

# COLORADO HEALTH ACCESS SURVEY



2017



## Methodology

## **Methods Report**

Colorado Health Institute (CHI) contracted with Social Science Research Solutions (SSRS) to conduct the 2017 CHAS. The goal of the CHAS is to document health insurance coverage, access to health care and use of health care for the noninstitutionalized population in Colorado. This report provides information about the methods used to collect, clean and document data in the CHAS.

The survey was conducted for CHI via a random digit dialing (RDD) computer-assisted telephone interview (CATI) by SSRS, an independent research company. Interviews were conducted from February 9, 2017 through May 21, 2017 among a representative sample of 10,029 households with at least one person age 18 and older. Interviews were stratified by 21 HSRs to ensure adequate representation within each of these important populations in Colorado. Both landline and cell phone sample were included in the overall survey design: 4,104 interviews were completed from the landline sample and 5,925 interviews were completed from the cell phone sample. For the 2009 and 2011 surveys, cell phone interviews were conducted only with respondents who did not have a landline telephone (cell phone-only respondents). For the 2013, 2015 and 2017 surveys, any cell phone respondent who lived in Colorado and was 18 or older was screened into the study. In 2017, SSRS was able to include respondents with cell phones with out-of-state area codes that reside in Colorado.

This methods report is organized into four sections: sample design; field preparation, fielding and data processing; weighting procedures; and survey response rates.

## Sample Design

The survey employed a dual-frame sampling design that includes a landline and cell phone sample. The dual frame design seeks to ensure complete coverage of all households that own at least one type of phone (approximately 98 percent of all Colorado households are listed in telephone banks or own a cell phone). Phone status was obtained from the NHIS modeled estimates (with standard errors) of the percent distribution of household telephone status for adults 18 and over, by state: United States, 2015, and projected for year 2017 for Cellphone Only (CPO) vs. not-CPO. The Centers for Disease Control and Prevention estimate that approximately 64.8 percent of all Colorado households own only a cell phone.<sup>1</sup>

Of the 10,029 interviews, 5,925 were conducted with respondents who owned a cell phone. This represents 59.1 percent of completed interviews. This, of course, is still an underrepresentation of cell phone-only households compared with CDC estimates. However, cell phone interviews are costlier due to the need to screen out both children and people who do not live in Colorado. This places a constraint on the number of cell phone-only interviews that can be completed. Determining the number of such interviews that will be included in a sample design requires balancing cost concerns and keeping the design effect of the weights at an acceptable level. Weighting procedures described later in this report adjust for this underrepresentation.

The cell phone sample was screened to determine that the owner of the cell phone was at least 18 years old and a resident of Colorado. The cell phone sample yielded the terminations and completed interviews noted in Table 1.

Table 1. Final disposition of the cell phone sample

Disposition	Sample Records	Percent
Completed interviews	5,925	50%
Under 18 years of age	560	5%
Does not live in CO	4,513	38%
Can't answer health insurance questions for household	849	7%
Not a cell phone	41	0.3%
<i>Total completions and terminations</i>	<i>11,888</i>	<i>100%</i>

The overall sampling design contained several features, including sample stratification, household selection criteria and selection criteria within households. These are described below:

- 1) Landline sample stratification
  - Set interview targets per Colorado HSR.
  - Set interview targets within three selected regions by telephone exchange based on incidence of African American households.
- 2) Cell phone sample stratification

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<sup>1</sup> [http://www.cdc.gov/nchs/data/nhis/earlyrelease/Wireless\\_state\\_201608.pdf](http://www.cdc.gov/nchs/data/nhis/earlyrelease/Wireless_state_201608.pdf)



- Set interview targets per Colorado HSR.
- Set interview targets within selected regions by cell phone rate center.

3) Household-level selection

- Screening to exclude out-of-state homeowners and vacation homes in both frames.
- Within the cell phone frame, screening excluded respondents under 18 years of age.
- Half of all landline households were screened to determine if any residents younger than 65 lived in the household. If nobody in the household fit this criterion, the household was terminated.

