

NATIONAL HEALTH AND AGING TRENDS STUDY (NHATS)
Development of Round 8 Survey Weights

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1. Introduction

The NHATS public use data originally supported weighted analysis of Medicare beneficiaries ages 65 and older living in the contiguous United States on September 30, 2010. The original cohort has been interviewed annually. Replenishment took place in Round 5 so that the sample could be used to study disability trends as well as individual trajectories. The replenishment sample was drawn as of September 30, 2014. Details on sample design and selection are available elsewhere (Montaquila et al. 2012a and Dematteis et al. 2016a).

For Round 8, as for Rounds 5, 6, and 7, separate sets of weights are provided for analyses pertaining to the original target population (the “2011 Cohort”) and for analyses pertaining to the new target population (the “2015 Cohort”). The survey weights included with the Round 8 public use file account for differential probabilities of selection and adjust for potential bias related to unit nonresponse to the Round 1 through 8 interviews.

As in prior rounds, for Round 8 of NHATS, two types of sampling weights have been produced (for each cohort): a tracker weight (on the Tracker file with the variable names `w8trfinwgt0` and `w8tr2011wgt0`) and an analytic weight (on the Sample Person file with the variable names `w8anfinwgt0` and `w8an2011wgt0`). For variance estimation (see Section 7), NHATS has also included replicate versions of these weights (`w8trfinwgt1-w8trfinwgt56` and `w8anfinwgt1-w8anfinwgt56` for the 2015 Cohort; `w8tr2011wgt1- w8tr2011wgt56` and `w8an2011wgt1- w8an2011wgt56` for the 2011 Cohort).

The methodology that was used to develop these weights and appropriate uses of each of these weights are discussed in the following sections. The next section provides an overview of how cases were classified for purposes of weight development. Sections 3 and 4 detail the creation of the tracker and analytic weights, respectively. Section 5 reports on the effect of weighting adjustments on the precision of NHATS survey estimates. Section 6 provides guidance on the use of the tracker and analytic weights. A final section provides information on the proper calculation of variance estimates to account for the complex design and estimation procedures used in NHATS.

2. Definition of Respondent

In the development of survey weights, an important first step is the classification of cases into groups based on eligibility and response status. For Round 8 of NHATS, Table 1 shows how the disposition codes map into respondent, ineligible, and nonrespondent statuses.

In the computation of the 2015 Cohort weights, both original sample and replenishment sample cases were included. In the computation of the 2011 Cohort weights, only cases in the original sample were included.

2015 Cohort Weights

For the 2015 Cohort Round 8 Tracker weight, only cases that were eligible as of September 30, 2014, and were classified in Round 8 as Respondents (including cases for whom a Round 8 Last Month of Life (LML) interview was completed) or Ineligible are assigned a positive weight ($n=7,264$). Cases for which at least one survey component is available (codes 60, 61, 62, 63 and 64) are considered respondents for purposes of the tracker weight.

Cases who became ineligible for the Round 8 interviews after they were selected, either due to death prior to their first interview (Round 1 for original sample cases, Round 5 for replenishment sample cases) or due to moving outside the contiguous U.S., also have positive Round 8 Tracker weights

For the 2015 Cohort Round 8 Analytic weight, only Respondents (codes 60, 61, 62, 63; n=5,435) are assigned a positive weight. For the SP interview, cases were required to have completed the self-reported disability protocol (through the section on Participation; PA) to be considered complete.

2011 Cohort Weights

For the 2011 Cohort Round 8 Tracker weight, only original sample cases classified as Respondents and Ineligible are assigned a positive weight (N = 5,951). Original sample cases for which at least one survey component is available (codes 60, 61, 62, 63 and 64) are considered respondents for purposes of the tracker weight.

Original sample cases who became ineligible for the Round 1 interview after they were selected, either because they died or moved out of the contiguous U.S. by the time of the fieldwork, have positive Round 8 Tracker weights. Those who became ineligible in subsequent rounds for an interview because they moved out of the contiguous U.S. or completed a Last Month of Life (LML) interview because they died also have positive tracker weights in Round 8. Replenishment sample cases added in 2015 do not have positive 2011 Cohort Round 8 Tracker weights.

For the 2011 Cohort Round 8 Analytic weight, only original sample Respondents (codes 60, 61, 62, 63; n=2,776) are assigned a positive weight. For the SP interview, cases were required to have completed the self-reported disability protocol (through the section on Participation; PA) to be considered complete.

Table 1. Classification of Round 8 NHATS Sample for Weight Development Purposes

Disposition code	Original Sample			Replenishment Sample		
	N	Classification for Tracker Weight	Classification for Analytic Weight	N	Classification for Tracker Weight	Classification for Analytic Weight
60 Complete, community	2,250	Respondent	Respondent	2,275	Respondent	Respondent
60-Complete, NH or residential care	233	Respondent	Respondent	143	Respondent	Respondent
61 Complete, NH facility	31	Respondent	Respondent	61	Respondent	Respondent
62 Complete, SP deceased, proxy interview	231	Deceased respondent ⁺	Respondent ⁺	166	N/A	N/A
63 Complete SP, FQ not complete	31	Respondent	Respondent	14	Respondent	Respondent
64 Complete FQ, SP not complete	69	Respondent	Nonrespondent	43	Respondent	Nonrespondent
75 Physically/mentally unable to participate, no proxy	4	Nonrespondent	Nonrespondent	2	Nonrespondent	Nonrespondent
76 Too ill to participate, no proxy	12	Nonrespondent	Nonrespondent	14	Nonrespondent	Nonrespondent
77 Refusal, Sample Person	62	Nonrespondent	Nonrespondent	133	Nonrespondent	Nonrespondent
78 Language barrier	1	Nonrespondent	Nonrespondent	1	Nonrespondent	Nonrespondent
79 Unable to locate	1	Eligibility unknown ⁺⁺	Eligibility unknown ⁺⁺	7	unknown ⁺⁺	unknown ⁺⁺
80 Unavailable during field period	2	Nonrespondent	Nonrespondent	7	Nonrespondent	Nonrespondent
82 Outside of Primary Sampling Unit	1	Nonrespondent	Nonrespondent	2	Nonrespondent	Nonrespondent
83 Ineligible (moved out of contiguous US)	2	Ineligible	Ineligible	0	Ineligible	Ineligible
85 Refusal, facility	3	Nonrespondent	Nonrespondent	6	Nonrespondent	Nonrespondent
86 Deceased, no proxy	4	nonrespondent ⁺	Nonrespondent ⁺	11	N/A	N/A
87 Refusal, proxy	16	Nonrespondent	Nonrespondent	13	Nonrespondent	Nonrespondent
88 Work stopped	0	Nonrespondent	Nonrespondent	0	Nonrespondent	Nonrespondent
89 Final other/specify*	0	Nonrespondent*	Nonrespondent*	2	Nonrespondent*	Nonrespondent*
Not attempted in Round 8						
Deceased in Round 1, 2, 3, or 4	2,127	Ineligible [#]	Ineligible [#]	0	N/A	N/A
Deceased in Round 5, 6, or 7	852	Ineligible	Ineligible	808	Ineligible	Ineligible
Other Round 1, 2, 3, or 4 ineligible	120	Ineligible [#]	Ineligible [#]	0	N/A	N/A
Other Round 5, 6, or 7 ineligible	5	Ineligible	Ineligible	50	Ineligible	Ineligible
Round 1, 2, 3, 4, 5, 6, or 7 nonrespondent	6,354	Nonrespondent ^{**}	Nonrespondent ^{**}	3,361	N/A	N/A
Total and number assigned weight	12,411	3,704 (5,951 ^{###})	2,776	7,119	3,560	2,659

⁺ For the original sample, the weights of deceased SPs were adjusted separately from those of living SPs.

⁺⁺ Due to the very low proportion of fielded cases in this category in Round 2 (0.46% of fielded cases), as well as the low proportion of Round 1 respondents that were ineligible for Round 2 (0.38%), these cases were treated as living nonrespondents in the computation of Round 2 weights. The same approach was used in the computation of Round 3 and Round 4 weights, and for original sample cases, in the computation of the Round 5, Round 6, Round 7, and Round 8 weights. For the replenishment sample, these cases were treated as cases with unknown eligibility in Round 5, and as living nonrespondents in the computation of Round 6, Round 7, and Round 8 weights.

^{**}These cases were previously adjusted for in the Round 1, Round 2, Round 3, Round 4, Round 5, Round 6, or Round 7 nonresponse adjustment to the tracker weight; the Round 7 nonresponse adjusted tracker weight was used as input to the Round 8 weighting process, so these cases are not included in the Round 8 nonresponse adjustment.

SP=Sample Person interview; FQ=Facility Questionnaire

[#]These categories only apply to the 2011 Cohort.

^{###}The number assigned tracker weights for the 2011 Cohort is given in parentheses.

3. Computation of Round 8 Tracker Weights

2015 Cohort Tracker Weights

To produce the 2015 Cohort Round 8 Tracker weight, two adjustments were made to the Round 7 nonresponse adjusted tracker weight—an adjustment for Round 8 nonresponse and a raking adjustment to estimated population totals from the Medicare Enrollment Database (EDB).

Response rates differed between the members of the original 2011 cohort and members of the 2015 cohort. Although the response rates for the two samples are converging, there is still enough of a difference to warrant adjusting the two samples separately for Round 8 nonresponse.

Potential variables for creating nonresponse cells for the 2015 Cohort Round 8 Tracker weights came from five sources:

- Beneficiary information from the sampling frame (the 20% HISKEW File for the original sample; the 20% extract of the EDB for the replenishment sample¹), including demographic characteristics of the beneficiary (e.g., age as of September 30, 2014, gender) and geographic information (e.g., census division, metro and micropolitan status) based on the beneficiary's address on the frame;
- County-level demographic information based on the 5% HISKEW file or the 5% extract of the EDB (e.g., percent of beneficiaries in the county who are Black; percent of beneficiaries in the county who are Hispanic) for the county linked to the beneficiary's address from the EDB;
- Census tract-level information based on the 2009-2013 5-year American Community Survey (e.g. tract-level demographic information), based on linkages to the beneficiary's address from the EDB;
- For the original sample, variables from the NHATS Rounds 1 through 7 interviews (race/ethnicity, highest education, and residential settings); and
- For the replenishment sample, variables from the NHATS Rounds 5 through 7 interviews (race/ethnicity, highest education, and Rounds 5, 6, and 7 residential settings).

Appendix Table 1 provides weighted response rates (using the 2015 cohort Round 7 Tracker nonresponse adjusted weights) by categories of the various indicators. We used these variables as input to a classification tree analysis to determine which of these variables were associated with nonresponse. This approach uses a search algorithm to identify variables associated with response propensities. At each step in the process, chi-square tests were performed to determine the most significant predictor of response, given the set of conditions already specified in the particular "branch." We also set a minimum cell size of 50.²

¹ The HISKEW file was a 20% sample of the Medicare EDB (as of Sept. 30, 2010) that served as the sampling frame for the original selection. At the time of selection of the replenishment sample, CMS no longer created HISKEW files, but instead, a customized extract of the EDB was created.

