December 8, 2015

2015 Ohio Medicaid Assessment Survey

Methodology Report

Prepared for

Ohio Colleges of Medicine Government Resource Center
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Introduction

1.1 Project Overview

The Ohio Department of Medicaid, the Ohio Department of Health (ODH), the Ohio Colleges of Medicine Government Resource Center (GRC), The Ohio State University (OSU), and other State of Ohio health-associated agencies teamed with RTI International to conduct the 2015 Ohio Medicaid Assessment Survey (OMAS), the latest in a series of surveys dating back to 1998.[1] Similar to earlier iterations of the OMAS and its predecessor, the Ohio Family Health Survey (OFHS), the 2015 OMAS collected data on the health status, health insurance status, health care access and utilization, and demographics of Ohioans for the purpose of assisting in the efficient and effective operations of the Ohio Medicaid program and other state programs. Specifically, the 2015 OMAS:

- provides data comparable to earlier versions of the OMAS and OFHS conducted in 2012, 2010, 2008, and 2004,[2] to assess changes over time;
- informs policies that serve Ohio's Medicaid and potentially Medicaid-eligible populations;
- helps policymakers assess the impact of recent changes in Ohio's economic climate, the health care marketplace, and government programs related to health care reform on Ohioans' health status and access to care; and
- helps policymakers evaluate the health risks of Ohioans.

The 2015 OMAS was fielded from January through June 2015. Data collection was conducted via telephone surveys in randomly selected Ohio households with landline telephones and Ohio individuals with cell phones. The survey was administered 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 or younger).

Representatives from Ohio Medicaid, GRC, OSU, ODH, the Ohio Department of Developmental Disabilities, the Ohio Department of Aging, the Ohio Department of Mental Health and Addiction Services, and RTI formed a working group called the OMAS Executive Committee (OMAS EC). The OMAS EC met in early August 2014 to initiate the project and review methodological procedures for implementing the OMAS. This collaboration continued through weekly meetings, ongoing reporting of results, and co-development of the survey instruments and methodological procedures for data capture, cleaning, and reporting.

[1] From 1998 to 2010, these surveys were referred to as the Ohio Family Health Survey (OFHS). The name was changed with the 2012 survey to reflect the role of Ohio Medicaid in funding and leading the survey effort.

[2] Because of methodological differences between the two studies, we do not recommend comparing results from the 2015 OMAS with the 1998 OFHS.

The OMAS EC was concerned with maintaining methodological continuity between the 2015 OMAS and earlier iterations of the survey, and maintaining a high standard for quality assurance in project procedures to preserve the validity of the data collected. This report describes the procedures involved in achieving these objectives.

1.2 Design Overview

The 2015 OMAS adult and child questionnaires covered several topics regarding the health and health insurance status of Ohio residents. 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. Consistent with the 2012 OMAS, the age at which one was considered a child for purposes of household enumeration and administration of the child survey instrument was 18 and under for the 2015 OMAS. This keeps the child age classification in line with the Ohio Medicaid program eligibility rules.

The sample design for the 2015 OMAS 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 2015 OMAS 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 ODH and at RTI. The IRBs reviewed materials and spoke with the Principal Investigators at OSU and GRC, and the Project Director at RTI, to assess whether the 2015 OMAS fell under their respective responsibilities for protecting human subjects in sponsored research. The IRBs determined that the 2015 OMAS was research in support of governmental agency programs, which under federal code does not necessarily require IRB oversight. The ODH IRB did agree that ODH would field and respond to respondent calls about the survey, including complaints and requests for information, and that ODH staff taking such calls would report any concerns to the ODH and RTI IRBs.

2

Sampling

2.1 Objectives of the Sample Design

The 2015 OMAS employed a five-pronged design consisting of the following:

1. a list-assisted random digit-dial (RDD) sample of landline numbers;

2. a high, medium, and low incidence African American RDD supplemental sample (landline African American oversample);

3. an Asian and Hispanic surname-based sample (Asian and Hispanic surname landline list samples);

4. a stratified random sample of cell phone numbers by rate center county (cell phone sample); and

5. a high incidence African American cell phone supplemental sample (cell phone African American oversample).

2.2 Sampling Plan

The OMAS 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 state of Ohio and select metropolitan counties and various subpopulations and regions of interest.

As we describe in this section, five separate samples were allocated to meet the 2015 OMAS goals. For each of the five 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[a]
Base cell phone sample	465,431	20,959	22,285
Cell phone African American oversample[b]	77,193	3,041	4,138
Base landline sample	680,546	12,650	11,958
Landline African American oversample[c]	150,201	2,578	1,872
Hispanic surname sample	27,614	384	1,304
Asian surname sample	23,162	388	1,319
Total	1,424,147	40,000	42,876

[a] Excludes 492 cases from the pilot.

[b] Number selected in Cuyahoga and Franklin counties. High African American strata based on the proportion of African Americans living in a rate center according to Claritas.

[c] Number selected in the "high" African American density strata in the five metropolitan counties (excluding Summit and Stark counties, which lacked high density African American exchanges). The high African American strata are defined as the exchanges with the largest density of African Americans. Density was determined based on Census data for the geographic areas served by exchanges (see section 2.4.2 below). The exact density cut-point varied across the five major metropolitan counties: Cuyahoga, Franklin, Hamilton, Lucas and Mahoning.

2.3 Population of Interest

The target population for the OMAS was the total, non-institutionalized adult and child populations residing in residential households in Ohio. 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 Ohio 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 2015 OMAS used a dual frame. The two frames consisted of (1) a list of all cell phone numbers, and (2) a list of all landline numbers. The 2015 OMAS used an overlapping design whereby dual users (i.e., persons who can be reached on either a cell phone or a landline phone number) can enter the survey through either phone type.[3]

2.4.1 Cell Phone Frame

For the cell phone sample, the Telecordia Local Exchange Routing Guide was used to identify the cell phone 1,000-blocks in Ohio. 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 OMAS consisted of a random sample of telephone numbers from all current operating telephone exchanges in Ohio. MSG's Genesys system was used to generate the full set of 100-blocks in Ohio—100-blocks refers to groupings of 100 phone numbers based on the area code, exchange, and next two numbers (e.g., 614-366-31XX 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 2015 OMAS was a stratified simple random sample of telephone numbers in Ohio. The 2015 OMAS sample design needs to support estimation at the following geographic levels:

- State
- Medicaid region
- County type
- County

To support estimation at each of these levels, the 2015 OMAS targeted 42,000 completed interviews.

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. In addition, the design considerations took into account the potential need to use small area estimation to produce estimates for

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

some outcomes when the number of respondents endorsing an outcome of interest is smaller than desired. Details and results from the design analysis comparison are provided in Berzofsky et al. (in press).

Given the shift in the type of telephone used in Ohio—52.6% identify as cell phone only or cell phone mostly telephone users (Blumberg et al., 2013) with a greater proportion of minorities, low income and households with children shifting to cell phones (Lu et al., 2014)—the 2015 OMAS shifted to a predominantly cell phone sample allocating. The 2015 OMAS targeted 60% of desired interviews to come from phone numbers on the cell phone frame and 40% from the landline frame. This translates to 25,200 respondents from the cell phone frame and 16,800 respondents from the landline frame. This allocation is an increase over the 2012 OMAS, which allocated 25% of the desired number of respondents to the cell phone frame, and the 2008 OFHS, which allocated less than 5% of the desired number of respondents to the cell phone frame.

Within each phone type, sample was distributed across five broad categories: two categories in the cell phone sample and three categories in the landline sample. For the cell phone sample these categories include (1) the base cell phone sample, and (2) the African American oversample. For the landline sample the categories include (1) base landline sample, (2) African American oversample, and (3) Asian and Hispanic surname lists. Each frame was stratified even further to help ensure estimation at each of the geographic levels of interest. Across both frames 213 unique strata were formed in the 2015 OMAS. 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 2015 OMAS targeted 25,200 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 90 unique geographic areas. Stratification was done at the county and sub-county levels. 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 resides. Therefore, a county can contain multiple rate centers or no rate centers[4]. These areas can be grouped to form strata based on the county for which the majority of the rate center resides; that is, rate centers can be assigned to a county. The collection of rate centers to form a county are 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 other than Cuyahoga and Franklin was its own stratum (86 strata). The rate center counties for Cuyahoga County and Franklin County were further broken out into high

[4] In Ohio, two counties – Carrol County and Vinton County – do not have any rate center areas assigned to them.

density African American and low density African American strata by over laying Census population information with the rate center boundaries (four strata; see Section 2.6.3 for further details).

2.6.2 Base Cell Phone Sample

The base cell phone sample was allocated across the 90 cell phone strata. To achieve the estimation goals of the 2015 OMAS, a minimum number of interviews per stratum was set at 45 completed interviews in each county. Initially, the cell phone sample was allocated proportionally across the 90 strata based on the number of cellular-dedicated 1,000 blocks in each stratum. If the proportional allocation resulted in a targeted sample size less than 45 the sample size was set at 45. Using a raking procedure, the sample size in the other strata were reduced as to not exceed the total number of desired interviews.

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 et al., in press). The Rate Center Plus method uses the 2012 OMAS 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 African American Oversample

Based on population information from Claritas, which overlays Census population information with the rate center boundaries, Cuyahoga County and Franklin County contained rate center areas that were over 30% African American ("AA" in subsequent tables). To increase the likelihood of contacting an African American, these rate center areas were oversampled. Within each county, these rate center areas were pooled to create sub-county strata. In addition to the base landline sample allocated to each of these strata, 300 completed interviews were allocated to them.

2.6.4 Sample Selection

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

2.7 Landline Sample

The 2015 OMAS targeted 16,800 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 123 unique strata. Stratification was done at the county and sub-county levels. The nonmetropolitan counties plus Stark and Summit were each a stratum (83 strata). Each of the remaining five metropolitan counties[5] were further split into three strata based on the density of African Americans living in the Census tract (15 strata). Furthermore, in counties for which a large

[5] The five metropolitan counties are Cuyahoga, Franklin, Hamilton, Lucas, and Montgomery.

portion of the listed Asian or Hispanic listed numbers existed (i.e., at least 10% of total listed numbers) the listed Asian or Hispanic numbers in that county were assigned their own stratum (25 strata).

2.7.2 Base Landline Sample

The base cell phone sample was allocated across the 123 landline strata. To achieve the estimation goals of the 2015 OMAS, a minimum number of interviews per stratum was set at 45 completed interviews in each county. The initial allocation was based on the number of landline numbers in each stratum. If, based on a proportional allocation, the number of allocated interviews was less than 45, the sample size was set to 45. A raking procedure was used to reduce the sample allocation in the other strata. 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, et.al. 2013). Therefore, because the potential increase in bias was large, listed households were not oversampled.

2.7.2 African American Oversample

One key goal of the OMAS was to produce reliable probability-based estimates of the African American population. To achieve this, an oversample of telephone numbers in the five high-density African American counties[6] (Cuyahoga, Franklin, Hamilton, Lucas, and Montgomery) was conducted.[7] An oversample of African Americans in these counties was needed to achieve a reliable estimate because African Americans in Ohio are heavily concentrated in these five counties, requiring the large majority of African American respondents to come from these metropolitan counties.

Because of the desire to produce an African American estimate for each of the five largest urban counties, a balanced allocation of the African American oversample was used. In each county for which African Americans had a population density large enough to create substrata, a balance oversampling of 300 interviews was allocated to county by frame type.

