Kansas and Missouri Consumer Health Access Survey (KMHS)

Methodology Report

Prepared for

Health Care Foundation of Greater Kansas City
Kansas Health Foundation
Missouri Foundation for Health
REACH Healthcare Foundation
United Methodist Health Ministry Fund

Prepared by

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Anna Sommers, PhD
Tamara L. Terry
Thomas Duffy, MPA
RTI International
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Introduction

1.1 Project Overview

The Kansas and Missouri Health Consumer Health Access Survey (KMHS) was designed to meet the common objectives of five regional health foundations. The KMHS is intended to provide a clearer picture of access to health care in Kansas and Missouri than is currently available. The funders prioritized questions on the health and unmet needs of working-age adults (ages 19-64), including health and dental insurance coverage, prevalence of chronic illness and serious injury, barriers to having a usual place of care that can be addressed by the safety net, accessibility of community health centers, and unmet care needs for mental health care, specialists, prescription drugs, and dental care.

The REACH Healthcare Foundation (REACH) contracted with RTI, International (RTI) to design and pilot test the KMHS in early 2017. RTI designed the survey instrument in collaboration with the funder and four other regional health foundations serving Kansas, Missouri, and the bi-state Kansas City area: Kansas Health Foundation, Healthcare Foundation of Greater Kansas City (HCF), Missouri Foundation for Health, and United Methodist Health Ministry Fund. The main survey and analysis were funded by all five foundations. The main survey was administered between September 2017 and January 2018. (See *Appendix A* for the Pilot Test Report.)

The KMHS was fielded from September 2017 through January 2018. Interviewers collected data via telephone surveys in randomly selected Kansas and Missouri households with landline telephones and Kansas and Missouri individuals with cell phones. Interviewers administered the survey to a randomly selected adult or adult proxy in case of interview difficulties and, if applicable, an adult proxy on behalf of a randomly selected child (18 years of age or younger).

1.2 Design Overview

The KMHS adult and child questionnaires covered several topics regarding the health and health insurance status of Kansas and Missouri residents. (See *Appendix D* for the survey questionnaire.) Topics included:

- type of health insurance coverage, if any;
- general physical, mental, and dental health status;
- diagnosis of select health conditions;
- health care use and needs;
- perceptions of health care quality;
- access to health care; and
- health-associated demographics.

The survey consisted of two main sections—one for the randomly selected adult in the household and a second for an adult proxy responding for a randomly selected child under the age of 19, if one was

presently residing in the adult respondent's household. The age at which one was considered a child for purposes of household enumeration and administration of the child survey instrument was 18 years of age and under for the KMHS. This keeps the child age classification in line with the Medicaid program eligibility rules.

The sample design for the KMHS was a complex design consisting of landline and cell phone numbers. This design is explained in Section 2, "Sampling."

1.3   Institutional Review Board Determination

Because the KMHS involves collecting data about adult respondents and child respondents via an adult proxy, study documents including the design, research protocol, and questionnaires were delivered to the institutional review boards (IRBs) at RTI. The IRB reviewed materials and spoke with the principal investigators at RTI to assess whether the KMHS fell under their respective responsibilities for protecting human subjects in sponsored research. The IRB determined that the KMHS was research in support of governmental agency programs, which under federal code does not necessarily require IRB oversight.

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Sampling

2.1 Objectives of the Sample Design

The KMHS employed a three-pronged design consisting of the following:

1. a list-assisted random digit dialing (RDD) sample of landline numbers;
2. a stratified random sample of cell phone numbers by rate center county (cell phone sample); and
3. an oversample of cell phone numbers in the six counties associated with the REACH/HCF service area which include Allen, Johnson, and Wyandotte Counties in Kansas and Cass, Jackson, and Lafayette Counties in Missouri.

2.2 Sampling Plan

The KMHS sampling plan was a probability-based design with known probabilities of selection at each stage of selection. This design allows for inference to be made for the entire states of Kansas and Missouri as well as the REACH/HCF service area and various subpopulations and regions of interest.

As we describe in this section, two separate samples were allocated to meet the KMHS goals. For each of the three designs discussed previously, *Table 2-1* summarizes the starting quantity of phone numbers that were selected and the number of completed interviews for each sample type.

Table 2-1. Proposed Sample Sizes by Type of Sample

Type of Sample	Sample Size from Vendor	Target Number of Completed Interviews	Actual Number of Completed Interviews
Cell phone sample	193,364	3,323	3,846
Landline sample	49,860	831	428
Total	243,224	4,154	4,274

2.3 Population of Interest

The target population for the KMHS was the total noninstitutionalized adult and child populations residing in residential households in Kansas and Missouri. Excluded from this population were adults and children who met at least one of the following criteria:

- in penal, mental, or other institutions;
- living on military bases covered by dedicated central office codes;
- living in other group quarters such as dormitories, barracks, convents, or boarding houses (with 10 or more unrelated residents);
- contacted at their second residence during a stay of fewer than 30 days;
- living in Kansas or Missouri less than a month;
- without access to a residential phone (landline or cell phone);

- who did not speak English or Spanish well enough to be interviewed; and
- with physical or mental impairments that prevented a respondent from completing an interview (as defined by the interviewer or by another member of the household) if a knowledgeable proxy was not available.

2.4   Sampling Frames

The KMHS used a dual-frame approach consisting of two distinct frames. The two frames consisted of (1) a list of all cell phone numbers with a Kansas or Missouri area code, (2) a list of all landline numbers. The used an overlapping design, whereby dual users (i.e., people who can be reached on either a cell phone or a landline phone number) can enter the survey through either phone type.[1]

2.4.1 Cell Phone Frame

For the cell phone sample, the Telcordia Local Exchange Routing Guide was used to identify the cell phone 1,000-blocks in Kansas and Missouri. As described in detail in **Section 2.5**, each 1,000-block was assigned to a rate center county for stratification purposes.

2.4.2 Landline Frame

The landline samples for the KMHS consisted of a random sample of telephone numbers from all current operating telephone exchanges in Kansas and Missouri. MSG's Genesys system was used to generate the full set of 100-blocks in Kansas and Missouri—100-blocks refers to groupings of 100 phone numbers based on the area code, exchange, and next two numbers (e.g., 913-*366-31XX* is a 100-block). Listed landline information is used to assign 100-blocks to counties and zip codes, allowing sampling statisticians to target a sample.

2.5   General Sample Design

The KMHS was a stratified simple random sample of telephone numbers in Kansas and Missouri. The KMHS sample design needs to support estimation at the following geographic levels:

- state
- REACH/HCF service area
- county type (urban, mid-size, or rural)

To support estimation at each of these levels, the KMHS targeted 4,154 completed interviews. The REACH/HCF service area is defined by six counties – three in Kansas and three in Missouri. The counties in the REACH/HCF service area include Allen, Johnson, and Wyandotte Counties in Kansas and Cass, Jackson, and Lafayette Counties in Missouri. County type is defined by the population density within a county. Urban counties were defined as those with 50,000 or 100,000 more persons in Kansas and Missouri, respectively. Mid-size counties are defined as counties with between 20,000 and 50,000

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[1] If reached on both phones, the person was ineligible on the second phone type for which they were contacted. Because of the large number of phone numbers on each frame, the likelihood of being reached on both phone types is small.

persons in Kansas and between 20,000 and 100,000 persons in Missouri. Rural counties have fewer than 20,000 persons in both Kansas and Missouri.

In determining the optimal allocation, several design allocations were considered. The design considerations took into account achieving a minimum number of completed interviews in each analysis stratum while minimizing the design effects at each level of analysis. Each design considered utilized a basic broad stratification based on county type. In other words, there were a minimum of three strata within each state. Sections 2.6.1 and 2.7.1 will discuss further stratification which were created for the cell phone or landline frames, respectively.

Given the current distribution in the type of telephone used in Kansas and Missouri—82.6% and 82.8%, respectively, identify as cell phone only, cell phone mostly, or dual telephone users (National Center for Health Statistics [NCHS] 2016), with a greater proportion of minorities, low-income, and households with children shifting to cell phones (Lu et al., 2014)—the KMHS predominantly allocated the sample to the cell phone frame. The KMHS targeted 80% of desired interviews to come from phone numbers on the cell phone frame and 20% from the landline frame. This translates to 3,323 respondents from the cell phone frame and 831 respondents from the landline frame.

The cell phone and landline frames were stratified even further to help ensure estimation at each geographic level of interest. Across both frames, 225 unique strata were formed in the KMHS. Details on the stratification and allocation within the cell phone frame are in Section 2.6. Details on the stratification and allocation within the landline frame are in Section 2.7.

2.6   Cell Phone Sample

The KMHS targeted 3,323 completed interviews to come from the cell phone frame. This section describes how the sample was stratified and allocated.

2.6.1 Stratification

The cell phone frame was stratified into 220 unique geographic areas at the county level. Counties were defined using *rate center areas*. A rate center area is the area in which a cell phone was activated. Rate center areas are not bound by traditional geographic boundaries (e.g., county borders); rather they are areas surrounding an activation center. Denser areas with more activation centers will have more rate center areas. More rural areas will have fewer rate center areas. A rate center area is assigned to a county based on where the majority of the rate center population resides. Therefore, a county can contain multiple rate centers or no rate centers. These areas can be grouped to form strata based on the county for which the majority of the rate center population resides; that is, rate centers can be assigned to a county. The collection of rate centers to form a county is called a *rate center county*. Although not a perfect match, rate center counties are correlated to the county for which the cell phone owner resides. Each rate center county was its own stratum (220 strata). Within Kansas and Missouri, there are 7 counties which do not have a rate center assigned to their counties. Therefore, sample was only allocated to the 213 rate center counties with non-zero phone numbers assigned.

2.6.2 Cell Phone Sample

The cell phone sample was allocated across the 213 cell phone strata. Initially, the cell phone sample was allocated proportionally across the three county types within each state. The allocated sample within each county type was further allocated to rate center counties within each county type based on the number of 1,000-blocks assigned to each county. As detailed in ***Section 2.8***, an oversample of telephone numbers (and persons) in the REACH/HCF service area.

Furthermore, because of the classification error between a cell phone number's assigned rate center and the actual county a respondent resides in, the *Rate Center Plus* allocation method was used (see Berzofsky, Scruggs, Speizer, Peterson, Lu, et al., 2017). The Rate Center Plus method used information purchased from MSG's Consumer Cellular Database to create a classification error matrix by which the conditional probabilities of a number being assigned to a rate center given the desired county the respondent is from was calculated. These probabilities were used to convert the desired number of interviews in each county to a rate center county for sample selection.

2.6.3 Sample Selection

The sample selection method varied by the type of cell phone sample. For the base cell phone sample, a stratified random sample of phone numbers from cellular-dedicated 1,000-blocks was selected. Within each stratum, the allocated number of phone numbers was selected using a simple random sample.

2.7   Landline Sample

The KMHS targeted 831 completed interviews to come from the landline frame. This section describes how the sample was stratified and allocated.

2.7.1 Stratification

The landline frame was stratified into 12 unique strata at the county and county type levels. Within each state each county type formed six strata. The 6 REACH/HCF service area counties were excluded from the county type strata to form the remaining six strata.

2.7.2 Landline Sample

The landline sample was allocated across the 12 landline strata. The landline sample was proportionally allocated to the six county types. If a county type contained one or more of the REACH/HCF service area counties, the county type sample was allocated across the strata. As detailed in ***Section 2.8***, the allocation to the REACH/HCF service area counties was based on an oversample in those counties to improve precision in the REACH/HCF service area. Although other studies have found that listed households have a higher propensity of responding (i.e., if they are more willing to publish their phone number, they are more likely to answer and respond to a survey), they are very likely different from unlisted households on key health and demographic characteristics (Tarnai Schultz, & Moore, 2009). Therefore, because the potential increase in bias was large, listed households were not oversampled.