² The classification tree analysis is designed to work with categorical predictor variables. Alternatives to this approach are propensity modeling based on logistic regression and Cartesian product cross-classification. The logistic regression approach uses a parametric model to identify predictors of response. When the pool of potential predictors includes continuous variables and categorizing the continuous variables would result in substantial losses of information, logistic regression modeling would be preferred over classification tree analysis. The Cartesian product cross-classification approach involves specifying a set of adjustment cell variables based on prior experience (generally, (1) prior analyses that identified predictors associated with response propensities;

We fit separate classification trees for the original sample and the replenishment sample. For the original sample, separate trees were fit for all living non-nursing home cases (Figure 1), nursing home residents (Figure 2), and deceased SPs (Figure 3) because underlying nonresponse processes differed for these three groups. Likewise, for the replenishment sample, separate trees were fit for living non-nursing home cases (Figure 4), nursing home residents (Figure 5), and deceased SPs (Figure 6). For the original sample, nursing home residents include both Round 1 residents who were not required to complete an SP Interview in Round 5 and new nursing home cases who were eligible for the SP interview in Round 5. Respondents to the LML interview conducted when the SP was deceased were proxy respondents. We included all variables as input for each of the trees.

Appendix Table 1 indicates the variables used in the final non-response cells for the 2015 Cohort Round 8 Tracker weights; an “a” indicates variables retained in the non-nursing home tree for the original sample, a “b” indicates those retained in the nursing home tree for the original sample, a “c” indicates those retained in the deceased original sample tree, a “d” indicates those retained in the non-nursing home tree for the replenishment sample, an “e” indicates those retained in the nursing home tree for the replenishment sample, and an “f” indicates those retained in the deceased replenishment sample tree.

For living SPs in the original sample who were living in the community and other residential settings (not nursing homes) in Round 7, final nonresponse cells included 15 indicators. For living SPs in the original sample who were living in nursing homes in Round 7 and for deceased SPs in the original sample, final nonresponse cells for each included just one indicator. Combinations of these variables created 26 nonresponse cells among the original sample in the non-nursing home group, 2 nonresponse cells among the nursing home group, and 2 nonresponse cells for the deceased group (See Appendix Figures 1, 2, and 3, respectively). For living SPs in the replenishment sample who were residing in the community and other residential settings (not nursing homes) in Round 7, final nonresponse cells included 18 indicators. Combinations of these variables created 26 nonresponse cells (See Appendix Figure 4). For living SPs in the replenishment sample who were residing in nursing homes in Round 7, the sample size was small enough to warrant the use of just a single nonresponse cell (See Appendix Figure 5). For deceased SPs in the replenishment sample, the total of 3 final nonresponse cells included 2 indicators (See Appendix Figure 6).

The final step in creating the 2015 Cohort Round 8 Tracker weight involved raking the nonresponse adjusted weights to control totals developed from the 5% EDB extract (of Medicare beneficiaries as of September 30, 2014) that was used for sampling. For consistency, the raking adjustment also included the ineligible (primarily deaths), since the frame that served as the source of the control totals also includes beneficiaries who were ineligible for NHATS. In Round 8, weight trimming was done in conjunction with this raking adjustment, due to a few outlier weights; this is discussed further in section 5.

As in Rounds 1 through 7, four dimensions were used in this Round 8 raking adjustment³:

and/or (2) predictors associated with response and/or subject matter expertise that informs the choice of variables).

³ For purposes of raking, age categories refer to age at Round 5 sampling.

- (1) Age category (65-69, 70-74, 75-79, 80-84, 85-89, 90+) by sex by race from the EDB (Black; non-Black);
- (2) Age category (65-69, 70-74, 75-79, 80-84, 85-89, 90+) by Census region;
- (3) Age category (65-69, 70-74, 75-79, 80-84, 85-89, 90+) by MSA status (from the EDB); and
- (4) Age category (65-69, 70-74, 75-79, 80-84, 85-89, 90+) by a binary indicator of whether the SP was enrolled in Medicare prior to age 65.

In addition, as in Rounds 5 through 7, a fifth dimension—whether or not the beneficiary was eligible for selection into the original sample (i.e., age 65 or older and enrolled in Medicare as of September 30, 2010)—was used.

2011 Cohort Weights

The 2011 Cohort Round 8 Tracker weight applies only to the original sample, and followed the approach used to compute the Rounds 1 through 7 Tracker weights. This process began with the Round 7 nonresponse adjusted tracker weight (prior to raking). This Round 7 weight accounted for differential probabilities of selection and included adjustments for nonresponse to Rounds 1 through 7, but was not raked to the HISKEW⁴. See Montaquila et al. (2012b) for details on the specific methodology used in computing and adjusting the Round 1 weights; also, refer to Montaquila et al. (2014, 2015a, 2015b) and DeMatteis et al. (2016b, 2017, 2018) for information about the specific adjustments applied in Rounds 2 through 7, respectively.

To produce the 2011 Cohort Round 8 Tracker weight, two adjustments were made to the Round 7 nonresponse adjusted tracker weight—an adjustment for Round 8 nonresponse and a raking adjustment to estimated population totals from the EDB. Potential variables for creating nonresponse cells for the 2011 Cohort Round 8 Tracker weights came from four sources:

- Beneficiary information from the sampling frame (the 20% HISKEW File for the original sample), including demographic characteristics of the beneficiary (e.g., age computed as of September 30, 2014 based on birthdate, gender) and geographic information (e.g., census division, metro and micropolitan status) based on the beneficiary’s address in the EDB;
- County-level demographic information based on the 5% HISKEW file (e.g., percent of beneficiaries in the county who are Black; percent of beneficiaries in the county who are Hispanic) for the county linked to the beneficiary’s address from the EDB;
- Census tract-level information based on the 2009-2013 5-year American Community Survey (e.g. tract-level demographic information), based on linkages to the beneficiary’s address from the EDB; and
- Variables from NHATS Rounds 1 through 7 (race/ethnicity, highest education, and residential settings).

Appendix Table 2 provides weighted response rates (using the Round 7 nonresponse adjusted tracker weights that were the basis for the 2011 Cohort Round 8 Tracker weights) by categories of the various indicators. We used these variables as input to a classification tree analysis to determine which of these

⁴ The HISKEW file was a 20% sample of the Medicare enrollment database (as of Sept. 30, 2010) that served as the sampling frame for the original selection.

variables were associated with nonresponse. This approach uses a search algorithm to identify variables associated with response propensities. At each step in the process, chi-square tests were performed to determine the most significant predictor of response, given the set of conditions already specified in the particular “branch.” We also set a minimum cell size of 50.⁵

Separate trees were fit for all living non-nursing home cases (Figure 7), nursing home residents (Figure 8), and deceased SPs (Figure 9) because underlying nonresponse processes differed for these three groups. For the original sample, nursing home residents include both Round 1 residents who were not required to complete an SP Interview and new Rounds 2 through 7 nursing home residents who were eligible for the SP interview in Round 8. Respondents to the LML interview conducted when the SP was deceased were proxy respondents. We included all variables as input for each of the trees.

Appendix Table 2 indicates the variables used in the final nonresponse cells for the 2011 Cohort Tracker weights, with an “a” for the non-nursing home tree, a “b” for the Round 7 nursing home residents tree, and a “c” for the deceased SP tree. For living SPs who were living in the community and other residential settings (not nursing homes) in Round 7, final nonresponse cells included 16 indicators; combinations of these variables created 26 nonresponse cells. Among living SPs who were nursing home residents in Round 7, final nonresponse cells included 1 indicator, resulting in 2 nonresponse cells. For deceased SPs, final non-response cells included 2 indicators, resulting in 3 nonresponse cells (See Appendix Figures 7, 8, and 9).

The final step in creating the 2011 Cohort Round 8 Tracker weight involved raking the nonresponse adjusted weights to control totals developed from the 5% HISKEW as of September 30, 2010 that was used for sampling of the original sample. For consistency, the raking adjustment also included the ineligible (primarily deaths), since the frame that served as the source of the control totals also includes beneficiaries who were ineligible for NHATS. In Round 8, weight trimming was done in conjunction with this raking adjustment, due to a few outlier weights; this is discussed further in section 5.

As in Rounds 1 through 5, four dimensions were used in this Round 8 raking adjustment⁶:

- (1) Age category (65-69, 70-74, 75-79, 80-84, 85-89, 90+) by sex by race from the EDB (Black; non-Black);
- (2) Age category (65-69, 70-74, 75-79, 80-84, 85-89, 90+) by Census region;
- (3) Age category (65-69, 70-74, 75-79, 80-84, 85-89, 90+) by MSA status (from the HISKEW); and
- (4) Age category (65-69, 70-74, 75-79, 80-84, 85-89, 90+) by a binary indicator of whether the SP was enrolled in Medicare prior to age 65.

⁵ The classification tree analysis is designed to work with categorical predictor variables. Alternatives to this approach are propensity modeling based on logistic regression and Cartesian product cross-classification. The logistic regression approach uses a parametric model to identify predictors of response. When the pool of potential predictors includes continuous variables and categorizing the continuous variables would result in substantial losses of information, logistic regression modeling would be preferred over classification tree analysis. The Cartesian product cross-classification approach involves specifying a set of adjustment cell variables based on prior experience (generally, (1) prior analyses that identified predictors associated with response propensities; and/or (2) predictors associated with response and/or subject matter expertise that informs the choice of variables).

⁶ For purposes of raking, age categories refer to age at Round 1 sampling.

4. Computation of Round 8 Analytic Weights

As with the tracker weights, separate Round 8 Analytic weights were computed for the 2015 Cohort (designed for analysis of the original and replenishment samples combined) and for the 2011 Cohort (designed for analysis of the original sample alone).

The computation of the analytic weights begins with the final Round 8 Tracker weight for the respective cohort. A weighting class adjustment was developed for the class of nonrespondents who were eligible for but did not complete the SP interview: those living in nursing homes or non-nursing home residential care in Round 8 who had completed a facility interview but not a Sample Person interview (n=112 for the 2015 Cohort and n=69 for the 2011 Cohort; designated as code 64). (Round 8 nursing home residents who were nursing home residents at the time of their baseline interview (code 61) were not eligible for an SP interview in Round 8, thus are not part of the analytic weight nonresponse adjustment). The approach was designed to preserve the tracker weight distributions by Round 8 residence type (nursing home, non-nursing home). That is, we allowed the weights of residential care cases with both a completed FQ and a completed SP interview (n=376 for the 2015 Cohort and n=233 for the 2011 Cohort) to be adjusted to account for similar cases missing the SP Interview.

2015 Cohort Analytic Weights

Because it was believed that response mechanisms may be different for the two samples (since members of the original sample had been engaged in the study for several rounds, whereas Round 8 was the fourth contact and attempt at gaining cooperation with the replenishment sample), the two samples were adjusted separately for Round 8 analytic nonresponse. Since the sample size is much smaller for this nonresponse adjustment, only a subset of variables used in tracker weight classification tree analysis was considered for the analytic weight nonresponse adjustments; additionally, three variables that characterize the Round 8 nursing home status, non-nursing home residential care status, and area of the facility where the SP lives were included (see Appendix Table 3). In order to preserve the tracker weight distribution, for each sample separately by Round 8 residence type, the first split in each tree was forced to be Round 8 nursing home status. (All subsequent splitting was based on response propensities.) For the original sample, 3 variables (designated with "o" in Appendix Table 3) were retained in the final classification tree, forming 4 cells (see Appendix Figure 10); for the replenishment sample, 2 variables designated with "r" in Appendix Table 3) were retained in the final classification tree, forming 3 cells (see Appendix Figure 11).