On the landline frame, each county was then further stratified into high-, medium-, and low-density African American areas. High-, medium-, and low-density refers to the concentration of telephone numbers associated with African American households in an exchange. Current data from Claritas were used to determine the percentage of African Americans in each telephone exchange. Phone exchanges were stratified into three categories (high, medium, and low density). ***Table 2-2*** presents the distribution of telephone numbers based on the associated percentage of African American households in the five metro counties for which on oversample was conducted. Because these distributions are not the same in each county, the definition of high, medium, and low density varied by county. The categories were created in such a way to maximize the likelihood of obtaining the desired number of African American respondents while maintaining a reasonable unequal weighting effect. Using these categories, for each county, an optimization routine was used to maximize the number of completed in the high-density

[6] Based on results of the 2012 OMAS, Stark and Summit counties did not have enough African American residents to make the oversampling in those counties efficient.

[7] On the landline frame oversampling was conducted in all five counties; on the cell phone frame oversampling was conducted only in Cuyahoga and Franklin counties.

African American stratum while ensuring that the unequal weighting effect for the county did not exceed a specified threshold.

Table 2-2. Number of Landline Telephone Numbers Assigned to an African American Household within the Seven Metro Counties, by Stratum Type

County	Total number of telephone landline numbers by density of African Americans in landline exchange					Expected number of African American landline telephone numbers by density of African Americans in landline exchanges				
	>80%	60%–80%	40%–60%	20%–40%	<20%	>80%	60%–80%	40%–60%	20%–40%	<20%
Cuyahoga	63,100	354,500	147,600	274,600	754,700	57,171	242,012	75,070	83,348	37,541
Franklin	0	36,000	77,700	387,700	801,400	0	22,891	33,320	117,769	84,311
Hamilton	600	2,300	25,300	268,500	306,600	514	1,542	118,212	83,412	24,730
Lucas	100	44,000	27,200	124,300	293,600	91	27,005	15,840	33,930	23,967
Montgomery	10,300	87,300	7,300	98,100	383,000	8,264	59,069	3,137	30,822	26,307

2.7.3 Asian and Hispanic List Samples

Another goal of the OMAS was to obtain reliable probability-based estimates of Asians and Hispanics residing in Ohio. Asians and Hispanics are not geographically clustered in Ohio. However, the ethnicity of household members can often be ascertained by the last name (or surname) associated with the household. These surnames are known for listed landline telephone numbers. Therefore, they can be grouped and oversampled to increase the likelihood of an Asian or Hispanic person being included in the sample. To achieve the desired number of Asian and Hispanic respondents the use of surname lists was necessary. However, based on prior experience, not all telephone numbers associated with a surname telephone number is of the desired ethnicity. Therefore, the 2015 OMAS included all willing respondents in the surname strata (i.e., non-Asian or non-Hispanic respondents will not be screened out if identified through the surname sample list).

To better control the distribution of Asian and Hispanic respondents across county, the surname lists were further stratified by county. Determining which Ohio counties should be stratified for a surname list was conducted through a three-step process. First, a database of all listed numbers in Ohio was generated with associated names and telephone numbers. Second, the distribution of surname numbers by county was computed. Counties with at least 10% of the surname numbers were identified for stratification. Third, a list of all possible Asian and Hispanic surnames was generated in each county with at least 10% of the surname list for the respective ethnicity. ***Table 2-3*** lists the counties for which Asians and Hispanic surname strata were created. In all, 11 counties met the threshold for Hispanics and 14 counties met the threshold for Asians.

Table 2-3. Counties with an Asian or Hispanic Surname Stratum

County	Asian strata	Hispanic strata
Butler	X	X
Cuyahoga	X	X
Delaware	X	
Franklin	X	X
Hamilton	X	X
Lake	X	X
Lorain	X	X
Lucas	X	X
Mahoning		X
Montgomery	X	X
Stark	X	X
Summit	X	X
Warren	X	

2.7.4 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. For the surname strata, within each identified county, all listed surname telephone numbers were selected (i.e., all numbers were selected with certainty).

2.7.5 Selection of Respondents within a Household

Among the households contacted through a landline, one adult (i.e., 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. Persons 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

the same as the one selected to complete the adult survey, but it was someone different when the randomly selected adult indicated that he or she could not accurately respond for the child.

2.8 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. The ratios varied by stratum type (i.e., landline, cell phone, surname sample). RTI used data from the 2012 OMAS to arrive at these average ratios. However, data from the 2012 OMAS also demonstrated that persons across strata did not respond at the same rate. Therefore, RTI used the 2012 OMAS response rates to adjust the ratios used to determine the starting number of selected phone numbers for the 2015 OMAS. The adjustment applied to the average rate for 2015 was the ratio of the average 2012 response rate and the response rate within the stratum in 2012. For the landline RDD samples (i.e., base landline, African American oversample, and surname samples) an average response rate of 55:1 was used. For cell phone samples (base cell phone, African American oversample), a ratio of 30:1 was used. ***Table2-4*** shows the amount of sample purchased and released by stratum.[8]

Table 2-4. Sample Released for Calling by Stratum

Stratum	Description	Phone Type	Sample Purchased	Sample Released[a]
1	Adams County	LL	2,074	817
2	Allen County	LL	9,397	1,847
3	Ashland County	LL	3,431	1,182
4	Ashtabula County	LL	5,141	1,232
5	Athens County	LL	4,507	1,690
6	Auglaize County	LL	2,347	769
7	Belmont County	LL	3,875	1,331
8	Brown County	LL	2,395	683
9	Butler County—Hispanic Surname	LL	956	717
10	Butler County—Asian Surname	LL	1,243	979
11	Butler County	LL	18,076	7,882
12	Carroll County	LL	2,395	742
13	Champaign County	LL	2,324	637
14	Clark County	LL	7,747	2,532
15	Clermont County—Asian Surname	LL	579	485
16	Clermont County	LL	10,532	4,125
17	Clinton County	LL	2,621	1,042
18	Columbiana County	LL	5,243	2,158
19	Coshocton County	LL	1,959	701
20	Crawford County	LL	3,213	1,088
21	Cuyahoga County—Hispanic Surname	LL	8,256	5,006

(continued)

[8] Sample purchased includes 777,452 cases that were removed during cleaning as nonworking numbers and were not released.

Table 2-4. Sample Released for Calling by Stratum (continued)

Stratum	Description	Phone Type	Sample Purchased	Sample Released[a]
22	Cuyahoga County—Asian Surname	LL	5,528	3,656
23	Cuyahoga County—AA Low Density	LL	37,542	14,131
24	Cuyahoga County—AA Medium Density	LL	22,829	6,888
25	Cuyahoga County—AA High Density	LL	27,320	5,584
26	Darke County	LL	3,053	1,105
27	Defiance County	LL	2,723	754
28	Delaware County—Asian Surname	LL	402	365
29	Delaware County	LL	9,717	4,474
30	Erie County	LL	5,132	1,757
31	Fairfield County	LL	8,292	2,830
32	Fayette County	LL	2,457	604
33	Franklin County—Hispanic Surname	LL	4,900	2,391
34	Franklin County—Asian Surname	LL	5,423	2,874
35	Franklin County—AA Low Density	LL	36,189	10,709
36	Franklin County—AA Medium Density	LL	24,582	7,431
37	Franklin County—AA High Density	LL	37,000	6,484
38	Fulton County	LL	3,630	607
39	Gallia County	LL	2,242	534
40	Geauga County	LL	6,322	2,319
41	Greene County—Asian Surname	LL	636	524
42	Greene County	LL	9,046	2,855
43	Guernsey County	LL	1,867	746
44	Hamilton County—Hispanic Surname	LL	1,726	1,154
45	Hamilton County—Asian Surname	LL	2,624	2,034
46	Hamilton County—AA Low Density	LL	15,931	6,392
47	Hamilton County—AA Medium Density	LL	19,450	8,082
48	Hamilton County—AA High Density	LL	35,020	15,105
49	Hancock County	LL	4,735	1,410
50	Hardin County	LL	2,732	744
51	Harrison County	LL	2,105	532
52	Henry County	LL	2,411	414
53	Highland County	LL	2,611	701
54	Hocking County	LL	1,898	738
55	Holmes County	LL	3,159	838
56	Huron County	LL	4,080	1,479
57	Jackson County	LL	2,151	775
58	Jefferson County	LL	3,528	1,057
59	Knox County	LL	5,232	1,171
60	Lake County—Hispanic Surname	LL	1,081	713
61	Lake County—Asian Surname	LL	760	567

(continued)

Table 2-4. Sample Released for Calling by Stratum (continued)

Stratum	Description	Phone Type	Sample Purchased	Sample Released[a]
62	Lake County	LL	9,623	3,560
63	Lawrence County	LL	3,066	968
64	Licking County	LL	11,731	3,976
65	Logan County	LL	2,806	1,349
66	Lorain County—Hispanic Surname	LL	2,777	1,471
67	Lorain County—Asian Surname	LL	765	515
68	Lorain County	LL	20,290	5,487
69	Lucas County—Hispanic Surname	LL	3,000	1,463
70	Lucas County—Asian Surname	LL	1,395	925
71	Lucas County—AA Low Density	LL	17,682	5,722
72	Lucas County—AA Medium Density	LL	4,421	1,510
73	Lucas County—AA High Density	LL	19,999	7,539
74	Madison County	LL	2,575	798
75	Mahoning County—Hispanic Surname	LL	1,442	856
76	Mahoning County	LL	12,091	4,080
77	Marion County	LL	3,881	1,201
78	Medina County	LL	8,520	3,386
79	Meigs County	LL	2,089	741
80	Mercer County	LL	2,662	695
81	Miami County	LL	6,464	2,585
82	Monroe County	LL	2,066	576
83	Montgomery County—Hispanic Surname	LL	1,272	684
84	Montgomery County	LL	1,965	936
85	Montgomery County—AA Low Density	LL	15,837	4,336
86	Montgomery County—AA Medium Density	LL	4,061	855
87	Montgomery County—AA High Density	LL	30,862	7,291
88	Morgan County	LL	2,143	334
89	Morrow County	LL	2,526	365
90	Muskingum County	LL	4,832	1,202
91	Noble County	LL	1,554	637
92	Ottawa County	LL	2,580	927
93	Paulding County	LL	2,548	752
94	Perry County	LL	2,319	798
95	Pickaway County	LL	2,923	1,467
96	Pike County	LL	2,028	597
97	Portage County	LL	10,632	3,631
98	Preble County	LL	2,041	852
99	Putnam County	LL	2,334	498
100	Richland County	LL	9,967	2,491
101	Ross County	LL	4,060	887

(continued)

Table 2-4. Sample Released for Calling by Stratum (continued)

Stratum	Description	Phone Type	Sample Purchased	Sample Released[a]
102	Sandusky County	LL	4,175	1,579
103	Scioto County	LL	4,587	2,129
104	Seneca County	LL	3,059	944
105	Shelby County	LL	2,259	1,087
106	Stark County—Hispanic Surname	LL	962	605
107	Stark County—Asian Surname	LL	1,006	634
108	Stark County	LL	33,498	12,065
109	Summit County—Hispanic Surname	LL	1,242	837
110	Summit County—Asian Surname	LL	1,898	1,324
111	Summit County	LL	48,861	17,442
112	Trumbull County	LL	13,889	3,838
113	Tuscarawas County	LL	4,755	1,809
114	Union County	LL	3,703	1,412
115	Van Wert County	LL	2,923	686
116	Vinton County	LL	1,630	605
117	Warren County—Asian Surname	LL	903	614
118	Warren County	LL	11,811	5,115
119	Washington County	LL	3,696	947
120	Wayne County	LL	9,855	1,984
121	Williams County	LL	2,809	826
122	Wood County	LL	9,316	2,598
123	Wyandot County	LL	2,480	672
124	Adams County	Cell	296	177
125	Allen County	Cell	7,998	5,660
126	Ashland County	Cell	2,857	2,134
127	Ashtabula County	Cell	5,880	4,071
128	Athens County	Cell	6,821	4,497
129	Auglaize County	Cell	303	121
130	Belmont County	Cell	2,700	1,734
131	Brown County	Cell	1,325	913
132	Butler County	Cell	4,464	2,723
134	Champaign County	Cell	589	415
135	Clark County	Cell	5,315	3,593
136	Clermont County	Cell	1,417	984
137	Clinton County	Cell	2,093	1,307
138	Columbiana County	Cell	3,268	1,933
139	Coshocton County	Cell	2,074	1,468
140	Crawford County	Cell	871	566
141	Cuyahoga County—AA Low Density	Cell	18,041	4,513
142	Cuyahoga County—AA High Density	Cell	36,885	24,449

