokers in the Montana population. The width of a confidence interval (e.g.,  $\pm 2\%$ ) using weighted data is dependent upon sample size and the design effect of the survey. Generally, estimates based on large samples have narrower confidence intervals and are more precise than are estimates based on small samples.

Confidence intervals must be considered when making comparisons among subgroups of the population (e.g., among age classes). Percentages for different subgroups of the population can be considered significantly different if their confidence intervals do not overlap. A statistical test is needed to determine if estimates are different when the confidence intervals overlap.

**Table C: Demographic Distribution of Montana Adults in the 2012 Behavioral Risk Factor Surveillance System (BRFSS)**

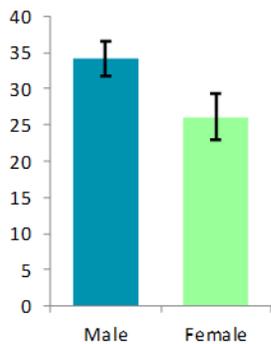
	2012 BRFSS Sample		
	Sample Size (N)	Population Estimate	Weighted Percent †
<b>All Adults:</b>	8,679	780,800	100.0
<b>Sex:</b>			
Male	3,786	388,800	49.8
Female	4,893	391,900	50.2
<b>Age:</b>			
18 - 24	460	96,900	12.5
25 - 34	948	123,400	15.9
35 - 44	950	112,200	14.4
45 - 54	1,497	138,800	17.9
55 - 64	1,947	145,000	18.7
65+	2,829	160,100	20.6
Unknown§	48		
<b>Education:</b>			
<High School	620	72,900	9.3
High School	2,758	243,100	31.2
Some College	2,512	264,200	34.0
College Degree +	2,767	198,300	25.4
Unknown§	22		
<b>Income:</b>			
<\$15,000	1,040	85,000	12.2
\$15,000 - \$24,999	1,612	140,600	20.1
\$25,000 - \$49,999	2,632	213,300	30.5
\$50,000 - \$74,999	1,169	112,300	16.1
\$75,000 +	1,551	147,600	21.1
Unknown§	945		
<b>Race/Ethnicity:</b>			
White, non-Hispanic	7,575	693,800	89.6
AI/AN*	594	40,400	5.2
Other or Hispanic**	420	40,000	5.1
Unknown§	90		
<b>Disability:</b>			
Disability	2,481	191,800	24.8
No Disability	6,094	580,600	75.2
Unknown§	104		
<b>Region:</b>			
1- Eastern MT	992	63,300	8.3
2- N Central MT	1,934	109,100	14.3
3- S Central MT	1,330	154,500	20.2
4- Southwest MT	1,530	188,600	24.7
5- Northwest MT	2,762	249,100	32.6
Unknown§	131		

† Weighted percentages are based on CDC's 2012 pop. estimate of 780,800 adults.

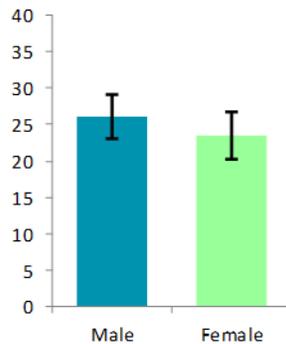
§ Cases with unknown values are excluded from relevant analyses.

\* American Indian or Alaska Native only.

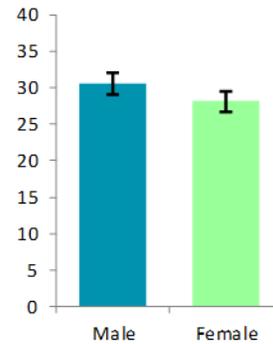
\*\* All other non-White (including multi-racial or Hispanic).



**No Overlap**  
Significantly different  
( $p < .05$ )



**Substantial Overlap**  
Not significantly different  
( $p > .05$ )



**Some Overlap**  
Needs a chi-square or other  
statistical test to determine  
significance

Analysis of subpopulations results in a concomitant reduction of sample size. The more subgroups into which the data are partitioned, the smaller the sample size per subgroup. **Prevalence estimates based on denominators with fewer than 50 respondents or half-width confidence intervals greater than 10 percent are not reported due to their inherent low precision.**

The SAS statistical software package for survey data analysis was used to compute prevalence estimates (expressed as percentages) and associated 95% confidence intervals using sample weights provided by CDC.

## Questionnaire

The BRFSS questionnaire has three parts: the core, consisting of the fixed core questions (asked every year), rotating core questions (asked in alternating years), and emerging core questions (asked for only one year). There are also optional modules provided by the CDC, any number of which can be selected by individual states for inclusion; and state-added questions of specific interest to individual states. All states must ask the core questions without modification in wording. As part of the core, respondents are asked to provide demographic information including such indicators as sex, age, race, marital status, annual household income, employment status, and education level. Optional modules and state-added questions may be added by individual states to their respective questionnaires. Montana's BRFSS Working Group, consisting of state data analysts and users, helps to establish the state questionnaire content each year using the "Criteria for Adding Questions to the MT BRFSS," which can be found at the Montana BRFSS website: [www.brfss.mt.gov](http://www.brfss.mt.gov).

The 2012 Montana BRFSS questionnaire consisted of 176 questions. Not all respondents were asked all questions, since some questions pertain to a specific age group or sex or persons with a particular health condition. In 2012, the average length of time to complete the survey was 27 minutes.

## Survey Limitations

Surveys that require self-reporting of data have limitations and should be interpreted with caution. Respondents may have a tendency to under-report behaviors that are socially undesirable, unhealthy, or illegal and to over-reporting desirable behaviors. The accuracy of self-reported information is also affected by the ability of respondents to fully recall past behaviors or health screening results.

Telephone surveys exclude households without telephones, which may result in a biased survey population due to under-representation of certain segments of the population. In 2012, based on NCHS estimates, less than 2% of Montana households did not have any telephone service.

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<sup>1</sup> These geographic subdivisions are designated by the U. S. Office of Management and Budget and used by the U. S. Census Bureau as of June 2003. See [http://www.cdc.gov/brfss/smart/smart\\_faq.htm](http://www.cdc.gov/brfss/smart/smart_faq.htm) for frequently asked questions and answers about SMART BRFSS and MMSAs.

<sup>2</sup> For a detailed description of BRFSS methodology, see the BRFSS User's Guide, an online version at: [http://www.cdc.gov/brfss/data\\_documentation/PDF/UserguideJune2013.pdf](http://www.cdc.gov/brfss/data_documentation/PDF/UserguideJune2013.pdf).

<sup>3</sup> The AAOPR standard definitions can be found online at: [http://www.aapor.org/Standard\\_Definitions2.htm#Uv6G\\_2JdWdQ](http://www.aapor.org/Standard_Definitions2.htm#Uv6G_2JdWdQ).

<sup>4</sup> The 2012 Summary Data Quality Report can be found online at: [http://www.cdc.gov/brfss/annual\\_data/2012/pdf/SummaryDataQualityReport2012\\_20130712.pdf](http://www.cdc.gov/brfss/annual_data/2012/pdf/SummaryDataQualityReport2012_20130712.pdf).

<sup>5</sup> Raking, also called Automated Sample Weighting System methodology or Iterative Proportional Fit, credited to W.E. Deming and F. Stephan, was first used to estimate U.S. Census population totals in 1940. Raking is commonly used when only the marginal population totals of the adjusted weights are known and the joint population distributions of post-strata are unknown. Raking is preferable as a post-stratification method when the cell counts of the responders within each demographic combination are too small to produce stable estimates. It is equivalent to log-linear regression expected totals.