As a final step, we applied a raking procedure so that marginal totals based on the analytic weights would match the totals at replenishment sampling by: 5-year age groups, sex, race, region, micro/metropolitan status, and whether Medicare was received before age 65.

2011 Cohort Analytic Weights

As with the 2011 Cohort Round 8 Tracker weights, the 2011 Cohort Round 8 Analytic weight applies only to the original sample. Since the sample size is much smaller for this nonresponse adjustment, only a subset of variables used in tracker weight classification tree analysis was considered for the analytic weight nonresponse adjustments; additionally, three variables that characterize the Round 8 nursing home status, non-nursing home residential care status, and area of the facility where the SP lives were

included (see Appendix Table 4). In order to preserve the tracker weight distribution by Round 8 residence type, the first split was forced to be Round 8 nursing home status. (All subsequent splitting was based on response propensities.) Three variables (designated with “*” in Appendix Table 4) were retained in the final classification tree, forming 4 cells (see Appendix Figure 12).

As a final step, we applied a raking procedure so that marginal totals based on the analytic weights would match the totals at sampling by: 5-year age groups, sex, race, region, micro/metropolitan status, and whether Medicare was received before age 65.

5. Design Effects Related to Weighting

Although weighting adjustments are aimed at reducing bias, increased variation in weights generally increases the variances of survey estimates (Kish, 1965). Thus, in the development and implementation of the weighting methodology for NHATS, care was taken to balance the bias reductions against the potential increases in variance.

The estimated overall design effect due to variation in the Round 1 nonresponse adjusted tracker weights was 1.28. After applying Round 2 nonresponse adjustments within cells determined by the classification tree results, the estimated overall design effect due to unequal weighting increased to 1.33. Incorporating the Round 3 nonresponse adjustments, the estimated overall design effect due to unequal weighting was 1.35, and after Round 4 nonresponse adjustment this overall design effect was 1.34.

2015 Cohort Weights

The composited weights used in computing the 2015 Cohort Round 5 Tracker weights had an overall design effect (due to variation in the weights) of 1.34. After Round 5 nonresponse adjustment, the overall design effect was 1.55, with the increase being due to the extent of variation in response propensities between and within the two samples (the original sample and Round 5 replenishment sample). The nonresponse adjusted Round 6 Tracker weights and the nonresponse adjusted Round 7 Tracker weights had overall design effects of 1.62 and 1.64, respectively. The nonresponse adjusted Round 8 Tracker weights had an overall design effect of 1.65. In order to limit the variation in the weights, after the raking adjustment, trimming of the tracker weights was considered; 1 case with an influential outlier weight was identified, and its tracker weight was trimmed, the weights were re-raked. After the raking adjustment, the design effect for the final 2015 Cohort Round 8 Tracker weights was 1.66.

After the adjustments applied in computing the analytic weight (nonresponse adjustment and raking), four cases were identified as influential outliers, and their analytic weights were trimmed; following trimming, the weights were re-raked. After the re-raking, the design effect for the final 2015 Cohort Round 8 Analytic weights was 1.64 overall, and 1.62 for living SPs and 1.69 for deceased SPs.

2011 Cohort Weights

For the 2011 Cohort weights, after Round 5 nonresponse adjustment, the overall design effect was 1.33. After adjusting for Round 6 nonresponse and for Round 7 nonresponse, the overall design effects were 1.32 and 1.32, respectively. After adjusting for Round 8 nonresponse, the overall design effect was 1.31.

In order to limit the variation in the weights, after the raking adjustment, the tracker weights were trimmed and then re-raked; four cases with extreme weights were trimmed at this point. After the raking adjustment and trimming, the design effect for the final 2011 Cohort Round 8 Tracker weights was 1.34.

After the adjustments applied in computing the analytic weight (nonresponse adjustment and raking), one case was identified as an influential outlier, and its analytic weight was trimmed; following trimming, the weights were re-raked. After the re-raking, the design effect for the final 2011 Cohort Round 8 Analytic weights was 1.33 overall; and 1.32 for living SPs and 1.31 for deceased SPs.

6. Use of the Tracker vs. Analytic Weight

When using the tracker weight from any round, respondents are weighted up to represent all Medicare beneficiaries ages 65 and older who were alive on or as of the target date for the cohort (September 30, 2014 for the 2015 Cohort; September 30, 2010 for the 2011 Cohort) and residing in the contiguous United States. In contrast, the analytic weight at a given round reproduces only those alive and eligible for NHATS during the prior round fieldwork period (with the exception of a small number of persons from the prior round who are deemed ineligible in the current round because they relocated outside the contiguous U.S.). Thus, the Round 8 Analytic weight reproduces those alive and eligible for NHATS during the Round 7 fieldwork period.

The only other difference between the two sets of weights is the treatment of respondents who live in residential care settings other than nursing homes. In cases where an FQ interview was completed but an (eligible) SP interview was not completed in Round 8, a positive Round 8 weight sits in the Tracker file and a zero Round 8 weight in the Analytic file. The analytic weights of individuals with both an SP and FQ interview have been adjusted to represent these cases (persons assigned both an SP and FQ interview but with only an FQ). For all other respondents (including cases with proxy responses to the LML interview) the analytic and tracker weights are equal.

Most often analyses will use the analytic weight. The tracker weight is appropriate for making national estimates using the FQ information (e.g. for services available to older adults living in residential care settings) and for investigating the role of mortality on Round 1 disability estimates and successive cross-sections.

Another important consideration is whether to use a round-specific weight and, for Rounds 5 through 8, whether to use the 2015 Cohort weight or the 2011 Cohort weight. A useful rule of thumb is to always consider the population to which an estimate is being generalized. To estimate, for example, the proportion of the population in Round 1 who has a particular characteristic in Round 2, 3, 4, 5, 6, 7, or 8 (measured in the SP interview) or who was in a particular type of residential care in Round 2, 3, 4, 5, 6, 7, or 8 (measured in the FQ interview), a Round 1 weight should be used. The former would use the Round 1 Analytic weight and the latter the Round 1 Tracker weight. To estimate characteristics of people ages 75 and older in Round 8, or the characteristics of those living in residential care settings in Round 8 as measured in the Round 8 FQ interview, the Round 8 weight should be used. The former would use the Round 8 Analytic weight and the latter the Round 8 Tracker weight. To estimate characteristics (as of Round 8) of people 65 and older in Round 5, the 2015 Cohort Round 8 weight should be used. To examine associations between a characteristic in Round 8 and a characteristic in Round 1 (or any round prior to Round 5), the 2011 Cohort Round 8 weight should be used.

7. Variance Estimation

Two broad classes of methods have been developed for computation of standard errors of estimates from complex sample surveys: (1) Taylor series linearization and (2) replication methods. The NHATS data files contain the information necessary for analysts to use either of these approaches to compute standard errors. The “stratum” and “cluster” variables that allow users to compute variance estimates using Taylor series linearization are provided on the NHATS Tracker and SP files as the variables w5varstrat and w5varunit, respectively.

The replication approach that was used in NHATS (Montquila et al. 2012b) is the modified balanced repeated replication (BRR) method suggested by Fay (Judkins 1990). When estimating the variance of ratios of rare subsets, one problem that occasionally arises from standard BRR is that one or more replicate estimates will be undefined due to zero denominators. Instead of increasing the weights of one half-sample by 100 percent and decreasing the weights of the other half-sample to zero as in standard BRR, Fay’s method perturbs the weights by $\pm 100(1-K)$ percent where K is referred to as “Fay’s factor.” The perturbation factor for standard BRR is 100 percent, or $K=0$. For NHATS, $K = 0.3$ was used.

Nonresponse adjustment and raking were repeated for each of the replicates. For Round 8, the final tracker replicate weights are provided in the variables w8trfinwgt1-w8trfinwgt56 for the 2015 Cohort and w8tr2011wgt1- w8tr2011wgt56 for the 2011 Cohort, and the analytic replicate weights are provided in the variables w8anfinwgt1-w8anfinwgt56 for the 2015 Cohort and w8an2011wgt1-w8an2011wgt56 for the 2011 Cohort. Through the creation of person-level replicate weights, Fay’s method approximately reflects the contribution of variance due to nonresponse adjustments, calibration adjustments (e.g., poststratification or raking), and other weight adjustment factors that are dependent on the observed sample.

For additional information on application of weights and variance estimation in NHATS analyses, see the National Health and Aging Trends Study (NHATS) User Guide at www.nhats.org

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Appendix: Variables Used in Nonresponse Adjustment for Round 8 NHATS Weights

Appendix Table 1. Response Rates by Various Indicators: NHATS Round 8 2015 Cohort

Variable & Values	Weighted Response Rate	Variable & Values	Weighted Response Rate
OVERALL	94.0%	TRACT-LEVEL INDICATORS (Quartiles)	
BENEFICIARY INDICATORS		Household Income^{3 a d} (C_AGG_HH_INC)	
Age^{1 d} (H_AGECAT_R5)		1: 1 st quartile	93.2%
1: 65-69	93.5%	2: 2 nd quartile	92.3%
2: 70-74	93.4%	3: 3 rd quartile	94.4%
3: 75-79	94.5%	4: 4 th quartile	95.0%
4: 80-84	94.5%	9: Missing	100.0%
5: 85- 89	96.2%	Median Household Income^{3 a} (C_MED_HH_INC)	
6: 90+	95.3%	1: 1 st quartile	92.4%
Gender^{1 a d} (H_SEX)		2: 2 nd quartile	93.8%
1: Male	93.2%	3: 3 rd quartile	94.2%
2: Female	94.6%	4: 4 th quartile	95.0%
Census Region^{2 a} (S_REGION)		9: Missing	100.0%
1: Northeast	96.2%	Median Household Income 65+^{3 d} (C_MED_HH_INC_65)	
2: Midwest	94.4%	1: 1 st quartile	92.5%
3: South	92.7%	2: 2 nd quartile	93.7%
4: West	93.9%	3: 3 rd quartile	95.2%
Census Division^{2 a d f} (DIVISION)		4: 4 th quartile	94.2%
1: New England	96.9%	9: Missing	84.3%
2: Middle Atlantic	95.9%	% Households with Adult 65+^{3 a d} (C_PCT_HH_65)	
3: East North Central	94.3%	1: 1 st quartile	91.0%
4: West North Central	94.5%	2: 2 nd quartile	93.5%
5: South Atlantic	91.8%	3: 3 rd quartile	95.5%
6: East South Central	90.9%	4: 4 th quartile	94.4%
7: West South Central	95.3%	% Households in Poverty^{3 a d} (C_PCT_HH_POV)	
8: Mountain	99.2%	1: 1 st quartile	95.4%
9: Pacific	93.1%	2: 2 nd quartile	94.0%
Census Metro/Micro Area Designation (2013)² (S_METMICRO)		3: 3 rd quartile	93.0%
1: Metropolitan area	93.9%	4: 4 th quartile	93.1%
2: Micropolitan area	93.7%	% Households Reporting Public Assistance^{3 d} (C_PCT_HH_PUBASST)	
3: Non-metro	95.3%	1: 1 st quartile	93.9%
Health Maintenance Organization Beneficiary¹ (HMOTYPE)		2: 2 nd quartile	95.2%
0: Yes	94.1%	3: 3 rd quartile	92.7%
9: No	93.9%	4: 4 th quartile	93.9%
Age First Enrolled in Medicare¹ (MEDIC_BEG)		% Households Reporting Retirement Income^{3 a d} (C_PCT_HH_RETIREINC)	
1: Prior to age 65	91.1%	1: 1 st quartile	93.9%
2: At or after age 65	94.3%	2: 2 nd quartile	92.5%
Race/Ethnicity^{4 a d} (RL5DRACEHISP_R)		3: 3 rd quartile	94.9%
1: White, non-Hispanic	94.6%	4: 4 th quartile	94.3%
2: Black, non-Hispanic	92.9%	% Households Reporting Social Security^{3 d} (C_PCT_HH_SOCSEC)	
3: Other, non-Hispanic	90.7%	1: 1 st quartile	92.9%
4: Hispanic	94.2%	2: 2 nd quartile	93.7%
5: DK/RF	83.6%	3: 3 rd quartile	94.4%
Highest Education (R5)^{4 a d f} (EL5HIGSTSCHL_R)		4: 4 th quartile	94.3%
0: Not applicable	90.5%		
1: DK/RF	83.4%		
2: Below high school	91.8%		
3: High school	93.1%		
4: Above High school	94.0%		