(continued)

Table 2-4. Sample Released for Calling by Stratum (continued)

Stratum	Description	Phone Type	Sample Purchased	Sample Released[a]
143	Darke County	Cell	2,835	2,119
144	Defiance County	Cell	2,358	1,314
145	Delaware County	Cell	2,327	1,782
146	Erie County	Cell	3,866	2,591
147	Fairfield County	Cell	3,345	2,534
148	Fayette County	Cell	408	252
149	Franklin County—AA Low Density	Cell	8,629	1,920
150	Franklin County—AA High Density	Cell	40,308	26,955
151	Fulton County	Cell	304	216
152	Gallia County	Cell	1,871	934
153	Geauga County	Cell	1,158	820
154	Greene County	Cell	1,175	407
155	Guernsey County	Cell	4,377	2,475
156	Hamilton County	Cell	54,707	32,493
157	Hancock County	Cell	5,568	4,251
158	Hardin County	Cell	1,026	650
159	Harrison County	Cell	1,091	567
160	Henry County	Cell	790	551
161	Highland County	Cell	2,338	1,545
162	Hocking County	Cell	1,810	1,174
163	Holmes County	Cell	2,395	1,629
164	Huron County	Cell	3,377	2,361
165	Jackson County	Cell	1,493	936
166	Jefferson County	Cell	3,132	2,007
167	Knox County	Cell	5,497	4,233
168	Lake County	Cell	18,831	13,903
169	Lawrence County	Cell	2,499	1,485
170	Licking County	Cell	5,189	3,716
171	Logan County	Cell	3,195	2,294
172	Lorain County	Cell	12,142	8,734
173	Lucas County	Cell	28,719	19,640
174	Madison County	Cell	956	640
175	Mahoning County	Cell	13,669	8,578
176	Marion County	Cell	4,616	3,406
177	Medina County	Cell	5,382	4,190
178	Meigs County	Cell	930	644
179	Mercer County	Cell	5,415	4,656
180	Miami County	Cell	2,561	1,794
181	Monroe County	Cell	1,157	791
182	Montgomery County	Cell	38,866	25,761

(continued)

Table 2-4. Sample Released for Calling by Stratum (continued)

Stratum	Description	Phone Type	Sample Purchased	Sample Released[a]
183	Morgan County	Cell	406	231
184	Morrow County	Cell	1,395	899
185	Muskingum County	Cell	5,192	3,437
186	Noble County	Cell	1,297	748
187	Ottawa County	Cell	1,014	533
188	Paulding County	Cell	816	431
189	Perry County	Cell	795	519
190	Pickaway County	Cell	2,007	1,476
191	Pike County	Cell	1,366	720
192	Portage County	Cell	3,311	2,117
193	Preble County	Cell	1,507	903
194	Putnam County	Cell	1,621	1,184
195	Richland County	Cell	7,631	5,276
196	Ross County	Cell	7,358	5,032
197	Sandusky County	Cell	2,947	1,907
198	Scioto County	Cell	5,489	3,727
199	Seneca County	Cell	3,257	1,775
200	Shelby County	Cell	4,059	3,053
201	Stark County	Cell	21,697	13,152
202	Summit County	Cell	35,436	21,519
203	Trumbull County	Cell	5,668	2,950
204	Tuscarawas County	Cell	5,964	3,567
205	Union County	Cell	1,254	914
206	Van Wert County	Cell	2,073	1,486
208	Warren County	Cell	784	344
209	Washington County	Cell	4,944	3,135
210	Wayne County	Cell	6,468	5,220
211	Williams County	Cell	933	626
212	Wood County	Cell	1,882	1,422
213	Wyandot County	Cell	544	318

[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.

2.9 Pre-Data Collection Sample Processing

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

2.9.1 Cell Phone

The cell phone sample cannot be processed through a dialer. Therefore, to pre-process the cell phone sample and remove nonworking numbers, RTI relied on a service from MSG called Cell-Wins that uses billing records and call usage data to flag the status of cell phone numbers. Cell-Wins classifies a number into 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 be used in the past month or two.

Cell-Wins is a relatively new service. RTI evaluated the accuracy of the Cell-Wins flag in Ohio during the 2015 OMAS pilot. To evaluate the accuracy of the Cell-Wins flag in Ohio, the 2015 OMAS released 18,500 cell phone numbers regardless of their Cell-Wins activity status, but with a Cell-Wins activity status assigned. During data collection these numbers were tracked to determine if telephone numbers assigned as inactive were truly nonworking telephone numbers. If the telephone numbers are truly inactive then they can be excluded prior to being released without causing coverage bias; however, if the inactive flag is inaccurate than there is a potential for coverage bias. The evaluation found that telephone numbers assigned a Cell-Wins inactive status only created a 2.4% undercoverage rate (i.e., the vast majority of telephone numbers identified as inactive truly were nonworking telephone numbers). The rate varied by County Type, but was always less than 5% in all County Types. Berzofsky et al. (in press a) present the details and results of the experiment.

Based on the very low undercoverage rates demonstrated in the pilot experiment, Cell-Wins inactive telephone numbers were removed from the list of sampled telephone numbers prior to uploading to the CATI system. To ensure the maximum accuracy of the Cell-Wins flag, replicates did not have their Cell-Wins status assigned to them until 2 days before they were fielded. On average, Cell-Wins identified about 35% of cell phone numbers as inactive.

2.9.2 Landline

The pre-processing 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 (ISDN) 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.

2.10 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 in 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 2-5*** indicates the dates one which new replicates were released into the field and the amount of telephone numbers associated with the released replicates.

Table 2-5. Sample Released by Date

Release Date	Total Sample[a]
Landline	
1/5/2015[b]	67,248
1/15/2015	98,822
1/27/2015	41,189
3/4/2015	12,949
3/31/2015	44,809
4/27/2015	34,851
Total	299,868
Cell Phone	
1/5/2015[b]	25,141
1/28/2015	20,170
2/4/2015	20,381
2/11/2015	39,891
2/25/2015	21,041
3/13/2015	35,169
4/6/2015	31,052
4/13/2015	113,194
5/18/2015	40,788
Total	346,827

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

[b] Includes sample released during pilot, but completed during main study

2.11 Number of Respondents

The survey achieved 42,876 total interviews, including 16,453 from the landline frame and 26,423 from the cell phone frame. Across the strata the sample achieved targeted respondent sample size

goals of at least 45 interviews in each stratum in all but 13 landline strata and 2 cell phone strata[9]; combined, all but three counties (Fayette, Noble, and Vinton) achieved the targeted goal of 90 completed interviews. ***Table 2-6*** presents the number of completed interviews in each county by phone type.

Table 2-6. Completed Interviews by County and Telephone Type

Ohio County	Landline	Cell Phone	Total
Adams County	48	50	98
Allen County	73	388	461
Ashland County	54	186	240
Ashtabula County	116	252	368
Athens County	63	323	386
Auglaize County	49	229	278
Belmont County	115	110	225
Brown County	54	92	146
Butler County	464	579	1,043
Carroll County	50	61	111
Champaign County	52	86	138
Clark County	233	363	596
Clermont County	241	331	572
Clinton County	41	118	159
Columbiana County	142	210	352
Coshocton County	73	114	187
Crawford County	50	76	126
Cuyahoga County	1,801	1,919	3,720
Darke County	69	159	228
Defiance County	48	83	131
Delaware County	235	325	560
Erie County	88	178	266
Fairfield County	175	339	514
Fayette County	48	38	86
Franklin County	1,946	2,362	4,308
Fulton County	44	81	125

(continued)

[9] The landline strata that did not obtain their target sample size were Clinton, Hardin, Henry, Holmes, Logan, Mercer, Morrow, Noble, Ottawa, Preble, Seneca, Vinton, and Wyandot; the cell phone strata that did not obtain their target were Fayette and Vinton.

Table 2-6. Completed Interviews by County and Telephone Type (continued)

Ohio County	Landline	Cell Phone	Total
Gallia County	64	72	136
Geauga County	131	171	302
Greene County	257	368	625
Guernsey County	46	152	198
Hamilton County	1,348	1,513	2,861
Hancock County	77	294	371
Hardin County	35	102	137
Harrison County	44	47	91
Henry County	32	75	107
Highland County	47	147	194
Hocking County	52	96	148
Holmes County	26	104	130
Huron County	52	161	213
Jackson County	48	75	123
Jefferson County	99	122	221
Knox County	87	337	424
Lake County	287	487	774
Lawrence County	65	91	156
Licking County	282	430	712
Logan County	32	189	221
Lorain County	482	636	1,118
Lucas County	695	1,144	1,839
Madison County	49	109	158
Mahoning County	269	443	712
Marion County	82	233	315
Medina County	137	382	519
Meigs County	45	64	109
Mercer County	32	240	272
Miami County	133	265	398
Monroe County	54	64	118
Montgomery County	948	1,362	2,310

(continued)

Table 2-6. Completed Interviews by County and Telephone Type (continued)

Ohio County	Landline	Cell Phone	Total
Morgan County	52	63	115
Morrow County	30	121	151
Muskingum County	112	272	384
Noble County	30	48	78
Ottawa County	41	102	143
Paulding County	46	45	91
Perry County	47	100	147
Pickaway County	73	118	191
Pike County	47	74	121
Portage County	210	317	527
Preble County	37	93	130
Putnam County	45	137	182
Richland County	169	371	540
Ross County	100	371	471
Sandusky County	59	130	189
Scioto County	101	201	302
Seneca County	39	109	148
Shelby County	45	239	284
Stark County	739	837	1,576
Summit County	973	1,251	2,224
Trumbull County	242	370	612
Tuscarawas County	88	223	311
Union County	55	121	176
Van Wert County	45	130	175
Vinton County	24	44	68
Warren County	247	342	589
Washington County	86	245	331
Wayne County	98	447	545
Williams County	52	80	132
Wood County	86	329	415
Wyandot County	26	66	92
Total	16,453	26,423	42,876

Questionnaire

3.1 Instrument Content

The 2015 OMAS 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 ▪ 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 ▪ Establish the selected respondents' insurance status
Currently Insured (Adult)	Questions included a variety of characteristics about the respondent's health insurance, such as: ▪ Type ▪ Source ▪ Length of coverage ▪ Previous coverage ▪ Respondent's lack of coverage in the past
Currently Uninsured (Adult)	Respondents who were currently uninsured were asked about: ▪ The last time they had insurance ▪ Type and source of their previous health insurance
Health Status and Care-Giving (Adult)	Questions focused on respondents': ▪ General physical and mental health ▪ Current and past health care conditions ▪ Need for assistance in day-to-day activities, special therapy, and treatment or counseling ▪ Use of tobacco products and alcohol ▪ Current pregnancy (female respondents age 19-44 years only)

(continued)

