

Oregon Health Insurance Survey

Methodology Report

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1. OHIS 2013 DESIGN AND METHODOLOGY SUMMARY

1.1 Overview

The Oregon Health Insurance Survey (OHIS) is an address-based survey of Oregon's population. The goal of the study is to collect information about health insurance coverage, health care costs, and access to and use of health care for the Oregon population.

The study was designed to capture reliable data for a number of populations:

- Each of the 15 regions of Oregon
- Whites, African Americans, Hispanics, Native Americans, and Asians
- The total population of Oregon

The OHIS sample is representative of Oregon's non-institutionalized population living in households.

1.2 Sample Design Objectives

The State expressed interest in: (1) attaining adequate representation for each of the 15 regions within Oregon; and, (2) ensuring the proportionality of ethnic and racial minority populations.

The study was based on an address-based design. Because of the increase in cell phone only (CPO) households, researchers are faced with increasing challenges in terms of being able to cover an entire population. This is due, in part, to the fact that a small proportion of Oregon's CPO households have area codes outside of Oregon. Nation-wide, nearly thirty percent of households are now without landline telephone service, and it is estimated that another eight percent are part of "zero-bank" households. An address-based design circumvents these difficulties, given that the sample source is the U.S. Postal Service's Delivery Sequence File (DSF), a database that is considered to cover at least 98 percent of all households in the U.S. Address-based designs allow for stratification at the Census Block Group level.

In order to achieve the State's objectives, the sample design incorporated stratification by both region and the ethnic populations. The stratification accommodated diverse clustering of ethnic groups, specifically African Americans, Asians, and Native Americans, within these regions. As will be detailed in Section 2.2, this resulted in 21 strata, including the 15 regions, two surname strata, and four high incidence strata.

1.3 Data Collection

Because the sample is address-based, data collection methods differ from traditional telephone samples. The OHIS 2013 study executed a data collection strategy designed to attain the highest response rate possible. This design combines telephone, web, and mail survey options. Telephone and web interviews were conducted in English and Spanish.

Table 1, below, provides a summary of the topic areas covered in the survey. Further details on data collection are provided in Section 3 later in this report.

Table 1: Summary of Topic Areas Covered in the 2013 OHIS, by Household Members

Topics	Survey Respondent	All Household Members	Target Household Member	Target's Spouse (if present) and Parents (if present and Target age<26)
Demographic characteristics (age, race/ethnicity, gender, marital status, education)	X	X	X	X
Nativity and languages spoken			X	
Length of residency in the Oregon			X	
Health insurance coverage	X	X	X	X
Detailed employment questions			X	X
Availability of employer sponsored insurance			X	X
Health and disability status			X	
Access to and use of health care			X	
Family income			X	
Homeownership	X			
Household telephone status	X			

1.4 Response Rates

The overall response rate for OHIS 2013 is based on the AAPOR RR4 calculation.

To maximize the response rate, especially at the screener stage, an invitation letter was mailed to all sampled addresses. Households in the High-Hispanic and Hispanic surname strata received a booklet containing both English- and Spanish-language versions of the invitation letter. Unmatched sample (sample for which a telephone number could not be identified) was offered one of three incentives: (1) \$20 upon completion of the survey; (2) \$10 upon completion of the survey; or (3) a \$2 bill in the initial mailing and \$10 upon

completion of the survey. A subset of matched sample was sent a \$2 bill in the initial mailing. Details on these conditions are found in Section 3.6.

The OHIS 2013 response rate is 43.9 %.

1.5 Weighting the Sample

Survey data are weighted to adjust for differential sampling probabilities, to reduce any biases that may arise because of differences between respondents and non-respondents (i.e., nonresponse bias), and to address gaps in coverage in the survey frame (i.e., coverage bias). Survey weights, when properly applied, can reduce the effect of nonresponse and coverage gaps on the reliability of the survey results (Keeter et al. 2000, Groves 2006).

Details are provided in the Section 4.

2. SAMPLING METHODS

2.1 Overview

Historically, RDD telephone interviewing has been the method of choice for many survey data collection efforts given the strength of its randomization method (random digit dialing), the ease of administering complex questionnaires using computerized interviewing systems, excellent coverage of the overall population (given that less than 2% of Americans live in a household without telephone service), and relatively low cost. Survey coverage refers to the extent to which the sample frame for a survey includes all members of the target population. A survey design with a gap in coverage raises the possibility of bias if the individuals missing from the sample frame (e.g., households without landline telephones) differ from those in the sample frame. Unfortunately, the coverage of the overall population in RDD surveys is changing as more and more households are relying on cell phones and giving up their landline telephones.

Cell phone-only households are increasing rapidly in the United States, with 38.2% of households estimated to be cell phone-only in the second half of 2012, as compared to 29.7% in late 2010 (Blumberg & Luke, 2013). While there is limited data available on the share of cell phone-only households within each state, a recent model-based approach (combining survey data and synthetic estimates) was used to generate state-level estimates of cell phone-only households using the National Health Interview Survey (NHIS). As of the end of 2011, the National Health Institute Survey (NHIS) estimated that 38.2% of adults in Oregon lived in households that were wireless only. Projecting to the present day, it is likely that figure is now over 40 percent.

In order to capture cell phone-only households in the sample frame for the OHIS, the decision was made to utilize an address-based-sample (AB sample) for the survey. The AB sample captures households with landline phones, cell phone-only households and non-telephone households, supplementing the landline sample of the traditional RDD survey. One limitation of both AB sample and RDD sample is that they will both miss homeless persons in the state. This is estimated to be less than 1% of the population.

The sample was developed in the following steps:

1. A file was generated of all Oregon residential addresses currently in use based on the United States Postal Service Delivery Sequence File (DSF). The DSF is a computerized file that contains information on all delivery addresses serviced by the USPS, with the exception of general

delivery.¹ The DSF is updated weekly and contains home and apartment addresses as well as Post Office boxes and other types of residential addresses for mail delivery.

2. That address file was run against databases from InfoUSA and Experian that include all listed landline telephone numbers in the state to identify addresses with a listed telephone number.

In order to facilitate the fielding of the survey (discussed below), the final AB sample was divided into two segments: addresses with a listed landline telephone number and addresses without a listed landline telephone number.

The overall sampling design contained a number of features across several dimensions that can be described in terms of sample stratification, household selection criteria, and within household selection criteria. These are described below.

1) Sample stratification

- Interview targets for state-specified 15 Oregon regions.
- Within regions, a creation of strata of addresses by listed Asian and Hispanic surnames.
- Stratification of residual households (those without an Asian or Hispanic surname) by Census block group aggregate incidence of Hispanicity, and percent African American, percent Native American, and percent Asian.

2) Household-level selection

- The respondent's primary residence is in Oregon.
 - Confirmation of Oregon residency via county of residence or zip code
- The respondent, age 18 or older who can answer questions about the health insurance coverage of the members of the household. If the person on the phone is younger than 18, interviewer asks for another household member who is 18 or older.
- Screening households where every person in the household is age 65 or older:
 - If a household with a listed telephone number contains only adults ages 65 and older, the telephone or web interview terminates in 50 percent of such instances. This screening procedure was designed to address the fact that such households more readily respond to surveys compared to other households.
 - Households with unlisted telephone numbers and mail survey respondents are excluded from this criteria

¹ See <http://pe.usps.gov/text/dmm300/509.htm>.

3) Person selection

- A *target*(or *focus person* in the mail survey) is randomly selected from all household members
 - If it is a single-person household, that person is the target.
 - If it is a household with two or more people, a random selection of household members is performed by the CATI/web program; in the hard copy instrument, the household member with the most recent birthday is selected as the *focus person*.