Variable & Values	Weighted Response Rate	Variable & Values	Weighted Response Rate
Highest Education (R1)^{4#c} (EL1HIGSTSCHL_R)		TRACT-LEVEL INDICATORS (Quartiles)	
0: Not applicable	97.8%	% Households Reporting SSI^{3 d} (C_PCT_HH_SSS)	
1: DK/RF	87.5%	1: 1 st quartile	94.8%
2: Below high school	95.0%	2: 2 nd quartile	94.4%
3: High school	96.8%	3: 3 rd quartile	93.0%
4: Above High school	96.5%	4: 4 th quartile	93.8%
COUNTY LEVEL INDICATORS		% Households Owning Their Home^{3 a d} (C_PCT_OWNSHOME)	
% Black 65+ (deciles)^{2 a b d} (PCTBLK)		1: 1 st quartile	92.7%
0: 1 st decile	95.7%	2: 2 nd quartile	93.7%
1: 2 nd decile	94.8%	3: 3 rd quartile	93.7%
2: 3 rd decile	95.1%	4: 4 th quartile	95.1%
3: 4 th decile	96.1%	% Households 65+ Owning Their Home^{3 a d} (C_PCT_OWNSHOME_65)	
4: 5 th decile	90.3%	1: 1 st quartile	94.3%
5: 6 th decile	92.3%	2: 2 nd quartile	92.8%
6: 7 th decile	93.5%	3: 3 rd quartile	94.2%
7: 8 th decile	94.4%	4: 4 th quartile	94.6%
8: 9 th decile	93.2%	% Households 65+ Below Poverty^{3 a} (C_PCT_POV_65)	
9: 10 th decile	93.2%	1: 1 st quartile	94.6%
% Hispanic 65+ (deciles)^{2 a d} (PCTHISP)		2: 2 nd quartile	93.6%
0: 1 st decile	93.8%	3: 3 rd quartile	93.6%
1: 2 nd decile	92.4%	4: 4 th quartile	94.1%
2: 3 rd decile	94.3%	Per Capita Income³ (C_PER_CAP_INC)	
3: 4 th decile	92.7%	1: 1 st quartile	92.3%
4: 5 th decile	93.3%	2: 2 nd quartile	93.0%
5: 6 th decile	94.5%	3: 3 rd quartile	95.5%
6: 7 th decile	95.1%	4: 4 th quartile	94.6%
7: 8 th decile	95.9%	OTHER INDICATORS	
8: 9 th decile	95.0%	R7 Residential Care Status^{4 a} (R7DRESID)	
9: 10 th decile	92.8%	1: R7 Community	93.9%
% Poverty (deciles)^{2 d} (PCTPOV)		2: R7 Residential Care Resident not nursing home (SP interview complete)	96.3%
0: 1 st decile	95.2%	3: R7 Residential Care Resident not nursing home (FQ only)	86.0%
1: 2 nd decile	95.4%	4: R7 nursing home (SP interview complete)	99.3%
2: 3 rd decile	94.6%	5: R7 nursing home (FQ only)	94.4%
3: 4 th decile	95.1%	7: R1 to R6 Residential Care Resident not nursing home (FQ only)	88.0%
4: 5 th decile	93.1%	8: R1 to R6 nursing home	94.1%
5: 6 th decile	92.7%		
6: 7 th decile	93.7%		
7: 8 th decile	94.5%		
8: 9 th decile	93.7%		
9: 10 th decile	90.7%		

¹Based on Information either on the September 30, 2010 CMS 20% Health Insurance Skeleton Eligibility Write-Off (HISKEW) file if the case is in the original sample, or on the September 30, 2014 CMS 20% Enrollment Database (EDB) extract if the case is in the replenishment sample .

²Based on county-level information from the September 30, 2014 CMS 5% EDB extract linked to the beneficiary's EDB address.

³Based on tract-level information from the 2009-2013 5-year American Community Survey file linked to the beneficiary's EDB address.

⁴Based on responses to items in the Rounds 1 to 5 interviews.

#Response rates were computed only for the original sample.

^ Response rates were computed only for the replenishment sample.

a=retained in classification tree analysis for living SP non-nursing home branch of the original sample

b=retained in classification tree analysis for living SP nursing home branch of the original sample

c=retained in classification tree analysis for deceased SP branch of the original sample

d= retained in classification tree analysis for living SP non-nursing home branch of the replenishment sample

e= retained in classification tree analysis for living SP nursing home branch of the replenishment sample

f= retained in classification tree analysis for deceased SP branch of the replenishment sample

N=5,851 (5,547 respondents and 304 non-respondents)

Variable names used in classification trees shown parenthetically.

Appendix Table 2. Response Rates by Various Indicators: NHATS Round 8 Cohort 2011

Variable & Values	Weighted Response Rate	Variable & Values	Weighted Response Rate
OVERALL	96.2%	TRACT-LEVEL INDICATORS (Quartiles)	
BENEFICIARY INDICATORS		Household Income^{3a} (C_AGG_HH_INC)	
Age¹ (H_AGECAT)		1: 1 st quartile	96.9%
1: 65-69	96.4%	2: 2 nd quartile	95.4%
2: 70-74	96.5%	3: 3 rd quartile	96.0%
3: 75-79	95.2%	4: 4 th quartile	96.5%
4: 80-84	96.6%	Median Household Income^{3a} (C_MED_HH_INC)	
5: 85- 89	95.5%	1: 1 st quartile	95.8%
6: 90+	95.4%	2: 2 nd quartile	97.0%
Gender^{1a} (H_SEX)		3: 3 rd quartile	95.7%
1: Male	96.9%	4: 4 th quartile	96.2%
2: Female	95.6%	Median Household Income 65+³ (C_MED_HH_INC_65)	
Census Region¹ (S_REGION)		1: 1 st quartile	96.4%
1: Northeast	96.9%	2: 2 nd quartile	96.9%
2: Midwest	96.8%	3: 3 rd quartile	96.0%
3: South	95.8%	4: 4 th quartile	95.8%
4: West	95.5%	9: Missing	45.1%
Census Division^{1abc} (DIVISION)		% Households with Adult 65+^{3a} (C_PCT_HH_65)	
1: New England	98.4%	1: 1 st quartile	94.0%
2: Middle Atlantic	96.2%	2: 2 nd quartile	95.5%
3: East North Central	97.0%	3: 3 rd quartile	97.5%
4: West North Central	96.4%	4: 4 th quartile	96.6%
5: South Atlantic	94.4%	% Households in Poverty^{3a} (C_PCT_HH_POV)	
6: East South Central	96.8%	1: 1 st quartile	96.6%
7: West South Central	97.7%	2: 2 nd quartile	95.9%
8: Mountain	96.9%	3: 3 rd quartile	97.0%
9: Pacific	95.3%	4: 4 th quartile	95.0%
Census Metro/Micro Area Designation (2013)² (S_METMICRO)		% Households Reporting Public Assistance^{3a} (C_PCT_HH_PUBASST)	
1: Metropolitan area	95.8%	1: 1 st quartile	95.6%
2: Micropolitan area	97.5%	2: 2 nd quartile	96.8%
3: Non-metro	97.9%	3: 3 rd quartile	96.2%
Health Maintenance Organization Beneficiary¹ (HMOTYPE)		4: 4 th quartile	96.1%
0: Yes	95.6%	% Households Reporting Retirement Income^{3a} (C_PCT_HH_RETIREINC)	
9: No	96.4%	1: 1 st quartile	95.8%
Age First Enrolled in Medicare¹ (MEDIC_BEG)		2: 2 nd quartile	95.5%
1: Prior to age 65	95.2%	3: 3 rd quartile	96.3%
2: At or after age 65	96.3%	4: 4 th quartile	96.8%
Race/ethnicity^{4a} (RL1DRACEHISP_R)		% Households Reporting Social Security³ (C_PCT_HH_SOCSEC)	
1: White, non-Hispanic	96.6%	1: 1 st quartile	94.9%
2: Black, non-Hispanic	96.0%	2: 2 nd quartile	95.6%
3: Other, non-Hispanic	92.9%	3: 3 rd quartile	95.8%
4: Hispanic	94.2%	4: 4 th quartile	97.5%
5: DK/RF	84.5%	% Households Reporting SSI^{3a} (C_PCT_HH_SSS)	
Highest Education (R1)⁴ (EL1HIGSTSCHL_R)		1: 1 st quartile	95.6%
0: Not applicable	97.6%	2: 2 nd quartile	97.0%
1: DK/RF	86.7%	3: 3 rd quartile	95.1%
2: Below high school	94.7%	4: 4 th quartile	96.7%
3: High school	96.8%		
4: Above High school	96.5%		