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

Questionnaire Section	Contents of Section
Utilization and Quality of Adult Health Care Services (Adult)	Section asked respondents: ▪ When they last visited a doctor ▪ When they last saw a dentist ▪ Number of times spent in a hospital overnight ▪ How many times they had to go to the emergency room
Access to Care and Unmet Needs (Adult)	Topics covered: ▪ The place respondents usually went for health care ▪ Whether they had a personal doctor or nurse ▪ Characteristics of the care received at their usual place of care ▪ Whether they needed professional help coordinating health care and how often help was received ▪ Whether they needed to see a specialist within the past 12 months ▪ Their ability to access dental care ▪ Whether they experienced difficulty in getting needed prescriptions and other health care because of cost ▪ Use of prescription pain medications ▪ Ease of accessing care compared to 3 years ago ▪ Economic stressors related to health care, including ability to pay medical bills
Employment	Respondents were asked about: ▪ Their job status, and if they were currently employed ▪ A description of their work place setting, health insurance offered by their employer, the number of hours they worked ▪ The number of persons employed at their current place of business
Demographics and Family (Adult)	Demographic questions in this section included: ▪ Marital status ▪ Spouse/partner's employment status ▪ Education ▪ Race and ethnicity ▪ Income ▪ Number of telephone numbers within the household ▪ If 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) ▪ The selected child's current insurance status

(continued)

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

Questionnaire Section	Contents of Section
Insurance Coverage (Child)	If the selected child had insurance, the adult proxy was asked a variety of questions, such as: ▪ Type ▪ Source ▪ Period of time the child had been covered ▪ Previous coverage ▪ Any possible lack of coverage in the past
Currently Uninsured (Child)	If the selected child was uninsured at the time of the interview, the adult proxy was asked questions about the: ▪ Last time the child had insurance ▪ Type and source of the previous insurance ▪ Whether anyone tried to get Medicaid coverage for the child or reasons the child no longer had Medicaid coverage (if previously covered)
Health Status (Child)	Questions in this section focused on the child's: ▪ General and physical health ▪ Consumption of 100% fruit juice and sugar-sweetened beverages (children 0-5 years only) ▪ Use of prescription drugs and health services ▪ Ability to do age-appropriate activities ▪ Need for special therapy, treatment, or counseling
Utilization and Quality of Health Care Services (Child)	This section asked respondents about: ▪ The child's doctor and dental visits ▪ If the child had overnight stays in a hospital and any visits to an emergency room
Access to Care (Child)	Interviewers asked respondents about: ▪ Where the child usually goes to receive health care ▪ If the child has a personal doctor or nurse ▪ Characteristics of the care the child received at their usual place of care ▪ Whether the adult needed professional help coordinating the child's health care and how often help was received ▪ Any needs for a specialist within the past 12 months ▪ Whether they had a problem seeing a specialist, if applicable
Unmet Health Needs (Child)	This section of the survey asked about: ▪ Access to dental care, vision care, and other types of health care for the child ▪ Whether the child had not had a prescription filled because of the cost ▪ The ease of access to medical care for the child compared with 3 years ago
Demographics (Child)	Demographic items included the child's: ▪ Race and ethnicity ▪ The employment status of his or her parents

(continued)

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

Questionnaire Section	Contents of Section
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

The OMAS EC collaborated on the development of the survey questionnaire. The Research Team initiated the process by taking the survey instruments used in the 2012 OMAS and the 2004-2010 Ohio Family Health Surveys and reviewing them with the sponsoring state agencies to assess which items would remain, which would be removed, and what new items would be necessary to meet the agencies' current needs. These needs were incorporated into sections consisting of health system access and use, health demographics, poverty and economic stressors, health status, and health care reform policy issues for adults and children.

After the OMAS EC had developed a working draft of the adult and child instruments, RTI project staff assisted with finalization of the instrument and preparation for pilot testing. RTI staff examined the instruments for ease of administration and response, wording and response categories for new items, transitions and overall survey flow, skip patterns and item-specific logic, and actual survey length versus the budgeted length restrictions.

RTI received a draft version of the questionnaire from the OMAS EC in late September 2014, with the goal of programming, testing, and finalizing the survey for a pilot test in late December. 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;
- contributed items developed by RTI from other surveys to replace occupation-related items that were not deemed adequate based on prior iterations of the OMAS/OFHS;
- compiled a comprehensive assessment of recommended revisions to the 2012 OMAS and prior instruments, identifying problems that the project team believed the instrument posed for data collection and posed strategies for resolving those problems;
- 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 2015 OMAS 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 Wednesday, December 10, 2014, and continued through Thursday, December 18, 2014. All of the 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 300 cell phone and 200 landline interviews. At the conclusion of interviewing, RTI obtained 504 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 8,426 landline and cell phone sample records from across the state. RTI did not pre-screen the sample with the vendor prior to 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.

During the pilot test, the minimum interview length was 15.62 minutes and the maximum interview time was 79.51 minutes. Approximately 75% of all interviews, including households with children, were completed in less than 37 minutes. The total interview length was similar between landline and cell phone respondents. The mean interview time for cases administered for the adult questionnaire was 29.08 minutes, with a median time of 27.78 minutes (prior to making reductions to the instrument, the mean interview time for the adult questionnaire was 31.8 minutes with a median time of 30.7 minutes). Approximately 75% of all adult section interviews were completed in less than 32 minutes. The adult questionnaire interview time was similar between landline and cell phone respondents.

The pilot included 78 cases with a child interview. The mean interview time for cases administered to both the adult and child questionnaires was 39.8 minutes, with a median time of 38.4 minutes. The minimum interview length for cases administered both the adult and child questionnaires was 28.0 minutes and the maximum interview time was 67.7 minutes. Approximately 75% of all child questionnaire interviews were completed in less than 44.0 minutes.

A detailed report on the results of the pilot test, ***2015 Ohio Medicaid Assessment Survey: Pilot Test Report***, was delivered separately to the OMAS EC. The cases completed during the pilot period were not included in the final analytic dataset.

3.4 Cognitive Testing

RTI conducted an assessment of respondent comprehension for a subset of the survey items in the 2015 OMAS. The items selected had all been peer-reviewed and vetted by the OMAS EC members responsible for survey design but had not been administered in a prior round of the OMAS. The assessment was based on a review of recorded interviews during the 2015 OMAS pilot study conducted in December 2014. RTI was unable to conduct full cognitive interviews, as originally planned, because of the compressed questionnaire development schedule. The revised assessment protocol was approved by the OMAS EC to provide some insights into possible respondent comprehension difficulties ahead of the main study launch. The assessment focused on selected items in survey instrument sections, including household income, coverage through the insurance exchange, definition of family, pre-paid cell phone usage, sugar-sweetened beverage intake (children), posttraumatic stress disorder (adult), and developmental disability (adult).

The assessment protocol for evaluating the cognitive burden of each item on the survey respondent was based on a review of the recorded interview during the pilot study. Quality evaluators listened to the interviewer-respondent interaction and evaluated whether the respondent had trouble understanding the question or the response categories. As part of the evaluation, the evaluator noted when either the question or response category had to be repeated and what clarifications, if any, were requested by the respondent for understanding the intent of the item.

A detailed report on the results of the pilot test, ***2015 Ohio Medicaid Assessment Survey: Cognitive Interview Report***, was delivered separately to the OMAS EC.

3.5 Cuts for Length

To bring the survey within a budgeted average of 20 minutes for adult respondents and 6 minutes per child proxy, questions were cut from both the adult and child instruments. The OMAS EC leadership developed guidelines for prioritizing questionnaire items to distinguish items that were critical to policy and program analyses from those that were less critical and therefore candidates for deletion. The guideline for deleted questions included time considerations (long banks of questions), whether an item would show much movement since the last wave of the OMAS, and the degree to which a question was of importance to the Ohio Medicaid program or important in terms of examining economic impact, health risk change, and health system stress for Ohioans.

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 E: Final Questionnaires***

4

Data Collection

4.1 Procedures

RTI used the Voxco CATI software system to program and field the 2015 OMAS. 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, and 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 only accepted a predetermined range or type of response.

4.1.1 Implementation Protocol

The 2015 OMAS closely followed the Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance System calling protocols, as prior iterations of the OMAS had. The instrument maintained counters to manage protocol. The 2015 OMAS used up to a 15-attempt protocol for landline sample, and up to a 10-attempt protocol for the cell phone sample.

4.1.1.1 Call Scheduling

In line with prior iterations of the survey, to encourage younger and more diverse population participation, RTI scheduled most interviewing session hours for weekday evenings, Saturday days, and Sunday evenings. 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 Research Operations Center (ROC) also scheduled shifts between 9 a.m. and 5 p.m. 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.

4.1.1.2 Number of Attempts

Interviewers made a minimum of 15 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 day, and Sunday evening 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 and 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, which was the protocol for earlier iterations of the OMAS,.

4.1.1.3 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 six 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 lower priority than specific callbacks.

RTI's system also accommodated the restarting of interrupted interviews 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 a 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 2015 OMAS definition for determining eligible households in the landline sample was based on prior OMAS surveys. This defines an eligible household as any residential housing unit such as an apartment, a house, or a mobile home. Non-eligible households included dormitories, hospital rooms, nursing homes, group homes, sororities/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 Ohio 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, then household members were verified as being eligible; eligibility included all related adults (aged 19 years 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 2015 OMAS 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 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 2015 OMAS allowed for the use of proxy interviews in the same manner as the 2012, 2010, and 2008 administrations. Proxies were requested when the selected respondent had a cognitive or physical impairment. A knowledgeable adult for the proxy was defined as someone 19 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 2005 OMAS. 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 2015 OMAS 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. This information was reviewed by staff just before calling the telephone number again. During nonresponse refresher trainings, 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 about the following situations:

- 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 2015 OMAS in English and Spanish. Of the 42,876 completed records in the final data file, 449 (1.05%) 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

As has been done for prior iterations of the OMAS, RTI implemented a variety of methods to maximize response rates for the 2015 OMAS:

- 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 the day, to maximize efforts to each household;
- conducting interviews in Spanish and English; and
- the use of a $10 incentive for cell phone respondents.

Each of these is described in detail below.

4.1.7.1 "Short" Version of Child Questionnaire

Mid-survey terminations were more likely in the child section of the survey because of the length of the survey and the similarity of the child questions to the previously asked adult questions. This had been true in prior iterations of the OMAS and continued to be a problem with the 2015 OMAS. In an effort to boost response rates and avoid mid-terminate surveys, the OMAS EC agreed to implement a shortened child section during which the fundamental questions for the child were asked before the survey was suspended.

The OMAS EC defined the fundamental child questions (following the child's name, nickname, or initials) as the child's age and whether the child had health insurance. If the selected child did have health insurance, the respondent was asked whether the child was covered by Medicaid or another government assistance program. If the child did not have health insurance coverage, the respondent was asked if the child had health insurance at any time in the last 12 months, or inquired when the child last had health care coverage.

Partially completed records were called to the maximum attempts set in the protocol in an attempt to complete the remainder of the child questions. If the remainder of child questions were not obtained and the record had reached 15 attempts, the record was considered a complete.

4.1.7.2 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 the State of Ohio 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 _____, and I am calling on behalf of the State of Ohio. We are conducting a survey on health and health care issues. Your participation would help the State of Ohio make better health care policy decisions for its residents. Please call us at (PROJECT TOLL-FREE NUMBER) at your convenience."

4.1.7.3 Survey Verification Lines

RTI's ROC dedicated a toll-free telephone number to receive respondent calls regarding the legitimacy and validity of the study. RTI staff also made contact information for ODH available to those respondents who wished to contact the survey sponsors directly. Of the sponsoring agencies, ODH took responsibility for responding to concerns about the survey effort and shared this information with GRC and RTI.