2.2 Sample Stratification

The sample was stratified in order to attain both adequate representation of the state of Oregon, by area, and proportionality of ethnic and racial populations. The sample design needed to address the fact that there is little variance in household minority status by area, as indicated below:

Table 2: Household minority status by region

Region	Percent of All Households	Percent African American	Percent Native American	Percent Asian	Percent Hispanic
1	3.1	0.4	2.1	0.6	11.0
2	2.9	0.2	3.3	0.7	11.3
3	2.9	0.5	2.4	1.0	10.6
4	4.3	0.3	0.7	0.8	5.3
5	4.3	0.3	1.4	0.8	4.4
6	5.2	0.5	0.8	2.4	5.1
7	9.5	0.8	0.9	2.1	5.3
8	4.7	0.3	1.5	0.7	4.1
9	5.5	0.6	0.8	0.9	7.3
10	2.9	0.2	1.6	0.7	3.4
11	7.4	0.8	1.0	1.6	16.4
12	4.1	0.4	1.5	1.2	9.0
13	20.2	5.0	0.7	5.1	7.4
14	9.6	0.7	0.6	3.0	5.4
15	13.4	1.7	0.5	7.8	10.9
TOTAL	100	1.6	1.0	3.1	7.9

Notably, the only option to effectively increase African American and other ethnic interviews within the 15-region plan would have been to oversample region 13 (Multnomah county). Area 13 is also the most populous region of the state; therefore, from an overall perspective,

there is no need to oversample this stratum. In addition, Native Americans, which represent the smallest of the racial/ethnic groups, do not cluster well by region. Whereas their incidence is higher in areas 1, 2, and 3 compared to all other areas of the state, their incidence, on average, in these three areas is still only 2.6 percent. Finally, Asians also do not cluster well; and similar to the African Americans, they tend to cluster in regions 13 and 15, areas that did not need to be oversampled to attain the adequate number of interviews.

In order to achieve the State's objectives, the sample design therefore incorporated stratification by both region and the ethnic populations. The design was developed by first extracting all households with a Hispanic or Asian surname and placing them into surname strata. Next, any block group that is ten percent or more African American, Asian, or Native American, or 30 percent or more Hispanic, was flagged. These groups were then placed into separate high incidence strata. This resulted in 21 strata, including the 15 regions, two surname strata, and four high incidence strata. The 21-strata design allowed for the attainment of at least 319 interviews in each of the 15 regions. The study was also designed to attain proportional representation, at a state level, of African Americans, Hispanics, Native Americans and Asians. In aggregate, the sample plan was designed to attain a minimum of 9,000 interviews across the State.

Below, in Table 3, are the final strata used for the study:

Table 3: Household race by strata

Region/Strata	Total Households	Caucasian Households	African American Households	Native American Households	Asian Households	Hispanic Households
1	39,945	36,153	93	487	84	2,359
2	39,365	34,979	32	538	80	3,029
3	38,898	34,226	155	828	212	2,575
4	65,368	60,318	137	432	331	3,094
5	64,706	59,816	140	713	210	2,356
6	77,429	70,053	304	637	1,205	3,495
7	140,667	126,433	973	1,218	1,633	6,536
8	71,371	65,659	140	1,086	172	2,354
9	82,910	74,225	385	698	469	5,217
10	44,278	41,068	68	720	126	1,213
11	94,299	80,172	590	907	1,120	9,321
12	60,464	53,171	170	720	522	4,606
13	229,549	193,515	6,763	1,435	7,809	13,430
14	137,284	123,954	814	812	2,516	6,549
15	140,697	116,464	2,129	666	5,696	12,137
High AA	36,524	23,615	6,483	322	1,014	3,637
High Hispanic	53,683	30,896	556	491	1,900	18,684
High Asian	95,119	67,783	3,229	513	14,346	6,163
High Native American	5,775	3,334	11	1,986	0	166
Hispanic Surname	26,059	9,381	521	26	261	15,635
Asian Surname	14,951	5,980	299	15	8,223	299
TOTAL	1,559,340	1,311,197	23,992	15,250	47,928	122,857

This design clusters minority interviews into the additional strata, as illustrated by the incidence figures below:

Table 4: Household race incidence by strata

Strata	Percent African American	Percent Native American	Percent Asian	Percent Hispanic
1	0.2	1.2	0.2	5.9
2	0.1	1.4	0.2	7.7
3	0.4	2.1	0.5	6.6
4	0.2	0.7	0.5	4.7
5	0.2	1.1	0.3	3.6
6	0.4	0.8	1.6	4.5
7	0.7	0.9	1.2	4.6
8	0.2	1.5	0.2	3.3
9	0.5	0.8	0.6	6.3
10	0.2	1.6	0.3	2.7
11	0.6	1.0	1.2	9.9
12	0.3	1.2	0.9	7.6
13	2.9	0.6	3.4	5.9
14	0.6	0.6	1.8	4.8
15	1.5	0.5	4.0	8.6
High AA	17.8	0.9	2.8	10.0
High Hispanic	1.0	0.9	3.5	34.8
High Asian	3.4	0.5	15.1	6.5
High Native American	0.2	34.4	0.0	2.9
Hispanic Surname	2.0	0.1	1.0	60.0
Asian Surname	2.0	0.1	55.0	2.0

The sampling plan is as follows:

Table 5: Estimated interviews by race

Strata	Percent of Households	Percent of Interviews	Interviews	African American Interviews	Native American Interviews	Asian Interviews	Hispanic Interviews	Weight	Region Interviews
1	2.6	2.7	243	1	3	1	14	1.1	352
2	2.5	2.8	252	0	3	1	19	1.1	337
3	2.5	4.0	360	1	8	2	24	1.6	459
4	4.2	3.8	342	1	2	2	16	0.9	368
5	4.1	3.8	342	1	4	1	12	0.9	414
6	5.0	4.0	360	1	3	6	16	0.8	419
7	9.0	6.0	540	4	5	6	25	0.7	651
8	4.6	4.0	360	1	5	1	12	0.9	398
9	5.3	5.0	450	2	4	3	28	0.9	497
10	2.8	4.0	360	1	6	1	10	1.4	385
11	6.0	4.0	360	2	3	4	36	0.7	563
12	3.9	4.0	360	1	4	3	27	1.0	450
13	14.7	9.0	810	24	5	28	47	0.6	1,856
14	8.8	6.0	540	3	3	10	26	0.7	682
15	9.0	6.0	540	8	3	22	47	0.7	1,168
AA	2.3	6.0	540	96	5	15	54	2.6	-
Hispanic	3.4	5.0	450	5	4	16	157	1.5	-
Asian	6.1	9.0	810	27	4	122	52	1.5	-
Native American	0.4	2.0	180	0	62	0	5	5.4	-
Hispanic Surname	1.7	4.9	441	9	0	4	265	2.9	-
Asian Surname	1.0	4.0	360	7	0	198	7	4.2	-
TOTAL	100.0	100.0	9,000	195	137	444	900		9,000

We developed allocations designed to maximize the number of minority interviews while maintaining a design effect under 2.0. The high design effect is concentrated within Native American (2.93) interviews; design effects for Asians, Hispanics, and African Americans are 2.14, 1.81 and 1.72 respectively.

The right-most column denotes the number of interviews by area, once interviews from the high incidence and surname strata are folded back into the 15 OHIS regions. The sample plan was designed so that a minimum of 337 interviews would be completed in each region. While the design “on paper” was expected to attain between interviews between 134 percent and 161 percent above proportionality, in practice, we expected the design to attain interviews ranging from 100 percent to 115 percent above proportionality, due to systematic

nonresponse whereby ethnic minorities tend to cooperate in surveys less frequently than Caucasians, on average.

The final step in pulling the sample for the survey was the extraction of 75 percent of all age-listed sample for which the household contains only persons ages 65 and older. Nationally, 82% of all adults ages 65 and older are found on these lists. As such, removing 75% of age-listed sample for households including only people age 65 or older is an effective way to reduce the number of interviews with 65+ households.

3. DATA COLLECTION

3.1 Overview

Data collection relied on three interview modes: telephone, web, and mail. Advance letters, reminder letters, and reminder post cards were mailed to all members in the sample, offering the option to complete the survey by telephone or online. In addition, for sample associated with listed telephone numbers, traditional telephone interviewing methods were used.

The specific steps for the data collection process were as follows.

1. Advance letters were sent to all households. The advance letter invited the household to participate in the study and offered the option of calling in to the survey center using a toll-free telephone number or completing a web-based survey. Letters sent to households associated with a listed telephone number also notified people that they would be receiving a call in the next few weeks to complete the survey.
2. Telephone interviews were attempted with all households for which we had a telephone number. The initial calls commenced one week after the mailing of the advance letters.
3. Reminder notices were sent to all non-responding households.
4. A final reminder notice was sent to all non-responding households. The survey included an experiment in which some households were sent a copy of the mail questionnaire in this final reminder notice and others were sent a reminder letter without a copy of the mail questionnaire. See Section 3.6 for an explanation of the experimental conditions.

The advance letters and reminder letters were printed on The Oregon Health Authority letterhead and signed by Tina Edlund, Deputy Director of Oregon Health Authority. All of the letters and reminder postcards included a 1-800 toll-free number that the respondent could call for additional information on the survey or to complete the survey by telephone.

3.2 Timeline

The study timeline was as follows:

Table 6: Timeline

Milestone	Date(s)
Draft Instrument Received by SSRS	October 4, 2012
CATI Survey Pretest Interviews	November 27, 2012
Web Survey Pretest Interviews	November 29-December 5, 2012
Mail Survey Pretest Interviews	December 3-December 11, 2012
Advance Letter Approval	December 4, 2012
Sample Batch 1 Advance Letters Mailed (3 Waves)	January 4, 7, & 8, 2013
Sample Batch 1 First Web Interview Completed	January 7, 2013
Sample Batch 1 First CATI Interview Completed	January 7, 2013
Sample Batch 1 Outgoing Calls Begin	January 16, 2013
Sample Batch 1 Reminder Postcards Mailed (3 Waves)	January 11, 14, & 15, 2013
Sample Batch 2 Advance Letters Mailed	February 22, 2013
Sample Batch 2 First Web Interview Completed	February 25, 2013
Sample Batch 2 First CATI Interview Completed	February 25, 2013
Sample Batch 2 Outgoing Calls Begin	March 4, 2013
Sample Batch 2 Reminder Postcards Mailed	March 1, 2013
Sample Batch 1 Mail QN or Reminder Letter Mailed	March 8, 2013
1 st Preliminary File Delivery	March 19, 2013
Sample Batch 2 Mail QN or Reminder Letter Mailed	April 1, 2013
Sample Batch 3 Outgoing Calls Begin	April 11, 2013
Sample Batch 3 First CATI Interview Completed	April 11, 2013
Sample Batch 3 Advance Letters Mailed (2 Waves)	April 12 & 15, 2013
Sample Batch 3 First Web Interview Completed	April 15, 2013
Field Termination	May 1, 2013
Final Main Data File Delivery	July 1, 2013
Final Person File Delivery	July 12, 2013
Final Paradata Delivery	July 26, 2013

3.3 Completed Interviews

As noted above, data were collected using multiple modes—telephone, web, and mail. Table 8 shows the number of completions for each mode of data collection with a separate category for in-bound (toll free) telephone calls from sample members requesting to complete the survey by telephone versus outbound phone interviews where a telephone interviewer called the respondent. For the most part, questions are identical for telephone, web, and mail instruments, although some modifications were made for ease of interviewing within each mode. The mail survey is a slightly condensed version of the CATI/Web instruments. The major distinction between the telephone mode and the web and mail modes is that, in the case of the CATI interviews, a trained interviewer guided the respondent through the process, whereas the web and mail surveys were self-administered. (However, as described below, technical support was available for those completing the web and mail surveys.)

Table 7: Completed and partial interviews – mode by telephone status

	Total	With Listed Landline Telephone Number	With No Listed Landline Telephone Number
Total Sample	29,204	13,200	16,004
Total Completed Interviews	9,123	4,562	4,561
Total Partial Interviews	120	50	70
Phone-outbound	2,032	2,032	0
Phone-inbound	1,048	372	676
Web/Internet	4,929	1,612	3,317
Mail	1,234	596	638

Although web and mail respondents were completing the questionnaires without the direct assistance of an interviewer, all correspondence with respondents included contact information for project staff who were available to assist respondents with any problems they had completing the survey. For those completing the survey on-line, there was access to both staff telephone numbers and an email link for technical support.

Table 8: Completed and partial interviews – target race by strata

STRATA	TOTAL	White	Black/AA	Native American	Asian	Hispanic	Other	DK/ Ref.
1	241	229	1	8	2	9	1	2
2	251	233	0	6	10	6	2	2
3	382	361	6	17	7	13	1	1
4	335	316	2	6	9	13	1	0
5	362	344	1	8	5	7	2	3
6	371	351	3	6	8	13	2	2
7	534	494	7	16	10	20	8	3
8	370	349	3	16	7	16	1	1
9	497	470	5	16	9	23	2	3
10	374	358	3	23	4	10	0	0
11	409	388	5	11	7	18	1	2
12	368	349	4	13	6	14	0	1
13	841	772	23	17	29	24	8	3
14	589	557	4	10	20	14	6	2
15	532	491	11	12	22	22	5	3
High AA	565	446	76	16	21	33	10	8
High Hispanic	426	368	7	9	8	47	8	2
High Asian	807	705	26	17	60	35	4	5
High NA	207	144	1	62	5	6	1	1
Hispanic Surname	387	194	8	15	14	264	4	7
Asian Surname	395	211	4	9	191	11	4	0
TOTAL	9,243	8,130	200	313	454	618	71	51

The OHIS was administered in two languages-English and Spanish. All mailings to High Hispanic strata included bilingual materials (English and Spanish). All Hispanic strata telephone interviewing was conducted by bilingual interviewers. In addition, any “language barriers” that were encountered in other strata were called back by bilingual interviewers. A total of 169 interviews were conducted in Spanish.

3.4 Training Materials and Interviewer Training

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

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

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

Interviewers were monitored during the first several nights of interviewing and provided feedback where appropriate to improve interviewer technique and clarify survey questions. This formal interviewer monitoring process was repeated periodically during the field period.

SSRS's facilities allow Interviewing Supervisors to view a computer-assisted telephone interview as well as hear it. In this way, the Supervisor is able to both ascertain that given questions are being asked correctly, and also confirm that the answers are being recorded correctly. Throughout the study, the interviewers were monitored by field personnel and project directors.

3.5 Pretesting

Pretest interviews are conducted in order to insure that proper wording, question sequencing, and informational objectives are being met. CATI pretest interviews also provide an opportunity to: (1) get feedback from interviewers and supervisors regarding the clarity of the instrument (including issues and concerns raised by respondents); and (2) monitor interviewers and make modifications to interviewer training procedures and materials. Separate pretests were conducted for the CATI, web, and mail survey instruments.

CATI Pretest

A total of 33 CATI pretest interviews were conducted on November 27, 2012. Overall, the instrument worked well and respondents appeared to be engaged in the interview. The interviews averaged 22.7 minutes, which was in line with the estimated survey length. As anticipated, analysis of the pretest interviews pointed to the benefit of making adjustments both to the instrument and interviewer training protocols.

SSRS and the Oregon project team identified a few questions that either seemed to be confusing to respondents or could benefit from further clarification in the instrument. Several adjustments were made as indicated below:

- Introduction to S6a: The wording made it sound as though the person selected as the target would be asked to come to the phone to talk about their access to health care services. The introduction was changed to read: “I need some general information about the people in this house. My computer will then randomly pick one person, and I will ask you about that person’s access to health care services.”
- S8: A code for ‘Roommate’ was added to this question.
- A17: The language was adjusted to insert “him/her” rather than “their” for targets who were not the respondent.
- A17c: Language was added to clarify that the question was asking about the total amount of the medical bills that are being paid off over time rather than the current amount that is owed.
- D9: The question was changed to “Is your residence...?” rather than “Is this residence...?”
- I-series: The language used in the I-series was adjusted to mirror the language used in the H-series.
- Research questions: The wording of R1 and R2 was changed, and R3 was deleted.

Web Pretest

A total of five web pretest interviews were conducted between November 29 and December 5, 2012. All respondents were recruited from households with listed telephone numbers. SSRS project staff listened over the phone as the respondents completed the survey and noted potential problem areas. After the respondents finished the survey, SSRS project staff asked the respondents for feedback about the instrument using a series of structured questions.

SSRS identified a few areas that were clarified before fielding the study:

- General Web Design:
 - One pretest respondent struggled as a result of the placement of the navigation buttons. This respondent accidentally suspended the survey because he thought

the ‘Suspend’ button was the ‘Next’ button. The layout of the buttons was redesigned to make navigation more intuitive, and the ‘Suspend’ button was relabeled ‘Finish the survey later.’

- The FAQs were hosted at the address: www.oregonhealthsurvey.com/faq rather than hosting them on www.ssrs.com as was done in 2011 in order make navigation easier for respondents.
- S4: The instructions for whom to include in the household counter were modified to include “members of the armed forces, including National Guard members, who are deployed but typically live in your household.”
- A15 & IN3: Several respondents worried about coming up with an accurate estimate when answering A15 and IN3. The question was updated to include ‘Your best estimate is fine’ in order to allay the respondents’ concerns about needing to provide an exact figure.
- A17a, Part G: The question ‘Was it for something else (SPECIFY)?’ was changed to ‘Was it for some other type of medical service?’ in order to clarify what was being asked.
- A17c: In line with the CATI pretest, the question was changed to: “How much is the total amount of the medical bills the TARGET is paying off over time?”
- A1 & DS1: The words ‘usually’ and ‘serious’ were emphasized using bolding and underlining so that they would stand out more on the computer screen.
- IN3: One respondent thought this question was asking only about income from the sources listed in IN2c. The text ‘all sources’ was underlined in order to emphasize that the question is asking about total income.

Mail Survey Pretest

The mail pretest of the 2013 Oregon Health Insurance Survey (OHIS) took place between December 3 and 11, 2012, during which time SSRS conducted two sets each of internal and external pretests with: (1) members of the SSRS staff who were previously unfamiliar with the instrument; and, (2) Oregon residents. Revisions were made to the instrument following each phase of the pretest based on feedback provided. As part of these sequential pretests, twelve members of the SSRS staff, and six respondents from Oregon completed the survey.

SSRS pretest participants were asked to take the survey on their own and were then debriefed by members of the OHIS project team. Based on feedback received, the instrument was modified and a revised instrument was mailed to the first set of Oregon pretest respondents. The revised instrument was also pretested internally and again revised before sending the hard copy instrument to the final set of Oregon respondents.

Oregon pretest participants were recruited from households with listed telephone numbers and were mailed a copy of the survey. SSRS project staff listened over the phone as the respondents completed the survey and noted potential problem areas. After the respondents finished the survey, SSRS project staff asked the respondents for feedback about the

instrument using a series of structured questions. All six respondents then mailed their completed survey to SSRS for review by project staff.

SSRS identified a few areas that were clarified before fielding the study:

- Missed skip instructions (e.g., Q.20): Several respondents did not notice the brackets that indicated skip patterns and therefore answered questions they should have skipped. As a result, the skip instructions were redesigned by replacing brackets with shaded tables that would help to call respondents' attention to the skip patterns.
- Selection of the focus person:
 - One respondent wrote in the target's birthday instead of the target's name or initials. Presumably this did not affect which person the respondent was thinking about when answering questions about the target, but we underlined 'name' and 'initials' to try to ensure the respondents understood what was being asked.
 - Selection of the focus person: One respondent wrote in his wife's name as the focus person, then turned the page and started answering questions about himself. Following the pretest, we tried to reinforce that the subsequent questions are about the target by changing the directions at the top of the second page of the survey to "The following questions are about the FOCUS PERSON – the member of your household with the most recent birthday."
- Q.6 (Target age): SSRS replaced the three boxes in which respondents were to record the target's age with a single line to make it clear that the respondent should write in the age and not the birth date.
- Q.11 (H series):
 - Two respondents reported that the target has insurance through both his or her own employer and a household member's employer. "Their own" and "someone else's" were underlined to call attention to the difference between Parts A & B of this question.
 - Light shading was used in this grid in order to call attention to the follow-up (IF YES) questions.
- Q.32 & Q.94 (Q.E11a): The question instructions were reformatted to make it clear that not all respondents needed to answer. The filler responses 'the FOCUS PERSON has health insurance through their work' and 'the FOCUS PERSON is not offered health insurance through their work' were moved to the top of the list so they were more visible to the many respondents for whom the question did not apply. In the spouse/parent employment section, the response 'This person is not currently employed' was left as the final item in the list, as it was the last response option for all of the questions in this section.
- Q.80 (Household grid): SSRS sought to make this section more straightforward by asking about all relationships relative to the target rather than asking about relationships to both the focus person and the respondent.
- Q.81 (I series): The instruction to check 'yes' or 'no' for each type of insurance was moved to make it more visible.

- Q.82 to Q.96 (Employment section): We added a place at the beginning of this section where the respondent was asked write in the initials of the spouse or parent(s), so we could compare these to the initials in the Q.80 and determine which person in the household grid is the 1st or 2nd parent.

3.6 Research and Sample-Based Incentive Experiment

The 2013 Oregon HIS included both a sample experiment into the design of the study and a limited number of research questions at the end of each completed interview. The experiment and research questions were included in order to provide data that could be used in the design of future Oregon HIS studies to potentially (1) reduce non-response, (2) improve the quality of data collection, (3) reduce future cost expenditures associated with the OHIS, and (4) potentially contribute to the relatively small body of research that has been conducted on multimodal, address-based designs.

Specifically, the survey included an experiment designed to test the effectiveness of different incentive amounts in encouraging participation. The survey groups were further subdivided into respondents who were sent a mail survey in the third mailing and those who were sent a reminder letter without a hard copy of the survey. Some members of the AB sample with a listed phone number received no incentive, whereas other received a \$2 bill in the initial survey invitation. There were three incentive conditions for members of the AB sample without a listed phone number: (1) a \$20 incentive, which was mailed to the respondent upon completion of the survey; (2) a \$10 incentive, which was mailed to the respondent upon completion of the survey; and, (3) a \$2 bill in the initial survey invitation and a \$10 incentive, which was mailed to the respondent upon completion of the survey. Information on the incentives was provided in all advance letters and reminder letters and in the introduction to the survey. Table 10 shows the amount of sample released and the number of completed interviews by telephone status for each experimental condition.

Preliminary analyses of the experiment suggest that the \$2 pre-incentive, combined with the \$10 post incentive was most successful and the \$10 post incentive (only) was the least successful in boosting cooperation among unmatched sample. Not surprisingly, the \$2 post incentive also boosted participation in the matched sample. SSRS will continue to review these data to determine which, in any, of the incentive conditions may have helped to boost completes for unmatched sample, particularly among the lower population groups (lower income, lower educational attainment) that tend to be underrepresented in ABS designs.

In addition, a larger portion of the survey groups that were sent a mail survey in the third mailing completed the survey than did those who were sent a reminder letter without a hard copy survey.

Table 9: Experimental Conditions – by telephone status

FRAME	Incentive	Mail Survey	Total Sample	Total Interviews
DSF w/ Phone	None	Yes	9,303	3,278
		No	1,424	360
	\$2 Pre	Yes	1,861	753
		No	612	221
DSF no Phone	\$20 Post	Yes	8,803	2,623
		No	799	207
	\$10 Post	Yes	2,402	622
		No	799	172
	\$2 Pre & \$10 Post	Yes	2,402	785
		No	799	222
TOTAL			29,204	9,243

Preliminary analysis of the research questions also indicates that the vast majority of respondents are extremely or very confident in the accuracy of the health insurance information they provided about the Focus Person and others in the household.

SSRS will be reviewing these data in depth and will report to the Oregon Office of Health Analytics regarding analyses on these data including any differences in non-response and per interview cost expenditures.

3.7 Call Rules for the CATI Interviews

Several call rules were implemented for matched sample in order to ensure high cooperation and quality data. For matched sample, SSRS:

- Instituted an average call rule of original plus 19 callbacks before considering a sampling unit exhausted
- Varied the times of day, and the days of the week that call-backs are placed (differential call rule)
- Permitted respondents to set the schedule for a call-back; allowing them to phone back on our 800 number
- Allowed a one week rest period for sample after attaining six no answer calls.
- Made refusal attempts on each initial refusal, with the conversion occurring at least 14 days after the initial contact.

3.8 Refusal Avoidance and Conversion Strategies

With the increased popularity of telemarketing and the use of telephone answering machines and calling number identification (i.e., caller-ID), the problem of non-response has become acute in household telephone surveys. Similarly, the increasing prevalence of unsolicited advertising in the mail (i.e., junk mail) makes it more difficult to conduct surveys using only invitation letters as we are doing here with the AB sample without a listed telephone number. In addition to the incentives and call rules for the CATI interviews outlined above, we employed several other techniques to maximize the response rate for the survey. In the CATI interviewing, this included providing a clear and early statement that the call was not a sales call. In all three versions of the survey (telephone, web, and mail), the introduction included an explanation of the purpose of the study, the expected amount of time needed to complete the survey, and a discussion of the incentives. A toll-free number was provided to all respondents.

In an effort to maximize the response rate in the interview phase, respondents were given every opportunity to complete the interview at their convenience. For instance, those refusing to continue at the initiation of or during the course of the telephone interview were offered the opportunity to be re-contacted at a more convenient time to complete the interview. They were also offered the opportunity to complete the survey on-line or to call into the 1-800 toll-free telephone number to complete the survey. Those completing the interview on the web were able to complete the survey at their own speed and stop and re-start as needed.

A key way to increase responses rates is through the use of refusal conversions. Though all of SSRS's interviewers regularly go through "refusal aversion" training, refusals are still a regular part of survey research. SSRS used a core group of specially-trained and highly-experienced refusal conversion interviewers to call all who initially refused the survey in an attempt to persuade respondents to complete the survey.

3.9 Caller ID

In an effort to maximize the response rate, a caller ID number was set up, such that when SSRS made outgoing calls, respondents saw the number on the caller ID. For OHIS, respondents with Caller ID capabilities saw: "Oregon Health (971) 256-5515". If a respondent missed the call or wanted to check that it is a valid number, he or she could call the number back. For this reason, call forwarding was set up so that SSRS could disposition the calls and respond to questions related to the survey.

3.10 Completed Interviews by Telephone Status

The table below shows the number of completed interview done in households that had only a cell phone, only a landline phone, both a landline and cell phone, and the residual categories for

no telephone or telephone status unknown. We completed surveys with 2,829 cell phone-only households, 5,325 landline and cell phone households, 855 landline-only households, 49 non-telephone households and 185 households that did not report their telephone status.

Table 10: Completed interviews – telephone type by telephone status

	Total	With Listed Landline Telephone Number	With No Listed Landline Telephone Number
Total Interviews	9,243	4,612	4,631
Cell phone-only	2,829	379	2,450
Landline phone-only	855	622	233
Cell phone and landline phone	5,325	3,513	1,812
No telephone	49	9	40
Phone status unknown	185	89	96

3.11 Data Processing and Preparation

Data file preparation began soon after the study entered the field. CATI range and logic checks were used to check the data during the data collection process. Additional data checks were implemented as part of the data file development work, checking for consistency across variables and family members, and developing composite measures of family and household characteristics. This included checking to ensure that respondents didn't leave more than 50% of their responses blank in the online version of the study, and reviewing length of both web and CATI interviews to isolate outliers.

4. RESPONSE RATE

4.1 Overview

Response rates are one method used to assess the quality of a survey, as they provide a measure of how successfully the survey obtained responses from the sample. The American Association of Public Opinion Research (AAPOR) has established standardized methods for calculating response rates (AAPOR, 2008). This survey uses AAPOR's response rate definition RR4, with an AAPOR-approved alternative method of addressing ineligible households (described below). We report the overall response rates achieved for the sample. Before presenting those estimates, we describe our methods for calculating the response rates.

4.2 Defining the Response Rate

SSRS calculates response rates in accordance to AAPOR RR4 calculations. However, the AAPOR Standard Definitions manual does not provide explicit guidelines for ABS designs, nor

does it provide more than general guidance for screener surveys. This memo documents the SSRS approach to both of these issues.

Screener Studies

Generally, screener surveys are different than general population surveys in that there are two levels of eligibility: household and screener. That is, a sample record is “household eligible” if it is determined that the record reaches a valid household. Screener eligible refers to whether known household-eligible records are eligible to in fact complete the full survey. In the case of the Oregon Health Insurance Survey, screener eligibility refers to whether a listed household has a member under the age of 65, for those surveys in which such criteria are mandatory. In addition, households must be located within the geographic target area of the study.

The standard AAPOR RR4 formula is as follows:

$$\frac{I + P}{I + P + R + NR + [UNR + UR]e}$$

Where:

I: Completed Interview

P: Partial Interview

R: Known Eligible Refusal/ Breakoff

NR: Known Eligible Non-Respondent

UR: Household, Unknown if Screener Eligible

UNR: Unknown if Household

e = Estimated Percent of Eligibility

At issue with this calculation for screener surveys is that it does not distinguish the two separate eligibility requirements: UNR and UR and both multiplied by an overall “e” that incorporates any and all eligibility criteria. An alternative RR4 calculation utilized by a large number of health researchers and academicians simply divides “e” into two separate numbers, one for household eligibility and one for screener eligibility:

$$\frac{I + P}{I + P + R + NR + [(UNR)e_2 + (UR)]e_1}$$

Where:

e2 = Estimated Percent of Household Eligibility

e1 = Estimated Percent of Screener Eligibility

“E” calculations are completed via the standard “proportional representation” method dictated by AAPOR. In short, e2 is all identified household / (all identified households + all identified non-households) and e1 = all identified households eligible to do the full survey / (all identified households known to be eligible to do the full survey + all identified households known to not be eligible to do the full survey).

ABS Studies

ABS studies are particularly challenging for response rate calculations given that they are typical multi-modal. That is, while the frame is address-based, the method of interviewing is often web and/or telephone as well as address. Therefore, the question is how to treat telephone dispositions when the frame is based on address. Prior studies (specifically, MA HIS 2011) show that over 95% of the time, completed interviews via phone were completed by a person at the address sampled. Given this high “hit rate,” it is our opinion that all sample records determined by phone to be an occupied household should be considered a successful match between phone and address. This is important, because it therefore means any eligible refusal should in fact be treated as an eligible refusal (meaning, we assume that the phone matched the address and therefore it is a refusal from a valid sample record). That said, any non-working, fax, and business disposition is, by its nature, proven to be an unsuccessful match between phone and address. Therefore, any such records should not be treated as ineligible, but in fact UNR, a sample record for which household eligibility has not yet been established.

By definition then, a large percent of sample records will end up as UNR. The vast majority of unmatched sample, however, will be considered a “no answer,” given that invitations to participate were mailed, without any response whatsoever. And as mentioned, within matched sample, all non-working/fax/business telephone dispositions for which there is no more “important” web or mail dispositions (like a completed interview) will be considered UNR as well.

4.3 Final Response Rates

Table 11: Final Dispositions and Response Rates

	Total	1	2	3	4	5	6	7	8	9	10	11
INELIGIBLE												
Undeliverable	3899	104	111	179	145	174	145	183	178	188	139	148
No Eligible Respondent	601	21	21	26	23	25	24	37	28	43	39	21
Total Ineligible Cases	4500	125	132	205	168	199	169	220	206	231	178	169
	0											
ELIGIBLE	0											
Refusal	50	0	1	3	3	0	1	1	3	2	5	0
Breakoffs	47	1	1	2	1	1	3	2	0	1	0	0
Answering Machine/Other	23	0	1	0	1	1	1	2	2	2	1	0
Partial Interview	120	0	5	5	6	2	6	3	5	5	4	6
Interview Complete	9123	241	246	377	329	360	365	531	365	492	370	403
Total Eligible Cases	9367	242	254	387	341	364	376	539	375	502	380	409
Unknown Eligibility												
Refusal	1500	30	35	50	40	71	55	91	73	85	69	53
Breakoffs	448	10	14	21	14	17	21	20	22	31	20	15
Answering Machine	1475	37	23	43	33	42	46	88	64	76	34	44
Language Unable	33	0	0	0	0	0	0	0	0	0	1	0
Busy	88	1	3	4	0	2	4	4	3	2	1	1
No Answer	9886	260	248	401	359	342	343	463	363	498	348	356
Call Blocking	26	0	1	2	0	0	2	0	0	5	2	0
Bad Number, but Mail Delivered	1671	38	30	55	54	43	50	73	55	88	54	47
No Screener Completed	162	4	2	9	5	8	6	5	7	12	3	4
Physically/Mentally Unable/Group Quarters	52	0	2	2	3	1	1	5	1	6	3	2
Total Unknown Eligible Cases	15261	380	359	587	504	521	524	747	588	799	533	522
TOTAL CASES	29204	747	745	1179	1013	1084	1069	1506	1169	1532	1091	1100
RR4	43.9%	46.1%	48.4%	46.6%	46.6%	47.9%	47.5%	47.1%	45.2%	44.3%	47.6%	50.0%

Table 11: Final Dispositions and Response Rates (Con't)

	Total	12	13	14	15	High AA	High Hisp	High Asian	High NA	Hisp Sur	Asian Sur
INELIGIBLE											
Undeliverable	3899	118	329	201	210	294	260	369	66	231	127
No Eligible Respondent	601	23	42	42	31	24	26	51	9	16	29
Total Ineligible Cases	4500	141	371	243	241	318	286	420	75	247	156
	0										
ELIGIBLE	0										
Refusal	50	1	6	4	3	1	0	6	2	2	6
Breakoffs	47	1	5	1	4	2	1	5	1	9	6
Answering Machine/Other	23	1	1	2	2	1	3	1	0	0	1
Partial Interview	120	4	4	7	7	9	16	9	2	7	8
Interview Complete	9123	364	837	582	525	556	410	798	205	380	387
Total Eligible Cases	9367	371	857	597	541	569	428	819	210	398	408
Unkown Eligibility											
Refusal	1500	66	125	112	80	78	81	123	19	77	87
Breakoffs	448	13	35	30	10	26	14	37	11	37	30
Answering Machine	1475	44	136	100	111	71	66	208	17	77	115
Language Unable	33	0	4	0	1	5	2	6	0	4	10
Busy	88	6	9	2	7	4	7	11	3	8	6
No Answer	9886	361	814	645	497	665	524	996	285	725	393
Call Blocking	26	2	2	3	1	1	0	4	0	1	0
Bad Number, but Mail Delivered	1671	57	153	104	113	106	112	171	23	137	108
No Screener Completed	162	4	17	14	13	5	6	17	0	9	12
Physically/Mentally Unable/Group Quarters	52	3	3	3	2	7	3	2	1	1	1
Total Unknown Eligible Cases	15261	553	1289	1007	830	964	811	1559	358	1073	753
TOTAL CASES	29204	1065	2517	1847	1612	1851	1525	2798	643	1718	1317
RR4	43.9%	45.4%	45.3%	42.1%	44.7%	44.3%	42.3%	40.3%	42.1%	32.7%	38.2%

5. SURVEY WEIGHTS AND VARIANCE ESTIMATION

5.1 Survey Weights

Survey data are weighted to adjust for differential sampling probabilities, to reduce any biases that may arise because of differences between respondents and non-respondents (i.e., nonresponse bias), and to address gaps in coverage in the survey frame (i.e., coverage bias). Survey weights, when properly applied in surveys can reduce the effect of nonresponse and coverage gaps on the reliability of the survey results (Keeter et al. 2000, Groves 2006).

We constructed analytical survey weights for the Oregon Health Survey using standard procedures. That is, separate weights are created for all persons and for the target-person in the household.

5.2 Constructing the Base Weights

The first step in the weighting process for each sample is to create a household weight for each completed survey. That household weight is used to construct weights for each person in the household and for the target-person in each household.

We first adjusted the base weight so that all the households attain the same probability of selection. This adjustment corrects for the over-sampling of addresses in some strata in comparison to others:

$$(f = n_{\text{interviews}} / N_{\text{frame}})$$

Table 12: Base weights by strata

STRATA	Percent of Households	Percent of Interviews	Stratification Weight
1	2.6	2.6	0.98
2	2.5	2.7	0.93
3	2.5	4.1	0.60
4	4.2	3.6	1.16
5	4.1	3.9	1.06
6	5.0	4.0	1.24
7	9.0	5.8	1.56
8	4.6	4.0	1.14
9	5.3	5.4	0.99
10	2.8	4.0	0.70
11	6.0	4.4	1.37
12	3.9	4.0	0.97
13	14.7	9.1	1.62
14	8.8	6.4	1.38
15	9.0	5.8	1.57
High AA	2.3	6.1	0.38
High Hispanic	3.4	4.6	0.75
High Asian	6.1	8.7	0.70
High NA	0.4	2.2	0.17
Hispanic Surname	1.7	4.2	0.40
Asian Surname	1.0	4.3	0.22

This step has the additional feature of correcting for non-response² as well, since the percent of interviews, rather than total sample, in each strata, is matched to the percent of households in each strata. Therefore, non-response and stratification are corrected in one step (compared to matching sample to households, and then correcting the number of interviews to sample as a separate non-response correction).

A second adjustment corrected for non-response between listed and unlisted sample. Since listed sample has the benefit of containing a phone number, response rate is often much higher in that frame compared to unmatched sample. However, this was not the case in

² Nonresponse creates biases survey estimates because the characteristics of those interviewed differ from those who were not interviewed. The size of the bias is based on this difference and the response rate (Groves, 1989). Non-response adjustments are designed to reduce this bias. A weighting class adjustment (Brick and Kalton, 1996) method is the type of nonresponse adjustment procedure typically used in most survey research, and is utilized here as a function of the stratification adjustment as described in the body of the text.

Oregon, given a robust web response in the unmatched sample. Nevertheless, the adjustment was made:

Table 13: Base weight of Matched and Unmatched sample

Sample Type	Percent of Households	Percent of Interviews	Stratification Weight
Matched	48.0%	49.9%	0.96
Unmatched	52.0%	50.1%	1.04

The base weight also corrected for the termination of approximately 50% of households in which there were no adults under the age of 65. This correction gave all households for which there was someone under the age of 65 a weight of 1, and those who were interviewed that did not contain a person under the age of 65 a weight of 2.

Finally, a number of adults adjustment was made, such that households with 1 adult received a base weight correction of 1, households with 2 adults received a base weight correction of 2, and households with 3 or more adults received a base weight correction of 3 (t). This correction was capped at 3 to prevent large weights for large households.

The final base weight was a product of these four corrections (strata weight * sample type weight * under 65 weight * number of adults weight).

5.3 Constructing the Target Weights

To create a target weight for each person in an interviewed household we started with the base weight and then post-stratified so that our weighted sample population totals equaled population control totals based on data for Oregon. Specifically, we aligned the sample to current Census population estimates for Oregon on age, race/ethnicity x puma, race/ethnicity x education, gender, homeownership, and foreign born status x education. The demographic information and homeownership data came from the American Community Survey, 2011. We examined the distribution of the resulting person weights and determined that there was not need to implement trimming rules, though a trimmed weight was included upon request.

We utilized an iterative proportionate fitting (IPF) procedure create the post-stratification weights. IPF is a now-ubiquitous sample balancing routine originally developed by W. Edwards Deming and Frederick F. Stephan to adjust samples in economic and social surveys on selected demographic characteristics against data obtained from the U.S. Census. The theory behind IPF is explained in Deming's book *Statistical Adjustment Of Data* (1943), available in reprint from Dover Publications. Details on the Deming-Stephan method are spelled out in Chapter VII:

"Adjusting to Marginal Totals." (Werner, 2004). IPF ("raking") uses least-squares curve fitting algorithms to obtain a unique weight for each case that minimizes the root mean square error (RMSE) across multiple dimensions simultaneously. Then it applies these weights to the data and repeats the procedure using the newly obtained marginal counts to obtain yet another set of weights. This process is repeated for a specified number of iterations or until the difference in the RMSE between successive steps becomes less than a specific minimum value. This study employed an IPF procedure using the statistical software, QBAL. QBAL not only is an "industry standard" software for sample balancing post-stratification but also allows for the application of a pre-existing base weight to the input data for the sample balancing process.

Below are the control totals used and frequencies of the data, before and after the post-stratification routine. Note the adjustment of the control targets to account for missing data in the sample, a standard method of dealing with missing data for weighting procedures:

Table 14: Pre-Rake/Post-Rake frequencies

Gender	Population	Percent	Adjusted Percent	Pre-Rake Sample Percent	Post-Rake Sample Percent
Male	1862020	49.2	49.1	46.3	49.2
Female	1923194	50.8	50.8	53.6	50.7
Total	3785214	100.0	99.9	99.9	99.9
DK/R	8		0.1	0.1	0.1

Home Ownership	Population	Percent	Adjusted Percent	Pre-Rake Sample Percent	Post-Rake Sample Percent
Rent	1442434	38.1	37.5	27.3	37.5
Own	2342780	61.9	60.9	71.1	60.9
Total	3785214	100.0	98.3	98.3	98.3
DK/R	155		1.7	1.7	1.7

Age	Population	Percent	Adjusted Percent	Pre-Rake Sample Percent	Post-Rake Sample Percent
0 thru 17	856866	22.6	22.6	21.1	22.8
18 thru 24	334459	8.8	8.8	3.9	8.8
25 thru 34	518625	13.7	13.7	7.5	13.7
35 thru 44	493648	13.0	13.0	8.5	13.0
45 thru 54	519402	13.7	13.7	14.2	13.7
55 thru 64	521991	13.8	13.8	25.4	13.8
65 thru 96	540223	14.3	14.3	19.4	14.3
Total	3785214	100.0	100.0	100.0	100.0

Race by Education		Population	Percent	Adjusted Percent	Pre-Rake Sample Percent	Post-Rake Sample Percent
No H.S. Diploma	White/Other	187824	5.0	4.9	3.1	4.8
	Black	7206	0.2	0.2	0.1	0.2
	Asian	15786	0.4	0.4	0.2	0.4
	Native American	8575	0.2	0.2	0.3	0.2
	Hispanic	103189	2.7	2.7	0.7	2.7
H.S. Diploma	White/Other	618830	16.3	16.0	14.5	16.0
	Black	12602	0.3	0.3	0.3	0.3
	Asian	26574	0.7	0.7	0.3	0.7
	Native American	17899	0.5	0.5	0.6	0.5
	Hispanic	74235	2.0	1.9	0.8	1.9
Some College	White/Other	907920	24.0	23.5	25.0	23.3
	Black	19826	0.5	0.5	0.5	0.5
	Asian	40684	1.1	1.1	0.7	1.1
	Native American	23857	0.6	0.6	1.0	0.6
	Hispanic	69176	1.8	1.8	1.1	1.8
College Degree	White/Other	697214	18.4	18.0	24.9	18.0
	Black	9762	0.3	0.3	0.3	0.3
	Asian	52359	1.4	1.4	1.7	1.4
	Native American	9265	0.2	0.2	0.4	0.2
	Hispanic	25325	0.7	0.7	0.7	0.7
Under 18	White/Other	569205	15.0	14.7	14.5	14.9
	Black	30438	0.8	0.8	0.7	0.8
	Asian	52071	1.4	1.3	1.5	1.3
	Native American	22318	0.6	0.6	0.6	0.6
	Hispanic	182805	4.8	4.7	3.4	4.8
	Total	3784945	100.0	98.0	98.0	98.0
	DK/Ref	187		2.0	2.0	2.0

Race by PUMA		Population	Percent	Adjusted Percent	Pre-Rake Sample Percent	Post-Rake Sample Percent
41100	White/Other	402261	10.6	10.4	14.2	10.4
	Black	2799	0.1	0.1	0.4	0.1
	Asian	7555	0.2	0.2	0.4	0.2
	NA	16295	0.4	0.4	0.9	0.4
	Hispanic	67732	1.8	1.8	1.1	1.8
41200	White/Other	597881	15.8	15.5	13.4	15.5
	Black	7101	0.2	0.2	0.1	0.2
	Asian	24765	0.7	0.6	0.4	0.6
	NA	17711	0.5	0.5	0.4	0.5
	Hispanic	51728	1.4	1.3	0.6	1.3
41300	White/Other	409665	10.8	10.6	12.3	10.6
	Black	2683	0.1	0.1	0.1	0.1
	Asian	7245	0.2	0.2	0.3	0.2
	NA	14785	0.4	0.4	0.6	0.4
	Hispanic	37471	1.0	1.0	0.8	1.0
41400	White/Other	347173	9.2	9.0	9.8	9.0
	Black	4301	0.1	0.1	0.1	0.1
	Asian	13440	0.4	0.3	0.3	0.4
	NA	10573	0.3	0.3	0.4	0.3
	Hispanic	101425	2.7	2.6	1.4	2.6
All Other Pumas	White/Other	1224013	32.3	31.7	32.5	31.7
	Black	62950	1.7	1.6	1.5	1.6
	Asian	134469	3.6	3.5	3.1	3.5
	NA	22550	0.6	0.6	0.7	0.6
	Hispanic	196374	5.2	5.1	2.7	5.1
	Total	3784945	100.00	98.2	98.2	98.2
	DK/Ref	163		1.8	1.8	1.8

US Born by Education		Population	Percent	Adjusted Percent	Pre-Rake Sample Percent	Post-Rake Sample Percent
US Born	Less Than High School	213625	5.6	5.6	4.0	5.6
	High School Diploma	673511	17.8	17.7	15.9	17.7
	Some College	979898	25.9	25.7	27.4	25.7
	College Degree	705615	18.6	18.5	25.7	18.5
	Under 17	821821	21.7	21.6	20.2	21.6
Foreign Born	Less Than High School	108955	2.9	2.9	0.8	2.9
	High School Diploma	76629	2.0	2.0	1.0	2.0
	Some College	81565	2.2	2.1	1.4	2.1
	College Degree	88550	2.3	2.3	2.5	2.3
	Under 17	35045	0.9	0.9	0.6	0.9
	Total	3785214	100.00	99.4	99.4	99.4
	DK/Ref	51		0.6	0.6	0.6

5.4 Constructing the Person Weights

The person file required separate weighting procedures. These mimics the target person weighting procedure exactly, with the exception of the number of adults base weight correction, which was not done since each case in the person file is a household member.

5.5 Variance Estimation and the Average Design Effect

Complex survey designs and post-data collection statistical adjustments affect variance estimates and, as a result, tests of significance and confidence intervals. Variance estimates derived from standard statistical software packages that assume simple random sampling are generally too low, which leads significance levels to be overstated and confidence intervals to be too narrow.

The impact of the survey design on variance estimates is measured by the design effect. The design effect describes the variance of the sample estimate for the survey relative to the variance of an estimate based on a hypothetical random sample of the same size. In situations where statistical software packages assume a simple random sample, the adjusted standard error of a statistic should be calculated by multiplying by the design effect. Each variable will have its own design effect. Average design effects are summarized below. In 2013, the design effect for estimates for the target person in the household was 1.82. Trimmed, this was reduced to 1.62.

Table 15: Design effects

Race/Ethnicity	Estimate	Standard Error	95% Confidence Interval		Design Effect	Unweighted Count
			Lower	Upper		
White	77.8%	0.6%	76.6%	78.9%	1.8	7536
Black	2.1%	0.2%	1.7%	2.5%	1.9	178
Asian	4.8%	0.3%	4.2%	5.4%	2.0	414
Native American	2.3%	0.2%	1.9%	2.7%	1.5	270
Hispanic	10.8%	0.5%	9.9%	11.7%	2.1	618
Other	0.6%	0.1%	0.5%	0.9%	1.4	64

Education	Estimate	Standard Error	95% Confidence Interval		Design Effect	Unweighted Count
			Lower	Upper		
No H.S. Diploma	7.4%	0.4%	6.6%	8.2%	2.4	418
H.S. Diploma	19.6%	0.6%	18.5%	20.7%	1.8	1560
Some College	27.9%	0.6%	26.8%	29.1%	1.6	2665
College Degree	21.7%	0.5%	20.8%	22.7%	1.3	2626
Under 18	23.1%	0.5%	22.1%	24.2%	1.5	1949

Age	Estimate	Standard Error	95% Confidence Interval		Design Effect	Unweighted Count
			Lower	Upper		
0 thru 17	23.1%	0.5%	22.1%	24.2%	1.5	1949
18 thru 24	8.6%	0.5%	7.7%	9.6%	2.6	356
25 thru 34	13.1%	0.5%	12.1%	14.2%	2.3	696
35 thru 44	12.6%	0.5%	11.7%	13.6%	2.0	784
45 thru 54	13.7%	0.4%	12.9%	14.6%	1.5	1316
55 thru 64	14.2%	0.3%	13.6%	14.9%	0.9	2347
65 thru 96	14.6%	0.4%	13.8%	15.4%	1.2	1795

Gender	Estimate	Standard Error	95% Confidence Interval		Design Effect	Unweighted Count
			Lower	Upper		
Male	49.1%	0.7%	47.8%	50.4%	1.6	4282
Female	50.9%	0.7%	49.6%	52.2%	1.6	4960

Variance estimation procedures have been developed for most standard software packages to account for complex survey designs. We provide a replicate stratum (strata) on the survey data files that can be used with the appropriate weight variable to obtain corrected standard errors using a Taylor series approximation (or other related linearization method). Users interested in using a linearization method can choose to use SUDAAN, the “SVY” commands in Stata, the “PROC SURVEYMEANS” and “PROC SURVEYREG” commands in SAS, or the “CSELECT” complex samples procedures in the SPSS complex samples module.

6. INCOME IMPUTATION

Income is commonly imputed utilizing a range of methods, including hot deck imputation, regression imputation, and mean imputation within adjustment cells (see Brick and Kalton, 1996; Mandal and Stasny, 2004). Comparative analysis finds highly similar results by each technique. For this study, we utilized regression imputation, as we have done for many other projects in the past. Quite simply, regression imputation builds a multiple regression model of income for those cases in which income data are available, utilizing whatever independent variables are available to maximize the r-squared for the overall model. In short, a regression model is built in which as much variance as possible within the dependent variable (income) is explained by the independent variables. R-squares in the social sciences tend to be low, often under .10 (10%). Yet income regression models tend to be quite robust, with r-squares in excess of .25. The standard technique is to begin by building a fully specified model (in short, every possible independent variable is included), and then trimming the model of the most insignificant variables, to arrive at a robust but not over-specified final model. Independent variables are typically recoded as dichotomous variables or by imputing missing data to the

mean, so that there are no missing data in the independent variables. As such, SPSS can then save the predicted values for every case, including those in which income is missing. The final variable includes raw data for those cases in which income is not missing, and imputed data for cases in which income is missing.

Below is the final model utilized for the 2013 OHIS.

Table 16: Final Imputation Model

Independent Variable	B	SE	Beta	t	Sig.
(Constant)	-51117	8414.71		-6.075	.000
region1	-8146	3943.982	-0.023	-2.065	.039
region2	-4352	4238.249	-0.011	-1.027	.305
region3	-13678	3564.223	-0.042	-3.838	.000
region4	-8320	4115.461	-0.022	-2.022	.043
region5	-10684	3866.535	-0.03	-2.763	.006
region6	-8168	3856.585	-0.023	-2.118	.034
region7	-9863	3193.602	-0.034	-3.088	.002
region8	-14380	3952.964	-0.04	-3.638	.000
region9	-5455	3434.66	-0.017	-1.588	.112
region10	-14240	3937.945	-0.04	-3.616	.000
region11	-8124	3173.93	-0.028	-2.56	.011
region12	-12582	3505.907	-0.039	-3.589	.000
region14	1032	3019.052	0.004	0.342	.733
Go to Doc's Office When Sick	10021	2696.865	0.059	3.716	.000
Go Elsewhere When Sick	2816	3213.746	0.013	0.876	.381
Did Not Fill Prescription	-442	2687.963	-0.002	-0.164	.869
Did Not Get Dental Care	-7279	2149.228	-0.038	-3.387	.001
Did Not Get Needed Medicine	-10729	2589.816	-0.051	-4.143	.000
Trouble Paying Medical Bills	-10108	2068.973	-0.057	-4.885	.000
Overall health	2980	810.305	0.046	3.678	.000
Household Count	2173	1139.571	0.04	1.907	.057
Family County	11446	2896.3	0.192	3.952	.000
Married	21763	3519.895	0.149	6.183	.000
African Americans	-9292	5490.874	-0.018	-1.692	.091
Asians	-2332	3929.474	-0.006	-0.593	.553
Native Americans	-6817	4630.194	-0.016	-1.472	.141
Hispanic	-4017	3440.195	-0.014	-1.168	.243
Different Races in HH	3251	2714.949	0.014	1.198	.231
Average HH Education	6084	432.646	0.167	14.062	.000
Employed: Self	5527	2245.707	0.028	2.461	.014
Employed: Military	-7749	11438.62	-0.007	-0.677	.498

Employed: Unpaid	-10739	8124.705	-0.014	-1.322	.186
Unemployed, Looking for Work	-16300	2750.581	-0.066	-5.926	.000
Unemployed, Not Looking	-6831	2611.481	-0.029	-2.616	.009
Retired	-11361	2476.606	-0.067	-4.587	.000
Disabled	-8912	2936.449	-0.037	-3.035	.002
Hold Multiple Jobs	-3218	2645.831	-0.013	-1.216	.224
Have a Temp Job	-13911	3477.114	-0.043	-4.001	.000
Have Seasonal Job	-13422	4702.501	-0.03	-2.854	.004
Veterans in HH	2404	2239.283	0.013	1.074	.283
Students in HH	-16943	3586.842	-0.052	-4.724	.000
Home Rented	-12795	1959.366	-0.077	-6.53	.000
Anyone in the HH Uninsured	-9320	2429.688	-0.046	-3.836	.000
Children in HH	-11283	3056.137	-0.154	-3.692	.000
Cobra	17533	6891.011	0.026	2.544	.011
Medicare	-7732	2448.296	-0.045	-3.158	.002
Tricare (etc.)	-10394	3960.768	-0.031	-2.624	.009
OHP	-16199	3476.869	-0.054	-4.659	.000
HealthyKids	-26720	3695.288	-0.089	-7.231	.000
OMIP	-20875	9853.28	-0.022	-2.119	.034
Direct Purchase	-10254	2410.428	-0.049	-4.254	.000
Model R2	0.27				
Model F test	50				.000