Variable & Values	Weighted Response Rate	Variable & Values	Weighted Response Rate
COUNTY LEVEL INDICATORS		TRACT-LEVEL INDICATORS (Quartiles)	
% Black 65+ (deciles)^{2 a}	(PCTBLK)	% Households Owning Their Home^{3 a}	(C_PCT_OWNSHOME)
0: 1 st decile	98.2%	1: 1 st quartile	94.4%
1: 2 nd decile	97.7%	2: 2 nd quartile	96.3%
2: 3 rd decile	97.9%	3: 3 rd quartile	96.7%
3: 4 th decile	95.6%	4: 4 th quartile	96.5%
4: 5 th decile	95.1%	% Households 65+ Owning Their Home^{3 a}	(C_PCT_OWNSHOME_65)
5: 6 th decile	95.2%	1: 1 st quartile	94.6%
6: 7 th decile	95.5%	2: 2 nd quartile	95.7%
7: 8 th decile	94.0%	3: 3 rd quartile	96.3%
8: 9 th decile	95.9%	4: 4 th quartile	97.5%
9: 10 th decile	95.6%	% Households 65+ Below Poverty^{3 a}	(C_PCT_POV_65)
% Hispanic 65+ (deciles)^{2 a c}	(PCTHISP)	1: 1 st quartile	96.2%
0: 1 st decile	96.5%	2: 2 nd quartile	96.0%
1: 2 nd decile	96.2%	3: 3 rd quartile	95.6%
2: 3 rd decile	98.2%	4: 4 th quartile	96.9%
3: 4 th decile	96.4%	Per Capita Income³	(C_PER_CAP_INC)
4: 5 th decile	96.9%	1: 1 st quartile	95.0%
5: 6 th decile	94.6%	2: 2 nd quartile	96.6%
6: 7 th decile	97.1%	3: 3 rd quartile	96.1%
7: 8 th decile	96.3%	4: 4 th quartile	96.5%
8: 9 th decile	93.6%	OTHER INDICATORS	
9: 10 th decile	95.7%	R7 Residential Care Status⁴	(R7DRESID)
% Poverty (deciles)^{2 a}	(PCTPOV)	1: R7 Community	96.0%
0: 1 st decile	97.7%	2: R7 Residential Care Resident not nursing home (SP interview complete)	98.3%
1: 2 nd decile	95.1%	3: R7 Residential Care Resident not nursing home (FQ only)	98.7%
2: 3 rd decile	95.0%	4: R7 nursing home (SP interview complete)	100.0%
3: 4 th decile	97.7%	5: R7 nursing home (FQ only)	85.4%
4: 5 th decile	94.3%	7: R1-R6 Residential Care Resident not nursing home (FQ only)	95.9%
5: 6 th decile	97.1%	8: R1- R6 nursing home	100.0%
6: 7 th decile	95.9%		
7: 8 th decile	95.4%		
8: 9 th decile	97.5%		
9: 10 th decile	96.3%		

¹Based on Information on the September 30, 2010 CMS 20% Health Insurance Skeleton Eligibility Write-Off (HISKEW) file.

²Based on county-level information from the September 30, 2014 CMS 5% EDB extract linked to the beneficiary's EDB address.

³Based on tract-level information from the 2009-2013 5-year American Community Survey file linked to the beneficiary's EDB address.

⁴Based on responses to items in the Rounds 1 and 6 interviews.

a=retained in classification tree analysis for living SP non-nursing home branch

b=retained in classification tree analysis for living SP nursing home branch

c=retained in classification tree analysis for deceased SP branch

N=2,951 (2,845 respondents and 106 non-respondents)

Variable names used in classification trees shown parenthetically.

Appendix Table 3. Sampled Person Interview Response Rates Among Cases with Completed Facility Questionnaires, by Various Indicators: NHATS Round 8 2015 Cohort

Variable & Values	Weighted Response Rate	Variable & Values	Weighted Response Rate
OVERALL	77.2%	COUNTY LEVEL INDICATORS	
BENEFICIARY INDICATORS		% Black 65+ (deciles)² (PCTBLK)	
Age¹ (H_AGECAT_R5)		0: 1 st decile	75.9%
1: 65-69	97.2%	1: 2 nd decile	75.6%
2: 70-74	79.1%	2: 3 rd decile	74.8%
3: 75-79	76.9%	3: 4 th decile	78.7%
4: 80-84	72.5%	4: 5 th decile	87.3%
5: 85- 89	78.6%	5: 6 th decile	66.1%
6: 90+	73.6%	6: 7 th decile	83.4%
R5 Race Ethnicity⁸ (RL5DRACEHISP_R)		7: 8 th decile	69.3%
1: White, non-Hispanic	81.2%	8: 9 th decile	81.8%
2: Black, non-Hispanic	76.6%	9: 10 th decile	82.2%
3: Other, non-Hispanic	68.9%	% Hispanic 65+ (deciles)² (PCTHISP)	
4: Hispanic	61.0%	0: 1 st decile	82.0%
5: DK/RF	32.3%	1: 2 nd decile	86.5%
Gender¹ (H_SEX)		2: 3 rd decile	73.0%
1: Male	77.6%	3: 4 th decile	78.6%
2: Female	77.0%	4: 5 th decile	80.9%
Census Region^{1o} (S_REGION)		5: 6 th decile	76.3%
1: Northeast	72.0%	6: 7 th decile	63.2%
2: Midwest	73.9%	7: 8 th decile	78.9%
3: South	82.5%	8: 9 th decile	69.7%
4: West	77.6%	9: 10 th decile	84.1%
Census Division¹ (DIVISION)		% Poverty (deciles)² (PCTPOV)	
1: New England	64.0%	0: 1 st decile	63.6%
2: Middle Atlantic	75.9%	1: 2 nd decile	72.0%
3: East North Central	74.3%	2: 3 rd decile	83.8%
4: West North Central	73.5%	3: 4 th decile	72.3%
5: South Atlantic	77.5%	4: 5 th decile	79.4%
6: East South Central	89.9%	5: 6 th decile	88.1%
7: West South Central	91.0%	6: 7 th decile	70.8%
8: Mountain	89.9%	7: 8 th decile	88.9%
9: Pacific	74.8%	8: 9 th decile	77.2%
Census Metro/Micro Area Designation (2013)¹ (S_METMICRO)		9: 10 th decile	86.2%
1: Metropolitan area	77.6%	OTHER INDICATORS	
2: Micropolitan area	68.6%	Facility Type Indicator³ (FQ8DLOCSP)	
3: Non-metro	81.8%	1: Independent living/other	78.8%
Health Maintenance Organization Beneficiary¹ (HMOTYPE)		2: Assisted Living	78.1%
0: Yes	75.6%	3: Special care/memory care/Alzheimers unit	84.2%
9: No	77.8%	4: Nursing home	70.2%
Age First Enrolled in Medicare¹ (MEDIC_BEG)		8: Not Reported	100.0%
1: Prior to age 65	75.0%	R1 Residential Care Status^{4#o} (R1DRESID_R)	
2: At or after age 65	77.4%	1: Community	85.2%
		2: Residential Care Resident not nursing home	57.4%
		R2 Residential Care Status^{5#} (R2DRESID_R)	
		1: Community in R2	84.9%
		2: Residential care in R2	63.4%
		3: Nursing home in R2	57.3%

Variable & Values		Weighted Response Rate	Variable & Values		Weighted Response Rate
OTHER INDICATORS			R3 Residential Care Status^{6#} (R3DRESID_R)		
R2 Nursing Home Status^{5#}	(R2NH)		1: Community in R3		86.9%
1: Yes		57.3%	2: Residential care in R3		66.0%
2: No		77.8%	3: Nursing home in R3		38.5%
R3 Nursing Home Status^{6#}	(R3NH)		R4 Residential Care Status^{7#} (R4DRESID_R)		
1: Yes		38.5%	1: Community in R4		87.6%
2: No		79.5%	2: Residential care in R4		69.4%
R4 Nursing Home Status^{7#}	(R4NH)		3: Nursing home in R4		51.1%
1: Yes		51.1%	R5 Residential Care Status^{8r} (R5DRESID_R)		
2: No		79.7%	1: Community in R5		89.9%
R5 Nursing Home Status⁸	(R5NH)		2: Residential care in R5		66.2%
1: Yes		52.3%	3: Nursing home in R5		52.3%
2: No		78.2%	R6 Residential Care Status⁹ (R6DRESID_R)		
R6 Nursing Home Status⁹	(R6NH)		1: Community in R6		91.9%
1: Yes		57.8%	2: Residential care in R6		69.5%
2: No		79.0%	3: Nursing home in R6		57.8%
R7 Nursing Home Status¹⁰	(R7NH)		R7 Residential Care Status¹⁰ (R7DRESID_R)		
1: Yes		69.8%	1: Community in R7		91.2%
2: No		78.6%	2: Residential care in R7		75.3%
R8: Nursing Home Status^{11o}	(R8NH)		3: Nursing home in R7		69.8%
1: Yes		71.9%	R8 Residential Care Status¹¹ (R8DRESID_R)		
2: No		78.9%	2: Residential care in R8		78.9%
			3: Nursing home in R8		71.9%

¹Based on Information either on the September 30, 2010 CMS 20% Health Insurance Skeleton Eligibility Write-Off (HISKEW) file if the case is in the original sample, or on the September 30, 2014 CMS 20% Enrollment Database (EDB) extract if the case is in the replenishment sample .

²Based on county-level information from the September 30, 2014 CMS 5% EDB extract linked to the beneficiary's EDB address.

³Based on the responses to two items on the type of facility from the FQ, FQ6 (fq6facdescri; including answers from FQ6A) and FQ10 (fq6faaretype).

⁴Based on responses to items in the Round 1 interview or interview process.

⁵Based on responses to items in the Round 2 interview or interview process.

⁶Based on responses to items in the Round 3 interview or interview process.

⁷Based on responses to items in the Round 4 interview or interview process.

⁸Based on responses to items in the Round 5 interview or interview process.

⁹Based on responses to items in the Round 6 interview or interview process.

¹⁰Based on responses to items in the Round 7 interview or interview process.

¹¹Based on responses to items in the Round 8 interview or interview process.

#Response rates were computed only for the available original sample.

^ Response rates were computed only for the available replenishment sample.

o=retained in classification tree analysis for adjustment of missing SP interview of the original sample.

r=retained in classification tree analysis for adjustment of missing SP interview of the replenishment sample.

N=488 (376 respondents and 112 nonrespondents); Variable names used in classification trees shown parenthetically.

Appendix Table 4. Sampled Person Interview Response Rates Among Cases with Completed Facility Questionnaires, by Various Indicators: NHATS Round 8 2011 Cohort