4.1.7.4 Refusal Conversion Efforts

Refusal conversion for the 2015 OMAS 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 above has more detailed information on the refusal conversion protocols for the OMAS.

4.1.7.5 Reattempting Numbers

As discussed above in 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.

4.1.7.6 Conducting Interviews in Spanish

The 2015 OMAS was conducted in English and Spanish to maximize response rates and increase the participation of Ohio's Hispanic population. As noted previously, a small percentage (1.1%) was conducted by Spanish-speaking interviewers with households or cell phones which were flagged as non–English speaking within the system.

4.1.7.7 The Use of a $10 Incentive for Cell Phone Respondents

As noted in Section 2, the 2015 OMAS design increased the desired number of interviews on the cell phone frame from 25% to 55%. With this increase there was concern regarding potential undercoverage because of respondents on prepaid plans not wanting to participate in the survey because of the impact on their cell phone minutes. Persons 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 rural persons (Berzofsky, et. al., in press)—both key demographic groups for OMAS. To ensure representation from prepaid users, the 2015 OMAS offered a $10 incentive.

To validate the benefit of offering an incentive, the 2015 OMAS embedded a split sample experiment into its pilot study to determine whether (1) the incentive improved data collection efficiency, and (2) the incentive increased persons in key demographic categories—including prepaid cell phone users. Berzofsky et al. (in press b) present the details and results from the experiment. In summary, the experiment found that the incentive significantly increased data collection efficiency by increasing the participation rate and reducing the number of call attempts needed to achieve a completed interview. Furthermore, the experiment found that the incentive increased the proportion of respondents in key demographic groups—minorities, adults under 30, households with children, low income, adults and children on Medicaid, uninsured children, and prepaid phone plan users.[10] Furthermore, the efficiency gains offset 25% of the cost of the incentive. Based on these findings, the $10 incentive was adopted in the main sample.

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

[10] The proportion of uninsured adults was not increased by the incentive, but this difference was not statistically significant.

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: (1) by check, or (2) an online gift card from a choice of nine stores.[11] 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. A large majority of respondents selected the gift card method, especially younger respondents.

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 on adult health insurance status; or

- the adult section of the questionnaire including the question on adult health insurance status and at least the key questions (as identified by the OMAS EC) in the child section of the questionnaire.

In the 2015 OMAS final dataset, there are variables indicating the status of the adult and child sections of each case. Included in the final dataset are 3,636 interviews (8.5% 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 of 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

RTI conducted numerous interviewer training sessions for the 2015 OMAS. The first session preceded the pilot test in December 2014, and multiple sessions were held prior to the fielding of the main study in January 2015 and throughout the field period. The training was conducted by RTI's project management team at RTI's Raleigh, North Carolina, ROC training facility. Members of the OMAS EC participated in the pilot test and initial field period training sessions. RTI's extensive training, combined with study quality control procedures, ensured consistent, high-quality interviewing throughout data collection.

The quality of data collection depends largely on the performance of the interviewing staff. Interviewers on this study were specifically recruited for health care research and call center experience. RTI developed an intensive 2-day training curriculum for the 2015 OMAS, integrating project-specific background discussion with hands-on practice interviewing, review of general and project-specific protocols, and quizzes to reinforce learning.

[11] The online gift card was provided through the Consortium Group. A service fee of $1.25 was charged for each gift card selected.

Interviewers had to complete training and certification prior to beginning "live" calling in production. Training consisted of 8 hours split between the two evenings. Topics covered during training focused heavily on the survey's background and structure, study-specific protocols and procedures, pronunciation, and answering frequently asked questions. Members of the OMAS EC attending the training sessions assisted with additional study details and answered interviewer questions.

During training, interviewers participated in two round-robin mock interviews, two paired-practice mocks, and completed individual survey practice. Field certification for the OMAS involved two oral quizzes and successfully attending and participating during training sessions and exercises. Interviewers needed to achieve 100% correct on both oral quizzes to become certified and begin calling.

The 2015 OMAS pilot training agenda included the items in ***Table 4.1***.

In addition, any attendees who were new hires were required to complete RTI's standard new hire training, which includes our *iLearning* and onsite introductory CATI training systems. Additional information about the training can be found in ***Appendix B: Interviewer Training Manual***.

Table 4-1. Agenda

Time, Minutes	Topic	Time, Minutes	Topic
Evening 1		**Evening 2**	
15	Welcome and Introduction	10	Q&A/Review
25	Survey Background, Purpose and Structure	30	Emotional Distress and Sensitivity
10	Roles and Responsibilites	30	Refusal Avoidance
10	General Contacting Procedures	55	Paired Practice
15	Respondent Rights and Importance of Confidentiality	15	**BREAK**
45	Review of Frequently Asked Questions (FAQs)	15	Review FAQ and Pronunciation
15	**BREAK**	40	Individual Read Through of Questionnaire
20	Pronunciation Practice	35	Certification
75	Round-Robin	10	Q&A/Final Review
10	Q&A Sessions		

RTI conducted follow-up refresher trainings and distributed project bulletins with frequently asked questions and issues encountered during fielding to all stations. These trainings reemphasized

survey protocol, covered strategies for handling refusals, reviewed the procedures for suspended records, and reviewed particular survey items with which the interviewers had difficulty. The refresher trainings reinforced quality control during data collection to ensure reliable, valuable data. Much of the information discussed during refresher trainings was based on feedback from the OMAS EC, who participated in both live monitoring and the review of recorded interviewing sessions throughout the field period. In total, 485 interviewers were trained and certified to work on the 2015 OMAS.

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***.)

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)[a]	15,279	24,453	39,732
2	1.2	Partial Complete	1,372	2,264	3,636
3	2.1	Refusals and Break-offs	24,163	32,536	56,699
4	2.2	Non-Contact (incl. Answering Machines)	596	9,047	9,643
5	4.4	Tech Circumstance (incl. Changed Number, Cellular Phones, Pagers)	494	279	773
6	4.5	Non-Residence (incl. Businesses, Dorms)	38,250	9,990	48,240
7	4.7	No Eligible Respondent (incl. No Adults, Not Qualified for Oversample)	74,441	96,705	171,146
8	4.2	Fax/Data Line	7,346	170	7,516
9	4.3	Non-Working, Disconnected Number[b]	14,049	25,843	39,892
10	3.1	Unknown, No Answer	37	3,745	3,782
11	3.2	Housing Unit, Unknown if Eligible Respondent (Screener Not Completed)	21,471	46,260	67,731
12	3.9	Unknown Eligibility, Other (incl. Language Barrier, Physical Impairment Preventing Interview)	76,809	92,552	169,361

[a] Includes 492 completed cases from the pilot.

[b] Excludes 777,452 cases that were removed from the system during cleaning; these cases are considered out of scope for the purposes calculating response rates.

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 11.9% for the landline sample, 12.7% for the cell phone sample, and 12.4% overall.

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, 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 3 response rate of 25.8% for the landline sample, 22.9% for the cell phone sample, and 24.1% 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 40.2% for the landline sample, 39.1% for the cell phone sample, and 39.5% 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. Response rates for each stratum can be found in ***Appendix C: Response Rate and Disposition Tables***.

4.2.5 Coverage Estimates of Subpopulations

Tables 4-3 through ***4-6*** detail expected and observed (without weighting or imputation) percentages of the population classified by key demographic variables by region and age group.[12] The

[12] Because 0- to 17-year-olds are listed as a separate age category the total number of respondents in these tables are equal to the total adult interviews and the total child interviews, which totals 52,998.

unweighted observed sample is compared to population distributions from the American Community Survey (ACS) 5-year averages. An arrow pointing up (↑) indicates that the observed sample percentage is greater than the population percentage. An arrow pointing down (↓) indicates that the observed sample percentage is less than the population percentage.

The sample tends to overrepresent populations with lower incomes, particularly those below the poverty level, and underrepresent populations with incomes over three times the poverty level. This is consistent with the 2004, 2008, 2010, and 2012 surveys. The African American oversampling in metro areas successfully increased the percentage of African American respondents. In prior iterations of the survey—2008, 2010, and 2012—the sample was skewed heavily toward females and older age groups, which is typical in contemporary telephone surveys. Under the new design (i.e., increased cell allocation to 55% of completed interviews) the distributions by gender and age have shifted to look more like the population at large. ***Table 4-7*** presents the respondent distributions by gender and age in 2012 and 2015. As the table shows, the percentage of male and younger adult (19–34 years old) respondents greatly increased.

Table 4-3. Expected and Observed Ratio of Income to Poverty[a]

	Total Responses	Percentage							
		Under 1.0		1.0 to 2.0		2.0 to 3.0		Over 3.0	
		Exp.	Obs.	Exp.	Obs.	Exp.	Obs.	Exp.	Obs.
Age Group									
Total[b]	52,998	15.8	19.1↑	18.3	22.7↑	18.0	16.9↓	47.9	41.2↓
0–17	9,480	22.8	22.4↓	21.3	23.1↑	18.1	17.2↓	37.8	37.4↓
18–64c	31,299	14.9	20.2↑	16.1	21.2↑	16.8	16.0↓	52.2	42.6↓
65+	12,219	8.0	13.7↑	23.2	26.6↑	23.0	19.2↓	45.8	40.5↓
Region									
Total	52,998	20.6	19.1↓	20.7	22.7↑	24.7	16.9↓	34.0	41.2↑
Appalachian	8,704	17.6	22.0↑	21.6	25.8↑	19.8	17.8↓	41.0	34.4↓
Metropolitan	27,835	23.3	20.8↓	22.5	22.4↓	27.4	15.8↓	26.7	41.0↑
Rural Non-App	7,848	24.7	16.1↓	19.2	23.4↑	28.0	19.5↓	28.2	41.0↑
Suburban	8,611	11.4	13.4↑	15.3	20.3↑	17.6	17.5↓	55.7	48.8↓

[a] The ratio of the reported household income to the federal poverty level for the reported household size.

[b] The total number of respondents is equal to the total number of adult and child interviews conducted because 0- to 18-year-olds are included.

[c] The 2015 OMAS defined a child as a person 18 years old or younger based on Medicaid eligibility criteria. However, the ACS uses 0–17 as an age category. Therefore, to have equal comparisons age categories were recreated based on respondent data to match the ACS.

Table 4-4. Expected and Observed Gender

	Total Responses	Percentage			
		Male		Female	
		Exp.	Obs.	Exp.	Obs.
Region					
Total	52,998	48.9	45.8↓	51.1	54.2↑
Appalachian	8,704	49.6	46.6↓	50.4	53.4↑
Metropolitan	27,835	48.4	44.7↓	51.6	55.3↑
Rural Non-App	7,848	49.6	47.7↓	50.4	52.3↑
Suburban	8,611	49.2	46.6↓	50.8	53.4↑

Table 4-5. Expected and Observed Race/Ethnicity

	Total Responses	Percentage							
		Hispanic		White		African American		Other	
		Exp.	Obs.	Exp.	Obs.	Exp.	Obs.	Exp.	Obs.
Region									
Total	52,998	3.2	4.3↑	80.8	72.9↓	12.0	13.2↑	4.0	9.6↑
Appalachian	8,704	1.3	1.9↑	93.5	85.1↓	2.8	3.7↑	2.4	9.3↑
Metropolitan	27,835	4.0	6.0↑	71.5	61.9↓	19.6	21.8↑	4.9	10.2↑
Rural Non-App	7,848	3.0	2.7↓	92.3	86.0↓	2.1	2.8↑	2.7	8.5↑
Suburban	8,611	2.3	2.6↑	90.4	84.2↓	3.8	4.1↑	3.5	9.0↑

Table 4-6. Expected and Observed Age

	Total Responses	Percentage							
		0–17[a]		18–34[a]		35–54		55+	
		Exp.	Obs.	Exp.	Obs.	Exp.	Obs.	Exp.	Obs.
Region									
Total	52,998	23.6	17.9↓	21.2	16.5↓	27.8	24.4↓	27.4	41.2↑
Appalachian	8,704	23.2	18.3↓	19.8	16.1↓	27.6	25.7↓	29.5	39.9↑
Metropolitan	27,835	23.3	17.3↓	22.5	16.8↓	27.4	23.9↓	26.7	42.0↑
Rural Non-App	7,848	24.7	18.7↓	19.2	16.2↓	28.0	24.5↓	28.2	40.7↑
Suburban	8,611	24.1	18.8↓	19.8	16.5↓	29.0	24.4↓	27.2	40.4↑

[a] The 2015 OMAS defined a child as a person 18 years old or younger based on Medicaid eligibility criteria. However, the ACS uses 0–17 as an age category. Therefore, to have equal comparisons age categories were recreated based on respondent data to match the ACS.

Table 4-7. Distribution of Respondents by Gender and Age by Survey Year, 2012 and 2015 OMAS

	2012	2015
Gender		
Male	38.7	44.5
Female	61.3	55.5
Age Category (years)		
19–24	4.2	7.2
25–34	7.9	11.7
35–44	11.4	12.2
45–54	17.6	17.9
55–64	23.4	22.4
65+	35.4	28.5

4.3 Interviewer Debriefing and Retraining

During the OMAS 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 on any instrument changes, give/receive any feedback, and cover any administrative items.

The main points of focus during the general retrainings were proper coding of case disposition, questionnaire administration, refusal aversion/conversion, and clarifying any issues that the telephone interviewers encountered in their first week of production (Question & Answer format) and needed additional clarification or guidance. During individual trainings with monitors or supervisors, telephone interviewers were provided specific instances and examples of where improvement could be made. These sessions were inclusive both of onsite monitoring and monitoring conducted by the client team. Overarching observations from both sets of monitoring were nearly the same and improvement was observed over time. Some comments included the following:

- 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 slow or too fast;
- 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, 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 and the OMAS EC 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.

4.4 Changes to the CATI During the Field Period

Some changes to the 2015 OMAS CATI program were necessary after the start of the field period. These changes were made when the OMAS EC and RTI determined that the program was not adequately accounting for situations that presented the interviewer or the respondent with difficulty asking and answering questions or navigating the instrument. Most of these changes were minor or informational, and did not affect the structure of the CATI dataset. A few changes did require calling a small subset of respondents back to confirm information. Specifically, questionnaire items B22 and B24 on insurance plans prior to one's current insurance, and WIC_1 on WIC benefits, were part of a recontact protocol to obtain data from respondents who should have received these questions but did not due to a skip logic error. Most, but not all respondents completed these questions when called back.

The details of all changes were kept in a log at RTI, along with notations of the different questionnaire versions and when they were put in the field. RTI has provided the OMAS EC with a condensed version of this log, which appears in ***Appendix H: Post Field Start Changes Log*** .

4.5 Data Collection Subcontractor

With the approval of the OMAS EC, RTI hired a data collection subcontractor to assist with completing the survey within the project time period. Precision Opinion, Inc. (Precision) of Las Vegas, Nevada, completed approximately 20% of total interviewing hours on the 2015 OMAS. RTI has a longstanding relationship with Precision, and its staff of interviewers and supervisors have assisted RTI with telephone interviewing on other major projects. In addition to this existing relationship, the advantages of using Precision include its use of the Voxco system. This allowed RTI to fully integrate Precision's call center staff into our project systems, so that they operated as a virtual extension of our own facilities. Precision employees were trained on site by RTI's training staff and were subject to the same protocols for calling on the project as RTI's staff. In addition, OMAS EC members were able to conduct live monitoring of Precision staff, just as they were able to do with RTI staff.

5

Data Processing and Analysis

5.1 Dataset

The Voxco survey management system stored 2015 OMAS telephone disposition data, sample data, survey response data, and data created by the survey management system 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.

5.1 Data Processing

5.1.1 Cleaning the Data

5.1.1.1 Inconsistent Responses

The CATI program prevents most data inconsistences with built-in variable range and skip logic checks. Some inconsistencies in the data, however, are not prevented by the CATI instrument and instead are corrected after data collection. The following describes these inconsistencies, along 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 post-processing:** 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.

5.1.1.2 Outliers—Out-of-range Responses

The CATI program developed for the 2015 OMAS 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 zero and 30. All range checks were "hard" in the sense that the computer would not allow an out-of-range response to be entered. 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.

5.1.1.3 Missing Values

After working with the OMAS EC to identify candidate variables for imputation at the household and individual levels, RTI conducted data imputation—rather than accept high levels of nonresponse resulting from "don't know" or "refused" responses, or from questions not asked. The section on Imputation below contains additional information on the OMAS imputation procedures.

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

5.1.2 Coding Open-ended Responses

The 2015 OMAS used the coding manuals from the 2012 OMAS iterations as a starting point for the development of a coding process. From these coding guides, additional codes were added as needed to allow for comparability with prior years while still giving added flexibility to the coders. All open-ended responses from the data were then output into files which were subsequently imported into a customized Excel program for verbatim coding. Several coders worked under a supervisor who checked their work for consistency. Coding results were shared with the OMAS EC on a regular basis, with the delivery of interim datasets during fielding, for review and approval or suggestions for changes in coding procedures.

Final coded verbatim data were merged back onto the SAS dataset for delivery to the OMAS EC. Data variables containing recoded verbatims have the appendage "_rec" on the variable name in the final dataset.

5.1.3 Recoded, Derived, and Auto-coded Variables

In the 2015 OMAS several variables were created to make analysis of the data easier. These variables come in one of three forms:

- recoded variable;
- derived variable; and
- 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.

5.1.3.1 Recoded Variable

Recoded variables are variables that are exact replicates of a survey item, only 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 due to 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.

5.1.3.2 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 of these items when categorizing an individual to have a particular characteristic.

5.1.3.3 Auto-coded Variables

Auto-coded variables are variables created by the CATI program 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.

5.1.4 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 were in violation of 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 were 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

In one case, the above scripts yielded a problem with the original CATI logic concerning variables that determined the creation of variable "prior_c" in the child data. This derived variable was meant to capture previous insurance coverage, but because of incorrect skip pattern instructions in the final specifications, it did not capture all relevant cases and was therefore dropped from the final dataset.

5.1.5 Data Formatting

The final SAS dataset has an associated SAS format library. This library contains variable labels to assist the end user in understanding the source and content of the variable. The SAS format library was set into 32 bit and 64 bit versions to accommodate SAS versions.

5.2 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. **Such variables are identified in the final dataset with the "_imp" suffix in the variable name**. Variables other than last month's and last year's household income were imputed exclusively with a weighted, sequential hot-deck (WSHD) approach that uses variable correlates for the formation of imputation cells and the sorting of donor and recipient cases within those cells. This approach also used the unit nonresponse-adjusted sampling weight to ensure that the sampling design is accounted for when matching donors with item nonrespondents.

In the case of missing household income, a multistage approach that emphasized intra-record consistency was used. This process was much more complex for household income compared to other variables because income was asked for two time periods (last year and past month) and each of these was potentially requested in multiple ways. The instrument attempted to collect income as a specific dollar value first, or, if the respondent refused to answer with a specific amount, as a number of dollar ranges (with range boundaries determined by the number of people supported by the household income).

5.2.1 WSHD Imputation (Excluding Income)

WSHD imputed missing values by pairing item nonrespondents with donors having similar values for auxiliary variables related to the variable being imputed (Iannacchione, 1982). This occurred in two ways: (1) sets of item respondents and nonrespondents were grouped based on the values of one or more variables that were important predictors of the variable in question—this cross-classification of predictors defined the "imputation cell"; and (2) within imputation cells, respondents and nonrespondents were sorted in an identical fashion—this makes it more likely (but not guaranteed) that nonrespondents will be paired with respondents having similar values of the sorting variable[s]. The actual pairing of records within cells occurs randomly, with pairing probabilities determined by the amount of overlap

between cases' scaled weight sums. Scaled weight sums are calculated by separately and cumulatively[13] summing respondents' and nonrespondents' nonresponse-adjusted weights and dividing each record's cumulative weight sum by the overall sum (either among respondents or nonrespondents) for the cell. These scaled weight sums are greater than zero and less than or equal to 1. These scaled weight sums can also be used to define scaled weight ranges, which are defined as the range between the previous case's scaled weight sum[14] and that of the case in question.

For example, consider the case where the first nonrespondent in an imputation cell has a scaled weight sum value of 0.3. This record therefore has a scaled weight range from 0 to 0.3. If the first two respondents in this cell have scaled weight sum values of 0.2 and 0.5, they are the only potential donors for the nonrespondent in question (they are the only ones with weight ranges overlapping that of the nonrespondent in question, having ranges from 0 to 0.2 and 0.2 to 0.5, respectively). Despite the fact that the second respondent has a wider weight range (0.5–0.2 = 0.3) relative to the first (0.2–0 = 0.2), it is less probable that it will be the donor record for the first nonrespondent. This is because the entire range of the first respondent overlaps with that of the nonrespondent, covering two-thirds of the nonrespondent's range. The remaining one-third of the nonrespondent's range is covered by the second respondent. Therefore, in this example, the first respondent will be selected as the donor with twice the probability of the second, despite having a smaller weight.

Table 5-1 presents the imputation cells and sorting criteria varied across variables; the cell variables and sorting variables are denoted with a C for a variable included in formation of the imputation cell and S for a variable used for sorting. Imputation proceeded in the order in which the variables are presented in the table.

5.2.2 Imputation for Last Month's and Last Year's Household Income

Income is an extremely important variable that is also subject to relatively high rates of missingness. The income questions were also fairly complex in nature, because there was both a last month's and last year's version (asked separately), and because each version could be reported as either a specific dollar value or a category, with category options varying by the number of dependents. This all resulted in a fairly intricate, multistep imputation process. The income imputation strategy employed is detailed in the following steps:

1. Classified missing income cases
    a. Reported continuous last year's income; missing last month's income entirely
    b. Reported continuous last year's income; reported categorical last month's income

[13]Because the weight sums are calculated cumulatively, the way in which the cells are sorted largely determines which records can be paired.

[14]The previous case refers to the ordering imposed by the sorting criteria. The left endpoint on the scaled weight range for the first case in a cell is zero.

Table 5-1. Classification and Sorting Order for Imputation Variables

Imputation Variables	Classification and Sorting Order														
	Phone Type	Region	Adult Gender	Adult Race	Adult Education Attainment	Adult Age	Adult Insurance Status	Adult Medicaid Status	No. of Children in HH	No. of Children in Family	No. of Adults in Family	Child Race	Child Age	Child Insurance Status	Poverty Status
Region	C														
Adult Gender	C	C													
Adult Race	C	C	C												
Adult Education Attainment	C	C	C	C											
Adult Age	C	C	C	C											
Adult Insurance Status	C	C	S	C	C	S									
Adult Medicaid Status	S	C	S	C	S	S	C								
Number of Children in Household	C	C		C	C	S									
Number of Children in Family	S	C		C	C	S			C						
Number of Adults in Family	C	C		C	C	S				C					
Family Members Supported by Inc.	S	S		S	S	S				C	C[a]/S				
Number of Landlines in Household	C	C		S	C	S									

(continued)

Table 5-1. Classification and Sorting Order for Imputation Variables (continued)

Imputation Variables	Classification and Sorting Order														
	Phone Type	Region	Adult Gender	Adult Race	Adult Education Attainment	Adult Age	Adult Insurance Status	Adult Medicaid Status	No. of Children in HH	No. of Children in Family	No. of Adults in Family	Child Race	Child Age	Child Insurance Status	Poverty Status
Number of Adults in Household[b]	S	S		S	S	S			C[c]		C[a]				
Days Covered by Insurance	S	S		S	S	S	S	C							
Child Gender	C	C													
Child Race	S	C		C	S										
Child Age		C			C	C[d]									
Child Insurance Status		S		C	C	S	C								
Child Medicaid Status		S			C	S		C				C		C	
Adult Health Status	S	S		C	C	S									C
Child Health Status	S	S										S	S		C

C – Variable used in formation of imputation cells.

S – Variable used for sorting within imputation cells.

[a] Number of adults in family was collapsed into three levels (1, 2, 3 or more).

[b] Only imputed for landline cases.

[c] Number of children in household was collapsed into three levels (1, 2, 3 or more).

[d] Adult age was collapsed into 6 levels (19–24, 25–34, 35–44, 45–54, 55–64, 65+).

c. Reported continuous last year's income; reported continuous last month's income

d. Reported categorical last year's income; missing last month's income entirely

e. Reported categorical last year's income; reported categorical last month's income

f. Reported categorical last year's income; reported continuous last month's income

g. Missing last year's income entirely; missing last month's income entirely

h. Missing last year's income entirely; reported categorical last month's income

i. Missing last year's income entirely; reported continuous last month's income

2. Used percentile-constrained lognormal interpolation (Couzens, Berzofsky, and Petersen, in press) for cases reporting last year's income categories (*d-f*), where possible (i.e., when there were enough cases with same number of people in the household to estimate lognormal parameters).

3. Used WSHD for *d-f* cases where there were not enough cases with same number of people in the household to estimate lognormal parameters, but where there was at least one additional case with the same cross-classification of number in household and income category number (1-10)[15]; formed imputation cells by number in household crossed with income category number.

4. Used linear interpolation (uniformly select a value between category boundaries) for *d-f* cases not accounted for by 2 or 3, above.

5. Used cases in group *c* to determine which factors were most important in predicting the ratio of last year's to last month's income (random forest variable importance, for example).

6. For cases in *i*, used the median ratio between last year's and last month's income to impute last year's income within the cross-classification of variables identified in step 5 (again, using cases from group c to determine the median value).

7. Used WSHD for cases in group *h*, with imputation cells defined by the cross-classification of number of people in the household and last month's income category number (1-10).

8. Use WSHD for cases in group *g* (imputing last year's and last month's income simultaneously from the same donor), with imputation cells defined by the cross-classification of Adult Medicaid Status, Adult Race, and Adult Gender.

9. For cases in *b*, *e*, and *h* with a reported categorical last month's income value, used a three-step interpolation/imputation approach equivalent to what was applied to last year's income in steps 2-4.

[15] Cutpoints used to define category boundaries differ across groups defined by the number of people in the household (ranging from 1 person to 15+ persons).

10. For cases in *a* and *d* with no reported last month's income information, used WSHD with imputation cells defined by the cross-classification of number of people in the household and categorized last year's income.

5.2.3 Amount of Item-nonresponse

Across all the variables imputed, the level of missing data ranged from 0.02% (number of adults in household) to 31.84% (last year's income). In general, of the 23 items imputed, all but last month's income, last year's income, and days covered by insurance had fewer than 10% of responses missing. ***Table 5-2*** shows the number and percentage of missing data for each item imputed.

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

Variable	Non-Respondents	Respondents	Pct. Missing
B4C2DAYS—Days Covered by Insurance	1,349	7,776	14.78
D30—Rate general health status	1,121	41,755	2.61
H77—Highest level of education completed	2,855	40,021	6.66
H84_A1—Number of family members supported by income	3,650	39,226	8.51
HHINCM-Last Month's Income	13,355[a]	29,521	31.15
HHINCY-Last Year's Income	13,653[b]	29,223	31.84
I90A—Child age	568	42,308	1.32
INSRD_A—Adult Insurance Status	114	42,762	0.27
INSRD_C—Child Insurance Status	132	42,744	0.31
L125—Rate child's health	158	42,718	0.37
MEDICD_A—Adult uses Medicaid	827	42,049	1.93
MEDICD_C—Child uses Medicaid	476	42,400	1.11
NUM_ADULTS—Number of adults in HH (Landline Only)	5	26,418	0.02
P148—Child gender	569	42,307	1.33
Q153—Number of other landlines	223	42,653	0.52
RACE5_A— Race Ethnicity Adult, 5 categories	644	42,232	1.5
RACE5_C— Race Ethnicity Child, 5 categories	153	42,723	0.36
S11—Number of adults in family	148	42,728	0.35
S12—Number of children in HH	84	42,792	0.2
S13B—Number of children in family	31	42,845	0.07
S14—Respondent age	835	42,041	1.95

[a]13,355 respondents were imputed for the continuous last month's income value; however 4,501 of them reported a categorical last month's income value. So 20.65% of respondents did not report any last month's income.

[b]13,653 respondents were imputed for the continuous last year's income value; however 4,142 of them reported a categorical last year's income value. So 22.18% of respondents did not report any last year's income.

5.3 Weighting

For the 2015 OMAS, 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; and
- weight trimming.

This section describes these steps in detail. Further detail on using the survey weights can be found in ***Appendix G: Data Usage***.

5.3.1 Design-Based Weight

The design-based weight (wt0) for each selected number is the inverse probability of selection. For OMAS, 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.

5.3.2 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, number of times phone number sampled). 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 below.

- Nonresponse adjustment (wt1): Within sampling stratum (county for landline numbers and rate center county for cell phone and Asian and Hispanic surname samples) the design-based weights of respondents were adjusted to account for the weight of the eligible nonresponding phone numbers.

- Multiple selection adjustment (wt2): The 2015 OMAS required two cell phone sample selections from MSG. This was necessary because additional ODH funding allowed more interviews to be completed than initially anticipated. To avoid needing to calculate conditional probabilities of selection, each sample was drawn from all numbers in the stratum including those numbers selected in prior samples. Therefore, it was possible for a number to be selected more than once. However, a number was only fielded one time during data collection. To account for this, wt2 was multiplied by the number of times a phone number was selected (i.e., wt3 = wt2*k_i where k_i = 1, or 2 is the number of times phone number *i* was selected to account for the number of times it was selected).

- Multiple phone number adjustment (wt3): 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 (i.e., wt4 = wt3/n_j where n_j = 1, 2,…,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 (wt4): To account for the sub-selection 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) (i.e., wt5 = wt4*n_h) where n_h = 1, 2, 3, 4 was 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., wt5 = wt4).

5.3.3 Dual-frame Adjustment

To minimize potential respondent bias, the 2015 OMAS incorporated a dual-frame design that used both landline and cell phone numbers. To maximize the likelihood of reaching a potential respondent, the OMAS 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 2015 OMAS 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 2015 OMAS 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

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

Prior to deciding to use the single-frame estimation, several other dual-frame adjustment approaches were considered and compared to each other. These approaches included a 50/50 composite approach, a composite approach with lambda (the proportion of the dual-frame users weight assigned to the landline dual-frame respondents) optimized to minimize the unequal weighting effect, and a composite approach with lambda optimized to minimize the design effect for past year's income. After comparing the standard errors for key estimates resulting from each of these approaches, it was determined that the SFE approach produced the smallest standard errors. Based on this analysis, the SFE approach was deemed the most appropriate for the 2015 OMAS.

5.3.4 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 do 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 2015 OMAS controlled for the following characteristics for the adult respondents:

- Age (6 levels)
- Race (5 levels)
- Gender (2 levels)
- Phone type (3 levels)
- Medicaid*Collapsed Age[16] (6 levels)
- Medicaid*Collapsed Age*Gender (12 levels)
- Age*Region (114 levels)
- Race*Region (95 levels)
- Race*Age (30 levels)
- Gender*Race*Age (60 levels)
- Medicaid (2 levels)
- County type (4 levels)
- Education (4 levels)
- Region (19 levels)
- Medicaid*Gender (4 levels)
- Medicaid*Region (38 levels)
- Gender*Region (38 levels)
- Gender*Age (12 levels)
- Education*Age (24 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 controls totals for age, race, gender, region, education, and county came from the 5-year American Community Survey. The control totals for phone type came from the 2012 National Health Interview Survey (Blumberg et al., 2013). The control totals for Medicaid enrollment came from the Ohio Department for Medicaid. These control totals are the average enrollment during the January–June data collection period.

The child weights were poststratified to the following characteristics:

- Age (4 levels)
- Race (5 levels)
- Gender (2 levels)
- Region (19 levels)
- Medicaid*Region (38 levels)
- Race Collapsed*Region (57 levels)
- Race Collapsed*Age (12 levels)
- Phone type (3 levels)
- Medicaid (2 levels)
- County type (4 levels)
- Medicaid*Gender (4 levels)
- Gender*Region (38 levels)
- Gender*Age (8 levels)

[16] Collapsed age has three levels: 19–44; 45–64; 65 or older.

Table 5-3. Adult Sample Marginal Weighting Adjustments and Population Totals

Adult Variable	Marginal Weight Adjustment	Adjustment Factor		Population	
		Minimum	Maximum	Frequency	Percent
Intercept	1.0810	0.6726	2.5393		
Age (years)					
19–24	1.1765	0.6726	2.2082	950,506	10.79
25–34	1.1412	0.6755	2.0650	1,470,692	16.70
35–44	1.1198	0.7656	2.1579	1,407,057	15.98
45–54	1.0622	0.7303	2.5393	1,602,965	18.20
55–64	1.0338	0.8402	2.0125	1,576,266	17.90
65+	1.0223	0.8173	1.9511	1,799,169	20.43
Race					
White	1.0716	0.8262	2.0118	7,248,756	82.31
Black/African American	1.1145	0.7451	2.0911	1,018,499	11.57
Hispanic	1.1441	0.6726	2.1579	247,140	2.81
Asian	1.2378	0.6755	2.5393	172,704	1.96
Other	1.0548	0.7293	1.7532	119,556	1.36
Gender					
Male	1.0949	0.6726	2.2082	4,249,385	48.25
Female	1.0684	0.7293	2.5393	4,557,271	51.75
Phone Type					
Cell	1.1492	0.6841	2.5393	3,240,849	36.80
Mixed	1.0463	0.6726	2.3284	5,107,860	58.00
Land	1.0295	0.7656	2.1398	457,946	5.20
Medicaid Status					
Medicaid	1.0945	0.6726	2.3284	1,656,928	18.81
Not Medicaid	1.0779	0.6841	2.5393	7,149,728	81.19
County Type					
Rural Appalachian	1.0497	0.7693	2.2797	1,367,010	15.52
Metro	1.1173	0.6726	2.5393	4,809,036	54.61
Rural Non-Appalachian	1.0395	0.7451	2.2321	1,157,010	13.14
Suburban	1.0323	0.7451	1.9700	1,473,599	16.73

(continued)

Table 5-3. Adult Sample Marginal Weighting Adjustments and Population Totals (continued)

Adult Variable	Marginal Weight Adjustment	Adjustment Factor		Population	
		Minimum	Maximum	Frequency	Percent
Region with Metro Counties					
Allen	1.0155	0.6755	1.2297	78,923	0.90
Butler	1.0655	0.8309	2.5393	276,015	3.13
Cuyahoga	1.2150	0.8173	1.9000	973,913	11.06
Franklin	1.3696	0.9929	2.3284	921,927	10.47
Hamilton	1.0270	0.7183	1.6074	607,809	6.90
Lorain	1.0210	0.7590	1.4214	231,172	2.62
Lucas	1.0226	0.7538	1.6816	328,379	3.73
Mahoning	1.0301	0.7656	2.2082	182,954	2.08
Montgomery	1.0307	0.8109	1.6606	406,895	4.62
Richland	1.0296	0.8605	1.6253	94,090	1.07
Stark	1.0040	0.7529	1.2377	288,998	3.28
Summit	1.0405	0.6726	1.4491	417,962	4.75
Remaining North Central	1.0546	0.7451	2.1702	218,940	2.49
Remaining Northeast	1.0655	0.7693	1.7559	913,146	10.37
Remaining Northeast Central	1.0235	0.7882	1.3985	264,087	3.00
Remaining Northwest	1.0331	0.8066	2.1240	368,927	4.19
Remaining South Central	1.0503	0.8031	2.2797	756,930	8.59
Remaining Southeast	1.0233	0.7451	1.4631	635,202	7.21
Remaining Southwest	1.0229	0.7507	1.7510	840,387	9.54
Education					
Less than high school	1.0954	0.8162	2.1778	948,214	10.77
High school	1.0703	0.7590	2.3284	2,977,458	33.81
Some college	1.1024	0.7303	2.5393	2,732,939	31.03
College or more	1.0632	0.6726	2.3031	2,148,043	24.39

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 Sample Marginal Weighting Adjustments and Population Totals

Child Variable	Marginal Weight Adjustment	Adjustment Factor		Population	
		Minimum	Maximum	Frequency	Percent
Intercept	1.0629	0.7854	2.1516		
Age (years)					
0-4	1.0946	0.7867	1.9595	690,576	24.77
5-9	1.0478	0.8529	2.0529	728,134	26.12
10-14	1.0583	0.7854	1.9573	756,139	27.13
15-18	1.0519	0.8826	2.1516	612,659	21.98
Race					
White	1.0471	0.8425	1.5595	2,039,504	73.17
Black/African American	1.1135	0.8432	1.7159	407,960	14.64
Hispanic	1.1249	0.8612	2.1516	156,050	5.60
Asian	1.0038	0.7854	1.8439	57,057	2.05
Other	1.1246	0.8599	2.1465	126,937	4.55
Gender					
Male	1.0529	0.7854	2.1498	1,425,387	51.13
Female	1.0734	0.8037	2.1516	1,362,120	48.87
Phone Type					
Cell	1.1049	0.8578	2.1516	1,246,016	44.70
Mixed	1.0273	0.7854	2.0002	1,460,654	52.40
Land	1.1062	0.8619	2.1201	80,838	2.90
Medicaid Status					
Medicaid	1.0893	0.7867	2.1516	1,260,275	45.21
Not Medicaid	1.0420	0.7854	1.8070	1,527,233	54.79
County Type					
Rural Appalachian	1.1028	0.7854	2.1516	417,511	14.98
Metro	1.0160	0.8188	1.2725	1,513,457	54.29
Rural Non-Appalachian	1.0216	0.8099	1.2671	382,964	13.74
Suburban	1.0202	0.8037	1.2636	473,576	16.99

(continued)

Table 5-4. Child Sample Marginal Weighting Adjustments and Population Totals (continued)

Child Variable	Marginal Weight Adjustment	Adjustment Factor		Population	
		Minimum	Maximum	Frequency	Percent
Region with Metro Counties					
Allen	1.0026	0.8770	1.2457	26,117	0.94
Butler	1.0114	0.8465	1.2280	98,143	3.52
Cuyahoga	1.1464	0.8838	1.3585	285,915	10.26
Franklin	1.3435	1.0413	2.1516	309,466	11.10
Hamilton	1.0281	0.8095	1.2162	198,822	7.13
Lorain	1.0052	0.8107	1.1652	73,044	2.62
Lucas	1.0149	0.8679	1.2332	106,907	3.84
Mahoning	1.0266	0.8483	1.2589	50,250	1.80
Montgomery	1.0767	0.7854	1.6823	126,221	4.53
Richland	1.0083	0.8915	1.2041	27,852	1.00
Stark	1.0000	0.8246	1.1904	86,738	3.11
Summit	1.0539	0.7867	1.3339	123,981	4.45
Remaining North Central	1.0230	0.8037	1.1397	67,652	2.43
Remaining Northeast	1.0360	0.8260	1.2725	273,863	9.82
Remaining Northeast Central	1.0050	0.8188	1.1512	88,363	3.17
Remaining Northwest	1.0332	0.8099	1.2419	124,122	4.45
Remaining South Central	1.0194	0.8177	1.2671	249,892	8.96
Remaining Southeast	1.0046	0.8422	1.2015	193,018	6.92
Remaining Southwest	1.0099	0.8186	1.2168	277,141	9.94

5.3.5 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 2015 OMAS, based on the analysis results, the largest 2.5% of weights were trimmed. This involved identifying weights larger than the weight value at the 97.5th percentile. Weights larger than this value were capped at the 97.5th percentile. The trimmed weight was redistributed to weights below the 97.5th 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.

5.3.6 Design Effects

To help evaluate the impact of the 2015 OMAS sample design and weighting adjustments on the variability of estimates, RTI and the OMAS EC 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 OMAS 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 2015 OMAS 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 rate center county) or subcounty 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 2015 OMAS, the sample allocation to each stratum was altered from a proportional allocation to give more sample to strata where certain subpopulations of interest (e.g., African Americans, rural residents) were likely to reside. 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 present) within each household were selected. Because the number of adults (or children) varied across households the probability of selection for persons 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. Additionally, weight trimming was conducted on the final set of weights. Weight trimming will 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 2015 OMAS, ***Table 5-5*** presents the design effects at the state and Medicaid region levels for the percentage of adults and children insured, respectively, the percentage of adults and children on Medicaid, respectively, and the self-reported health status of adults and children (five-point Likert scale), respectively, while ***Table 5-6*** presents the design effects at the county levels for the percentage of adults insured, the percentage of adults on Medicaid, and the self-reported health status of adults (five-point Likert scale). These design effects reflect estimates after the 2.5% weight trimming was conducted. As seen in the table, some design effects were less than one. This occurred for estimates in counties where no oversampling occurred, the weight adjustments were not very differential across respondents, and the outcome was homogeneous across respondents (e.g., most children insured).

Table 5-5. Design Effects at State and Medicaid Region Levels for Adult and Child Estimates of Key Outcomes

Medicaid Region	Insurance		Medicaid		Self-Reported Health Status	
	Adult	Child	Adult	Child	Adult	Child
State	1.93	1.26	1.67	1.76	1.69	1.72
North Central	1.71	0.75	1.58	1.62	1.62	1.57
Northeast	1.82	1.07	1.64	1.67	1.68	1.65
Northeast Central	1.74	1.62	1.39	1.60	1.48	1.57
Northwest	1.90	0.51	1.73	1.90	1.77	1.92
South Central	2.15	1.20	1.78	1.92	1.75	1.86
Southeast	1.73	1.32	1.66	1.66	1.66	1.77
Southwest	1.94	1.36	1.63	1.68	1.66	1.61

Table 5-6. Design Effects at County Level for Adult Estimates of Key Outcomes

County	Insurance	Medicaid	Self-Reported Health Status
Adams	1.80	1.39	1.30
Allen	1.60	1.69	1.59
Ashland	1.51	1.23	1.56
Ashtabula	1.55	1.53	1.61
Athens	2.32	2.14	1.71
Auglaize	1.28	2.33	1.91
Belmont	1.66	1.34	1.51
Brown	2.09	1.14	1.39
Butler	1.86	1.69	1.59
Carroll	1.33	1.51	1.26
Champaign	0.72	1.54	1.47
Clark	1.66	1.39	1.52
Clermont	1.90	1.48	1.59
Clinton	2.05	1.56	1.60
Columbiana	1.76	1.32	1.54
Coshocton	1.32	1.50	1.32
Crawford	1.86	1.26	1.72
Cuyahoga	1.76	1.76	1.75
Darke	1.73	1.14	1.41
Defiance	1.21	1.12	1.30
Delaware	2.38	1.63	1.52
Erie	1.64	1.25	1.57
Fairfield	1.97	1.69	1.62
Fayette	2.12	1.51	1.54
Franklin	2.25	1.92	1.86
Fulton	2.19	1.49	1.37
Gallia	2.11	1.73	1.51

(continued)

Table 5-6. Design Effects at County Level for Adult Estimates of Key Outcomes (continued)

County	Insurance	Medicaid	Self-Reported Health Status
Geauga	2.46	1.44	1.71
Greene	1.75	1.56	1.68
Guernsey	1.32	1.82	1.67
Hamilton	1.88	1.76	1.71
Hancock	1.95	1.52	1.61
Hardin	1.53	1.60	1.93
Harrison	1.20	1.56	1.20
Henry	1.96	1.23	1.44
Highland	1.99	1.54	1.62
Hocking	1.37	1.49	1.69
Holmes	1.99	1.03	1.69
Huron	0.86	1.02	1.22
Jackson	1.52	1.26	1.20
Jefferson	1.22	1.40	1.43
Knox	1.68	1.94	1.57
Lake	1.72	1.44	1.60
Lawrence	1.90	1.33	1.46
Licking	1.63	1.73	1.59
Logan	1.59	1.70	1.74
Lorain	1.74	1.42	1.60
Lucas	1.84	1.69	1.65
Madison	1.40	1.55	1.72
Mahoning	1.95	1.40	1.52
Marion	1.39	1.55	1.58
Medina	1.63	1.13	1.48
Meigs	2.12	1.58	1.53
Mercer	1.23	2.19	1.66

(continued)

Table 5-6. Design Effects at County Level for Adult Estimates of Key Outcomes (continued)

County	Insurance	Medicaid	Self-Reported Health Status
Miami	2.33	1.30	1.52
Monroe	0.98	1.34	1.43
Montgomery	1.96	1.72	1.88
Morgan	1.88	1.29	1.43
Morrow	1.78	1.24	1.39
Muskingum	1.69	1.54	1.48
Noble	2.29	1.64	1.60
Ottawa	0.59	1.25	1.64
Paulding	1.06	1.42	1.38
Perry	1.46	1.36	1.46
Pickaway	0.80	1.56	1.30
Pike	2.42	1.33	1.46
Portage	1.67	1.28	1.34
Preble	1.42	1.05	1.56
Putnam	0.88	1.79	1.51
Richland	2.55	1.43	1.48
Ross	1.36	1.63	1.67
Sandusky	1.08	1.34	1.43
Scioto	1.39	1.26	1.46
Seneca	1.57	1.15	1.39
Shelby	3.04	1.42	1.50
Stark	1.71	1.50	1.50
Summit	1.86	1.54	1.54
Trumbull	1.65	1.30	1.39
Tuscarawas	1.21	1.23	1.30
Union	1.39	1.79	1.46
Van Wert	0.92	1.95	2.13

(continued)

Table 5-6. Design Effects at County Level for Adult Estimates of Key Outcomes (continued)

County	Insurance	Medicaid	Self-Reported Health Status
Vinton	1.95	1.45	1.48
Warren	2.15	1.34	1.44
Washington	1.47	1.37	1.44
Wayne	2.34	1.31	1.61
Williams	0.63	1.05	1.55
Wood	1.85	1.64	1.55
Wyandot	2.05	1.77	1.62

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