2.7.3 Sample Selection

In the base landline and African American oversampling strata, within each stratum, a random sample of 100-blocks was selected. This sample was selected through a list-assisted 1+block RDD method.

2.7.4 Selection of Respondents Within a Household

Among the respondents contacted through a landline, one adult (i.e., a person 19 years of age or older) was selected using the modified most recent birthday method (i.e., the adult with the most recently past birthday to the day of the interview was selected). Among those contacted through a cell phone, the owner of the phone (if 19 years of age or older) was selected. People contacted on an unexpected phone type (i.e., a landline sample number that was a cell phone or vice versa) were considered ineligible for the study.

Furthermore, in households with children, one child was selected using the most recent birthday method. However, rather than having the child complete a survey, a proxy respondent who was most knowledgeable about the child was identified to complete the survey for the child. Ideally, this adult was selected to complete the adult survey, but a different person completed the survey when the randomly selected adult indicated that he or she could not accurately respond for the child.

2.8 REACH/HCF Service Area Oversample

In order to achieve some of the funders goals to produce reliable estimates within the REACH/HCF service area in the aggregate, an oversample was applied to those counties. An oversample increases the sample allocation to certain strata in order to improve the precision of estimates in those areas. In this case, the six counties associated with the REACH/HCF service had their sample sizes increased in order to allow for within state estimation of each service area. In other words, the oversample was designed to produce estimates for the combined area of Allen, Johnson, Wyandotte Counties in Kansas and the combined area of Cass, Jackson, and Lafayette Counties in Missouri. The oversample was designed to produce margin of errors of 2.8% and 3.6% in the Kansas counties and Missouri Counties, respectively, for the estimate of uninsured adults between 19 and 64 years old.

The oversample was implemented within each county type stratum. Once the county type sample size allocation was determined (as detailed in Section 2.5), if one or more of the REACH/HCF service area counties was in the county type stratum, the county type was further stratified based on the REACH/HCF counties and non-REACH/HCF counties. In the REACH/HCF service area counties the initial proportional allocation based on population size was increased to meet the precision goal. The non-REACH/HCF service area sample size was set as the difference between the total sample size for the county type and the REACH/HCF oversample. *Table 2-2* presents the population distribution, sample size distribution, and oversample rate by sub-stratum.

Table 2-2.   Population and Sample Distribution and Oversampling Rate by County Type Sub-Stratum

Stratum	Population (%)	Sample (%)	Oversample Rate
Kansas, urban non-REACH	39.3%	25.3%	0.6
Kansas, urban REACH	25.0%	39.0%	1.6
Kansas, mid-size	18.6%	18.6%	1.0
Kansas, rural non-REACH	16.7%	8.6%	0.5
Kansas, rural REACH	0.5%	8.5%	18.0
Missouri, urban non-REACH	47.2%	35.5%	0.8
Missouri, urban REACH	11.3%	23.0%	2.0
Missouri, mid-size non-REACH	28.3%	16.4%	0.6
Missouri, mid-size REACH	2.2%	14.0%	6.4
Missouri, rural	11.1%	11.1%	1.0

Once the final sample targeted respondent size by county type sub-stratum was determined, it was allocated across the two sample frames. Eighty percent of the sample was allocated to the cell phone frame and 20% of the sample was allocated to the landline frame.

2.9   Starting Sample Size of Telephone Numbers

To achieve the desired number of completed interviews, a response ratio factor was applied to the desired number of completed interviews to obtain the starting number of telephone numbers that should be purchased from MSG. For the landline RDD samples an average response rate of 125:1 was used. For cell phone samples, a ratio of 75:1 was used. While response rates were expected to vary by strata, no additional information was known about the strata level response rates to inform a non-homogeneous response rate assumption.

Table 2-3.   Sample Released for Calling by Stratum

Stratum	Stratum Description	County Type	Phone Type	Sample Released[a]
1	ALLEN COUNTY, KANSAS	RURAL	CELL	5012
2	ANDERSON COUNTY, KANSAS	RURAL	CELL	404
3	ATCHISON COUNTY, KANSAS	RURAL	CELL	375
4	BARBER COUNTY, KANSAS	RURAL	CELL	78
5	BARTON COUNTY, KANSAS	MID-SIZE	CELL	898
6	BOURBON COUNTY, KANSAS	RURAL	CELL	220
7	BROWN COUNTY, KANSAS	RURAL	CELL	434
8	BUTLER COUNTY, KANSAS	URBAN	CELL	691
9	CHASE COUNTY, KANSAS	RURAL	CELL	33
10	CHAUTAUQUA COUNTY, KANSAS	RURAL	CELL	36
11	CHEROKEE COUNTY, KANSAS	MID-SIZE	CELL	388
12	CHEYENNE COUNTY, KANSAS	RURAL	CELL	77

(continued)

Table 2-3.   Sample Released for Calling by Stratum (continued)

Stratum	Stratum Description	County Type	Phone Type	Sample Released[a]
13	CLARK COUNTY, KANSAS	RURAL	CELL	340

Stratum	Stratum Description	County Type	Phone Type	Sample Released[a]
14	CLAY COUNTY, KANSAS	RURAL	CELL	119
15	CLOUD COUNTY, KANSAS	RURAL	CELL	166
16	COFFEY COUNTY, KANSAS	RURAL	CELL	135
17	COMANCHE COUNTY, KANSAS	RURAL	CELL	33
18	COWLEY COUNTY, KANSAS	MID-SIZE	CELL	1079
19	CRAWFORD COUNTY, KANSAS	MID-SIZE	CELL	2173
20	DECATUR COUNTY, KANSAS	RURAL	CELL	41
21	DICKINSON COUNTY, KANSAS	RURAL	CELL	210
22	DONIPHAN COUNTY, KANSAS	RURAL	CELL	35
23	DOUGLAS COUNTY, KANSAS	URBAN	CELL	2564
24	EDWARDS COUNTY, KANSAS	RURAL	CELL	37
25	ELK COUNTY, KANSAS	RURAL	CELL	32
26	ELLIS COUNTY, KANSAS	MID-SIZE	CELL	1178
27	ELLSWORTH COUNTY, KANSAS	RURAL	CELL	125
28	FINNEY COUNTY, KANSAS	MID-SIZE	CELL	1403
29	FORD COUNTY, KANSAS	MID-SIZE	CELL	1200
30	FRANKLIN COUNTY, KANSAS	MID-SIZE	CELL	701
31	GEARY COUNTY, KANSAS	MID-SIZE	CELL	908
32	GOVE COUNTY, KANSAS	RURAL	CELL	92
33	GRAHAM COUNTY, KANSAS	RURAL	CELL	43
34	GRANT COUNTY, KANSAS	RURAL	CELL	124
35	GRAY COUNTY, KANSAS	RURAL	CELL	40
36	GREELEY COUNTY, KANSAS	RURAL	CELL	34
37	GREENWOOD COUNTY, KANSAS	RURAL	CELL	78
38	HAMILTON COUNTY, KANSAS	RURAL	CELL	45
39	HARPER COUNTY, KANSAS	RURAL	CELL	33
40	HARVEY COUNTY, KANSAS	MID-SIZE	CELL	1003
41	HASKELL COUNTY, KANSAS	RURAL	CELL	36
42	HODGEMAN COUNTY, KANSAS	RURAL	CELL	39
43	JACKSON COUNTY, KANSAS	RURAL	CELL	91
44	JEFFERSON COUNTY, KANSAS	RURAL	CELL	33
45	JEWELL COUNTY, KANSAS	RURAL	CELL	45
46	JOHNSON COUNTY, KANSAS	URBAN	CELL	42277
47	KEARNY COUNTY, KANSAS	RURAL	CELL	37
48	KINGMAN COUNTY, KANSAS	RURAL	CELL	81
49	KIOWA COUNTY, KANSAS	RURAL	CELL	31
50	LABETTE COUNTY, KANSAS	MID-SIZE	CELL	756
51	LANE COUNTY, KANSAS	RURAL	CELL	38
52	LEAVENWORTH COUNTY, KANSAS	URBAN	CELL	1131
53	LINCOLN COUNTY, KANSAS	RURAL	CELL	37
54	LINN COUNTY, KANSAS	RURAL	CELL	31
55	LOGAN COUNTY, KANSAS	RURAL	CELL	40
56	LYON COUNTY, KANSAS	MID-SIZE	CELL	1509
57	MCPHERSON COUNTY, KANSAS	MID-SIZE	CELL	791
58	MARION COUNTY, KANSAS	RURAL	CELL	175
59	MARSHALL COUNTY, KANSAS	RURAL	CELL	122

(continued)

Table 2-3.   Sample Released for Calling by Stratum (continued)

Stratum	Stratum Description	County Type	Phone Type	Sample Released[a]
60	MEADE COUNTY, KANSAS	RURAL	CELL	35
61	MIAMI COUNTY, KANSAS	MID-SIZE	CELL	745
62	MITCHELL COUNTY, KANSAS	RURAL	CELL	125
63	MONTGOMERY COUNTY, KANSAS	MID-SIZE	CELL	1203
64	MORRIS COUNTY, KANSAS	RURAL	CELL	142
65	MORTON COUNTY, KANSAS	RURAL	CELL	40
66	NEMAHA COUNTY, KANSAS	RURAL	CELL	127
67	NEOSHO COUNTY, KANSAS	RURAL	CELL	909
68	NESS COUNTY, KANSAS	RURAL	CELL	40
69	NORTON COUNTY, KANSAS	RURAL	CELL	86
70	OSAGE COUNTY, KANSAS	RURAL	CELL	37
71	OSBORNE COUNTY, KANSAS	RURAL	CELL	42
72	OTTAWA COUNTY, KANSAS	RURAL	CELL	78
73	PAWNEE COUNTY, KANSAS	RURAL	CELL	127
74	PHILLIPS COUNTY, KANSAS	RURAL	CELL	86
75	POTTAWATOMIE COUNTY, KANSAS	MID-SIZE	CELL	262
76	PRATT COUNTY, KANSAS	RURAL	CELL	479
77	RAWLINS COUNTY, KANSAS	RURAL	CELL	78
78	RENO COUNTY, KANSAS	URBAN	CELL	1240
79	REPUBLIC COUNTY, KANSAS	RURAL	CELL	73
80	RICE COUNTY, KANSAS	RURAL	CELL	137
81	RILEY COUNTY, KANSAS	URBAN	CELL	2596
82	ROOKS COUNTY, KANSAS	RURAL	CELL	88
83	RUSH COUNTY, KANSAS	RURAL	CELL	84
84	RUSSELL COUNTY, KANSAS	RURAL	CELL	87
85	SALINE COUNTY, KANSAS	URBAN	CELL	1347
86	SCOTT COUNTY, KANSAS	RURAL	CELL	132
87	SEDGWICK COUNTY, KANSAS	URBAN	CELL	12455
88	SEWARD COUNTY, KANSAS	MID-SIZE	CELL	730
89	SHAWNEE COUNTY, KANSAS	URBAN	CELL	5706
90	SHERIDAN COUNTY, KANSAS	RURAL	CELL	46
91	SHERMAN COUNTY, KANSAS	RURAL	CELL	87
92	SMITH COUNTY, KANSAS	RURAL	CELL	80
93	STAFFORD COUNTY, KANSAS	RURAL	CELL	34
94	STANTON COUNTY, KANSAS	RURAL	CELL	33
95	STEVENS COUNTY, KANSAS	RURAL	CELL	86
96	SUMNER COUNTY, KANSAS	MID-SIZE	CELL	219
97	THOMAS COUNTY, KANSAS	RURAL	CELL	122
98	TREGO COUNTY, KANSAS	RURAL	CELL	46
99	WABAUNSEE COUNTY, KANSAS	RURAL	CELL	33
100	WALLACE COUNTY, KANSAS	RURAL	CELL	31
101	WASHINGTON COUNTY, KANSAS	RURAL	CELL	75
102	WICHITA COUNTY, KANSAS	RURAL	CELL	32
103	WILSON COUNTY, KANSAS	RURAL	CELL	80
104	WOODSON COUNTY, KANSAS	RURAL	CELL	33
105	WYANDOTTE COUNTY, KANSAS	URBAN	CELL	0
107	ADAIR COUNTY, MISSOURI	MID-SIZE	CELL	285

(continued)

Table 2-3.   Sample Released for Calling by Stratum (continued)

Stratum	Stratum Description	County Type	Phone Type	Sample Released[a]
108	ANDREW COUNTY, MISSOURI	RURAL	CELL	0
109	ATCHISON COUNTY, MISSOURI	RURAL	CELL	46
110	AUDRAIN COUNTY, MISSOURI	MID-SIZE	CELL	169
111	BARRY COUNTY, MISSOURI	MID-SIZE	CELL	301
112	BARTON COUNTY, MISSOURI	RURAL	CELL	136
113	BATES COUNTY, MISSOURI	RURAL	CELL	142
114	BENTON COUNTY, MISSOURI	RURAL	CELL	326
115	BOLLINGER COUNTY, MISSOURI	RURAL	CELL	98
116	BOONE COUNTY, MISSOURI	URBAN	CELL	2583
117	BUCHANAN COUNTY, MISSOURI	MID-SIZE	CELL	1607
118	BUTLER COUNTY, MISSOURI	MID-SIZE	CELL	494
119	CALDWELL COUNTY, MISSOURI	RURAL	CELL	43
120	CALLAWAY COUNTY, MISSOURI	MID-SIZE	CELL	264
121	CAMDEN COUNTY, MISSOURI	MID-SIZE	CELL	509
122	CAPE GIRARDEAU COUNTY, MISSOURI	MID-SIZE	CELL	833
123	CARROLL COUNTY, MISSOURI	RURAL	CELL	91
124	CARTER COUNTY, MISSOURI	RURAL	CELL	33
125	CASS COUNTY, MISSOURI	MID-SIZE	CELL	1926
126	CEDAR COUNTY, MISSOURI	RURAL	CELL	138
127	CHARITON COUNTY, MISSOURI	RURAL	CELL	348
128	CHRISTIAN COUNTY, MISSOURI	MID-SIZE	CELL	38
129	CLARK COUNTY, MISSOURI	RURAL	CELL	31
130	CLAY COUNTY, MISSOURI	URBAN	CELL	116
131	CLINTON COUNTY, MISSOURI	MID-SIZE	CELL	1079
132	COLE COUNTY, MISSOURI	MID-SIZE	CELL	1469
133	COOPER COUNTY, MISSOURI	RURAL	CELL	245
134	CRAWFORD COUNTY, MISSOURI	MID-SIZE	CELL	174
135	DADE COUNTY, MISSOURI	RURAL	CELL	34
136	DALLAS COUNTY, MISSOURI	RURAL	CELL	94
137	DAVIESS COUNTY, MISSOURI	RURAL	CELL	85
138	DEKALB COUNTY, MISSOURI	RURAL	CELL	35
139	DENT COUNTY, MISSOURI	RURAL	CELL	240
140	DOUGLAS COUNTY, MISSOURI	RURAL	CELL	235
141	DUNKLIN COUNTY, MISSOURI	MID-SIZE	CELL	203
142	GASCONADE COUNTY, MISSOURI	RURAL	CELL	31
143	GENTRY COUNTY, MISSOURI	RURAL	CELL	46
144	GREENE COUNTY, MISSOURI	URBAN	CELL	4121
145	GRUNDY COUNTY, MISSOURI	RURAL	CELL	168
146	HARRISON COUNTY, MISSOURI	RURAL	CELL	91
147	HENRY COUNTY, MISSOURI	MID-SIZE	CELL	599
148	HICKORY COUNTY, MISSOURI	RURAL	CELL	40
149	HOLT COUNTY, MISSOURI	RURAL	CELL	33
150	HOWARD COUNTY, MISSOURI	RURAL	CELL	108
151	HOWELL COUNTY, MISSOURI	MID-SIZE	CELL	401
152	IRON COUNTY, MISSOURI	RURAL	CELL	31
153	JACKSON COUNTY, MISSOURI	URBAN	CELL	37473

(continued)

Table 2-3.   Sample Released for Calling by Stratum (continued)

Stratum	Stratum Description	County Type	Phone Type	Sample Released[a]
154	JASPER COUNTY, MISSOURI	URBAN	CELL	2386
155	JEFFERSON COUNTY, MISSOURI	URBAN	CELL	671
156	JOHNSON COUNTY, MISSOURI	MID-SIZE	CELL	1178
157	KNOX COUNTY, MISSOURI	RURAL	CELL	34
158	LACLEDE COUNTY, MISSOURI	MID-SIZE	CELL	254
159	LAFAYETTE COUNTY, MISSOURI	MID-SIZE	CELL	1377
160	LAWRENCE COUNTY, MISSOURI	MID-SIZE	CELL	125
161	LEWIS COUNTY, MISSOURI	RURAL	CELL	34
162	LINCOLN COUNTY, MISSOURI	MID-SIZE	CELL	130
163	LINN COUNTY, MISSOURI	RURAL	CELL	113
164	LIVINGSTON COUNTY, MISSOURI	RURAL	CELL	155
165	MCDONALD COUNTY, MISSOURI	MID-SIZE	CELL	0
166	MACON COUNTY, MISSOURI	RURAL	CELL	88
167	MADISON COUNTY, MISSOURI	RURAL	CELL	140
168	MARIES COUNTY, MISSOURI	RURAL	CELL	34
169	MARION COUNTY, MISSOURI	MID-SIZE	CELL	281
170	MERCER COUNTY, MISSOURI	RURAL	CELL	47
171	MILLER COUNTY, MISSOURI	MID-SIZE	CELL	37
172	MISSISSIPPI COUNTY, MISSOURI	RURAL	CELL	141
173	MONITEAU COUNTY, MISSOURI	RURAL	CELL	33
174	MONROE COUNTY, MISSOURI	RURAL	CELL	37
175	MONTGOMERY COUNTY, MISSOURI	RURAL	CELL	33
176	MORGAN COUNTY, MISSOURI	MID-SIZE	CELL	90
177	NEW MADRID COUNTY, MISSOURI	RURAL	CELL	142
179	NEWTON COUNTY, MISSOURI	MID-SIZE	CELL	261
180	NODAWAY COUNTY, MISSOURI	MID-SIZE	CELL	184
181	OREGON COUNTY, MISSOURI	RURAL	CELL	136
182	OSAGE COUNTY, MISSOURI	RURAL	CELL	39
183	OZARK COUNTY, MISSOURI	RURAL	CELL	91
184	PEMISCOT COUNTY, MISSOURI	RURAL	CELL	144
185	PERRY COUNTY, MISSOURI	RURAL	CELL	241
186	PETTIS COUNTY, MISSOURI	MID-SIZE	CELL	495
187	PHELPS COUNTY, MISSOURI	MID-SIZE	CELL	481
188	PLATTE COUNTY, MISSOURI	MID-SIZE	CELL	0
189	POLK COUNTY, MISSOURI	MID-SIZE	CELL	267
190	PULASKI COUNTY, MISSOURI	MID-SIZE	CELL	338
191	PUTNAM COUNTY, MISSOURI	RURAL	CELL	0
192	RALLS COUNTY, MISSOURI	RURAL	CELL	31
193	RANDOLPH COUNTY, MISSOURI	MID-SIZE	CELL	636
194	RAY COUNTY, MISSOURI	MID-SIZE	CELL	31
195	REYNOLDS COUNTY, MISSOURI	RURAL	CELL	0
196	RIPLEY COUNTY, MISSOURI	RURAL	CELL	94
197	SAINT CHARLES COUNTY, MISSOURI	URBAN	CELL	2634
198	SAINT CLAIR COUNTY, MISSOURI	RURAL	CELL	47
199	SAINTE GENEVIEVE COUNTY, MISSOURI	RURAL	CELL	137
200	SAINT FRANCOIS COUNTY, MISSOURI	MID-SIZE	CELL	628

(continued)

Table 2-3.   Sample Released for Calling by Stratum (continued)

Stratum	Stratum Description	County Type	Phone Type	Sample Released[a]
201	SAINT LOUIS COUNTY, MISSOURI	URBAN	CELL	14873
202	SALINE COUNTY, MISSOURI	MID-SIZE	CELL	408
203	SCHUYLER COUNTY, MISSOURI	RURAL	CELL	32
204	SCOTLAND COUNTY, MISSOURI	RURAL	CELL	31
205	SCOTT COUNTY, MISSOURI	MID-SIZE	CELL	312
206	SHANNON COUNTY, MISSOURI	RURAL	CELL	50
207	SHELBY COUNTY, MISSOURI	RURAL	CELL	33
208	STODDARD COUNTY, MISSOURI	MID-SIZE	CELL	215
209	STONE COUNTY, MISSOURI	MID-SIZE	CELL	34
210	SULLIVAN COUNTY, MISSOURI	RURAL	CELL	38
211	TANEY COUNTY, MISSOURI	MID-SIZE	CELL	747
212	TEXAS COUNTY, MISSOURI	MID-SIZE	CELL	129
213	VERNON COUNTY, MISSOURI	MID-SIZE	CELL	172
214	WARREN COUNTY, MISSOURI	MID-SIZE	CELL	186
215	WASHINGTON COUNTY, MISSOURI	MID-SIZE	CELL	133
216	WAYNE COUNTY, MISSOURI	RURAL	CELL	0
217	WEBSTER COUNTY, MISSOURI	MID-SIZE	CELL	77
218	WORTH COUNTY, MISSOURI	RURAL	CELL	31
219	WRIGHT COUNTY, MISSOURI	RURAL	CELL	190
220	SAINT LOUIS CITY COUNTY, MISSOURI	URBAN	CELL	2712
221	NON-REACH/HCF URBAN, KANSAS	URBAN	LANDLINE	6,300
222	JOHNSON COUNTY, KANSAS	URBAN	LANDLINE	7,620
223	WYANDOTTE COUNTY, KANSAS	URBAN	LANDLINE	2,100
223	MID-SIZE, KANSAS	MID-SIZE	LANDLINE	4,620
225	NON-REACH/HCF RURAL, KANSAS	MID-SIZE	LANDLINE	2,160
226	ALLEN COUNTY, KANSAS	RURAL	LANDLINE	2,100
226	NON-REACH URBAN, MISSOURI	URBAN	LANDLINE	8,820
228	JACKSON COUNTY, URBAN	URBAN	LANDLINE	5,760
229	NON-REACH/HCF MID-SIZE, MISSOURI	MID-SIZE	LANDLINE	4,080
230	CASS COUNTY, MISSOURI	MID-SIZE	LANDLINE	2,640
231	LAFAYETTE COUNTY, MISSOURI	MID-SIZE	LANDLINE	900
232	RURAL, MISSOURI	RURAL	LANDLINE	2,760

[a] Sample released is one of the following depending on phone type. Landline (LL): The phone numbers not identified as nonworking during the screening process. Cell phone: The phone numbers identified as having either an active or unknown activity Cell-WINS status.

2.10 Pre–Data-Collection Sample Processing

Prior to uploading the sample to the computer-assisted telephone interview (CATI) system, the sample phone numbers were preprocessed to remove clearly nonworking numbers. The preprocessing method was different for the landline and cell phone sample.

2.10.1 Cell Phone

The cell phone sample cannot be processed through a dialer. Therefore, to preprocess the cell phone sample and remove nonworking numbers, RTI relied on MSG Cell-WINS, which uses billing records and call usage data to flag the status of cell phone numbers. Cell-WINS classifies a number into

one of three categories—active, inactive, or unknown. An active number has been used in the past month. An inactive number has not been used in the past 3 months. An unknown number has not been used in the past month or two.

Cell-WINS inactive telephone numbers were removed from the list of sampled telephone numbers before they were uploaded to the CATI system. To ensure the maximum accuracy of the Cell-WINS flag, replicates were not assigned a Cell-WINS status until 2 days before they were fielded. On average, Cell-WINS identified about 35% of cell phone numbers as inactive.

2.10.2 Landline

The preprocessing of the landline phone numbers had the following steps:

1. Phone numbers were entered into the Neustar system to identify phone numbers that had been ported to a cell phone. Ported numbers were removed from the landline sample and appended to the cell phone sample with their CATI call type changed.
2. The remaining phone numbers were fed into the dialer to identify nonworking numbers. Numbers that were nonworking, based on the Integrated Services Digital Network cause codes returned to the dialer, were flagged for removal. Approximately 55% of phone numbers were flagged as ineligible because they were nonworking.

Once ported and nonworking numbers were removed, the remaining phone numbers were uploaded to the CATI for data collection.

2.11 Creation of Sample Replicates

Once each sample was selected, the selected telephone numbers were grouped into replicates containing up to 100 telephone numbers on the landline frame and 50 numbers on the cell phone frame. Replicates were formed at the stratum level. Because the sample size of phone numbers selected in a given stratum was not necessarily a multiple of 100 or 50, some replicates contained fewer than the desired replicate amount. Sets of replicates were released in a manner proportional to the population distribution in the state. *Table 2-4* indicates the dates on which new replicates were released into the field and the number of telephone numbers associated with the released replicates.

Table 2-4.   Sample Released by Date

Release Date	Total Sample[a]
Landline	
9/18/2017	17,645
Total	17,645
Cell Phone	
9/18/2017	56,543
11/6/2017	13,397
11/26/2017	42,824
Total	112,764

[a] Excludes phone numbers removed before fielding (i.e., either screened nonworking phone numbers on the landline frame or Cell-WINS inactive phone numbers on the cell phone frame).

2.12 Number of Respondents

The survey achieved 4,274 total interviews, including 428 from the landline frame and 3,846 from the cell phone frame. The sample produced 2,069 interviews in Kansas and 2,205 interviews in Missouri. ***Table 2-5*** presents the number of completed interviews in each county type by phone type.

Table 2-5.   Completed Interviews by County and Telephone Type

Description	Cell Phone	Landline	Total
All States - Total	3,846	428	4,274
Kansas - Total	1,869	200	2,069
Missouri - Total	1,977	228	2,205
Kansas Urban	1,148	100	1,248
Kansas Non-REACH/HCF Urban	530	48	578
Kansas REACH/HCF Urban[a]	618	52	670
Kansas Mid-size	351	36	387
Kansas Rural	370	64	434
Kansas Non-REACH Rural	250	31	281
Kansas REACH/HCF Rural[b]	120	33	153
Missouri Urban	1,232	118	1,350
Missouri Non-REACH/HCF Urban	732	65	797
Missouri REACH/HCF Urban[c]	500	53	553
Missouri Mid-size	582	67	649
Missouri Non-REACH/HCF Mid-size	467	32	499
Missouri REACH/HCF Mid-size[d]	115	35	150
Missouri Rural	163	43	206

[a] Includes Johnson County and Wyandotte County, KS
[b] Includes Allen County, KS
[c] Includes Jackson County, MO
[d] Includes Cass County and Lafayette County, MO

Questionnaire

3.1   Instrument Content

The KMHS questionnaire consisted of two main sections: an adult section and a child section. Within each section were separate modules focusing on topics such as health insurance coverage, health status, health care utilization, and health care access.

Table 3-1 is a summary of each questionnaire section.

Table 3-1.   Questionnaire Content by Section

Questionnaire Section	Contents of Section
Introduction and Screener Questions for Main Sample	Interviewers ▪ identify themselves and describe the purpose for the call, ▪ give general information about the survey, ▪ determine the number of people in the household (landline only) and the family, ▪ select a member of the household age 19 or older with the most recent birthday (landline only), ▪ determine respondents' ability to answer questions about their health insurance coverage, ▪ offer some initial background information about the study, and ▪ establish the selected respondents' insurance status.
Currently Insured (Adult)	Questions included a variety of characteristics about the respondent's health insurance, such as ▪ whether they had any health insurance coverage at time of interview source of coverage ▪ type of help respondent received to buy insurance on healthcare.gov or other private insurance, and any spell without coverage over 60 days in the past 12 months.
Currently Uninsured (Adult)	Respondents who were currently uninsured were asked about ▪ the last time they had insurance, ▪ tried to buy insurance in the past 2 years, ▪ type of help respondent received to buy insurance and outcome, and ▪ reasons for lack of coverage at time of interview.
Health (Adult)	Questions focused on respondents' ▪ ever told by a health professional they had a chronic condition from a list of conditions ▪ is prescribed medication for a chronic condition ▪ unmet need for medication or care of a chronic condition due to cost, ▪ ever had injury or accident that now limits ability to work or amount of work ▪ injury took place in the past year ▪ unmet need for care of injury in past year due to cost ▪ number of days in past 30 days kept from doing usual activities due to physical health ▪ number of days in past 30 days kept from doing usual activities due to mental health

Table 3-1.   Questionnaire Content by Section (continued)

Questionnaire Section	Contents of Section
Overall Unmet Need (Adult)	Section asked respondents • any time needed care and could not get it in past 12 months • any health care respondent needs right now and not getting because respondent has no health insurance or insurance will not pay for it • kind of care needed now
Usual Place of Care (Adult)	Topics covered include • where respondents usually go for health care, • provider setting of their usual place of care, • accessibility of their usual place of care • reasons for not having a usual place of care • trouble finding doctor who would see them or told by provider they were not accepting new patients in past 12 months
Access	Section asked respondents • when they last saw a general doctor, • when they last saw a dentist or dental hygienist, • whether they have dental coverage • did not get needed dental care in past 12 months • whether they saw a mental health professional in past 12 months • did not get needed mental health care or counseling in past 12 months • reasons why they did not get needed mental health care or counseling • whether they saw a specialist in past year, • whether respondent did not get needed care from a specialist in past 12 months • reasons for not getting needed care from a specialist • type of specialty care needed • prescribed medication by a doctor in past 12 months, • skipped doses, took less medication, or delayed taking medication to save money in past 12 months • whether they visited an emergency room in past 3 months, • Circumstances that apply to most recent ER visit
Medical Bill Problems	• whether family had problems paying medical bills or were unable to pay medical bills in past 12 months • whether family is still paying off medical debt • whether family experienced any of three economic stressors due to unpaid medical bills
Employment	Respondents were asked about • their job status and whether they were currently employed, • the number of hours they worked, and • whether they want to work more hours or are looking for work • whether a disability prevents them from working
Demographics and Family (Adult)	Demographic questions in this section included • marital status, • spouse/partner's employment status, • education, • race and ethnicity, • household income (2016), • number of telephone numbers within the household, and • whether there was any lack of telephone service within the past 12 months.

Screening Questions for Eligible Child	The first section of the child questionnaire asked adults about • the selected child's age and gender, • their relationship to the child, • their ability to answer questions about the child's health insurance coverage (landline only), and • the selected child's current insurance status.
Insurance Coverage (Child)	If the selected child had insurance, the interviewer asked the adult proxy a variety of questions, such as: • source of coverage • any lack of coverage in the past 12 months.
Currently Uninsured (Child)	If the selected child was uninsured at the time of the interview, the interviewer asked the adult proxy about the: • whether anyone tried to buy insurance for the child and reasons the child has no coverage • Any major medical costs while uninsured • whether child was insured at any time in past 12 months
Access to Care (Child)	Interviewers asked respondents about • any trouble finding a doctor to see child in past 12 months • whether child has a usual place to go for health care , • • whether child received a check-up in past 12 months • how long since child last saw a doctor or other health professional • how long since child saw a dentist or dental hygienist and number of dental visits • whether child did not get needed dental care in past 12 months • whether child has dental coverage • how long since child had their eyes examined • whether child did not get needed eye care in past 12 months • whether child currently needs or uses prescription medicine • whether prescription is for emotional or behavioral health problem • whether there was a time child needed prescription and did not get it in past 12 months • whether child has emotional or developmental problem for which they need treatment or counseling • whether child did not get needed treatment or counseling in past 12 months • whether the child saw a specialist within the past 12 months, and how many times • whether they saw a specialist while in a hospital overnight or in the emergency room. • whether child received all, some or none of the specialty care needed in past 12 months • reasons for not getting needed specialty care, if applicable • whether child visited the emergency room in past 3 months • circumstances that applied to the child's most recent ER visit in past 3 months
Demographics (Child)	Demographic items included the child's • age • gender • race and ethnicity and • the employment status of his or her parents.
Weighting Questions	The following questions from the adult interview were used in the weighting process: • How many phone lines do you have? • How many people live in the household? (landline only) • Do you have a cell phone (for landline respondents) or landline phone (for cell phone respondents)? • How many landline numbers/cell phones do you have?

3.2   Survey Instrument Development

RTI and REACH collaborated on the development of the survey questionnaire. The research team initiated the process by reviewing the survey instruments used in the 2017 Ohio Medicaid Assessment Survey (OMAS), other state health access surveys, the Medical Expenditure Panel Survey and the National Health Interview Survey. For specific topics of interest to the funders, questions were modified or developed to explore hypothesis funders had regarding the health needs and utilization patterns of residents in Kansas and Missouri.

After the working draft of the adult and child instruments was developed, RTI project staff helped finalize the instrument and prepare it for pilot testing. RTI staff examined the instruments for ease of administration and response, wording and response categories for additional items, transitions and overall survey flow, skip patterns and item-specific logic, and actual survey length versus the budgeted length restrictions.

A draft version of the questionnaire was agreed to in mid-summer 2017, with the goal of programming, testing, and finalizing the survey for a pilot test in late July. RTI's project team:

- reviewed the initial questionnaire item by item to assess question construction, order, and structure;
- discussed each section of the survey instrument and prepared preliminary training materials;
- prepared the next version of the questionnaire based on project team suggestions and strategies; and
- conducted a pilot test to develop a comprehensive assessment of recommended revisions to review with the Research Team. A detailed description of the pilot test follows.

3.3 Pilot Test

The primary objective and purpose of the KMHS pilot test was to replicate the conditions for full-scale survey data collection, to determine more accurately the survey length for both the adult and child versions of the instrument, and to further check the CATI programming, assess questionnaire flow, evaluate respondent understanding, identify potential fielding issues, and refine our understanding of interviewer training needs.

Interviewing for the pilot test started on July 31, 2017 and continued through August 1, 2017. All telephone interviewing occurred at the RTI CATI call center in Raleigh, North Carolina.

Pilot testing was completed using an English-only version of the instrument for both the cell phone and landline samples; the goal was to complete approximately 40 cell phone and landline interviews – 20 cell phone and 20 landline interviews; split evenly across the two states. At the conclusion of pilot interviewing, RTI obtained 27 completed interviews. Pilot test examination included identifying and correcting overt problems such as flow patterns and respondent comprehension and examining response distributions, missing data, proportions of "do not know" and "refused," extremely small cell sizes, survey section timings, and question series inconsistencies.

For the pilot test, RTI released 1,800 landline and cell phone sample records from across the state. For the landline sample, RTI did not prescreen the sample with the vendor before calling, as is sometimes done, relying instead on a predictive dialer to automatically dispose of nonworking numbers and for the interviewing staff to code out businesses. For the cell phone sample, RTI applied Cell-Wins and removed numbers identified as inactive.

During the pilot test, the average interview length was 26.5 minutes for the adult survey and 8.6 minutes for the child survey. The total interview length was similar between landline and cell phone respondents. The median times (i.e., the 50th percentile) were similar to average times, which indicates that outlier interviews did not influence the average times. The average times exceeded the target average time of 20 minutes for the adult survey and 5 minutes for the child survey.

3.4   Cuts for Length

To bring the survey within a budgeted average of 20 minutes for adult respondents and 5 minutes per child proxy, questions were cut from both the adult and child instruments. The changes made included:

- Streamlined Section A (insurance) to reduce interview time by cutting some questions, shortening others, and moving the question about dental coverage to the dental access sequence.

- Altered survey such that anyone who said yes to ESI or VA/Tricare/CHAMPUS and do not have Medicare skip the rest of Section A. Anyone saying yes to Medicare would also be asked about Medicaid (to identify dually enrolled individuals); then anyone who responded yes to either Medicare or Medicaid would skip to Section B. Only individuals who said no to all other insurance types would go to A7. The same changes were made to the child insurance module.

- The wording of insurance questions was shortened. For instance, the lists of program names are overly comprehensive. Question A1a, the confirmation for being uninsured, was cut. The question on dental coverage was moved to the dental access section, so that everyone is asked the same question at the same time.

- The interview strategy in the ANYHELP sequence in Section A was simplified. People with Medicare, Medicaid, or healthcare.gov insurance was asked to complete the ANYHELP sequence. Cases were limited to those with insurance through healthcare.gov. and the sequence was redesigned as a single question that focuses on the navigator/assistors of specific interest.

- The insurance history sequence was shortened and reasons for unmet dental needs, and also cut follow-up items related to medical bill problems.

Beyond deletions, the introduction, transition, and closing statements were revised to shorten the survey and reduce break-offs. Other minor text changes were made for clarity and flow purposes. Finally, a number of small logic errors were found and corrected.

Final versions of the Adult and Child questionnaires with CATI specifications can be found in ***Appendix D: Final Questionnaires***.

Data Collection

4.1 Procedures

RTI used the Voxco CATI software system to program and field the KMHS. This fully integrated program provided call management and replicate controls, multilingual interviewing capabilities, monitoring, and incidence tracking. The software automatically controlled skip and fill logic as well as range checking for numeric data. The programming logic directed the questionnaire's flow and prevented an interviewer from entering data in the wrong field. On any given screen of the questionnaire, the program accepted only a predetermined range or type of response.

4.1.1 Implementation Protocol

The KMHS closely followed the Centers for Disease Control and Prevention's (CDC) Behavioral Risk Factor Surveillance System (BRFSS) calling protocols used on the 2017 OMAS. The instrument maintained counters to manage protocol. The KMHS used up to a 10-attempt protocol for landline sample and up to a 5-attempt protocol for the cell phone sample.

Call Scheduling

To encourage the most diverse population participation, RTI scheduled most interviewing session hours for weekday evenings, Saturday and Sunday The target time interviewing period was between 5 p.m. and 9 p.m. respondent time on weekdays, between 10 a.m. and 9 p.m. on Saturday, and between 1 p.m. and 9 p.m. on Sundays. RTI's ROC also scheduled shifts between 9 a.m. and 5 p.m. on weekdays for up to a maximum of 20% of total session hours, primarily to dispose of business numbers and to reach respondents who work or are otherwise unavailable in the evenings.

Number of Attempts

Interviewers made a minimum of 10 attempts to reach an eligible household and interviewed an eligible adult for each telephone number in the landline sample frame. Each call attempt was given a minimum of five rings. The attempts were rotated through weekday day, weekday evening, Saturday, and Sunday shifts to maximize coverage of the residential population. Additional attempts were made when a household was reached and eligible for the study. Persistent "ring no-answers" were attempted a minimum of four times across varying days of the week. If a respondent was contacted on the last call and an interview could not be completed, another attempt was made.

Lines that were busy were called back a minimum of two times at 15-minute intervals. If the line was still busy after the third attempt, the number was attempted again on different calling occasions until the record was resolved.

Cell phone numbers were dialed a minimum of five times.

Callbacks

The CATI system allowed two types of callbacks depending on whether the respondent could offer a specific time and date to be contacted again. A system-scheduled callback was assigned to a record that could not be given a specific date and time, and a scheduled callback was for respondents who provided a definite appointment for recontact.

Callbacks to specific respondents were entered into the computer by interviewers and handled automatically by the program. RTI's system accommodated both general and specific callbacks. For a specific appointment, the record waited until the designated time to be released. At this time, the system found the next available interviewer and delivered the record as the next call. The call history screen that accompanied each record informed the interviewer that the call was a definite appointment and described the circumstances of the original contact. General callbacks, where respondents requested that we try to reach them at a generally specified time of day ("I usually get home around 6 o'clock") were sorted and allotted automatically by the system. They were held out of the sample until the appointed hour, when they were sent to a station with an open slot for that call. They had a higher system priority than returning no answer and busy records but a lower priority than specific callbacks.

RTI's system also accommodated restarting interrupted interviews by using a definite callback strategy. If a cooperative respondent had to terminate an interview but wanted to finish at a later time, it was possible to set a definite callback for that exact time and restart the interview where it left off. If the interviewer who began the survey was available at the prescribed time, the system sent the call back to that station.

The Voxco system automatically handled callbacks for "no answer," "busy," and "answering machine" outcomes. Repeated no answers were retried at different times of day and days of the week as follows: If a call between 5 p.m. and 6 p.m. resulted in no answer, the record was put in the queue to be retried between 8 p.m. and 9 p.m. of the same shift. Calls resulting in a busy signal were automatically recycled within the same shift according to a preset schedule. As with no answers, if a shift closed before an automatically rescheduled busy was attempted the number was cycled to the next available calling time.

4.1.2 Household Selection

The KMHS definition for determining eligible households in the landline sample was based on similar health access survey such as OMAS. This defines an eligible household as any residential housing unit such as an apartment, a house, or a mobile home. Ineligible households included dormitories; hospital rooms; nursing homes; group homes; sororities and fraternities; halfway houses; shelters; prisons or barracks; businesses; or any number that reached a computer, fax line, or pay phone. If the selected respondent had not lived in Kansas or Missouri for at least 1 month prior to the interview, the household was also considered ineligible.

4.1.3 Respondent Selection

After a household was determined to be eligible, household members were verified as being eligible; eligibility included all related adults (19 years of age or older), unrelated adults, roommates, and

domestic workers who considered the household their home. Household members did not include adult family members who were living elsewhere at the time of the interview.

The KMHS used the "most recent birthday method" to randomly select a respondent for an interview. Interviewers asked the person answering the screening questions to identify the adult 19 year of age or older currently living in the household who had had the most recent birthday. Full identification was not required; a first name or relationship was accepted. The person identified as having had the most recent birthday was the selected respondent for the interview. For the cell phone sample, the adult associated with the cell phone was by default the selected respondent.

4.1.4 Proxy Interviews

The KMHS allowed for the use of proxy interviews. Proxies were requested when the selected respondent had a cognitive or physical impairment. A knowledgeable adult for the proxy was defined as someone 19 years of age or older who was able to answer questions about the selected respondent's health insurance. For interviews that were suspended and resumed, the CATI program prompted interviewers to continue the survey only with the person who started the interview. As mentioned in the previous sections, proxies were not allowed in the cell phone study.

Proxy interviews were conducted for all child interviews in the KMHS. In these interviews, the screener randomly selected the child with the most recent birthday. For the landline sample, the interviewer then asked to speak to the adult most knowledgeable about the selected child's health insurance; in 1% of interviews the child interview was completed by someone other than the adult respondent. For the cell phone sample, the adult associated with the cell phone was asked to answer the child questions rather than handing the cell phone to another adult.

4.1.5 Refusal Conversion

All interviewers calling on the KMHS were trained to avoid refusals. When respondents refused to participate, the interviewer left a note explaining what had happened or had been said, if anything, and RTI's refusal conversion specialists made at least one more contact. Exceptions were made for cases in which the person answering the phone said something indicating a callback would not be appropriate, such as making threats. Whenever a respondent refused to be interviewed or terminated an interview in progress, the interviewer recorded information as to why the respondent refused or terminated the interview and entered this information into the CATI system. Staff reviewed this information just before calling the telephone number again. During nonresponse refresher training, supervisory staff compiled these cases and reviewed effective strategies for nonresponse avoidance and conversion.

Although a high response rate was important, the role of the interviewers was not to harass respondents into participating in either the selection process or the interview. Interviewers were trained to inform their supervisor:

- if the respondent was verbally abusive or threatened litigation,
- if the respondent requested to be placed on a "do not call" list, or
- if the household refused to transfer the call to the selected respondent and stated that they would never allow the call to be passed to the selected respondent.

These numbers were terminated and coded as final refusals not to be called back.

4.1.6 Spanish Interviewing

RTI conducted the KMHS in English and Spanish. Of the 4,274 completed records in the final data file, 154 were collected in a specialized CATI effort associating Spanish-speaking interviewers with records flagged during the primary collection effort as belonging to non–English-speaking households. The procedure for conducting interviews in Spanish was straightforward: When a bilingual interviewer reached a Spanish-speaking respondent, the interviewer explained the survey in Spanish and continued directly into the interview without interruption. When a non–Spanish-speaking interviewer contacted a Spanish-speaking household, the record was coded for Spanish interviewing, and the system automatically routed the record to a bilingual interviewer for subsequent attempts.

4.1.7 Methods Used to Increase Response Rates

RTI implemented a variety of methods to maximize response rates for the KMHS:

- the use of a "short" version of the child questionnaire
- leaving messages on answering machines and privacy managers
- providing verification numbers for RTI and the survey sponsors
- employing special refusal conversion efforts
- reattempting phone numbers on different days and at different times of day to maximize efforts to each household
- conducting interviews in Spanish and English
- the use of a $10 incentive for cell phone respondents

Each of these is described in detail below.

Leaving Messages on Answering Machines

RTI interviewing staff left messages on persistent "answering machine" and "privacy manager" dispositions, informing respondents of the study and scheduling another call attempt for the following day. The message stated that RTI interviewers were calling on behalf of nonprofit health organizations in Kansas and Missouri and that a callback at their convenience would be appreciated. The call center's toll-free telephone number was left on the answering machine. Messages were left on the first and fourth attempts to a household if an answering machine or privacy manager was reached on these attempts. For privacy managers, if a message could not be left, the interviewers were instructed to enter the call center's toll-free telephone number. RTI's call center supervisors were set up to handle incoming respondent calls to complete the interview in response to an answering machine message.

The text of the answering machine message appears below:

Hello, my name is (First and Last name) and I'm calling on behalf of nonprofit health organizations in Kansas and Missouri about a survey on health insurance coverage and problems getting care. Your participation will help the funders improve access to health care in your state. Please call us at 1-800-613-2408 at your convenience. We look forward to speaking with you. Thank you.

Survey Verification Lines

RTI's ROC dedicated a toll-free telephone number to receive respondent calls regarding the legitimacy and validity of the study. Project leaders took responsibility for responding to concerns about the survey effort and shared this information with funders as necessary.

Refusal Conversion Efforts

Refusal conversion for the KMHS occurred at two points: the initial contact with the household and during any subsequent contacts with the household. Study protocols allowed for the reattempt of households that had initially refused. Section 4.1.5   Refusal Conversion has more detailed information about the refusal conversion protocols for the KMHS.

Reattempting Numbers

As discussed earlier in Section 4.1.1, Implementation Protocol, telephone numbers that did not initially produce a completed interview were contacted on different days and at different times of the day to maximize efforts to reach each household. The study protocol allowed calling to be done over many weeks to ensure that respondents on vacation and those not at home during common calling hours could be reached.

Conducting Interviews in Spanish

The KMHS was conducted in English and Spanish to maximize response rates and increase the participation of Kansas and Missouri's Hispanic population. As noted previously, fewer than one percent were conducted by Spanish-speaking interviewers with households or cell phones which were flagged as non-English speaking within the system.

The Use of a $10 Incentive for Cell Phone Respondents

As noted in Section 2 (Sampling), the KMAS design set the desired number of interviews on the cell phone frame to be 80% of all interviews. With this allocation, there was concern about potential undercoverage because of respondents on prepaid plans not wanting to participate in the survey because of the impact on their cell phone minutes. People using a prepaid plan make up one in three cell phone users in the United States (Lifsher, 2013). Prepaid phone users may be highly correlated with lower economic status or those living in rural areas (Berzofsky et. al., 2015)—both key demographic groups for KMHS. To ensure representation from prepaid users, the KMHS offered a $10 incentive.

The process for notifying and implementing the cell phone incentive was as follows:

1. At the beginning of the interview, cell phone respondents were notified about the incentive. Only respondents who completed the interview were eligible for the incentive.
2. At the completion of the interview, the respondent was offered the incentive in one of two ways: by electronic Amazon code or by check. The respondent also had the option of declining the incentive. If the online gift card was selected, the respondent needed to provide a valid e-mail address. The check was offered only to participants who stated that they could not or did not want to receive an Amazon e-code.

4.1.8 Determining a Completed Interview

An interview was considered complete when a selected respondent or knowledgeable proxy answered

- the adult section of the questionnaire through and including the question about adult health insurance status or
- the adult section of the questionnaire, including the question about adult health insurance status and at least the key questions in the child section of the questionnaire.

In the KMHS final dataset, there are variables indicating the status of the adult and child sections of each case. Included in the final dataset are 332 interviews (7.8% of cases in the final dataset) that completed the health insurance status module in the adult questionnaire but terminated before completing the full instrument were coded as partial complete interviews. Adult interviews that completed all the adult modules are considered fully completed interviews. Because both partial and full respondents provided the critical analytic data, their records were included in the final dataset.

4.1.9 Interviewer Training

The KMHS data collection project team conducted an 8-hour project training that included talking points, slide presentations on various aspects of the KMHS telephone interviewing process, and certification exercises for training modules to ensure interviewers were able to apply what they had learned. All training materials were provided to the REACH Foundation prior to training and will be resent after the main study training occurs.

In-person training included instruction in using the Voxco CATI system, administering the survey instrument, strategies for gaining cooperation and averting refusals, and an overall understanding of the project purpose, background, and goals. At the end of in-person training, all interviewers completed a certification process for five critical skill areas:

- answering frequently asked questions and gaining cooperation/averting refusals;

- administering a mock interview;

- accessing the CATI, recording comments, and entering status codes;

- understanding the project's purpose, background, and goals; and

- correctly pronouncing key words in the instrument.

   All interviewers are required to pass each certification before they begin work in the field.

   Additional information about the training can be found in *Appendix B: Interviewer Training Manual*.

4.2   Response Rates

To affirm the representation of the target population in a study, researchers look to response rates as indicators of performance. There is no one agreed-upon standard response rate formula because each

project lends itself to different measures of performance. Several of these performance measures are discussed below.

All response rates will be affected by the procedure of assigning final status dispositions. The results of each call attempt were assigned a disposition according to guidelines published by the American Association for Public Opinion Research (AAPOR). These final dispositions can be summarized as follows:

Eligible
- Completes and partial interviews (if applicable)
- Refusals and noncontacts (after confirming eligible household)

Ineligible
- Survey Ineligible = No eligible respondents in household or cell phone did not belong to an eligible adult
- Nonresidential = Not a residential phone number

Unknown
- Unknown Eligible (known household) = Confirmed household but did not establish survey eligibility (landline); confirmed person owns phone but did not establish that phone is used for personal use (cell phone)
- Unknown Household = Cannot confirm whether the number is residential

Each telephone record's history of attempts is analyzed to determine the record's final status. Priority is given to outcomes that gather the most information. (For more information, see ***Table 4-2***.)

4.2.1 Lower-Bound Response Rate

The lower-bound response rate provides the lowest possible response rate figure. Also known as AAPOR Response Rate #1, it is obtained by dividing the number of completed interviews by the maximum number of potentially qualified households:

$$RR1 = \frac{Completes}{Eligible + Unknown}$$

For this survey, the lower-bound response rate was 1.7% for the landline sample, 2.1% for the cell phone sample, and 2.1% overall.

Table 4-2.   Distribution of Disposition Codes by AAPOR Response Category and Phone Type

Rank	AAPOR Group	Label	Count		
			Landline	Cell Phone	All Records
1	1.1	Completes (full interviews only)	395	3,556	3,951
2	1.2	Partial Complete	34	293	327
3	2.1	Refusals and Break-offs	1,442	10,629	12,071
4	2.2	Non Contact (incl. Answering Machines)	2	59	61
5	2.3	Other	0	0	0
6	4.4	Tech Circumstance (incl. Changed Number, Cellular Phones, Pagers)	45	23	68
7	4.5	Non-Residence (incl. Businesses, Dorms)	2,544	3,294	5,838
8	4.7	No Eligible Respondent (incl. No Adults, Not Qualified for Oversample)	189	8,641	8,830
9	4.2	Fax/Data Line	1,005	20	1,025
10	4.3	Non-Working, Disconnected Number	4,480	23,465	27,945
11	3.1	Unknown, No Answer	48		48
12	3.2	Housing Unit, Unknown if Eligible Respondent (Screener Not Completed)	4,937	17,069	22,006
13	3.9	Unknown Eligibility, Other (incl. Language Barrier, Physical Impairment Preventing Interview)	2,524	46,685	49,209

4.2.2 CASRO and AAPOR Response Rates

Some response rates take into account the ability of the interviewing staff to establish contact with potentially eligible households and to resolve all numbers that do not ring into potentially eligible households. In cases where resolution is not achieved—that is, telephone numbers cannot be assigned dispositions that definitely reflect eligibility—these response rates generally use an estimate of the rate at which telephone numbers ring into eligible households to classify a fraction of these numbers of unknown disposition as eligible. Compared to the lower-bound rate, these response rates increase the response rate calculation by not assuming all unscreened numbers belong to qualifying households. In addition, some "adjusted" response rates assign cases to the denominator where the respondent is eligible but unable to complete the interview because of impairment or language difficulties. One adjusted response rate, defined by the Council of American Survey Research Organizations (CASRO) and equivalent to AAPOR's Response Rate #3, calculates the eligible households by taking a proportion of the unresolved numbers and classifying them as eligible.

$$RR3 = \frac{Completes}{Eligible + e_u \times Unknown}, \text{ where } e_u = \left(\frac{Eligible}{Eligible + Ineligible} \right)$$

For this study, this calculation produced an AAPOR Response Rate #3 response rate of 12.1% for the landline sample, 10.8% for the cell phone sample, and 11.0% overall.

At the end of data collection, this study treats partial completes in the same manner as total completed interviews and includes them in the final analysis file. For this reason, we produced AAPOR's Response Rate #4, which includes partial completes in the numerator of the response rate equation.

$$RR4 = \frac{Completes + Partials}{Eligible + e_u \times Unknown}, \text{ where } e_u = \left(\frac{Eligible}{Eligible + Ineligible} \right)$$

For this study, this calculation produced an AAPOR Response Rate #4 response rate of 13.2% for the landline sample, 11.6% for the cell phone sample, and 11.9% overall.

4.2.3 Upper-Bound Response Rate

The upper-bound response rate provides the most optimistic percentage of generally recognized response rates. The upper bound, also known as AAPOR's Response Rate #5, is a measure of interviewer performance and does not take into account sample quality (e.g., numbers that ring but are never answered) nor household behavior that prevents contact (e.g., privacy manager technology, screening calls using an answering machine).

$$RR5 = \frac{Completes}{Eligible}$$

The upper-bound cooperation rate for this study was 22.9% for the landline sample, 26.4% for the cell phone sample, and 26.1% overall.

4.2.4 All Rates—Presented by State, Region, Stratum, and County

The sampling design was a dual-frame (cell phone and landline) design that included strata for each county within each frame.

4.3   Interviewer Debriefing and Retraining

During the KMHS data collection period there were two types of primary interviewer retraining: (1) general follow-up training approximately 1 week after an interviewer had completed general training and (2) ongoing, individual training based on observations from monitoring sessions (both live and recorded). There were also regular quality circle meetings to provide interviewers with updates on progress, provide information about any instrument changes, give and receive any feedback, and cover any administrative items.

The main points of focus during the general retraining were proper coding of case disposition, questionnaire administration, refusal aversion and conversion, and clarifying any issues that the telephone interviewers encountered in their first week of production (Q&A format) and needed additional clarification or guidance. During individual training with monitors or supervisors, telephone interviewers were provided specific instances and examples of where they could improve. These sessions were inclusive both of onsite monitoring and monitoring that the client team conducted. Overarching

observations from both sets of monitoring were nearly the same, and improvement was observed over time. Comments included

- issues with pronouncing numbers like a "northerner" and the word *ask;*
- lack of familiarity with the questionnaire: "stumbling and sounding choppy";
- reading answer choices or interviewer notes when not necessary;
- not consistently emphasizing highlighted words;
- reading too slowly or too quickly;
- over-probing or insufficient probing;
- interviewers being chatty and overly casual;
- good and appropriate handling of difficult respondents by addressing concerns, explaining the survey, and maintaining professionalism;
- being accommodating with elderly respondents: adjusting tone of voice and pace and being patient;
- enunciating and reading clearly;
- good use of neutral probing and interviewer prompts;
- engaging respondents to participate; and
- enthusiastic and pleasant tone of voice.

In addition, the verbatim coding process, which was an ongoing process conducted by RTI during the field period, revealed the need to integrate verbatim questions into the retraining procedures.

When observations from monitoring were felt to be a trend as much as isolated occurrences, this feedback was provided to interviewing staff during quality circle meetings to make sure there was no widespread misunderstanding. Feedback from interviewers during these meetings was mostly related to handling specific questions and getting clarification of standard interviewing techniques. Most interviewers expressed enjoyment with the work and being part of a research team.

Data Processing and Analysis

5.1   Dataset

The Voxco survey management system stored KMHS telephone disposition data, sample data, survey response data, and data that the survey management system created into a centralized database. The final dataset was created in the SAS statistical program produced directly from the meta and survey data collected in Voxco. The final dataset contains sample information and survey responses but does not include the telephone number to preserve respondent confidentiality.

5.2   Data Processing

5.2.1   Cleaning the Data

Inconsistent Responses

The CATI program prevents most data inconsistences with built-in variable range and skip logic checks. Some inconsistencies in the data, however, the CATI instrument cannot prevent; instead, such inconsistencies are corrected after data collection. The following list describes these inconsistencies, with the corrective action steps taken for each:

- **Inconsistencies resulting from incorrect open-end recoding:** There were a few occurrences where the open-ended response did not match the question (i.e., Why was it a problem seeing a specialist? "It was not a problem to see a specialist." The initial question asking whether it was a problem should have been answered, "Not a problem.") These were resolved and fixed in the open-end recoding process.
- **Inconsistencies because of respondents providing contradictory responses:** In certain cases, the CATI program could not force consistent data responses. For example, if a respondent stated that there were more adults in the family than in the household, the CATI script was programmed to verify this information. If the respondent stated that his or her response was correct, the inconsistency remained. These inconsistencies remained in the final dataset.
- **Inconsistencies introduced during postprocessing:** Occasionally, respondents provided contradictory responses, and the steps to correct the inconsistency yielded further complications. For example, if a respondent mentioned that he or she was insured through a current job, he or she was automatically coded as being employed. The next question asked the same respondent to indicate place of employment. Some respondents answered that they did not work or that they had lost their job. This inconsistency remained.

Outliers—Out-of-Range Responses

The CATI program developed for the KMHS was designed to minimize inconsistent responses throughout the questionnaire, and range checks were set to appropriate limits on responses. For example, if a question asked, "How many days in the last 30 did you drink alcohol?" the answer should fall between 0 and 30. All range checks were "hard" in the sense that the computer would not allow entry of

an out-of-range response. Consistency checks verified that responses matched one another across questions. For instance, if a respondent said that there were more adults in his or her central family unit than lived in the household, a consistency check prompted the interviewer to reconcile the responses between the two questions.

Missing Values

Both "don't know" and "refused" were consistently coded throughout the questionnaire as 98 and 99 or 998 and 999.

5.2.2 Coding Open-Ended Responses

The KMHS went through an upcoding process – reassigning open-ended responses to an existing response option when applicable – for all open-ended responses questions. All open-ended responses from the data were output into files that were subsequently imported into a customized Microsoft Excel spreadsheet for verbatim coding. Several coders worked under a supervisor who checked their work for consistency.

Final coded verbatim data were merged back into the SAS dataset for delivery to the KMHS funders. Data variables containing recoded verbatim text have the appendage *_REC* on the variable name in the final dataset.

5.2.3 Recoded, Derived, and Auto-Coded Variables

In the KMHS, several variables were created to make analysis of the data easier. These variables come in one of three forms:

- recoded variable
- derived variable
- auto-coded variable

These variables are identifiable in the dataset based on their names. For example, variables that end with *_REC* are recoded variables. Also, variables that do not have a survey item in their name are derived variables.

Recoded Variable

Recoded variables are variables that are exact replicates of a survey item, renamed to something that is more intuitive to the user. When applicable, recoded variables include open-ended responses that have been assigned to (1) an existing category, (2) a newly created category because of a large propensity of open-ended responses with a response not provided to respondents, or (3) an "other" category. These variables were created for the items of analytic importance that can be directly linked to only one survey question.

Derived Variable

Derived variables are variables that are created from two or more survey items. These items often involve the skip logic in the survey to ensure that the levels of the derived variable are properly

categorized. Furthermore, certain characteristics can be ascertained from several questions in the survey (e.g., does the person have insurance). Derived variables look at all these items when categorizing an individual to have a particular characteristic.

Auto-Coded Variables

Auto-coded variables are variables the CATI program creates during the interview based on respondent-answered questions. These variables are created during the interview process so that they can be used during the interview.

5.2.4 Quality Review

RTI conducted extensive tests of the integrity of the final data. RTI programmers developed SAS scripts that tested the integrity of all survey responses against the CATI logic and against the recoded, derived, and auto-coded variables. These scripts attempted to flag cases that violated any logic rules. Inconsistencies were logged in an output file and checked by data processing staff to see whether any of the data processing programs needed to be corrected.

After the final set of variables were recoded and created and analytic weights were produced, the data were reviewed for quality assurance. A set of checks was implemented to verify the key components of the data:

- Frequencies of derived variables with their source survey variables to ensure appropriate assignments
- Verification of universe totals (i.e., those eligible for an item) for each survey and derived variable
- Comparison of key estimates with prior year survey data to ensure that change in estimates was reasonable or expected
- Verification that all imputed variables had no item nonresponse after imputation
- Verification that the imputed variables had expected distributions
- Verification that all survey weights were positive and greater than one
- Verification that survey weight totals summed to expected control totals

5.2.5 Data Formatting

The final dataset was produced in SAS, Stata and SPSS. The file has an associated format library that contains variable labels to help users understand the source and content of the variable. The format values were provided to the funders.

5.3   Imputation

Key survey variables for which a respondent did not provide an answer were imputed to allow for a complete analysis data file. These variables were identified for one of two reasons: (1) their necessity in the weighting process and (2) the need to be part of a complete data file to ensure that records with a missing value in one of these variables could still be included in analyses using these variables. In the KMHS only variables required for weighting were imputed. Such variables are identified in the final dataset with the *_imp* suffix in the variable name. All variables were imputed with a stochastic imputation

approach that uses the distribution of the respondent set for a variable conditioned on correlated characteristics such as state of residence, county type, and age category.

5.3.1 Variables used in Weighting Which Required Imputation

The weighting process uses characteristics which are known from external sources to control for differences between the distribution in the sample and the population. If the response value for one of these variables is missing in the survey response imputation is needed in order to appropriately produce a survey weight. The variables which required imputation in the KMHS include:

- Adult race/ethnicity
- Education level
- Adult gender
- Number of telephones in household (landline) or owned (cell phone)
- Child race/ethnicity
- Child gender
- Child age category

5.3.3 Amount of Item Nonresponse

Across all the variables imputed, the level of missing data ranged from 0.1% (gender of adult) to 9.4% (age category of child). *Table 5-2* shows the number and percentage of missing data for each item imputed.

Table 5-2.   Number and Percentage of Missing Data for Imputed Variables

Variable	Non-respondents	Respondents	Pct. Missing
RACE_ETHNIC_A – 5-level race/ethnicity of adult	290	3,984	6.8%
GENDER_A – Gender of adult	3	4,271	0.1%
EDUCCAT4_A – 4-level Education level of adult	312	3,966	7.3%
L10 – Number of telephones	321	3,957	7.5%
RACE_ETHNIC_C – 5-level race/ethnicity of child	114	1,113	9.3%
GENDER_C – Gender of child	101	1,126	8.2%
AGECAT3W_C – Age category of child	115	1,112	9.4%

5.4 Weighting

For the KMHS, RTI incorporated four major steps in the process to create the survey weights to ensure proper inference to the target population:

- design-based weights
- nonresponse adjustment
- dual-frame adjustment
- poststratification
- weight trimming

This section describes these steps in detail.

5.4.1 Design-Based Weight

The design-based weight (wt0) for each selected number is the inverse probability of selection. For KMHS, which used a stratified design, the design-based weight is equal to the number of telephone numbers available in a stratum divided by the number of telephone numbers selected.

5.4.2 Nonresponse Adjustment

The first step in the weighting adjustment process was to adjust the design-based weights (wt0) for nonresponse and other survey design factors (i.e., child oversample, number of people in the household, number of telephone lines). To account for each of these adjustments the nonresponse step was broken into four sequential parts. Each of these parts was conducted separately for adult respondents (including those with a child) and the child interviews. These parts were implemented as described:

- **Nonresponse adjustment (wt1):** Within the sampling stratum (county for landline numbers and rate center county for cell phone), the design-based weights of respondents were adjusted to account for the weight of the eligible nonresponding phone numbers.
- **Multiple phone number adjustment (wt2):** Respondent weights were divided by the number of phone numbers (of the phone type—landline or cell phone—being responded on) reported by the respondent (e.g., $wt2 = wt1/n_j$ where $n_j = 1, 2, \ldots, k^*$ is the number of phone numbers person j has capped at three for landline respondents and two for cell phone respondents).
- **Number of people in household adjustment (wt3):** To account for the subselection of a respondent within a household for landline respondents, the weight was multiplied by the reported number of people in the household (capped at 4) (e.g., $wt3 = wt3*n_h$) where $n_h = 1, 2, 3,$ or 4—the number of adults in the household). A similar adjustment was made for the child weight using the number of children in the household. No adjustment was made for cell phone respondents (i.e., $wt3 = wt2$).

5.4.3 Dual-Frame Adjustment

To minimize potential respondent bias, the KMHS incorporated a dual-frame design that used both landline and cell phone numbers. To maximize the likelihood of reaching a potential respondent, the KMHS design allowed for respondents to be selected from either their landline or cell phone number (if they had both). However, the weight for these dual-frame respondents needed to be adjusted to account for the fact that they could have been selected from either frame (Lu et al., 2013). To identify the dual-frame respondents, the KMHS asked each respondent if he or she had a cell phone (if responding on a landline) or landline phone (if responding on a cell phone).

The KMHS used single-frame estimation (SFE) to adjust the weights of these dual-frame users. SFE treats dual-frame users as if they were selected from a single combined cell phone and landline frame. To achieve this goal, the joint probabilities of selection are calculated for each dual-frame user. Under an SFE approach, the weight for single frame users equals its nonresponse adjusted weight (i.e., an adjustment factor of one was applied). Mathematically, the SFE weights can be written as

$$wt_{SFE} = \begin{cases} wt4 & \textit{If landline only user} \\ \dfrac{1}{1/wt4_{LL} + 1/wt4_{Cell}} & \textit{If dual frame user} \\ wt4 & \textit{If cellphone only user} \end{cases}$$

5.4.4 Poststratification

After the dual-frame adjustment, the respondent weights were poststratified to known control totals. This step ensures that weights of the respondents accurately reflect the distribution of the target population. In other words, this step corrects for the fact that the distribution of the respondent sample may not be the same as the distribution of the target population. To make this adjustment, RTI used the generalized exponential model (GEM; Folsom & Singh, 2002), which is a raking procedure that simultaneously controls the marginal totals. Separate models were fit for the adult respondents and the child interviews. The KMHS produced separate poststratification models for Kansas and Missouri. The following characteristics were controlled for among adult respondents:

- Age (3 levels)
- Race (2 levels)
- Gender (2 levels)
- Phone type (3 levels)
- Education (2 levels)
- County type (3 levels)
- REACH/HCF service area (2 levels)

Table 5-3 displays the marginal control totals used for the adult population totals (population frequency), the marginal adjustment made at each characteristic level, and the minimum and maximum weight adjustment. The control totals for age, race, gender, region, education, and county came from the 5-year ACS. The control totals for phone type came from the 2016 National Health Interview Survey (NCHS, 2017).

The child weights were poststratified to the following characteristics:

- Age (3 levels)
- Race (2 levels)
- Gender (2 levels)
- Phone type (3 levels)
- County type (3 levels)

Table 5-3.   Adult Population Totals by State

Adult Variable	Kansas		Missouri	
	Count	Percentage	Count	Percentage
Total	2,192,370	100.0%	4,702,936	100.0%
Age, years				
19–44	1,030,950	47.0%	2,118,754	45.1%
45–64	723,749	33.0%	1,607,203	34.2%
65+	437,671	20.0%	976,979	20.8%
Race				
White, Non-Hispanic	1,739,474	79.3%	3,841,702	81.7%
Non-White	452,896	20.7%	861,234	18.3%
Gender				
Male	1,081,183	49.3%	2,280,183	48.5%
Female	1,111,187	50.7%	2,422,753	51.5%
Phone Type				
Cell	1,528,499	69.7%	3,296,450	70.1%
Mixed	358,171	16.3%	747,195	15.9%
Land	305,700	13.9%	659,290	14.0%
County Type				
Urban	1,416,908	64.6%	2,726,622	58.0%
Mid-Size	404,190	18.4%	1,453,964	30.9%
Rural	371,272	16.9%	522,350	11.1%
REACH/HCF Service Area				
Yes	556,581	25.4%	624,567	13.3%
No	1,635,789	74.6%	4,078,369	86.7%
Education level				
High School or less	798,860	36.4%	1,952,780	41.5%
Greater than High School	1,393,510	63.6%	2,750,156	58.5%

Table 5-4 displays the marginal control totals used for the child population totals (population frequency), the marginal adjustment made at each characteristic level, and the minimum and maximum weight adjustment.

Table 5-4.   Child Population Totals by State

Adult Variable	Kansas		Missouri	
	Count	Percentage	Count	Percentage
Total	714,919	100.0%	1,390,064	100.0%
Age, years				
0–5	197,406	27.6%	371,532	26.7%
6–12	202,670	28.3%	383,413	27.6%
13–18	314,843	44.0%	635,119	45.7%
Race				
White, Non-Hispanic	477,008	66.7%	1,010,372	72.7%
Non-White	237,911	33.3%	379,692	27.3%
Gender				
Male	367,670	51.4%	714,468	51.4%
Female	347,249	48.6%	675,596	48.6%
County Type				
Urban	464,355	65.0%	803,835	57.8%
Mid-Size	138,183	19.3%	435,039	31.3%
Rural	112,381	15.7%	151,190	10.9%
Phone Type				
Cell	590,842	82.6%	1,178,438	84.8%
Mixed	81,979	11.5%	168,141	12.1%
Land	42,098	5.9%	43,485	3.1%

5.4.5 Weight Trimming

The final step in the weighting process was to trim the extreme weights. This step is conducted to ensure that no one respondent has too much influence on the estimates. Weight trimming is useful to improve precision by reducing the variation in the weights. However, too much trimming may introduce bias in the estimates. Therefore, an analysis was conducted to determine the smallest level of weight trimming that sufficiently improved precision without introducing the potential for bias. As a part of this analysis, weight trimming levels of the largest 1%, 2.5%, 5%, and 7.5% of weights were compared. This comparison was conducted at the state and county levels.

For the KMHS, based on the analysis results, the largest 5% of weights among adults in Missouri were trimmed. No trimming was conducted in Kansas or among children in Missouri. This trimming involved identifying weights larger than the weight value at the 95th percentile. Weights larger than this value were capped at the 95th percentile. The trimmed weight was redistributed to weights below the 95th percentile such that their weights were kept in the weighting class from which they came. In other words, the marginal control totals created in the poststratification step were maintained. The trimming step was conducted using the GEM.

5.4.6 Design Effects

To help evaluate the impact of the KMHS sample design and weighting adjustments on the variability of estimates, RTI reviewed the design effects (DEFF; Kish, 1965) for key outcomes at the state and county levels. The design effect is defined as:

$$DEFF = \frac{sampling\ variance\ of\ a\ complex\ design}{sampling\ variance\ of\ a\ simple\ random\ sample}$$

For a proportion, which most of KMHS estimates are, this formula translates to:

$$DEFF_{prop} = \frac{v(\hat{p})_{complex}}{v(\hat{p})_{SRS}}$$

Where $\hat{p}$ is the estimated proportion; $v(\hat{p})_{SRS}$ is the estimated variance of the estimated proportion, assuming a simple random sample; and $v(\hat{p})_{complex}$ is the estimated variance of the estimated proportion, taking into account the complex survey design.

Factors in the KMHS design that contributed to the design effect include the following:

- **Stratification:** For both the landline and cell phone samples, a stratified design was used at the county or county type level. When the outcome of interest is homogeneous within a stratum, the design effect can be reduced.
- **Oversampling:** To meet the precision requirements for key subpopulations of the KMHS, the sample allocation to each stratum was altered from a proportional allocation to give more sample to strata with counties in the REACH/HCF service area. Any deviation from a proportional allocation is considered an oversample of one or more strata. Oversampling creates variation in the probabilities of selection, which increases the design effect.
- **Within-household selection:** One adult person for the landline sample and one child (if any were present) within each household were selected. Because the number of adults (or children) varied across households, the probability of selection for people in a household differed across households. This differing probability of selection increases the design effect.
- **Weight adjustments:** To reduce the potential for nonresponse and coverage bias, differential weight adjustments were applied to respondents. If response and coverage propensities varied greatly among subpopulations, the design effect may have increased as a result of these adjustments. In addition, weight trimming was conducted on the final set of weights to reduce the design effect of an estimate.

In general, the combination of the above factors led to a design effect greater than one. To illustrate the design effects in the KMHS, *Table 5-5* presents the design effects at the state level for the percentage of adults and children insured, respectively.

Table 5-5.   Design Effects at the State and County Type Levels for Adult and Child Estimates of Key Outcomes

	Insurance		Unmet Need	
Medicaid Region	**Adult**	**Child/a**	**Adult**	**Child**
Kansas	2.82	0.98	3.47	1.88
Urban	3.01	1.56	3.64	1.44
Mid-size	1.42	n/a	1.46	1.05
Rural	2.64	n/a	5.64	3.06
Missouri	3.46	1.69	3.88	1.67
Urban	3.20	1.71	3.87	1.50
Mid-size	4.60	n/a	4.95	2.03
Rural	1.27	n/a	1.37	1.37

n/a = Due to small sample sizes estimates are not recommended

5.5   Estimation

The KMHS used a complex survey design. As such, special procedures are required to properly calculate the standard error of estimates. This section details the approach for proper estimation. Examples of how to use existing software (e.g., Stata, SUDAAN) are presented in *Appendix E* (Data Usage).

5.5.1   Estimation Approach

Estimates in the KMHS can be produced through Taylor series linearization (TSL). TSL is a computational procedure that uses the sampling design, including strata and clusters, to estimate standard errors. For clustered designs, standard errors are estimated from the standard error among clusters; for stratified designs, such as KMHS, standard error are estimated within each stratum. Estimates of standard errors of means are available through formula; more complex estimates are then functions of means so that derivatives are used to linearize the variance. More information about Taylor series variance estimation for sample survey data is available in Woodruff (1971); Fuller (1975); Lohr (2009); Särndal, Swensson, and Wretman (1992); Lee, Forthofer, and Lorimor (1989); and Wolter (1985).

5.5.2   Estimation Variables

To calculate the TSL standard errors, the analyst needs the stratum identifiers, cluster identifiers, and analysis weights. The required variables for the KMHS are

- **WT_A:** analysis weight for adults,
- **WT_C:** analysis weight for children, and
- **STRATUM:** stratification indicator.

The KMHS had some strata for which there is only one adult or child respondent in a stratum. In these cases, estimation requires the use of either the grand mean or collapsing strata.

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Appendix A: Pilot Test Report

(Separate Document on Project Website)

Appendix B: Interviewer Training Manual

(Separate Document on Project Website)

Appendix C: Data Dictionary

(Separate Document on Project Website)

Appendix D: Survey Questionnaire

(Separate Document on Project Website)

Appendix E: Data Usage

E.1   Instructions for Using Weights

For the purposes of design-based (variance) estimation, the data file includes the following design variables:

- WT_A, WT_C: adjusted survey weights for adult-level and child-level estimates and analyses
- STRATA: a stratum indicator for generating design-based variance estimators

Sampling variances for the weighted estimates that account for the complex sample design can be computed with statistical software such as SUDAAN, STATA, or SAS.

An example SUDAAN statement would necessitate a Nest statement where STRATUM is specified, and a Design statement with a "WR" specification for a with-replacement sampling design (approximation).

An example follows for a health insurance variable (INSRD_A) that is tabulated by region.

```
Proc Descript Data=KMHS.ssd" Filetype=sas Design=WR;
Weight  WT_A;
Nest    STRATA;
Var     INSRD_A_IMP;
Tables  REGION;
Class   REGION;
Title   "KMHSS, Percent of adults insured by region";
Print Percent SEPercent;
```

This example SAS code shows how to compute the weighted percentage of adults insured statewide:

```
Proc Surveymeans Data= KMHS mean;
Stratum STRATA;
Weight WT_A;
Var INSRD_A_IMP:
Class INSRD_A_IMP;
Domain REGION;
run;
```

The following example STATA code shows how to compute the weighted percentage of adults uninsured statewide.

```
svyset _n [pweight=wt_a], strata(strata) vce(linearized) singleunit(certainty)
```

xi, noomit: svy: tabulate INSRD_A_IMP, level(95) ci deff

E.2 Limitations and Cautions When Using the Data

The KMHS carries with it the following limitations and cautions regarding use of the data:

- The data were collected via telephone only. A telephone-only approach precluded the ability to do the following:

  – Collect information from consumers of the sampled population without valid telephone numbers.
  – Maximize the number of attempts to reach nonrespondents; a mail-and-telephone survey method would increase the number of attempts.
  – Reach respondents in a manner that is most suitable for themselves; for example, respondents with limited speaking abilities may be more likely to conduct the survey via mail because they would not be required to talk to an interviewer.
  – Minimize bias that may result from only one mode of data collection. A study conducted in 1998 with the 36-Item Short Form Health Survey found that younger adults were more likely to refuse to participate when the study was administered via mail, whereas older adults were more likely to refuse telephone interviews (Perkins & Sanson-Fisher, 1998).

- Interviews were only conducted with households that could speak English or Spanish well enough to be interviewed. Thus, non–English- and non–Spanish-speaking households were excluded from the survey. As identified by the final dispositions, less than one tenth of 1% of households contacted were unable to complete the survey because of a language barrier.
- The literature indicates that using proxies can introduce bias to the survey results. Several studies have shown consistent differences between self- and proxy reporting (Bassett, Magaziner, & Hebel, 1990; Ellis et al., 2003; Epstein, Hall, Tognetti, Son, & Conant, 1989; Kovar & Wright, 1973; Mathiowetz & Groves, 1985; Todorov, 2003). The research has shown that proxies have difficulty measuring another person's behaviors or disabilities because they have a different perception of the behavior or disability when it is not their own. Availability of information also can be an issue when using proxies because they may not have the direct knowledge to respond accurately about another person's behavior or opinions. Proxies were limited to cases where the selected household member had a long-term or permanent physical or mental impairment. Of the more than 42,000 cases in the final data file, fewer than 1% were completed by proxy. Unrelated to the adult section, the child section was always by proxy.
- The inability to verify the information collected, and the reliance on self-reported insurance status and health behaviors, are further limitations of the study. Although both live monitoring of interviewers and review of their recordings verified the information as recorded, this survey's protocols did not allow for the verification of respondent insurance status by obtaining a copy of their insurance card. Research has shown that differences occur when comparing claims data and medical records to self-reported information provided in a telephone survey (Fowles, Rosheim, Fowler, Craft, & Arrichiello, 1999).

These limitations, as they relate to the ability to use the KMHS data, are common to all RDD telephone surveys in the following ways:

- The data can only be generalized to the population surveyed (i.e., the information cannot be generalized to households without telephones).

- Comparisons made to other data sources for Kansas and Missouri must be done with the understanding that differences in the data could result from differences in the how the survey was designed and conducted—not necessarily because of actual differences in the population of interest.
- To maximize coverage when conducting a telephone study, a dual frame of landline and cell phone numbers must be used. The KMHS used an overlapping dual-frame design, which included respondents who could have been captured from either frame. This poses several methodological challenges related to a person with both a landline and cell phone having multiple chances of being selected. As discussed in the section on weighting (5.3), the KMHS used a single-frame estimation technique to account for this overlap and to ensure proper weights for inference to the target population.
- When considering subpopulation sizes with KMHS data analysis, the RTI recommends using the NCHS guidelines for health-surveillance suppression of cell sizes of 10 or fewer to protect against possible identification breaches (NCHS, 2004).

E.3 Survey Dispositions

This section presents the final dispositions for the entire study and by region stratum and county. For details, see *Tables G-1 through G-4*.

1.1   Interview
1.2   Partial Interview
1.3   Refusals
2.2   Noncontact
3.1   Unknown, No Answer
3.2   Unknown Household
3.9   Unknown Other
4.2   Fax/Data Line
4.3   Nonworking, Disconnected Number
4.4   Tech Circumstance (incl. Changed Number, Cellular Phones, Pagers)
4.5   Nonresidence (incl. Businesses, Dorms)
4.7   No Eligible Respondent (incl. No Adults, Not Qualified for Oversample)