Variable & Values	Weighted Response Rate	Variable & Values	Weighted Response Rate
OVERALL	78.1%	COUNTY LEVEL INDICATORS	
BENEFICIARY INDICATORS		% Black 65+ (deciles)² (PCTBLK)	
Age¹ (H_AGECAT)		0: 1 st decile	75.5%
1: 65-69	72.5%	1: 2 nd decile	89.8%
2: 70-74	84.6%	2: 3 rd decile	79.7%
3: 75-79	85.5%	3: 4 th decile	74.9%
4: 80-84	73.9%	4: 5 th decile	88.8%
5: 85- 89	71.4%	5: 6 th decile	53.8%
6: 90+	75.3%	6: 7 th decile	85.4%
R1 Race Ethnicity⁴ (RL1DRACEHISP_R)		7: 8 th decile	78.9%
1: White, non-Hispanic	80.8%	8: 9 th decile	75.8%
2: Black, non-Hispanic	75.5%	9: 10 th decile	88.7%
3: Other, non-Hispanic	62.9%	% Hispanic 65+ (deciles)² (PCTHISP)	
4: Hispanic	34.0%	0: 1 st decile	86.3%
5: DK/RF	0.0%	1: 2 nd decile	82.9%
Gender¹ (H_SEX)		2: 3 rd decile	83.7%
1: Male	78.0%	3: 4 th decile	87.2%
2: Female	78.1%	4: 5 th decile	84.1%
Census Region¹ (S_REGION)		5: 6 th decile	71.7%
1: Northeast	63.0%	6: 7 th decile	52.9%
2: Midwest	79.9%	7: 8 th decile	76.2%
3: South	83.7%	8: 9 th decile	74.0%
4: West	83.2%	9: 10 th decile	98.8%
Census Division¹ (DIVISION)		% Poverty (deciles)² (POVERTY_PCT)	
1: New England	67.3%	0: 1 st decile	56.8%
2: Middle Atlantic	61.4%	1: 2 nd decile	72.9%
3: East North Central	76.7%	2: 3 rd decile	86.2%
4: West North Central	83.0%	3: 4 th decile	83.5%
5: South Atlantic	80.0%	4: 5 th decile	75.4%
6: East South Central	84.3%	5: 6 th decile	89.9%
7: West South Central	93.1%	6: 7 th decile	74.8%
8: Mountain	88.7%	7: 8 th decile	93.1%
9: Pacific	82.0%	8: 9 th decile	86.0%
Census Metro/Micro Area Designation (2013)² (S_METMICRO)		9: 10 th decile	84.2%
1: Metropolitan area	78.8%	OTHER INDICATORS	
2: Micropolitan area	61.9%	Facility Type Indicator³ (FQ8DLOCSP)	
3: Non-metro	85.2%	1: Independent living/other	80.4%
Health Maintenance Organization Beneficiary¹ (HMOTYPE)		2: Assisted Living	83.0%
0: Yes	79.6%	3: Special care/memory care/Alzheimer's unit	74.0%
9: No	77.6%	4: Nursing home	69.4%
Age First Enrolled in Medicare¹ (MEDIC_BEG)		R1 Residential Care Status^{4*} (R1DRESID_R)	
1: Prior to age 65	76.8%	1: Community	86.3%
2: At or after age 65	78.3%	2: Residential Care Resident not nursing home	57.2%
OTHER INDICATORS		R2 Residential Care Status⁵ (R2DRESID_R)	
R2 Nursing Home Status⁵ (R2NH)		1: Community in R2	86.1%
1: Yes	57.5%	2: Residential care in R2	63.4%
2: No	78.6%	3: Nursing home in R2	57.5%
R3 Nursing Home Status⁶ (R3NH)		R3 Residential Care Status⁶ (R3DRESID_R)	
1: Yes	36.8%	1: Community in R3	88.1%
2: No	80.3%	2: Residential care in R3	66.2%
		3: Nursing home in R3	36.8%

Variable & Values	Weighted Response Rate	Variable & Values	Weighted Response Rate
R4 Nursing Home Status⁷ (R4NH)		R4 Residential Care Status⁷ (R4DRESID_R)	
1: Yes	50.8%	1: Community in R4	88.7%
2: No	80.6%	2: Residential care in R4	69.8%
R5 Nursing Home Status⁸ (R5NH)		3: Nursing home in R4	50.8%
1: Yes	51.9%	R5 Residential Care Status⁸ (R5DRESID_R)	
2: No	80.8%	1: Community in R5	90.9%
R6 Nursing Home Status⁹ (R6NH)		2: Residential care in R5	70.9%
1: Yes	63.0%	3: Nursing home in R5	51.9%
2: No	80.4%	R6 Residential Care Status^{9*} (R6DRESID_R)	
R7 Nursing Home Status¹⁰ (R7NH)		1: Community in R6	93.9%
1: Yes	71.2%	2: Residential care in R6	71.2%
2: No	80.0%	3: Nursing home in R6	63.0%
R8 Nursing Home Status^{11*} (R8NH)		R7 Residential Care Status¹⁰ (R7DRESID_R)	
1: Yes	70.2%	1: Community in R7	94.6%
2: No	80.9%	2: Residential care in R7	76.3%
		3: Nursing home in R7	71.2%
		R8 Residential Care Status¹¹ (R8DRESID_R)	
		2: Residential care in R8	80.9%
		3: Nursing home in R8	70.2%

¹Based on Information on the September 30, 2010 CMS 20% Health Insurance Skeleton Eligibility Write-Off (HISKEW) file.

²Based on county-level information from the September 30, 2014 CMS 5% EDB extract linked to the beneficiary's EDB address.

³Based on the responses to two items on the type of facility from the FQ, FQ6 (fq6facdescri; including answers from FQ6A) and FQ10 (fq6faaretype).

⁴Based on responses to items in the Round 1 interview or interview process.

⁵Based on responses to items in the Round 2 interview or interview process.

⁶Based on responses to items in the Round 3 interview or interview process.

⁷Based on responses to items in the Round 4 interview or interview process.

⁸Based on responses to items in the Round 5 interview or interview process.

⁹Based on responses to items in the Round 6 interview or interview process.

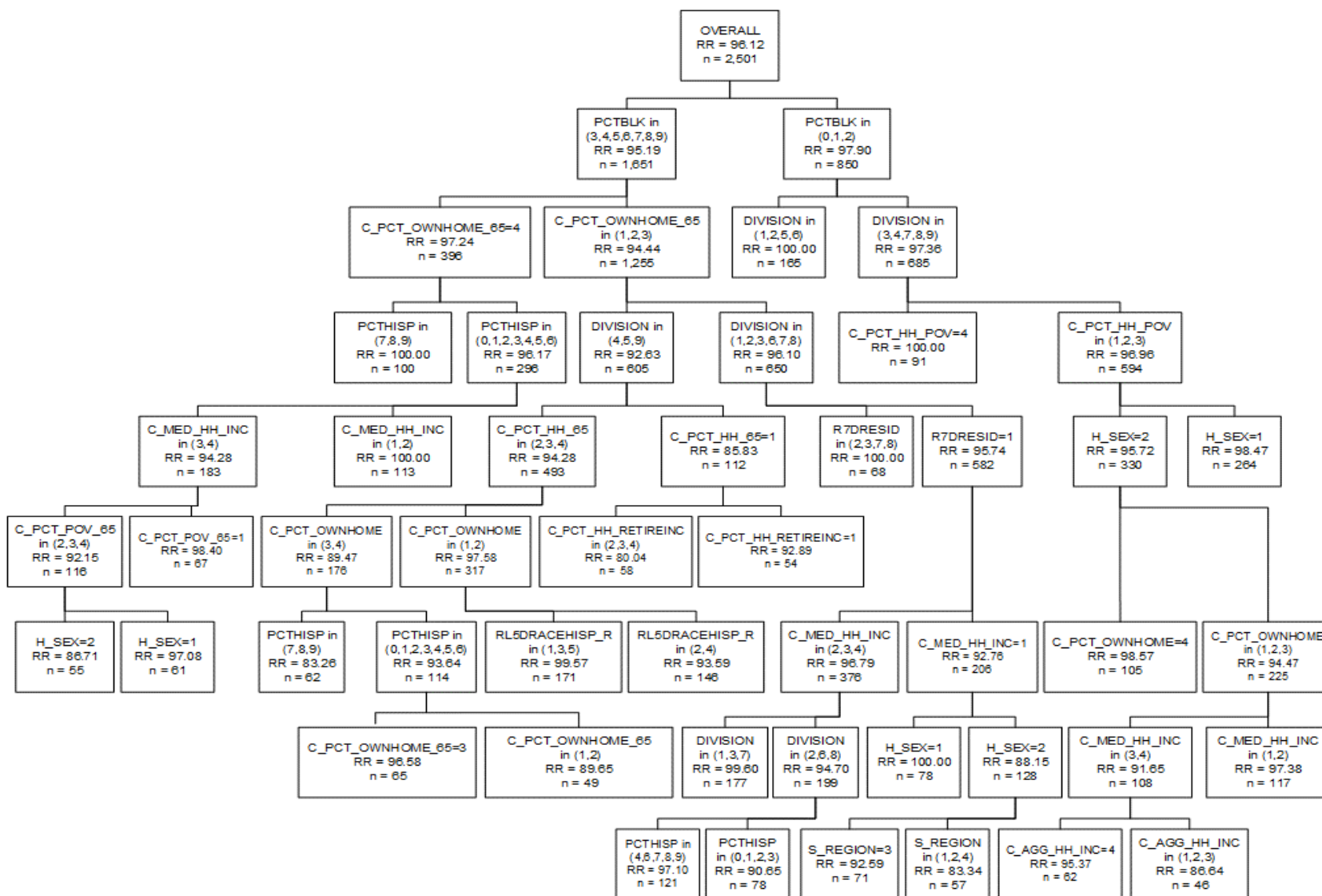
¹⁰Based on responses to items in the Round 7 interview or interview process.

¹¹ Based on responses to items in the Round 8 interview or interview process.

*=retained in classification tree analysis for adjustment of missing SP interview.

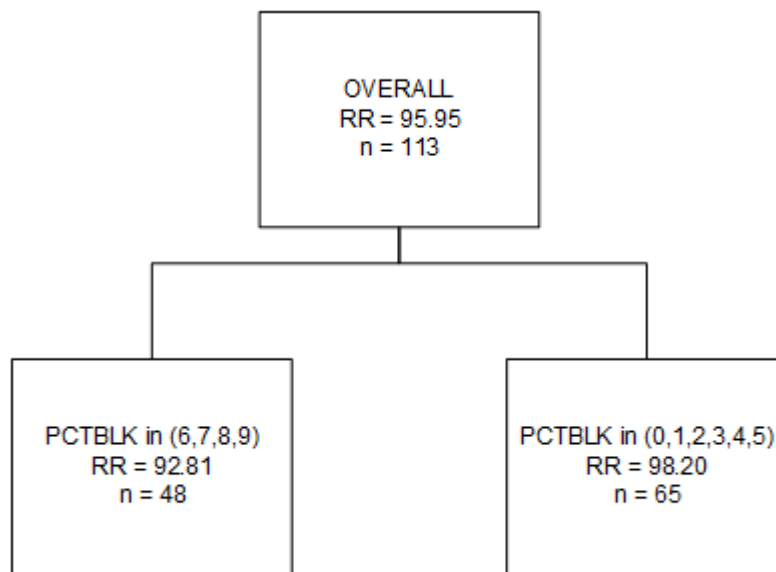
N=302 (233 respondents and 69 nonrespondents); Variable names used in classification trees shown parenthetically.