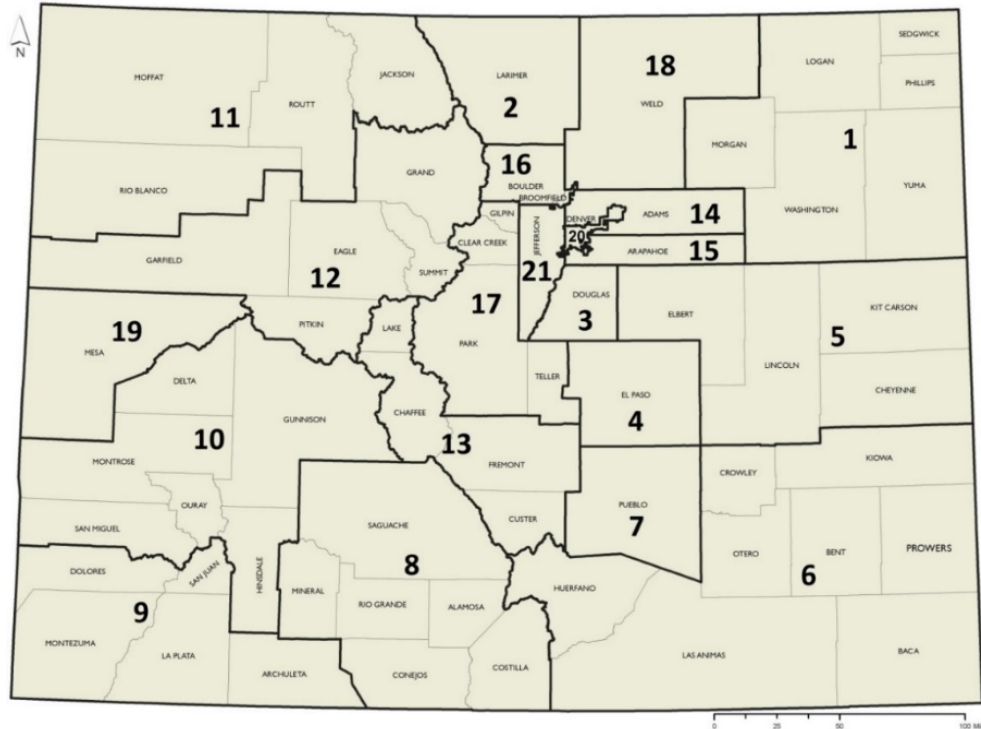
4) Individual-level (target) selection

- Screening to include adults who can answer questions about health insurance for every member of the household.
- A random selection of a "target" person. Throughout the entire field period, children in a household were weighted to provide a 60 percent increased likelihood of selection.

*Sample stratification*

The number of regional interviews was set to ensure adequate statistical power within each region. As we will describe later, each region was weighted to ensure within-region representation (see Table 2 for interviews completed by HSR).

Map 1. Colorado Health Statistics Regions (HSRs)



Additionally, HSRs 4, 15 and 20 were further stratified by telephone exchange in the landline frame to maximize the number of African American interviews obtained. These three regions were selected because they are the only regions in Colorado with sufficient numbers of African American households to warrant an attempt at disproportionate stratification of telephone exchanges. Each of these three regions was disproportionately sampled with exchanges with higher incidences of African American households oversampled at the expense of exchanges with low incidence rates (see Table 3 below).

The HSRs were developed by the Colorado Department of Public Health and Environment (CDPHE) for public health planning purposes. Boundaries of the regions were determined according to the size of the population in each county — counties with smaller populations were aggregated — and key demographic factors for each county, including the number of communities served by each county health department.

The landline sample for the project was stratified by these 21 HSRs. Since the landline sample includes the telephone exchange that is specific to where the owner of the landline phone actually lives, it is possible to stratify telephone numbers into small areas with relatively high levels of accuracy. However, since cell phone numbers do not necessarily correspond to where respondents reside, a different procedure is used to stratify cell phone sample.

The cell phone sample was stratified into the same 21 HSRs. However, cell phones cannot be stratified by exchange since there is no geographic linkage between exchange and geography. Rather, we stratified by rate center, a billing geography that is utilized by telephone companies for pricing purposes.

Table 2 shows the number of completes per HSR (or stratum) for the combined samples. Completed interviews were assigned to a region based on the respondent's ZIP code as reported during the survey interview.

Table 2. Completed interviews by health statistics region (HSR)

HSR	Landline	Cell	Total
1	163	241	404
2	161	240	401
3	171	234	405
4	287	479	766
5	157	244	401
6	159	243	402
7	160	244	404
8	163	241	404
9	162	244	406
10	160	242	402
11	160	242	402
12	152	248	400
13	162	230	392
14	257	297	554
15	296	400	696
16	166	285	451
17	173	230	403
18	163	246	409
19	161	245	406
20	345	470	815
21	326	380	706
<i>Total</i>	<i>4,104</i>	<i>5,925</i>	<i>10,029</i>

The stratification scheme illustrated in Table 3 was implemented to compensate for the expected bias created by telephone interviewing; that is, the distribution of most sampled populations tends to skew more heavily towards whites than the general population. As such, the goal was to ensure an adequate sample of African Americans comparable with their proportion in the Colorado population, and if possible, to obtain additional African American survey completes. The total number of African American completes in each of the three target regions is shown in Table 4.

Table 3. Sample stratification scheme for African American sample

Strata	Overall population	African Americans			Non-African Americans		
		Population	Interviews	Weight	Population	Interviews	Weight
<b>HSR 20 (Denver County)</b>							
Low	367,421	10,154	3	4.33	357,267	64	1.74
Medium	305,543	29,814	16	2.38	275,729	84	1.02
High	69,753	16,292	53	0.39	53,461	66	0.25
<i>Total</i>	742,717	56,260	72		686,457	214	
<b>HSR 15 (Arapahoe County)</b>							
Low	236,139	5,036	0	-	231,103	64	1.85
Medium	266,316	30,797	14	1.07	235,519	84	1.44
High	130,676	25,766	16	0.78	104,910	145	0.37
<i>Total</i>	633,131	61,599	30		571,532	293	
<b>HSR 4 (El Paso County)</b>							
Low	137,425	3,497	4	0.42	133,928	70	0.76
Medium	321,294	17,162	4	2.07	304,132	70	1.72
High	220,063	20,824	12	0.84	199,239	113	0.70
<i>Total</i>	678,782	41,483	20		637,299	253	

Table 4. Incidence of African Americans in three regions relative to completed interviews

	<i>Completed African American interviews</i>
Region 20 (Denver County)	70
Region 15 (Arapahoe County)	29
Region 4 (El Paso County)	18
<i>Total</i>	117

The initial targets were exceeded to ensure that sufficient numbers of African American interviews were completed across the state. In the end, SRSS completed 308 African American interviews statewide.

#### Household-level selection

Screening questions included those that excluded anyone living out of state or at a place that was not their main residence. Overall, 3.2 percent of all working landline numbers were terminated if calls reached a household with residents who do not live in Colorado or respondents for whom the number was not their main residence. Results of cell phone screening are presented earlier in this report. Of working landline numbers, 1.0 percent were terminated because nobody in the household was younger than 65.

#### Individual-level target person selection

The survey was designed to collect data at the household level as well as the individual level. Therefore, it was important for the respondent to be able to answer questions about each person's health insurance status in the house and necessary to randomly select one person as the "target" to serve as the household member for whom all questions were asked, including health insurance status.

Because CHI had a goal of oversampling children in households for analytical purposes, a disproportionate number of targets under the age of 18 were randomly selected by the computer (60 percent) once the household roster had been established.

In addition, CHI expressed concern that the CHAS could have a greater proportion of completes from persons age 65 and older because, in general, RDD telephone surveys have a higher complete rate for individuals age 65 and older than for the general population. Therefore, 50 percent of households with only residents aged 65 and older were terminated. The target selection process was also adjusted so that residents age 65 and older were never selected in mixed households. By the end of the time in the field, 19.2 percent of targets were ages 65 and older compared with 13.8 percent of Colorado's population in this age cohort.

All of the sampling steps were considered during the weighting procedure to correct for the disproportionality in the selection of these subsamples each step created, as will be described in later sections.

### ***Field Preparation, Fielding and Data Processing***

The questionnaire was originally developed by CHI, based on questions contained in the 2008 Massachusetts, Oklahoma and Minnesota Household Surveys, which closely followed the State Health Access Data Assistance Center (SHADAC) model of health interview survey questionnaires.

Specific sections were modified for Colorado. Changes were made to the questionnaire for the 2017 study. Significant changes from the 2015 to the 2017 version of the CHAS instrument are as follows:

#### Questions Added:

1. H1mba: if target has health insurance purchased by someone else, asks whether that person is employed or not.
2. H1mbb: if target is employed, asks how many people work for their employer.
3. H3ac: if target has employer-sponsored health insurance through someone else, asks how many employees work for their employer.
4. H3mba: if target has insurance purchased by someone else, asks whether that person is employed or not.
5. H3mbb: if target is employed, asks how many people work for their employer.
6. H4ab: if target is not insured but someone pays their medical bills and that person is employed, asks how many people work for their employer.
7. H4mba: if target has health insurance bought directly by someone else, asks if that person is employed or not.
8. H4mbb: asks how many people work for that person's employer.
9. H5a0: if target has private insurance, asks if they have FSA or HSA or HRA.
10. H5a1: if target is insured and there is more than one person in household, asks if everyone in household has same type of insurance.
11. H5a2: if everyone in household does not have same type of insurance, asks if everyone in household is covered.



12. A2b: if target has no usual place to go to when sick or if goes to an emergency room when sick, asks main reason why target does not have regular place for health care.
13. A5b: if target has not visited a health care professional or facility in past 12 months or have not visited a general doctor, asks if target tried to get general doctor care.
14. A5c: if target visited a general doctor or tried to get general doctor care, asks how many days target had to wait until first available appointment.
15. A6a: if target did not visit a health care professional or facility in past 12 months or has not visited a specialist, asks if target tried to get specialist care.
16. A6b: if target has visited a specialist or tried to get specialist care, asks how many days target had to wait until first available appointment.
17. A6c: if target visited a health care professional or facility in past 12 months, asks if target felt doctor, other health care provider or their staff judged target unfairly or treated them with disrespect.
18. A9a: asks if target did not do specified health care tasks for a reason other than cost.
19. A9baa: if target was unable to get appointment as soon as target thought one was needed, asks for what type of doctor care.
20. A9bba: if target was told doctor's office/clinic wasn't accepting patients with their type of health insurance, asks for what type of doctor care.
21. A9bca: if target told by doctor's office/clinic that they weren't accepting new patients, asks for what type of doctor care.
22. A9bda: if target was unable to find transportation to doctor's office/clinic, asks for what type of doctor care.
23. AF1f: if target is insured, asks satisfaction with current health insurance coverage on different factors.
24. AD1: if target is an adult, asks if they have an advance directive, living will or medical durable power of attorney.
25. AD2: if target has advance directive, asks if target has had a serious discussion regarding it with specified people.
26. MH1a: if target is age five or older, asks if target has seen or talked to specific health care providers about own mental health.
27. SU1: if target is an adult, asks if target needed treatment/counseling for alcohol/drug use but didn't get it.
28. SU2: if target is an adult who needed treatment, asks reasons why they didn't get the treatment they thought they needed.

Questions Removed:

1. S4ab: "How many of the people in household are age 65 or older?"
2. S9a: "Are you/target currently working for pay?"
3. H1ba, H1da, H1ma, H4a: "Is this an individual policy or is it a family policy?"
4. H1bb, H3bb, H4bb: "Do you/target get financial assistance to help with the cost of the premium?"
5. H8fa: "When you say you don't/target doesn't need health insurance, is this because...?"
6. H8ga: "When you say you do/target does/target's parents do not know how to get health insurance, is that because...?"
7. H9: "When using your/target's health plan, are you/target likely or unlikely to...?"
8. H10: "...please indicate whether you are/target is confident or not confident how well you/target understand what the term means."
9. S13: "Do you/Does your RELATIONSHIP currently have health insurance?"

10. I1: "What type of health insurance are you/is this person covered by?"
11. VCHK(#): "Does anyone else pay for your/this person's medical bills?"
12. I2: "And who is that?"
13. I4: "Have you/Has your RELATIONSHIP had insurance coverage for all of the past 12 months?"
14. I5: "How many months during the past 12 months were you/RELATIONSHIP without health insurance coverage?"
15. E2: "Do you/Does target/Does RELATIONSHIP) have more than one job, including part-time, evening or weekend work"?
16. E5: "How many hours per week do you/does target/does RELATIONSHIP usually work at your/their jobs?"
17. E6: "How long have you/has target worked for your/their job?"
18. E11a: "Why did you/target not accept insurance offered through your/their work"?
19. E12: "Could dependents be covered under that health insurance?"
20. A9bg: "...you/target/target's parent/guardian did not seek an appointment because you were/target was uninsured?"
21. AF1: "Please tell me if you/target strongly agree, somewhat agree, somewhat disagree, or strongly disagree with the statement – I feel protected when it comes to paying for my health care needs."
22. AF1a: "Does your/targets health insurance include a deductible?"
23. AF1b: "What is the amount of the annual deductible for you/target?"
24. AF1c: "Is it \$1,300 or more?"
25. AF1d and AF1e: "Which category best represents the annual deductible?"
26. AF2: "If low cost health insurance were made available, how much would you/target/target's parent be willing to pay for your/target's health coverage?"
27. AF3, AF3a, AF3b, and AF3c: Asked if target would be willing to pay \$200/\$150/\$100/\$50 per month for health care coverage.
28. IN2: "During 2016, did you/target/or any family member receive...?"

#### Questions Changed:

1. INTRO3 was reworded so that it would read more smoothly.
2. Question S6aa was changed to include "other/different gender identity" in response options.
3. Question S7(b-j) was changed from "male/female/boy/girl" to "gender" and "other/different gender identity" was added as a response option
4. Question H1, items h and i, and questions H1ia, H3a, H3a09a, H3aa, H4, H409a, H4aa, H5b, H5b09a, H5aa, H7a, H7a09a, H7aa, H8d, A7a "also known as Health First Colorado" was added.
5. Question H5aa, added "DNR code" "tried to sign up on Connect for Health Colorado, but wasn't able to complete my/their application/got all the way to the end but then I/they had to sign up elsewhere".
6. Question E4 added "main" to job.
7. Question A2 added code "0 An emergency room not part of a hospital".
8. Question A9, added "if necessary" reread of question.
9. Question A9b, changed instruction for item b to be asked if TINS=1; added "if necessary" reread of question.
10. Questions A10 and IN1 intros, added "or partner" to intros referring to "spouse"; added additional intro if fam\_cnt is greater than 1 or only 1 and none of the other intros had been read.
11. Question HS2, deleted "in your/his/her ability to work".

12. Question MH3 changed “seeking” to “getting” before “mental health care”,

In previous years, the majority of survey questions were administered to the target household member, but many demographic, socioeconomic and health insurance questions were asked of all household members. Beginning in 2017, the survey no longer includes this detailed rostering, and questions on non-target household members are limited to basic demographics.

Employment questions and employer-based health insurance questions were asked of parents of targets under the age of 26, as there is a higher prevalence of dependency on parents for health insurance among this younger group. Spouses of targets are also included in these questions. Prior to going into the field, SSRS programmed the study into a CATI program. Extensive checking of the program was conducted, given the large number of logic patterns that the skip patterns could generate. Household roster surveys with a specific target person require 3-4 times more manual labor to check when compared with a survey design with simply “last birthday” as the target selection criterion because of the complexity of the skip patterns.

All telephone interviews were conducted from February 9 to May 21, 2017 using the CATI system, which ensures that questions follow the logical skip patterns and that listed attributes are automatically rotated to eliminate “question position” bias.

CATI interviewers received both written materials on the survey and formal training. The written materials were provided prior to the beginning of the field period and included:

- 1) An annotated questionnaire that contained information about the goals of the study as well as detailed explanations of why questions were being asked, the meaning and pronunciation of key terms, potential obstacles to be overcome in getting good answers to questions, and respondent problems that could be anticipated ahead of time as well as strategies for addressing them.
- 2) A list of frequently asked questions and the appropriate responses to those questions.
- 3) A script to use when leaving messages on answering machines.
- 4) Contact information for project personnel.

Interviewer training was conducted both prior to the study pretest (described below) and immediately before the survey was officially launched. Call center supervisors and interviewers were walked through each question in the questionnaire. Interviewers were given instructions to help them maximize response rates and ensure accurate data collection. Interviewers were instructed to encourage participation by emphasizing the social importance of the project and to reassure respondents that the information they provided was confidential.

The pretest for the 2017 CHAS took place from January 31 through February 1, 2017 and between the hours of 6:00 p.m. and 9:00 p.m. MDT on weeknights and from noon until 6:00 p.m. MDT on Saturday and Sunday. SSRS interviewers completed a total of 21 interviews. All interviews were conducted with a listed landline sample that had a flag indicating it was likely to be a household with an annual income of less than \$35,000. The purpose of this was to increase the likelihood of securing interviews with uninsured targets. In an effort to complete interviews with uninsured respondents, we supplemented the sample with uninsured sample from the 2015 CHAS. We collected interviews with two uninsured respondents.

Project managers monitored the pretest in real time and provided digital recordings for review by CHI project team members. Overall, the flow of the survey was good, and the respondents remained interested throughout. New questions worked well. The following suggestions were made for changes to the instrument prior to fielding based on the results of the pretest:

- Minimizing the length of the introduction wherever possible to avert refusals and breakoffs.
- Q.H5a1 – suggested adding an additional instruction so that this question is not asked of respondents with a household size of 1.
- Q's A9, A9a, and A9b – suggested adding a "read if necessary" statement so that the interviewers are not repeating the entire question stem for each item.

SSRS maintained a staff of Spanish-speaking interviewers who, when contacting a household, were able to offer respondents the option of completing the survey in Spanish or in English. A total of 152 interviews were conducted in Spanish.

SSRS treated this study as a "best practices" study given certain budgetary and methodological directives from CHI. The survey fielding enacted the following best practice procedures:

- As part of our goal of maximizing response rate on every study, SSRS has made power dialing (using a computer to dial the number, but not allowing the computer to "predict" the availability of interviewers as is done by all telemarketers and most survey researchers) the standard operating procedure on all of our studies.
- SSRS instituted a call rule of original plus up to 20 callbacks before considering a sampling unit "dead."
- Varied the time of day and the day of the week when callbacks were placed using a programmed differential call rule.
- Explained the purpose of the study and stated as accurately as possible the expected length of the interview.
- Permitted respondents to set the schedule for a callback and encouraged them to phone back on our 800 number.
- Privacy managers were immediately called back on an open line. (CRT systems do not transmit caller ID information, so any record dispositioned to have a privacy manager are called back manually on phones that do relay caller ID information).
- Initial refused interviews were "put to bed" for a period of two weeks, when a refusal conversion attempt took place. Second refusals were put to bed for an additional 4 weeks, when a second conversion was attempted.

A target-level file that includes all data elements collected for the target person in the household along with data on the characteristics of the target's family and household was created from the raw survey data. CATI range and logic checks were used to check the data during the data collection process.

Additional data checks were implemented as part of the data file development work, checking for consistency across variables and family members and developing composite measures of family and household characteristics.

## **Weighting Procedures**

Survey data were weighted to: 1) adjust for the fact that not all survey respondents were selected with the same probability, and 2) account for gaps in coverage in the survey frame. Base weights (survey design weights) address the differential sampling rates described earlier in this report. Subsequently, the resulting base weights were post-stratified along several dimensions (raked) to reflect the control totals obtained from the 2016 estimates of the U.S. Census Bureau's American Community Survey. These counts were indexed by region, gender, education, age, and race/ethnicity. Phone status was obtained from the NHIS modeled estimates (with standard errors) of the percent distribution of household telephone status for adults aged 18 and over, by state: United States, 2015, and projected for year 2017 for cellphone only (CPO) vs. not-CPO.

In the first stage, SSRS developed design weights to compensate for a range of known biases that occur in telephone interviewing in general and the CHAS sample design specifically. These are summarized below:

- Non-response weight = Exchange weight \* eligibility rate, where the exchange weight equals the number of telephones called /number of telephones available to call. The eligibility weight equals the number of completes / number eligible to be completed. These were adjusted separately for landline and cellphone.
- Sub-sampling weight = Corrections for regions 4, 15, and 20 \* race and strata.
- Post-stratification weight = Rebalancing completes \* region to population counts.
- Number of persons weight = Correction for the number of persons in the household (capped at 3 or more).
- Phone use weight: Correction for dual cell phone and landline in the household. These households were given a weight of .5.
- Age weight = 18 years and younger down-weighted by a factor of .6 to rebalance from oversampling.
- Cell phone-only weight = 59.1 percent of the file is cell phone-only (these were weighted up to the statewide estimate of 64.8 percent).
- Listed cell phone weight = The listed cell phone sample was balanced back to the true distribution of listed cell sample in the RDD frame.
- Design weight = Nonresponse \* sub-stratification \* stratification \* persons \* phones \* age \* cell phone-only \* listed cell.

Each step was normalized to the sum of weights = unweighted number of completes. The final post-stratification procedures that followed included:

- Final weight = Design weight with a two-step raking procedure. The first raking occurs at the region level, where targets were set by age, educational attainment, gender, and race by 21 HSRs. A final statewide rake was conducted to reapportion cell phone-only households to 64.8 percent. In addition, the final total population estimate was based on the U.S. Census Bureau's 2016 Current Population Survey.

The final weights were developed using a procedure known as iterative proportional fitting or "raking" using the statistical software SPSS. Post-stratification targets were entered for age, race/ethnicity, gender, region, tenure of home ownership and education based on U.S. Census Bureau's American

Community Survey (ACS) estimates. The ACS reports data according to public use microdata area (PUMA), which is an area that defines the extent of territory for which the Census Bureau tabulates public use microdata sample data. The raking process was carried out at the regional level, for which population estimates had to be developed, since the ACS only provides super-PUMA and PUMA designations for in-state geography.

A method for overlaying PUMA population estimates over the 21 HSRs was developed by CHI. Each PUMA represents a proportion of the population for a certain county in Colorado. Allocation factors of PUMA-to-county population were obtained from the Missouri Census Data Center at the University of Missouri for all counties in Colorado, and an allocation of county to region was developed in order to calculate PUMA weights for each region. The regional PUMA weights were applied to the ACS data to generate regional population estimates of gender, education, race, etc. Final counts are provided below.



Table 6. Demographic characteristics by 21 health statistical regions (HSRs) in Colorado

HSR	Gender		Educational Attainment			
	Male	Female	Less than H.S.	H.S. diploma	Some college	College degree
1	50.0%	50.0%	8.3%	23.7%	28.5%	14.9%
2	50.0%	50.0%	3.6%	16.5%	25.9%	33.2%
3	49.5%	50.5%	2.1%	11.1%	22.8%	36.4%
4	49.9%	50.1%	4.6%	17.4%	27.6%	25.4%
5	49.9%	50.1%	4.6%	17.1%	26.4%	25.9%
6	50.3%	49.7%	10.6%	21.6%	29.0%	15.8%
7	49.7%	50.3%	9.5%	23.3%	27.1%	16.2%
8	50.4%	49.6%	11.7%	20.5%	29.0%	15.6%
9	51.0%	49.0%	7.6%	20.6%	26.6%	26.4%
10	50.7%	49.3%	5.9%	25.6%	25.6%	21.4%
11	51.1%	48.9%	9.1%	22.4%	20.5%	23.0%
12	51.7%	48.3%	9.3%	16.2%	20.8%	32.0%
13	50.0%	50.0%	7.3%	25.2%	30.5%	18.4%
14	50.7%	49.3%	11.5%	20.9%	23.3%	17.0%
15	49.0%	51.0%	7.0%	16.0%	24.3%	28.2%
16	50.6%	49.4%	3.7%	12.0%	22.2%	41.0%
17	51.0%	49.0%	4.6%	18.4%	26.5%	27.7%
18	49.8%	50.2%	9.1%	18.9%	26.7%	17.7%
19	48.1%	51.9%	7.4%	18.8%	28.8%	22.4%
20	50.0%	50.0%	10.7%	13.9%	19.0%	35.3%
21	49.6%	50.4%	4.8%	17.8%	24.4%	32.0%
<i>Total</i>	<i>50.0%</i>	<i>50.0%</i>	<i>6.9%</i>	<i>17.1%</i>	<i>24.4%</i>	<i>28.1%</i>

To handle missing data among some of the demographic variables we employed a technique called hot decking. Hot deck imputation replaces the missing values of a respondent randomly with another similar respondent without missing data. These are further determined by variables predictive of non-response that are present in the entire file. Using an SPSS macro detailed in “Goodbye, Listwise Deletion: Presenting Hot Deck Imputation as an Easy and Effective Tool for Handling Missing Data” (Myers, 2011), CHI imputed missing values for age, home ownership, education and race.

CHI examined the distribution of the resulting target weights and determined that there were some large weights. CHI implemented trimming rules for trimming to .10 minimum and 8 maximum off the low- and high-end weights. An untrimmed weight was included.

Table 7. Age and race/ethnicity distribution by 21 health statistic regions (HSRs) in Colorado

HSR	Age				Race/Ethnicity			
	0–17 years	18–34 years	35–64 years	65+ years	White	African American	Hispanic	Other
1	24.7%	19.9%	37.9%	17.5%	74.7%	1.3%	21.6%	2.3%
2	20.8%	27.6%	37.4%	14.2%	83.1%	1.1%	11.2%	4.6%
3	27.7%	17.3%	44.7%	10.4%	83.7%	1.1%	8.2%	7.0%
4	25.0%	25.3%	37.5%	12.2%	70.1%	6.1%	16.4%	7.4%
5	26.1%	17.8%	42.5%	13.7%	79.3%	1.2%	14.5%	4.9%
6	23.0%	19.7%	37.7%	19.5%	61.4%	0.7%	36.0%	2.0%
7	23.9%	21.2%	37.3%	17.7%	51.9%	1.5%	43.8%	2.8%
8	23.2%	20.2%	37.1%	19.5%	54.8%	0.6%	42.7%	1.9%
9	18.8%	21.0%	42.9%	17.2%	78.4%	0.8%	12.8%	8.1%
10	21.5%	18.0%	39.6%	20.9%	82.4%	0.5%	13.9%	3.3%
11	24.9%	21.4%	41.7%	12.0%	75.7%	0.7%	20.4%	3.1%
12	21.7%	23.5%	43.5%	11.3%	76.5%	0.8%	20.1%	2.7%
13	18.7%	15.6%	41.9%	23.7%	85.5%	0.0%	12.4%	2.1%
14	27.3%	24.8%	38.3%	9.5%	52.6%	3.1%	37.5%	6.8%
15	24.5%	23.4%	39.9%	12.2%	61.4%	8.9%	20.6%	9.1%
16	21.1%	26.3%	39.8%	12.8%	78.7%	0.6%	13.2%	7.6%
17	22.7%	19.0%	42.8%	15.5%	81.1%	3.9%	10.5%	4.6%
18	27.6%	22.9%	37.8%	11.7%	64.7%	1.6%	29.2%	4.5%
19	22.5%	23.3%	36.8%	17.4%	80.4%	0.6%	15.4%	3.6%
20	21.1%	31.1%	37.1%	10.7%	52.9%	9.9%	30.6%	6.7%
21	20.9%	22.4%	42.2%	14.5%	77.4%	1.2%	15.7%	5.7%
<i>Total</i>	23.5%	24.2%	39.4%	13.0%	68.6%	3.9%	21.4%	6.2%

Complex survey designs and post-data collection statistical adjustments affect variance estimates and resulting tests of significance and confidence intervals. The impact of the survey design on variance estimates is measured by the design effect, which represents the extent of departure from a simple random sample where all sample units respond. The design effect measures the variance inflation of the sample estimate relative to the variance of an estimate based on a hypothetical random sample of the same size. The design effect for the final full sample weight is 3.6. The design effect for the final trimmed sample weight is 3.1.

Table 8. Design effects

	Estimate	Standard Error	95% Confidence Interval		Design Effect	Unweighted Count
			Lower	Upper		
<i>Gender</i>						
Male	49.9%	0.9%	48.2%	51.6%	2.997	5,216
Female	50.1%	0.9%	48.4%	51.8%	2.997	4,813
<i>Race/Ethnicity</i>						
White	75.4%	0.8%	73.7%	77.0%	3.577	8,007
African American	4.6%	0.4%	3.9%	5.4%	3.408	347
Hispanic	13.0%	0.7%	11.8%	14.4%	3.767	918
Other	7.0%	0.5%	6.0%	8.1%	4.084	492
<i>Age</i>						
0-17	23.5%	0.8%	22.1%	25.0%	3.139	1,965
18-34	16.7%	0.7%	15.4%	18.2%	3.728	947
35-49	19.9%	0.7%	18.5%	21.3%	3.166	1,540
50-64	26.8%	0.7%	25.4%	28.2%	2.650	3,523
65+	13.1%	0.5%	12.1%	14.1%	2.231	1,927
<i>Educational Attainment</i>						
Under 18	20.3%	0.7%	18.9%	21.7%	3.217	1,661
No H.S. diploma	9.1%	0.6%	8.0%	10.3%	3.932	620
H.S. diploma	17.6%	0.6%	16.4%	18.9%	2.862	1,966
Some college	24.4%	0.7%	23.0%	25.9%	3.031	2,408
College degree	28.6%	0.7%	27.2%	30.1%	2.691	3,275
<i>Phone Ownership</i>						
Landline	35.8%	0.6%	34.7%	37.0%	1.580	6,273
Cell phone only	64.2%	0.6%	63.0%	65.3%	1.580	3,756

### **Survey Response Rates**

The response rate for this study was 21.5 percent for the landline sample and 22.0 percent for the cell phone sample using AAPOR's RR3 formula. This translates into an overall response rate of 21.8 percent. Following is a full disposition of the sample selected for this survey.

Table 9. Response rates by 21 health statistics regions (HSRs) in Colorado – landline

	HSR 1	HSR 2	HSR 3	HSR 4	HSR 5	HSR 6	HSR 7
<b>Eligible, interview (Category 1)</b>							
Complete	163	154	203	273	164	162	161
<b>Eligible, non-interview (Category 2)</b>							
Refusal	13	10	13	30	13	14	24
Break off (callback)	13	7	23	28	32	17	22
Answering machine household	9	6	4	7	3	4	7
Physically or mentally unable/incompetent	0	0	0	0	0	0	0
Language problem	0	0	0	1	0	0	1
<b>Unknown eligibility, non-interview (Category 3)</b>							
Always busy	50	124	213	133	77	62	100
No answer	1,717	2,189	6,222	4,129	2,068	1,359	2,174
Answering machine, unknown household	324	750	1,383	1,398	467	395	539
Call blocking	31	266	1,255	909	253	16	416
No screener completed	27	30	56	59	34	29	44
Refusal, unknown eligibility	452	445	649	1461	806	525	715
<b>Not eligible (Category 4)</b>							
Fax/data line	214	351	794	551	288	184	278
Nonworking number	1,4243	17,716	35,582	42,043	17,171	12,360	23,265
Business, government office, other organizations	161	382	870	794	324	177	388
No eligible respondent	56	74	93	138	67	98	84
Quota filled	163	484	930	15	0	0	642
RR3	26.0%	26.8%	19.2%	17.3%	17.2%	26.0%	19.6%

Table 9. Response rates by 21 health statistics regions (HSRs) in Colorado – landline

	HSR 8	HSR 9	HSR 10	HSR 11	HSR 12	HSR 13	HSR 14
<b>Eligible, interview (Category 1)</b>							
Complete	166	158	159	156	149	162	243
<b>Eligible, non-interview (Category 2)</b>							
Refusal	19	14	10	8	8	14	24
Break off (callback)	14	12	22	16	17	25	27
Answering machine household	5	6	4	5	4	5	9
Physically or mentally unable/incompetent	0	0	0	0	0	0	0
Language problem	0	1	0	0	0	0	0
<b>Unknown eligibility, non-interview (Category 3)</b>							
Always busy	63	131	96	78	173	24	307
No answer	1,496	2,399	1,933	1,736	7,159	1,002	4,426
Answering machine, unknown household	275	448	386	362	1,417	290	1,167
Call blocking	98	206	79	72	264	4	1,113
No screener completed	47	25	22	15	37	33	74
Refusal, unknown eligibility	481	413	422	425	650	385	1,051
<b>Not eligible (Category 4)</b>							
Fax/data line	202	296	223	194	584	166	613
Nonworking number	15,684	14,316	10,987	11,488	35,038	6,403	43,557
Business, government office, other organizations	246	297	219	244	642	104	719
No eligible respondent	82	87	80	70	75	76	101
Quota filled	162	199	386	78	0	33	1205
RR3	27.2%	27.7%	26.8%	18.9%	28.1%	28.1%	19.4%

Table 9. Response rates by 21 health statistics regions (HSRs) in Colorado – landline

	HSR 15	HSR 16	HSR 17	HSR 18	HSR 19	HSR 20	HSR 21
<b>Eligible, interview (Category 1)</b>							
Complete	323	176	193	143	162	286	348
<b>Eligible, non-interview (Category 2)</b>							
Refusal	46	15	10	13	8	22	30
Break off (callback)	51	17	11	27	15	56	28
Answering machine household	8	4	3	11	9	12	8
Physically or mentally unable/incompetent	0	0	0	0	0	0	1
Language problem	0	0	0	0	0	0	1
<b>Unknown eligibility, non-interview (Category 3)</b>							
Always busy	205	119	36	191	75	655	144
No answer	5,715	2,703	1,435	2,250	1,691	8,452	4,926
Answering machine, unknown household	1,836	1,057	383	716	289	2,124	1,589
Call blocking	1,243	464	297	190	86	1,779	1,076
No screener completed	123	58	23	48	30	134	75
Refusal, unknown eligibility	1,633	698	446	635	377	1,278	1,427
<b>Not eligible (Category 4)</b>							
Fax/data line	823	406	154	345	233	1,471	633
Nonworking number	70,874	24,331	10,908	18,823	9155	76,067	41,326
Business, government office, other organizations	1,151	412	214	348	202	1486	748
No eligible respondent	165	67	40	80	74	133	158
Quota filled	0	0	660	54	725	0	377
RR3	17.9%	20.3%	27.7%	19.1%	29.0%	18.6%	20.5%



Table 9. Response rates by 21 health statistics regions (HSRs) in Colorado – cell phone

	HSR 1	HSR 2	HSR 3	HSR 4	HSR 5	HSR 6	HSR 7
<b>Eligible, interview (Category 1)</b>							
Complete	239	214	105	452	283	235	240
<b>Eligible, non-interview (Category 2)</b>							
Refusal	19	13	7	30	23	15	16
Break off (callback)	6	16	13	35	6	15	7
Answering machine household	12	13	6	27	11	5	7
Physically or mentally unable/incompetent	0	0	0	0	2	0	0
Language problem	1	0	0	0	0	1	0
<b>Unknown eligibility, non-interview (Category 3)</b>							
Always busy	1	14	85	18	0	8	3
No answer	636	694	896	2,200	475	314	108
Answering machine, unknown household	862	2,158	2,511	5,626	589	733	337
Call blocking	0	1	2	1	2	0	0
No screener completed	85	84	49	225	92	63	76
Refusal, unknown eligibility	784	797	689	2,092	798	562	662
<b>Not eligible (Category 4)</b>							
Fax/data line	206	25	19	269	270	141	57
Nonworking number	5,971	2,724	684	6,349	7,994	3,437	3,074
Business, government office, other organizations	154	175	137	478	146	80	135
No eligible respondent	163	220	146	755	208	129	162
Quota filled	448	12	17	68	381	668	2,211
RR3	25.9%	18.4%	7.8%	18.0%	31.3%	29.8%	32.5%

Table 9. Response rates by 21 health statistics regions (HSRs) in Colorado – cell phone

	HSR 8	HSR 9	HSR 10	HSR 11	HSR 12	HSR 13	HSR 14
<b>Eligible, interview (Category 1)</b>							
Complete	254	271	195	276	272	213	161
<b>Eligible, non-interview (Category 2)</b>							
Refusal	13	13	9	13	15	11	10
Break off (callback)	4	8	9	10	25	10	9
Answering machine household	7	9	7	6	11	10	12
Physically or mentally unable/incompetent	0	0	0	1	0	0	0
Language problem	0	0	1	0	1	0	0
<b>Unknown eligibility, non-interview (Category 3)</b>							
Always busy	0	2	0	14	16	11	10
No answer	243	338	266	425	826	10	9
Answering machine, unknown household	414	689	546	1,168	2,212	10	12
Call blocking	0	0	0	0	0	0	0
No screener completed	79	87	66	114	135	0	0
Refusal, unknown eligibility	557	599	538	694	919	11	10
<b>Not eligible (Category 4)</b>							
Fax/data line	128	129	113	167	224	59	31
Nonworking number	2,334	3,730	3,993	22,816	6,210	2,671	985
Business, government office, other organizations	109	230	160	276	279	132	162
No eligible respondent	148	235	167	248	291	163	158
Quota filled	1,039	1,444	963	2,575	1,192	1	12
RR3	34.1%	36.4%	32.4%	37.7%	25.2%	22.8%	9.9%

Table 9. Response rates by 21 health statistics regions (HSRs) in Colorado – cell phone

	HSR 15	HSR 16	HSR 17	HSR 18	HSR 19	HSR 20	HSR 21
<b>Eligible, interview (Category 1)</b>							
Complete	201	198	286	227	280	1258	65
<b>Eligible, non-interview (Category 2)</b>							
Refusal	6	14	17	5	21	67	10
Break off (callback)	19	15	10	15	12	113	5
Answering machine household	8	9	12	5	15	112	5
Physically or mentally unable/incompetent	0	0	0	0	0	0	0
Language problem	0	0	0	2	0	2	0
<b>Unknown eligibility, non-interview (Category 3)</b>							
Always busy	65	0	0	45	7	176	34
No answer	1,340	760	1,199	1,042	522	6,293	477
Answering machine, unknown household	3,189	1,418	2,243	3,085	1,804	15,801	1,200
Call blocking	0	0	0	0	0	1	4
No screener completed	60	114	115	131	78	736	24
Refusal, unknown eligibility	1,097	769	1,277	1,017	889	5,335	408
<b>Not eligible (Category 4)</b>							
Fax/data line	37	46	121	32	184	191	17
Nonworking number	1,243	2,650	6,700	5,064	3,411	17,499	284
Business, government office, other organizations	209	267	377	203	178	1,336	54
No eligible respondent	200	254	378	252	238	1,363	86
Quota filled	469	8	110	4,470	256	56	10
RR3	10.4%	21.2%	22.6%	21.5%	23.1%	15.6%	8.0%

Table 10. Response rate for landline and cell phone samples

	Landline	Cell Phone	Total
<b>Eligible, Interview (Category 1)</b>			
Complete	4,104	5,925	10,029
<b>Eligible, non-interview (Category 2)</b>			
Refusal	356	347	703
Break off (callback)	3,033	6,525	9,558
Answering machine household-no message left	4,729	16,599	21,328
Physically or mentally unable/incompetent	228	650	878
Language problem	560	759	1,319
<b>Unknown eligibility, non-interview (Category 3)</b>			
Always busy	3,056	548	3,604
No answer	67,181	20,629	87,810
Answering machine, unknown household	10,117	12	10,129
Call blocking	13,100	34,863	47,963
No screener completed	12,185	15,059	27,244
Refusal unknown eligibility	3,056	548	3,604
<b>Not eligible (Category 4)</b>			
Fax/data line	9,003	2,466	11,469
Nonworking number	44,592	39,165	83,757
Business, government office, other organizations	10,128	5,277	15,405
No eligible respondent	1,898	5,964	7,862
Quota filled	6,098	17,655	23,753
RR3	21.5%	22.0%	21.8%