Figure 1. Round 8 2015 Cohort Tracker weight nonresponse adjustment cells – non nursing home cases in original sample



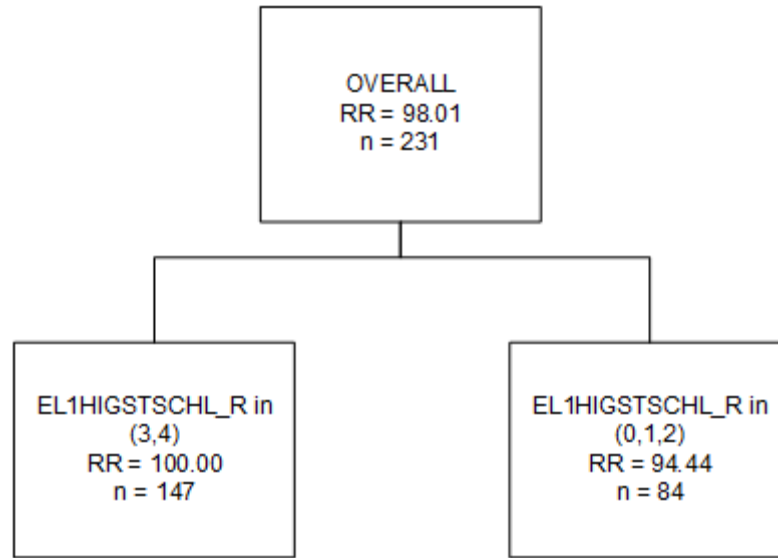
Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell

Figure 2. Round 8 2015 Cohort Tracker weight nonresponse adjustment cells – nursing home cases in original sample



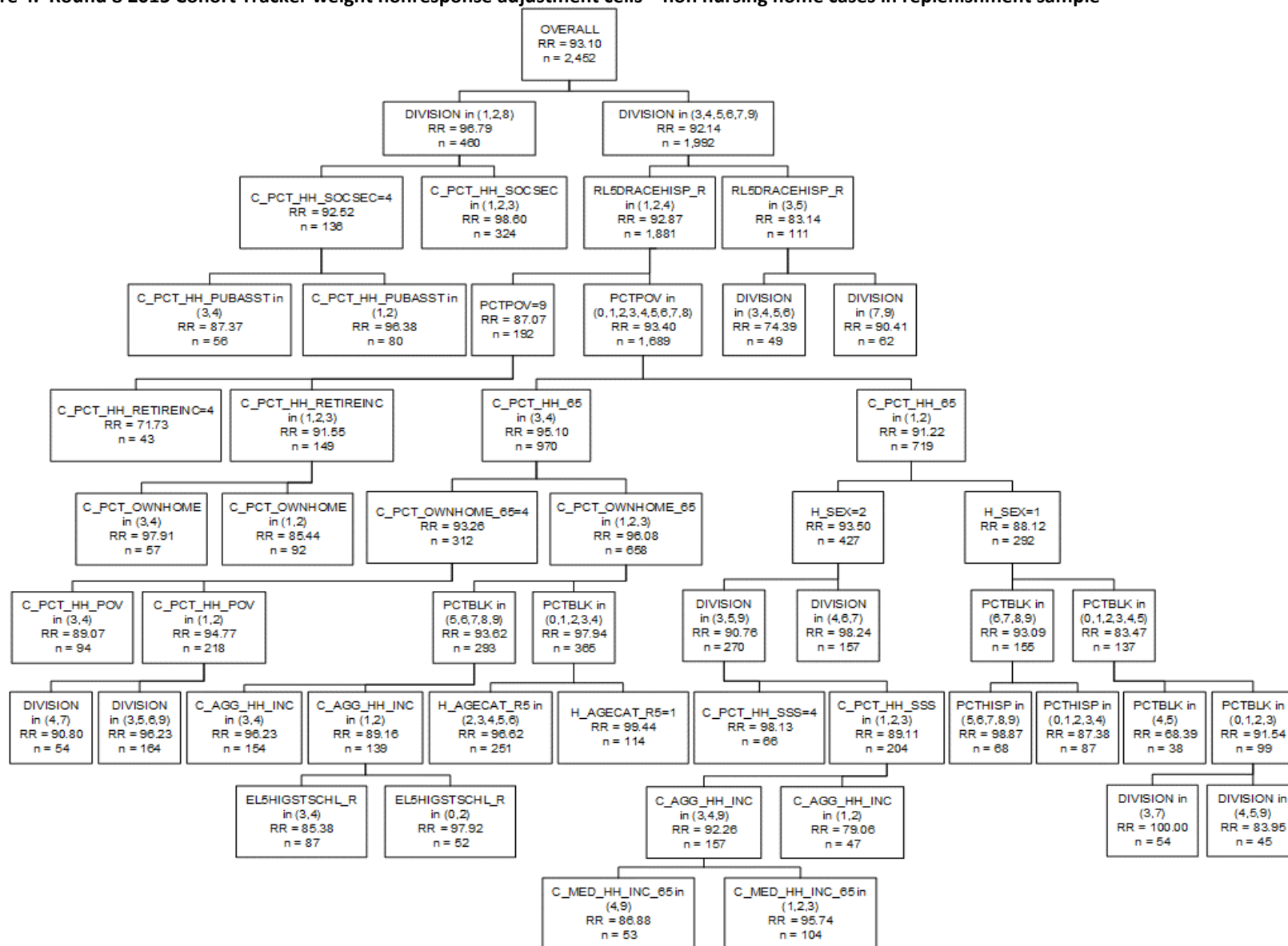
Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell

Figure 3. Round 8 2015 Cohort Tracker weight nonresponse adjustment cells – deceased cases in original sample



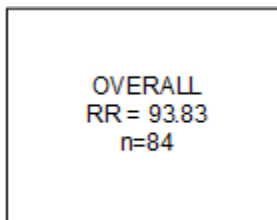
Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell

Figure 4. Round 8 2015 Cohort Tracker weight nonresponse adjustment cells – non nursing home cases in replenishment sample



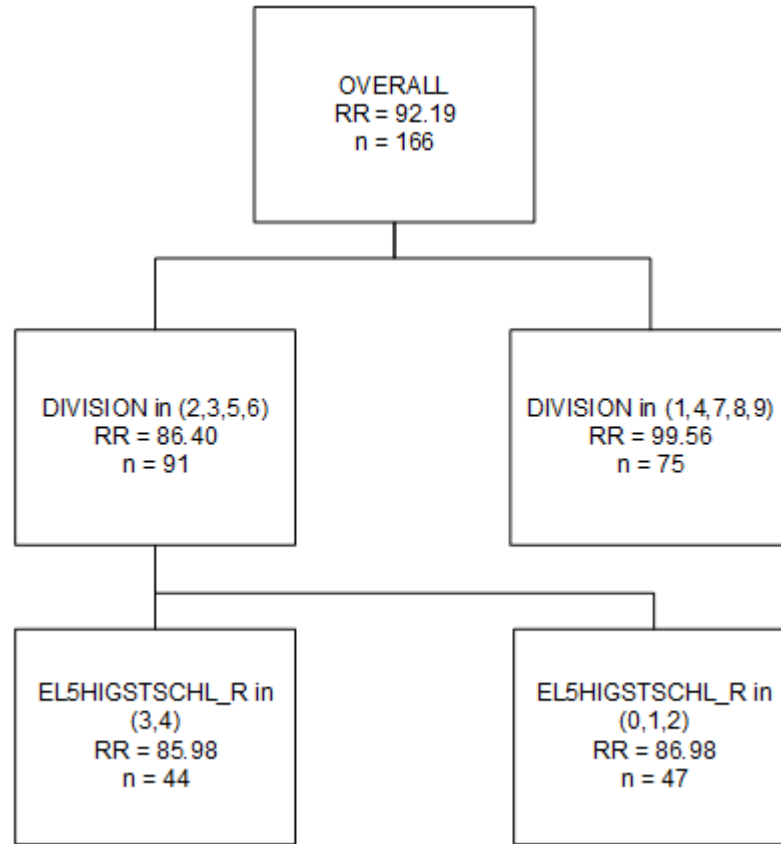
Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell

Figure 5. Round 8 2015 Cohort Tracker weight nonresponse adjustment cells – nursing home cases in replenishment sample



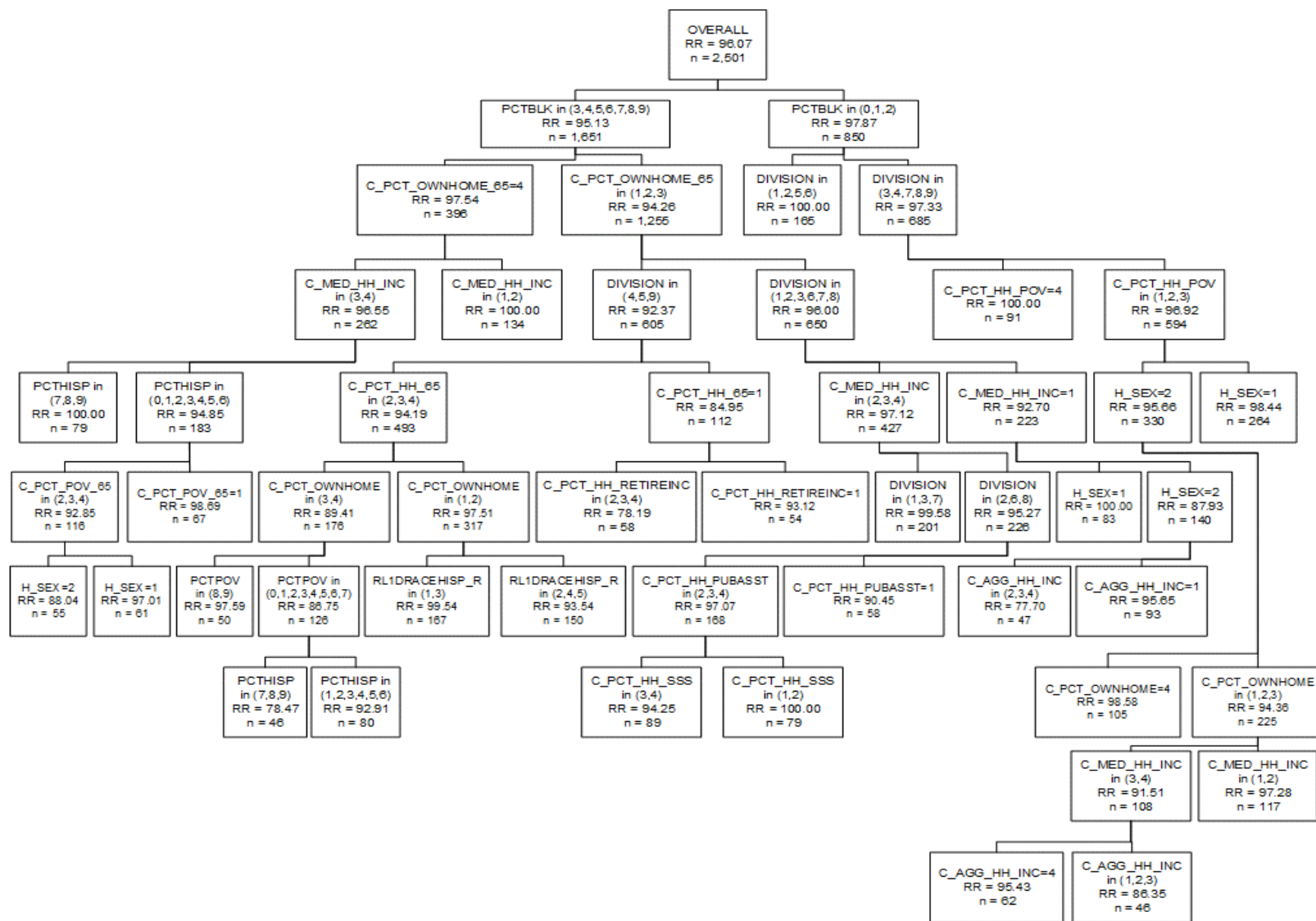
Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell

Figure 6. Round 8 2015 Cohort Tracker weight nonresponse adjustment cells – deceased cases in replenishment sample



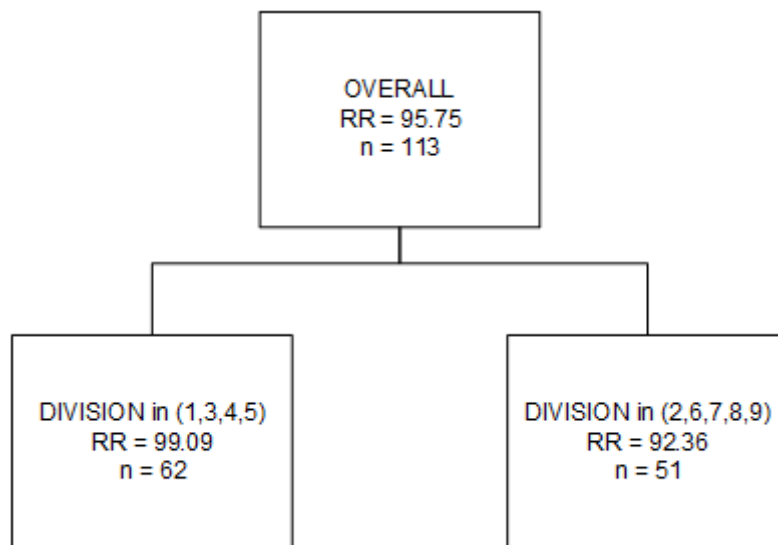
Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell

Figure 7. Round 8 2011 Cohort Tracker weight nonresponse adjustment cells – non nursing home cases in original sample



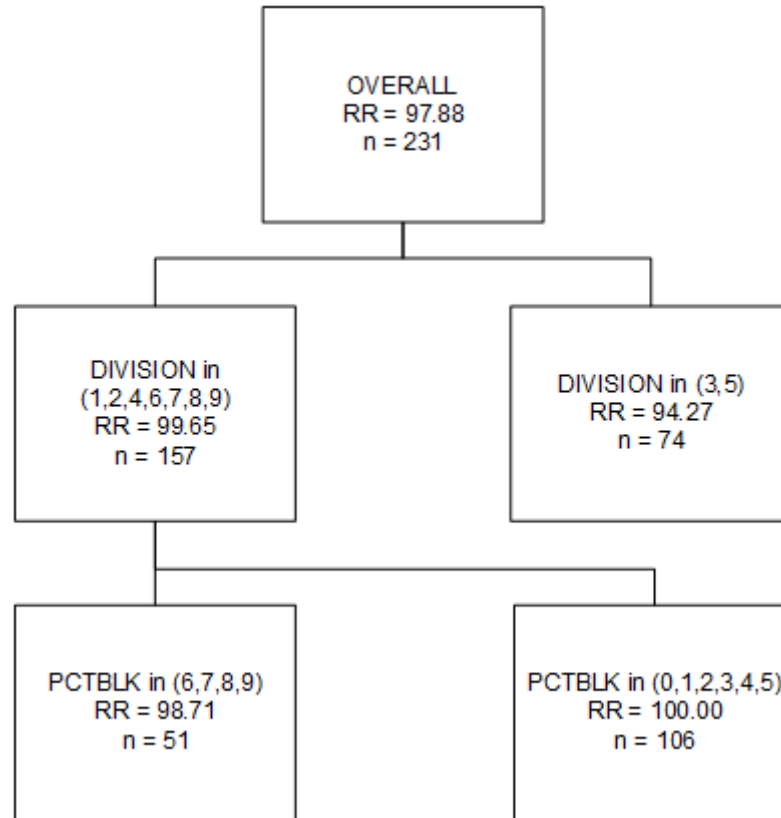
Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell

Figure 8. Round 8 2011 Cohort Tracker weight nonresponse adjustment cells – nursing home cases in original sample



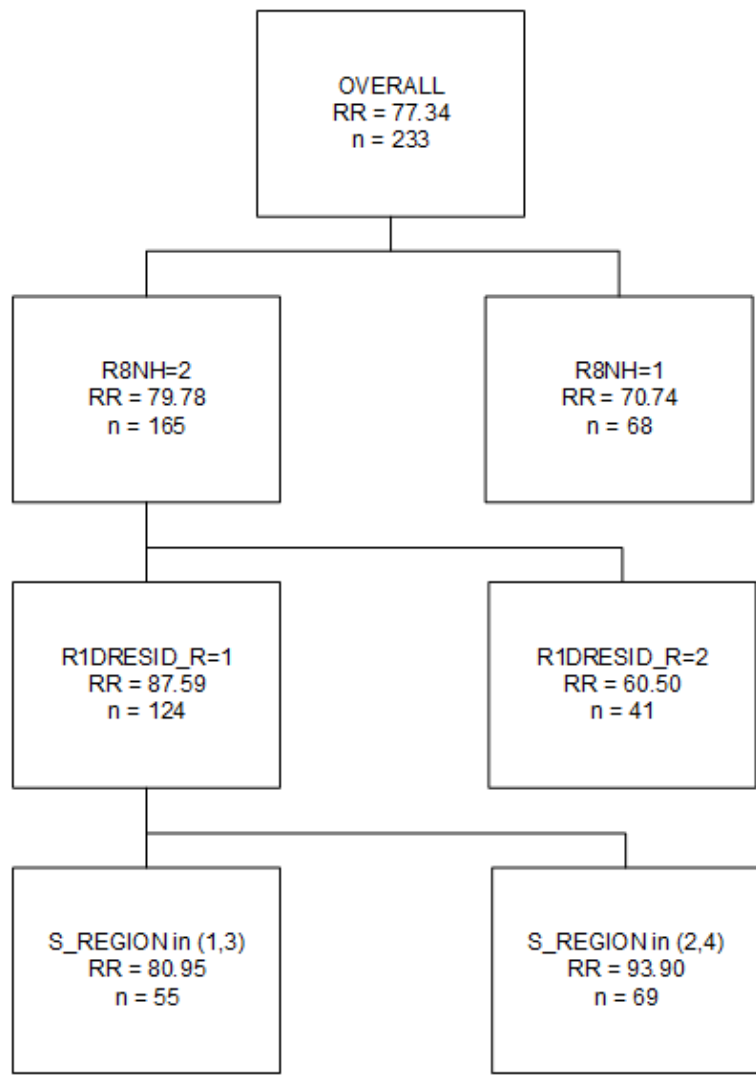
Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell

Figure 9. Round 8 2011 Cohort Tracker weight nonresponse adjustment cells – deceased cases in original sample



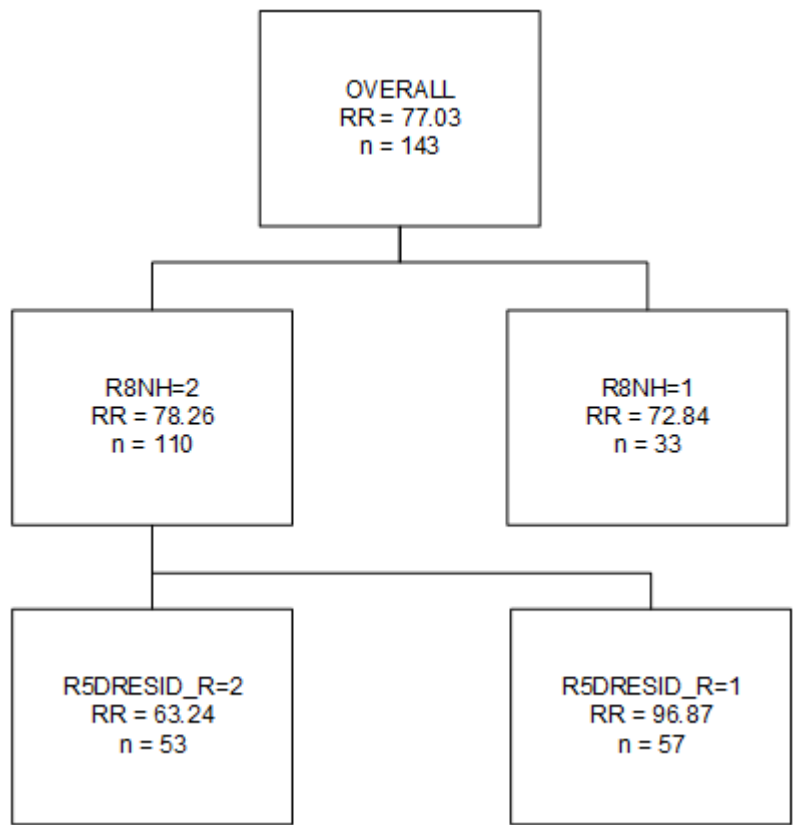
Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell

Figure 10. Round 8 2015 Cohort Analytic weight nonresponse adjustment cells – original sample residential care (not nursing home) and nursing home cases with both an SP and FQ interview



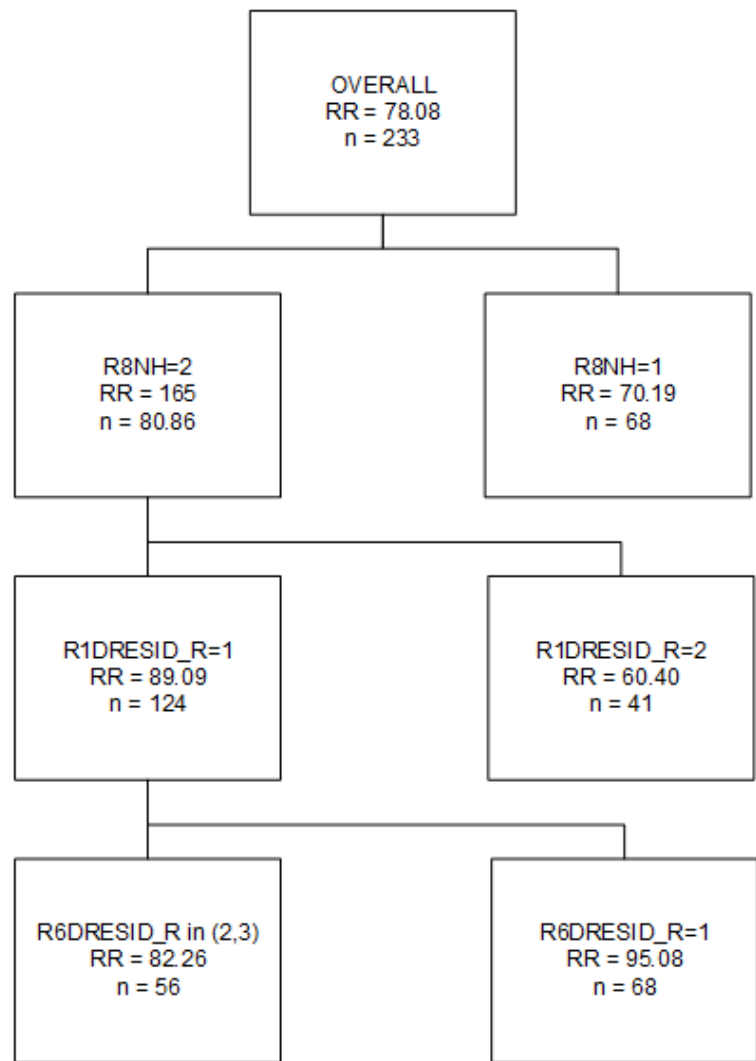
Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell

Figure 11. Round 8 2015 Cohort Analytic weight nonresponse adjustment cells – replenishment sample residential care (not nursing home) and nursing home cases with both an SP and FQ interview



Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell

Figure 12. Round 8 2011 Cohort Analytic weight nonresponse adjustment cells –original sample residential care (not nursing home) and nursing home cases with both an SP and FQ interview



Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell