NATIONAL HEALTH AND AGING TRENDS STUDY (NHATS)
Development of Round 6 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.

For Round 6, as for Round 5, 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 6 public use file account for differential probabilities of selection and adjust for potential bias related to unit nonresponse to the Round 1 through 6 interviews.

As in prior rounds, for Round 6 of NHATS, two types of sampling weights have been produced (for each cohort): a tracker weight (on the Tracker file with the variable names w6trfinwgt0 and w6tr2011wgt0) and an analytic weight (on the Sample Person file with the variable names w6anfinwgt0 and w6an2011wgt0). For variance estimation (see Section 7), NHATS has also included replicate versions of these weights (w6trfinwgt1-w6trfinwgt56 and w6anfinwgt1-w6anfinwgt56 for the 2015 Cohort; w6tr2011wgt1- w6tr2011wgt56 and w6an2011wgt1- w6an2011wgt56 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 6 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 6 Tracker weight, only cases that were eligible as of September 30, 2014, and were classified in Round 6 as Respondents (including cases for whom a Round 6 Last Month of Life (LML) interview was completed) or Ineligible are assigned a positive weight (n=8,042). 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 6 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 6 Tracker weights

For the 2015 Cohort Round 6 Analytic weight, only Respondents (codes 60, 61, 62, 63; n=7,099) 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 6 Tracker weight, only original sample cases classified as Respondents and Ineligible are assigned a positive weight (N = 6,222). 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 6 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 6. Replenishment sample cases added in 2015 do not have positive 2011 Cohort Round 6 Tracker weights.

For the 2011 Cohort Round 6 Analytic weight, only original sample Respondents (codes 60, 61, 62, 63; n=3,565) 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 6 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	2,913	Respondent	Respondent	3,017	Respondent	Respondent
60-Complete, NH or residential care	269	Respondent	Respondent	158	Respondent	Respondent
61 Complete, NH facility	72	Respondent	Respondent	131	Respondent	Respondent
62 Complete, SP deceased, proxy interview	280	Deceased respondent[+]	Respondent[+]	206	N/A	N/A
63 Complete SP, FQ not complete	31	Respondent	Respondent	22	Respondent	Respondent
64 Complete FQ, SP not complete	110	Respondent	Nonrespondent	67	Respondent	Nonrespondent
75 Physically/mentally unable to participate, no proxy	9	Nonrespondent	Nonrespondent	16	Nonrespondent	Nonrespondent
76 Too ill to participate, no proxy	21	Nonrespondent	Nonrespondent	44	Nonrespondent	Nonrespondent
77 Refusal, Sample Person	101	Nonrespondent	Nonrespondent	413	Nonrespondent	Nonrespondent
78 Language barrier	0	Nonrespondent	Nonrespondent	6	Nonrespondent	Nonrespondent
79 Unable to locate	15	Eligibility unknown[++]	Eligibility unknown[++]	37	Eligibility unknown[++]	Eligibility unknown[++]
80 Unavailable during field period	6	Nonrespondent	Nonrespondent	18	Nonrespondent	Nonrespondent
82 Outside of Primary Sampling Unit	2	Nonrespondent	Nonrespondent	4	Nonrespondent	Nonrespondent
83 Ineligible (moved out of contiguous US)	1	Ineligible	Ineligible	4	Ineligible	Ineligible
85 Refusal, facility	2	Nonrespondent	Nonrespondent	2	Nonrespondent	Nonrespondent
86 Deceased, no proxy	8	Deceased nonrespondent[+]	Nonrespondent[+]	10	N/A	N/A
87 Refusal, proxy	14	Nonrespondent	Nonrespondent	16	Nonrespondent	Nonrespondent
88 Work stopped	1	Nonrespondent	Nonrespondent	5	Nonrespondent	Nonrespondent
89 Final other/specify*	1	Nonrespondent*	Nonrespondent*	6	Nonrespondent*	Nonrespondent*
Not attempted in Round 6						
Deceased in Round 1, 2, 3, or 4	2,127	Ineligible[#]	Ineligible[#]	0	N/A	N/A
Deceased in Round 5	296	Ineligible	Ineligible	419	Ineligible	Ineligible
Other Round 1, 2, 3, or 4 ineligible	120	Ineligible[#]	Ineligible[#]	0	N/A	N/A
Other Round 5 ineligible	`3	Ineligible	Ineligible	43	Ineligible	Ineligible
Round 1, 2, 3, 4, or 5 nonrespondent	6,009	Nonrespondent**	Nonrespondent**	2,475	N/A	N/A
Total and number assigned weight	12,411	3,975 (6,222[##])	3,565	7,119	4,067	3,534

[+] 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 and Round 6 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 weights.

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

2015 Cohort Tracker Weights

To produce the 2015 Cohort Round 6 Tracker weight, two adjustments were made to the Round 5 nonresponse adjusted tracker weight—an adjustment for Round 6 nonresponse and a raking adjustment to estimated population totals from the Medicare Enrollment Database (EDB).

Response rates differed considerably between the members of the original 2011 cohort and members of the 2015 cohort. Moreover, response mechanisms were different for the two samples since members of the original sample had been engaged in the study for several rounds, whereas Round 6 was only the second contact with the 2015 cohort. We therefore adjusted the two samples separately for Round 6 nonresponse.

Potential variables for creating nonresponse cells for the 2015 Cohort Round 6 Tracker weights came 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 sample[1]), 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 5 interviews (race/ethnicity, highest education, and residential settings); and
- For the replenishment sample, variables from the NHATS Round 5 interview (race/ethnicity, highest education, and Round 5 residential setting).

Appendix Table 1 provides weighted response rates (using the 2015 cohort Round 5 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]

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[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.

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 6 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 5 and those in nursing homes in Round 5, final nonresponse cells included 14 indicators and 1 indicator, respectively. Combinations of these variables created 26 nonresponse cells among the original sample in the non-nursing home group and 2 nonresponse cells among the nursing home group (See Appendix Figures 1 and 2). For deceased SPs in the original sample, the total of 4 final nonresponse cells included 3 indicators (See Appendix Figure 3). For living SPs in the replenishment sample who were residing in the community and other residential settings (not nursing homes) and those in nursing homes in Round 5, final nonresponse cells included 15 indicators and 1 indicator, respectively. Combinations of these variables created 26 nonresponse cells among the replenishment sample non-nursing home residents and 2 nonresponse cells among the nursing home group (See Appendix Figures 4 and 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 6 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 ineligibles (primarily deaths), since the frame that served as the source of the control totals also includes beneficiaries who were ineligible for NHATS. In Round 6, 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 6 raking adjustment[3]:

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).

[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 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.

In addition, as in Round 5, 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 6 Tracker weight applies only to the original sample, and followed the approach used to compute the Rounds 1 through 5 Tracker weights. This process began with the Round 5 nonresponse adjusted tracker weight (prior to raking). This Round 5 weight accounted for differential probabilities of selection and included adjustments for nonresponse to Rounds 1 through 5, but was not raked to the HISKEW[4]. See Montaquila et al. (2012) 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. (2016) for information about the specific adjustments applied in Rounds 2 through 5, respectively.

To produce the 2011 Cohort Round 6 Tracker weight, two adjustments were made to the Round 5 nonresponse adjusted tracker weight—an adjustment for Round 6 nonresponse and a raking adjustment to estimated population totals from the EDB. Potential variables for creating nonresponse cells for the 2011 Cohort Round 6 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 5 (race/ethnicity, highest education, and residential settings).

Appendix Table 2 provides weighted response rates (using the Round 5 nonresponse adjusted tracker weights that were the basis for the 2011 Cohort Round 6 Tracker weights) by categories of the various indicators. We used these variables as input to a classification tree analysis to determine which of these

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[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 6), nursing home residents (Figure 7), and deceased SPs (Figure 8) 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 5 nursing home residents who were eligible for the SP interview in Round 6. 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 5 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 5 and those living in nursing homes in Round 5, final nonresponse cells included 14 indicators and 1 indicator, respectively; combinations of these variables created 26 nonresponse cells among the non-nursing home group and 2 nonresponse cells among the Round 5 nursing home residents. For deceased SPs, final non-response cells included 3 indicators, resulting in 4 nonresponse cells (See Appendix Figures 7, 8, and 9).

The final step in creating the 2011 Cohort Round 6 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 ineligibles (primarily deaths), since the frame that served as the source of the control totals also includes beneficiaries who were ineligible for NHATS. In Round 6, 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 6 raking adjustment[6]:

(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

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[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 sampling.

(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.

4. Computation of Round 6 Analytic Weights

As with the tracker weights, separate Round 6 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 6 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 6 who had completed a facility interview but not a Sample Person interview (n=177 for the 2015 Cohort and n=110 for the 2011 Cohort; designated as code 64). (Round 6 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 6, thus are not part of the analytic weight nonresponse adjustment). The approach was designed to preserve the tracker weight distributions by Round 6 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=427 for the 2015 Cohort and n=269 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 6 was the second contact and attempt at gaining cooperation with the replenishment sample), the two samples were adjusted separately for Round 6 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 6 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 6 residence type, the first split in each tree was forced to be Round 6 nursing home status. (All subsequent splitting was based on response propensities.) For the original sample, 5 variables (designated with "o" in Appendix Table 3) were retained in the final classification tree, forming 6 cells (see Appendix Figure 10); for the replenishment sample, 3 variables designated with "r" in Appendix Table 3) were retained in the final classification tree, forming 4 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 (see footnote 2).

2011 Cohort Analytic Weights

As with the 2011 Cohort Round 6 Tracker weights, the 2011 Cohort Round 6 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 6 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 6 residence type, the first split was forced to be Round 6 nursing home status. (All subsequent splitting was based on response propensities.) Four variables (designated with "*" in Appendix Table 4) were retained in the final classification tree, forming 5 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 (see footnote 2).

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 had an overall design effect of 1.62. In order to limit the variation in the weights, after the raking adjustment, trimming of the tracker weights was considered; however, no influential outlier weights were identified, so no weights were trimmed at this stage. After the raking adjustment, the design effect for the final 2015 Cohort Round 6 Tracker weights was 1.61.

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 6 Analytic weights was 1.59 overall, and 1.57 for living SPs and 1.46 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, the overall design effect was 1.32. In order to limit the variation in the weights, after the raking adjustment, the tracker weights were trimmed and then re-

raked; three cases with extreme weights were trimmed at this point. After the raking adjustment and trimming, the design effect for the final 2011 Cohort Round 6 Tracker weights was 1.35.

The additional steps involved in creating the analytic weight (nonresponse adjustment and raking) had minimal effect on the estimated overall design effect (1.34 overall; 1.32 for living SPs and 1.40 for deceased SPs) and did not introduce any influential outlier weights.

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 6 Analytic weight reproduces those alive and eligible for NHATS during the Round 5 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 6, a positive Round 6 weight sits in the Tracker file and a zero Round 6 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 and 6, 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, or 6 (measured in the SP interview) or who was in a particular type of residential care in Round 2, 3, 4, 5, or 6 (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 6, or the characteristics of those living in residential care settings in Round 6 as measured in the Round 6 FQ interview, the Round 6 weight should be used. The former would use the Round 6 Analytic weight and the latter the Round 6 Tracker weight. To estimate characteristics (as of Round 6) of people 65 and older in Round 5, the 2015 Cohort Round 6 weight should be used. To examine associations between a characteristic in Round 6 and a characteristic in Round 1 (or any round prior to Round 5), the 2011 Cohort Round 6 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.

As discussed in Montaquila, Freedman, Spillman, and Kasper (2012), for NHATS, the replication approach that was used 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 ±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 6, the final tracker replicate weights are provided in the variables w6trfinwgt1-w6trfinwgt56 for the 2015 Cohort and w6tr2011wgt1- w6tr2011wgt56 for the 2011 Cohort, and the analytic replicate weights are provided in the variables w6anfinwgt1-w6anfinwgt56 for the 2015 Cohort and w6an2011wgt1-w6an2011wgt56 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 6 NHATS Weights

Appendix Table 1. Response Rates by Various Indicators: NHATS Round 6, 2015 Cohort

Variable & Values		Weighted Response Rate	Variable & Values		Weighted Response Rate
OVERALL		88.4%	TRACT-LEVEL INDICATORS (Quartiles)		
BENEFICIARY INDICATORS			Household Income[3]	(C_AGG_HH_INC)	
Age[1][a][d]	(H_AGECAT_R5)		1: 1st quartile		86.6%
1: 65-69		85.5%	2: 2nd quartile		89.3%
2: 70-74		90.1%	3: 3rd quartile		88.5%
3: 75-79		87.8%	4: 4th quartile		88.6%
4: 80-84		89.6%	9: Missing		100.0%
5: 85- 89		92.8%	Median Household Income[3]	(C_MED_HH_INC)	
6: 90+		93.6%	1: 1st quartile		88.5%
Gender[1]	(H_SEX)		2: 2nd quartile		89.6%
1: Male		88.8%	3: 3rd quartile		86.9%
2: Female		88.1%	4: 4th quartile		88.8%
Census Region[2][d]	(S_REGION)		9: Missing		100.0%
1: Northeast		86.2%	Median Household Income 65+[3]		
2: Midwest		91.6%		(C_MED_HH_INC_65)	
3: South		87.5%	1: 1st quartile		88.3%
4: West		88.7%	2: 2nd quartile		88.1%
Census Division[2][a][c][d][e][f]	(DIVISION)		3: 3rd quartile		89.0%
1: New England		91.8%	4: 4th quartile		88.4%
2: Middle Atlantic		83.6%	9: Missing		65.8%
3: East North Central		92.8%	% Households with Adult 65+[3][a][d]	(C_PCT_HH_65)	
4: West North Central		89.9%	1: 1st quartile		87.8%
5: South Atlantic		88.0%	2: 2nd quartile		88.4%
6: East South Central		90.5%	3: 3rd quartile		88.9%
7: West South Central		84.7%	4: 4th quartile		88.3%
8: Mountain		88.2%	% Households in Poverty[3][a]	(C_PCT_HH_POV)	
9: Pacific		88.8%	1: 1st quartile		89.4%
Census Metro/Micro Area Designation (2013)[2]			2: 2nd quartile		88.2%
	(S_METMICRO)		3: 3rd quartile		88.1%
1: Metropolitan area		88.2%	4: 4th quartile		87.7%
2: Micropolitan area		89.2%	% Households Reporting Public Assistance[3][d]		
3: Non-metro		89.4%		(C_PCT_HH_PUBASST)	
Health Maintenance Organization Beneficiary[1][a][d]			1: 1st quartile		87.8%
	(HMOTYPE)		2: 2nd quartile		87.9%
0: Yes		87.9%	3: 3rd quartile		89.2%
9: No		88.7%	4: 4th quartile		89.0%
Age First Enrolled in Medicare[1][a]			% Households Reporting Retirement Income[3][a][d]		
	(MEDIC_BEG)			(C_PCT_HH_RETIREINC)	
1: Prior to age 65		85.0%	1: 1st quartile		88.0%
2: At or after age 65		88.8%	2: 2nd quartile		85.5%
R5 Race Ethnicity[4][c][d]	(RL5DRACEHISP_R)		3: 3rd quartile		90.9%
1: White, non-Hispanic		89.8%	4: 4th quartile		88.8%
2: Black, non-Hispanic		86.9%			
3: Other, non-Hispanic		82.1%			
4: Hispanic		84.6%			
5: DK/RF		74.6%			

Variable & Values	Weighted Response Rate	Variable & Values	Weighted Response Rate
R5 Highest Education[4][^] (EL5HIGSTSCHL_R)		**% Households Reporting Social Security[3][d]**	
0: Not applicable	94.7%	(C_PCT_HH_SOCSEC)	
1: DK/RF	69.4%	1: 1st quartile	87.8%
2: Below high school	83.1%	2: 2nd quartile	88.7%
3: High school	86.2%	3: 3rd quartile	87.8%
4: Above High school	86.7%	4: 4th quartile	89.1%
R1 Highest Education[4][#][a] (EL1HIGSTSCHL_R)			
0: Not applicable	95.4%	**TRACT-LEVEL INDICATORS (Quartiles)**	
1: DK/RF	76.0%	**% Households Reporting SSI[3]** (C_PCT_HH_SSS)	
2: Below high school	94.9%	1: 1st quartile	88.9%
3: High school	93.7%	2: 2nd quartile	88.1%
4: Above High school	95.9%	3: 3rd quartile	90.2%
		4: 4th quartile	86.5%
COUNTY LEVEL INDICATORS		**% Households Owning Their Home[3]**	
% Black 65+ (deciles)[2][a][c][d] (PCTBLK)		(C_PCT_OWNHOME)	
0: 1st decile	91.7%	1: 1st quartile	88.2%
1: 2nd decile	90.3%	2: 2nd quartile	87.9%
2: 3rd decile	90.7%	3: 3rd quartile	88.8%
3: 4th decile	89.7%	4: 4th quartile	88.6%
4: 5th decile	85.5%	**% Households 65+ Owning Their Home[3][a][d]**	
5: 6th decile	86.4%	(C_PCT_OWNHOME_65)	
6: 7th decile	84.9%	1: 1st quartile	86.8%
7: 8th decile	87.6%	2: 2nd quartile	87.8%
8: 9th decile	89.0%	3: 3rd quartile	88.6%
9: 10th decile	87.8%	4: 4th quartile	89.9%
% Hispanic 65+ (deciles)[2][a][d] (PCTHISP)		**% Households 65+ Below Poverty[3][a][d]**	
0: 1st decile	91.7%	(C_PCT_POV_65)	
1: 2nd decile	89.0%	1: 1st quartile	88.5%
2: 3rd decile	89.2%	2: 2nd quartile	87.8%
3: 4th decile	89.1%	3: 3rd quartile	89.0%
4: 5th decile	90.7%	4: 4th quartile	88.6%
5: 6th decile	90.1%	**Per Capita Income[3][a]** (C_PER_CAP_INC)	
6: 7th decile	85.6%	1: 1st quartile	87.5%
7: 8th decile	86.4%	2: 2nd quartile	88.9%
8: 9th decile	85.2%	3: 3rd quartile	88.5%
9: 10th decile	87.0%	4: 4th quartile	88.5%

Variable & Values		Weighted Response Rate	Variable & Values	Weighted Response Rate
% Poverty (deciles)[2 a b d f]	(PCTPOV)		**OTHER INDICATORS**	
0: 1st decile		86.6%	**R5 Residential Care Status[4 d]** (R5DRESID)	
1: 2nd decile		90.8%	1: R5 Community	87.9%
2: 3rd decile		86.0%	2: R5 Residential Care Resident not nursing home (SP interview complete)	94.8%
3: 4th decile		92.8%	3: R5 Residential Care Resident not nursing home (FQ only)	100.0%
4: 5th decile		87.5%		
5: 6th decile		90.0%	4: R5 nursing home (SP interview complete)	97.2%
6: 7th decile		89.4%	5: R5 nursing home (FQ only)	92.8%
7: 8th decile		85.7%	7: R1 to R4 Residential Care Resident not nursing home (FQ only)	92.9%
8: 9th decile		89.4%		
9: 10th decile		86.2%	8: R1 to R4 nursing home	95.7%

[1]Based 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 .

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

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

[4]Based on responses to items in the Rounds 1 and 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=8,033 (7,276 respondents and 757 non-respondents)

Variable names used in classification trees shown parenthetically.

Appendix Table 2. Response Rates by Various Indicators: NHATS Round 6, 2011 Cohort

Variable & Values		Weighted Response Rate	Variable & Values		Weighted Response Rate
OVERALL		94.9%	**TRACT-LEVEL INDICATORS (Quartiles)**		
BENEFICIARY INDICATORS			**Household Income[3][a]**	(C_AGG_HH_INC)	
Age[1][a][c]	(H_AGECAT)		1: 1st quartile		93.9%
1: 65-69		94.9%	2: 2nd quartile		95.0%
2: 70-74		94.5%	3: 3rd quartile		94.6%
3: 75-79		95.1%	4: 4th quartile		95.5%
4: 80-84		94.9%			
5: 85- 89		95.7%	**Median Household Income[3]**	(C_MED_HH_INC)	
6: 90+		97.8%	1: 1st quartile		95.7%
Gender[1]	(H_SEX)		2: 2nd quartile		94.6%
1: Male		95.1%	3: 3rd quartile		94.8%
2: Female		94.8%	4: 4th quartile		94.9%
Census Region[1]	(S_REGION)				
1: Northeast		93.3%	**Median Household Income 65+[3]**		
2: Midwest		96.5%		(C_MED_HH_INC_65)	
3: South		95.4%	1: 1st quartile		94.6%
4: West		93.8%	2: 2nd quartile		94.5%
Census Division[1][a][c]	(DIVISION)		3: 3rd quartile		95.1%
1: New England		94.4%	4: 4th quartile		95.5%
2: Middle Atlantic		92.7%	9: Missing		100%
3: East North Central		96.6%	**% Households with Adult 65+[3][a]**	(C_PCT_HH_65)	
4: West North Central		96.4%	1: 1st quartile		95.7%
5: South Atlantic		95.4%	2: 2nd quartile		95.8%
6: East South Central		95.9%	3: 3rd quartile		94.4%
7: West South Central		95.2%	4: 4th quartile		94.4%
8: Mountain		91.1%	**% Households in Poverty[3][a]**	(C_PCT_HH_POV)	
9: Pacific		94.2%	1: 1st quartile		94.6%
Census Metro/Micro Area Designation (2013)[2]			2: 2nd quartile		95.2%
	(S_METMICRO)		3: 3rd quartile		94.6%
1: Metropolitan area		94.6%	4: 4th quartile		95.6%
2: Micropolitan area		95.9%	**% Households Reporting Public Assistance[3]**		
3: Non-metro		96.8%		(C_PCT_HH_PUBASST)	
Health Maintenance Organization Beneficiary[1][a]			1: 1st quartile		94.4%
	(HMOTYPE)		2: 2nd quartile		96.1%
0: Yes		95.4%	3: 3rd quartile		94.5%
9: No		94.7%	4: 4th quartile		94.7%
Age First Enrolled in Medicare[1]	(MEDIC_BEG)		**% Households Reporting Retirement Income[3][a]**		
1: Prior to age 65		91.7%		(C_PCT_HH_RETIREINC)	
2: At or after age 65		95.2%	1: 1st quartile		95.2%
R1 Race Ethnicity[4][c]	(RL1DRACEHISP_R)		2: 2nd quartile		93.4%
1: White, non-Hispanic		95.2%	3: 3rd quartile		95.9%
2: Black, non-Hispanic		95.6%	4: 4th quartile		95.2%
3: Other, non-Hispanic		95.5%	**% Households Reporting Social Security[3]**		
4: Hispanic		93.7%		(C_PCT_HH_SOCSEC)	
5: DK/RF		75.2%	1: 1st quartile		95.0%
R1 Highest Education[4][a]	(EL1HIGSTSCHL_R)		2: 2nd quartile		95.4%
0: Not applicable		95.5%	3: 3rd quartile		94.4%
1: DK/RF		75.8%	4: 4th quartile		95.0%
2: Below high school		94.8%			
3: High school		93.7%			
4: Above High school		96.0%			

Variable & Values		Weighted Response Rate	Variable & Values		Weighted Response Rate
COUNTY LEVEL INDICATORS			**TRACT-LEVEL INDICATORS (Quartiles)**		
% Black 65+ (deciles)[2][a]	(PCTBLK)		**% Households Reporting SSI[3][a]**	(C_PCT_HH_SSS)	
0: 1st decile		95.5%	1: 1st quartile		95.2%
1: 2nd decile		94.3%	2: 2nd quartile		95.2%
2: 3rd decile		95.7%	3: 3rd quartile		95.4%
3: 4th decile		95.0%	4: 4th quartile		93.8%
4: 5th decile		95.1%	**% Households Owning Their Home[3]**		
5: 6th decile		95.0%		(C_PCT_OWNHOME)	
6: 7th decile		95.6%	1: 1st quartile		94.3%
7: 8th decile		96.1%	2: 2nd quartile		95.0%
8: 9th decile		92.4%	3: 3rd quartile		95.6%
9: 10th decile		94.3%	4: 4th quartile		94.6%
% Hispanic 65+ (deciles)[2][a]	(PCTHISP)		**% Households 65+ Owning Their Home[3][a]**		
0: 1st decile		97.7%		(C_PCT_OWNHOME_65)	
1: 2nd decile		97.6%	1: 1st quartile		93.5%
2: 3rd decile		94.5%	2: 2nd quartile		94.8%
3: 4th decile		95.1%	3: 3rd quartile		94.6%
4: 5th decile		95.3%	4: 4th quartile		96.5%
5: 6th decile		93.3%	**% Households 65+ Below Poverty[3][a]**		
6: 7th decile		93.9%		(C_PCT_POV_65)	
7: 8th decile		95.6%	1: 1st quartile		94.7%
8: 9th decile		91.9%	2: 2nd quartile		94.2%
9: 10th decile		94.1%	3: 3rd quartile		95.6%
% Poverty (deciles)[2][a][b]	(PCTPOV)		4: 4th quartile		95.2%
0:1st decile		94.5%	**Per Capita Income[3]**	(C_PER_CAP_INC)	
1: 2nd decile		96.7%	1: 1st quartile		94.2%
2: 3rd decile		93.9%	2: 2nd quartile		94.9%
3: 4th decile		97.0%	3: 3rd quartile		95.4%
4: 5th decile		94.5%	4: 4th quartile		95.0%
5: 6th decile		95.4%			
6: 7th decile		94.0%	**OTHER INDICATORS**		
7: 8th decile		93.4%	**R5 Residential Care Status[4]**	(R5DRESID)	
8:9th decile		95.3%	1: R5 Community		94.7%
9: 10th decile		94.7%	2: R5 Residential Care Resident not nursing home (SP interview complete)		99.1%
			3: R5 Residential Care Resident not nursing home (FQ only)		100.0%
			4: R5 nursing home (SP interview complete)		97.4%
			5: R5 nursing home (FQ only)		92.3%
			7: R1-R4 Residential Care Resident not nursing home (FQ only)		92.9%
			8: R1- R4 nursing home		97.6%

[1]Based on Information on the September 30, 2010 CMS 20% Health Insurance Skeleton Eligibility Write-Off (HISKEW) file.
[2]Based on county-level information from the September 30, 2014 CMS 5% EDB extract linked to the beneficiary's EDB address.
[3]Based on tract-level information from the 2009-2013 5-year American Community Survey file linked to the beneficiary's EDB address.
[4]Based on responses to items in the Rounds 1 and 5 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=3,855 (3,675 respondents and 180 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 6, 2015 Cohort

Variable & Values	Weighted Response Rate	Variable & Values	Weighted Response Rate
OVERALL	69.4%	**COUNTY LEVEL INDICATORS**	
BENEFICIARY INDICATORS		**% Black 65+ (deciles)[2][o]** (PCTBLK)	
Age[1] (H_AGECAT_R5)		0: 1st decile	63.8%
1: 65-69	85.0%	1: 2nd decile	73.3%
2: 70-74	68.6%	2: 3rd decile	73.6%
3: 75-79	66.9%	3: 4th decile	74.3%
4: 80-84	70.5%	4: 5th decile	69.3%
5: 85- 89	67.3%	5: 6th decile	62.0%
6: 90+	70.7%	6: 7th decile	67.2%
R5 Race Ethnicity[8][r] (RL5DRACEHISP_R)		7: 8th decile	69.4%
1: White, non-Hispanic	73.3%	8: 9th decile	78.0%
2: Black, non-Hispanic	77.2%	9: 10th decile	59.9%
3: Other, non-Hispanic	53.7%	**% Hispanic 65+ (deciles)[2]** (PCTHISP)	
4: Hispanic	59.6%	0: 1st decile	72.7%
5: DK/RF	18.5%	1: 2nd decile	72.6%
Gender[1] (H_SEX)		2: 3rd decile	73.7%
1: Male	73.1%	3: 4th decile	70.7%
2: Female	67.7%	4: 5th decile	72.8%
Census Region[1] (S_REGION)		5: 6th decile	72.1%
1: Northeast	60.6%	6: 7th decile	65.5%
2: Midwest	69.8%	7: 8th decile	62.8%
3: South	74.8%	8: 9th decile	68.6%
4: West	69.4%	9: 10th decile	61.6%
Census Division[1][o][r] (DIVISION)		**% Poverty (deciles)[2]** (PCTPOV)	
1: New England	75.3%	0: 1st decile	63.5%
2: Middle Atlantic	51.0%	1: 2nd decile	61.3%
3: East North Central	67.9%	2: 3rd decile	72.9%
4: West North Central	71.5%	3: 4th decile	72.7%
5: South Atlantic	72.7%	4: 5th decile	73.8%
6: East South Central	78.3%	5: 6th decile	69.9%
7: West South Central	79.9%	6: 7th decile	69.4%
8: Mountain	83.7%	7: 8th decile	67.1%
9: Pacific	66.7%	8: 9th decile	73.2%
Census Metro/Micro Area Designation (2013)[1] (S_METMICRO)		9: 10th decile	79.0%
1: Metropolitan area	70.0%	**OTHER INDICATORS**	
2: Micropolitan area	56.6%	**Facility Type Indicator[3][o]** (FQ6DLOCSP)	
3: Non-metro	80.7%	1: Independent living/other	74.7%
Health Maintenance Organization Beneficiary[1] (HMOTYPE)		2: Assisted Living	70.6%
		3: Special care/memory care/Alzheimers unit	51.2%
0: Yes	62.7%	4: Nursing home	61.1%
9: No	71.8%	**R1 Residential Care Status[4][#][o]** (R1DRESID_R)	
Age First Enrolled in Medicare[1] (MEDIC_BEG)		1: Community	80.6%
1: Prior to age 65	69.1%	2: Residential Care Resident not nursing home	56.2%
2: At or after age 65	69.4%	**R2 Residential Care Status[5][#]** (R2DRESID_R)	
		1: Community in R2	81.7%
		2: Residential care in R2	59.2%
		3: Nursing home in R2	60.7%

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		85.2%
1: Yes		60.7%	2: Residential care in R3		62.3%
2: No		71.5%	3: Nursing home in R3		47.1%
R3 Nursing Home Status[6][#]	(R3NH)		**R4 Residential Care Status**[7][#]	(R4DRESID_R)	
1: Yes		47.1%	1: Community in R4		86.4%
2: No		73.6%	2: Residential care in R4		67.8%
R4 Nursing Home Status[7][#]	(R4NH)		3: Nursing home in R4		52.0%
1: Yes		52.0%	**R5 Residential Care Status**[8]	(R5DRESID_R)	
2: No		74.5%	1: Community in R5		83.1%
R5 Nursing Home Status[8]	(R5NH)		2: Residential care in R5		67.6%
1: Yes		52.2%	3: Nursing home in R5		52.2%
2: No		71.1%	**R6 Residential Care Status**[9]	(R6DRESID_R)	
R6 Nursing Home Status[9][o][r]	(R6NH)		2: Residential care in R6		71.4%
1: Yes		61.6%	3: Nursing home in R6		61.6%
2: No		71.4%			

[1]Based 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 .

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

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

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

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

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

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

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

[9]Based on responses to items in the Round 6 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=604 (427 respondents and 177 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 6, 2011 Cohort

Variable & Values		Weighted Response Rate	Variable & Values		Weighted Response Rate
OVERALL		71.5%	**COUNTY LEVEL INDICATORS**		
BENEFICIARY INDICATORS			**% Black 65+ (deciles)[2] ***	(PCTBLK)	
Age[1]	(H_AGECAT)		0: 1st decile		64.4%
1: 65-69		69.6%	1: 2nd decile		78.4%
2: 70-74		77.0%	2: 3rd decile		78.8%
3: 75-79		75.9%	3: 4th decile		73.7%
4: 80-84		69.5%	4: 5th decile		70.2%
5: 85- 89		64.0%	5: 6th decile		54.1%
6: 90+		72.7%	6: 7th decile		74.2%
R1 Race Ethnicity[4]	(RL1DRACEHISP_R)		7: 8th decile		73.7%
1: White, non-Hispanic		73.4%	8: 9th decile		75.7%
2: Black, non-Hispanic		78.3%	9: 10th decile		75.8%
3: Other, non-Hispanic		36.5%	**% Hispanic 65+ (deciles)[2]**	(PCTHISP)	
4: Hispanic		60.4%	0: 1st decile		69.3%
5: DK/RF		36.4%	1: 2nd decile		71.8%
Gender[1]	(H_SEX)		2: 3rd decile		77.8%
1: Male		71.6%	3: 4th decile		81.6%
2: Female		71.5%	4: 5th decile		72.4%
Census Region[1]	(S_REGION)		5: 6th decile		66.6%
1: Northeast		57.2%	6: 7th decile		64.7%
2: Midwest		71.5%	7: 8th decile		60.1%
3: South		77.0%	8: 9th decile		81.5%
4: West		79.3%	9: 10th decile		72.1%
Census Division[1]	(DIVISION)		**% Poverty (deciles)[2]**	(PCTPOV)	
1: New England		75.6%	0: 1st decile		62.7%
2: Middle Atlantic		49.9%	1: 2nd decile		66.6%
3: East North Central		65.6%	2: 3rd decile		65.5%
4: West North Central		76.6%	3: 4th decile		75.7%
5: South Atlantic		78.6%	4: 5th decile		72.2%
6: East South Central		75.5%	5: 6th decile		73.5%
7: West South Central		74.1%	6: 7th decile		67.0%
8: Mountain		88.2%	7: 8th decile		71.2%
9: Pacific		77.5%	8: 9th decile		90.7%
Census Metro/Micro Area Designation (2013)[2]			9: 10th decile		94.9%
	(S_METMICRO)				
1: Metropolitan area		72.2%	**OTHER INDICATORS**		
2: Micropolitan area		58.9%	**Facility Type Indicator[3] ***	(FQ6DLOCSP)	
3: Non-metro		78.3%	1: Independent living/other		81.1%
Health Maintenance Organization Beneficiary[1]			2: Assisted Living		68.3%
	(HMOTYPE)		3: Special care/memory care/Alzheimers unit		68.1%
0: Yes		70.8%	4: Nursing home		61.4%
9: No		71.7%	**R1 Residential Care Status[4] ***	(R1DRESID_R)	
Age First Enrolled in Medicare[1]	(MEDIC_BEG)		1: Community		81.5%
1: Prior to age 65		70.7%	2: Residential Care Resident not nursing home		55.6%
2: At or after age 65		71.7%			

Variable & Values		Weighted Response Rate	Variable & Values		Weighted Response Rate
OTHER INDICATORS			**R2 Residential Care Status[5]**	(R2DRESID_R)	
R2 Nursing Home Status[5]	(R2NH)		1: Community in R2		82.6%
1: Yes		61.7%	2: Residential care in R2		58.9%
2: No		72.0%	3: Nursing home in R2		61.7%
R3 Nursing Home Status[6]	(R3NH)		**R3 Residential Care Status[6]**	(R3DRESID_R)	
1: Yes		48.7%	1: Community in R3		85.8%
2: No		73.8%	2: Residential care in R3		62.0%
R4 Nursing Home Status[7]	(R4NH)		3: Nursing home in R3		48.7%
1: Yes		53.4%	**R4 Residential Care Status[7]**	(R4DRESID_R)	
2: No		74.8%	1: Community in R4		87.0%
R5 Nursing Home Status[8]	(R5NH)		2: Residential care in R4		67.7%
1: Yes		53.1%	3: Nursing home in R4		53.4%
2: No		75.9%	**R5 Residential Care Status[8]**	(R5DRESID_R)	
R6 Nursing Home Status[9] *	(R6NH)		1: Community in R5		90.9%
1: Yes		61.5%	2: Residential care in R5		71.0%
2: No		75.7%	3: Nursing home in R5		53.1%
			R6 Residential Care Status[9]	(R6DRESID_R)	
			2: Residential care in R6		75.7%
			3: Nursing home in R6		61.5%

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

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

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

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

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

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

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

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

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

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

N=379 (269 respondents and 110 nonrespondents); Variable names used in classification trees shown parenthetically.

Figure 1. Round 6 2015 Cohort Tracker weight nonresponse adjustment cells – non nursing home cases in original sample

Overall
RR = 94.74
n = 3,237

PCTHISP in (2,3,4,5,6,7,8,9)
RR = 94.04
n = 2,495

PCTHISP in (0,1)
RR = 97.46
n = 742

EL1HIGSTSCHL_R in (0,1,2,3)
RR = 92.43
n = 1,178

EL1HIGSTSCHL_R=4
RR = 95.39
n = 1,317

MEDIC_BEGIN=1
RR = 91.49
n = 78

MEDIC_BEGIN=2
RR = 98.21
n = 664

C_PCT_OWNHOME_65=4
RR = 96.52
n = 241

C_PCT_OWNHOME_65 in (1,2,3)
RR = 91.28
n = 937

PCTPOV in (0,1,2,3,4,5,6)
RR = 96.19
n = 1,039

PCTPOV in (7,8,9)
RR = 92.01
n = 278

H_AGECAT_R5 in (5,6)
RR = 100.00
n = 174

H_AGECAT_R5 in (1,2,3,4)
RR = 97.78
n = 490

C_PCT_HH_RETIREINC in (1,2,3)
RR = 99.81
n = 153

C_PCT_HH_RETIREINC=4
RR = 91.70
n = 88

DIVISION in (2,3,8)
RR = 87.11
n = 258

DIVISION in (1,4,5,6,7,9)
RR = 92.94
n = 679

C_PCT_HH_RETIREINC in (1,2)
RR = 94.41
n = 381

C_PCT_HH_RETIREINC in (3,4)
RR = 97.30
n = 658

DIVISION in (2,6)
RR = 95.48
n = 144

DIVISION in (3,4,5,7,8)
RR = 98.64
n = 346

PCTHISP in (6,7,8,9)
RR = 81.22
n = 113

PCTHISP in (2,3,4,5)
RR = 92.47
n = 145

C_PCT_POV_65 in (1,2,3)
RR = 91.35
n = 430

C_PCT_POV_65=4
RR = 96.46
n = 249

H_AGECAT_R5 in (1,2,3)
RR = 73.66
n = 48

H_AGECAT_R5 in (4,5,6)
RR = 91.06
n = 65

C_PCT_HH_POV in (1,2,3)
RR = 90.03
n = 338

C_PCT_HH_POV=4
RR = 97.05
n = 92

DIVISION in (4,7)
RR = 100.00
n = 93

DIVISION in (1,2,3,5,6,8,9)
RR = 92.85
n = 288

HMOTYPE=0
RR = 100.00
n = 83

HMOTYPE=9
RR = 89.33
n = 195

PCTBLK in (2,3,4,5,6,7,8,9)
RR = 92.14
n = 262

PCTBLK in (0,1)
RR = 83.77
n = 76

PCTBLK in (0,1,2,3,4)
RR = 88.21
n = 128

PCTBLK in (5,6,7,8,9)
RR = 97.19
n = 160

DIVISION in (2,3,6,7,8,9)
RR = 98.44
n = 387

DIVISION in (1,4,5)
RR = 95.80
n = 271

PCTHISP in (2,3,4)
RR = 95.48
n = 86

PCTHISP in (5,7,8,9)
RR = 85.93
n = 109

H_AGECAT_R5 in (3,4,5,6)
RR = 89.67
n = 191

H_AGECAT_R5 in (1,2)
RR = 96.47
n = 71

C_PCT_HH_65 in (1,2)
RR = 92.63
n = 82

C_PCT_HH_65 in (3,4)
RR = 80.61
n = 46

PCTPOV in (4,5,6)
RR = 87.17
n = 60

PCTPOV in (0,1,2,3)
RR = 98.65
n = 211

C_PCT_POV_65 in (1,2)
RR = 81.19
n = 54

C_PCT_POV_65 in (3,4)
RR = 91.45
n = 55

C_PER_CAP_INC in (1,2)
RR = 82.95
n = 76

C_PER_CAP_INC in (3,4)
RR = 94.23
n = 115

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

Figure 2. Round 6 2015 Cohort Tracker weight nonresponse adjustment cells – nursing home cases in original sample

```
              ┌─────────────────────┐
              │      OVERALL        │
              │   RR = 96.26        │
              │    n = 158          │
              └─────────────────────┘
              ┌──────────┴──────────┐
┌─────────────────────┐   ┌─────────────────────┐
│ PCTPOV in (0,1,2,3) │   │    PCTPOV in        │
│   RR = 91.95        │   │  (4,5,6,7,8,9)      │
│    n = 62           │   │   RR = 99.15        │
│                     │   │    n = 96           │
└─────────────────────┘   └─────────────────────┘
```
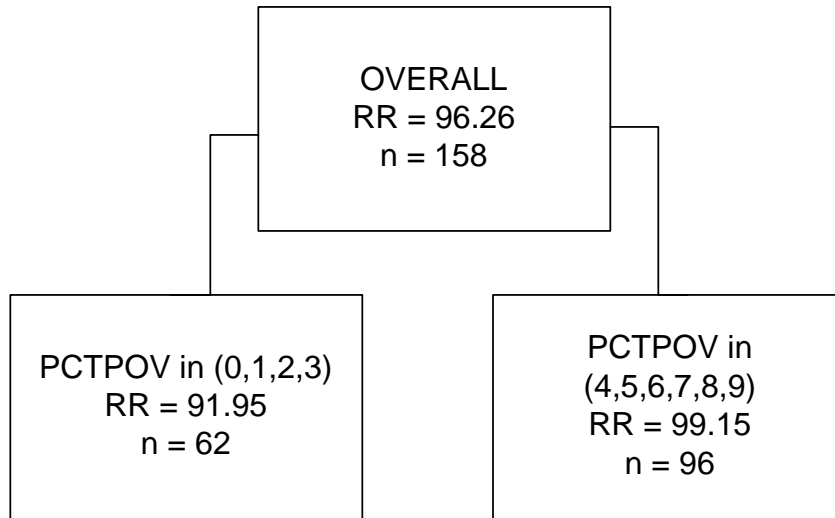
Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell

Figure 3. Round 6 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 6 2015 Cohort Tracker weight nonresponse adjustment cells – non nursing home cases in replenishment sample

OVERALL
RR = 85.32
n = 3270

DIVISION in (1,3,4,5,6,8,9)
RR = 87.02
n = 2,553

DIVISION in (2,7)
RR = 79.34
n = 717

RL5DRACEHISP_R in (1,2)
RR = 88.34
n = 2,246

RL5DRACEHISP_R in (3,4,5)
RR = 78.95
n = 307

C_PCT_OWNHOME_65 in (1,2,3)
RR = 77.24
n = 557

C_PCT_OWNHOME_65=4
RR = 86.08
n = 160

DIVISION in (4,5,6,8)
RR = 86.49
n = 1,231

DIVISION in (1,3,9)
RR = 90.47
n = 1,015

H_AGECAT_R5 in (1,2)
RR = 76.45
n = 143

H_AGECAT_R5 in (3,4,5,6)
RR = 84.44
n = 164

C_PCT_HH_PUBASST in (1,2)
RR = 72.39
n = 254

C_PCT_HH_PUBASST in (3,4)
RR = 82.56
n = 303

PCTHISP in (0,1,2,3,4,5,6,7)
RR = 87.02
n = 1,183

PCTHISP in (8,9)
RR = 73.17
n = 48

HMOTYPE=9
RR = 92.11
n = 674

HMOTYPE=0
RR = 87.01
n = 341

RL5DRACEHSP_R=4
RR = 83.65
n = 67

RL5DRACEHSP_R in (3,5)
RR = 70.72
n = 76

C_PCT_HH_SOCSEC=4
RR = 82.95
n = 74

C_PCT_HH_SOCSEC in (1,2,3)
RR = 68.99
n = 180

S_REGION=3
RR = 89.90
n = 126

S_REGION=1
RR = 77.64
n = 177

R5DRESID=1
RR = 86.68
n = 1,102

R5DRESID in (2,7,8)
RR = 95.83
n = 81

H_AGECAT_R5 in (3,4,5,6)
RR = 87.92
n = 332

H_AGECAT_R5 in (1,2)
RR = 94.03
n = 342

C_PCT_HH_SOCSEC in (3,4)
RR = 83.18
n = 189

C_PCT_HH_SOCSEC in (1,2)
RR = 92.13
n = 152

PCTPOV=0
RR = 56.02
n = 30

PCTPOV in (1,2,3,4,5,6,7,8,9)
RR = 73.25
n = 150

H_AGECAT_R5=1
RR = 71.18
n = 50

H_AGECAT_R5 in (2,3,4,5,6)
RR = 82.99
n = 127

PCTBLK in (0,1,2)
RR = 89.68
n = 276

PCTBLK in (3,4,5,6,7,8,9)
RR = 85.59
n = 826

C_PCT_POV_65 in (1,2)
RR = 97.43
n = 195

C_PCT_POV_65 in (3,4)
RR = 89.24
n = 147

H_AGECAT_R5=1
RR = 63.51
n = 42

H_AGECAT_R5 in (2,3,4,5,6)
RR = 81.99
n = 108

C_PCT_OWNHOME_65 in (1,2)
RR = 81.31
n = 65

C_PCT_OWNHOME_65 in (3,4)
RR = 91.98
n = 211

PCTBLK in (3,4,5,6)
RR = 83.39
n = 342

PCTBLK in (7,8,9)
RR = 87.76
n = 484

C_PCT_HH_65 in (1,2,3)
RR = 80.50
n = 207

C_PCT_HH_65=4
RR = 88.38
n = 135

C_PCT_HH_RETIREINC in (1,2,3)
RR = 90.17
n = 371

C_PCT_HH_RETIREINC=4
RR = 80.76
n = 113

C_PCT_HH_SOCSEC=1
RR = 87.41
n = 68

C_PCT_HH_SOCSEC in (2,3,4)
RR = 77.15
n = 139

H_AGECAT_R5 in (1,2)
RR = 92.65
n = 207

H_AGECAT_R5 in (3,4,5,6)
RR = 83.74
n = 164

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

Figure 5. Round 6 2015 Cohort Tracker weight nonresponse adjustment cells – nursing home cases in replenishment sample


```
                    ┌─────────────────────┐
                    │      OVERALL        │
                    │    RR = 93.73       │
                    │     n = 125         │
                    └─────────────────────┘
              ┌──────────┴──────────┐
┌─────────────────────────┐  ┌─────────────────────────┐
│  DIVISION in (3,6,7,8)  │  │  DIVISION in (1,2,4,5,9) │
│      RR = 84.03         │  │      RR = 100.00         │
│        n = 47           │  │        n = 78            │
└─────────────────────────┘  └─────────────────────────┘
```
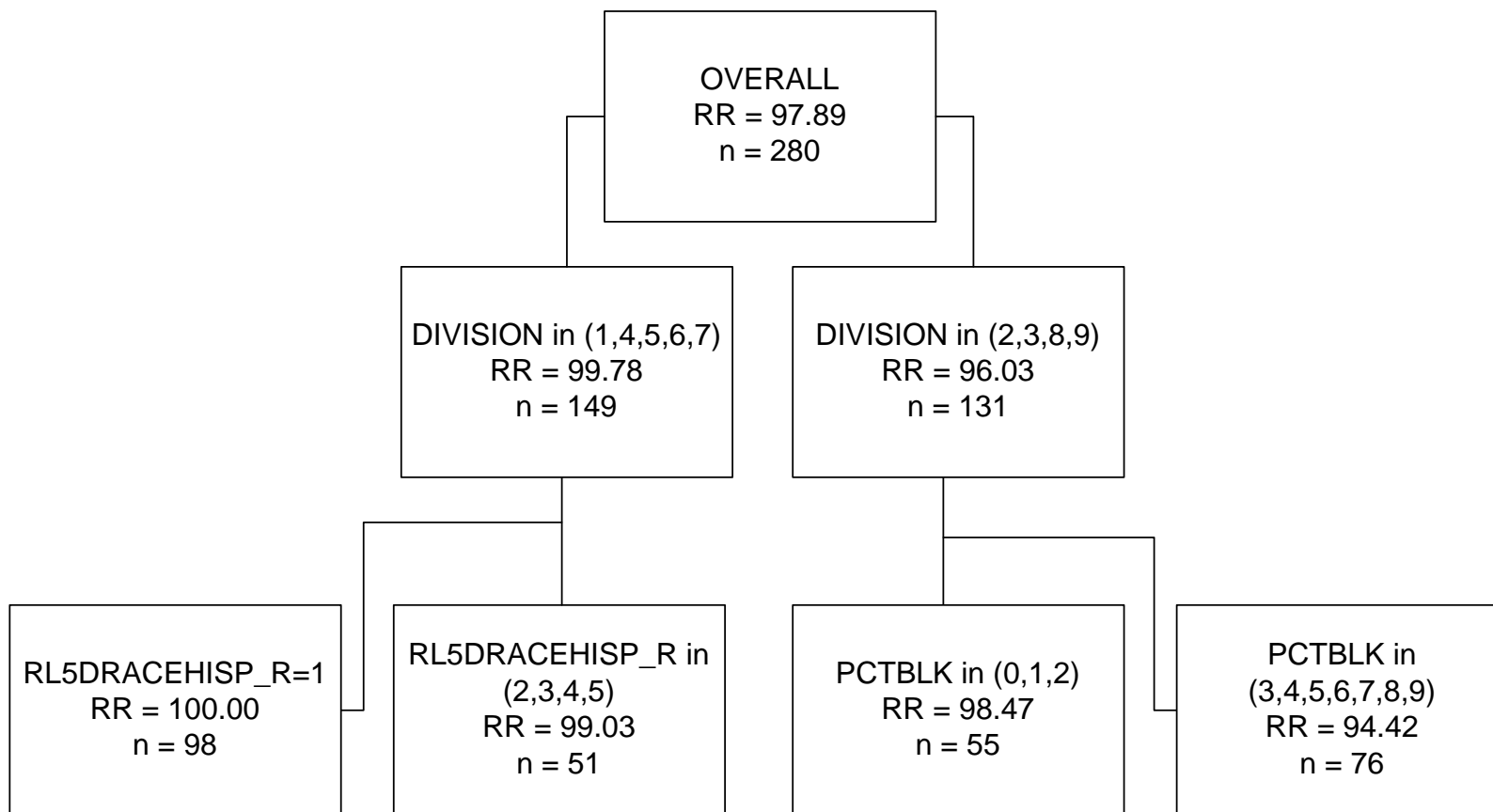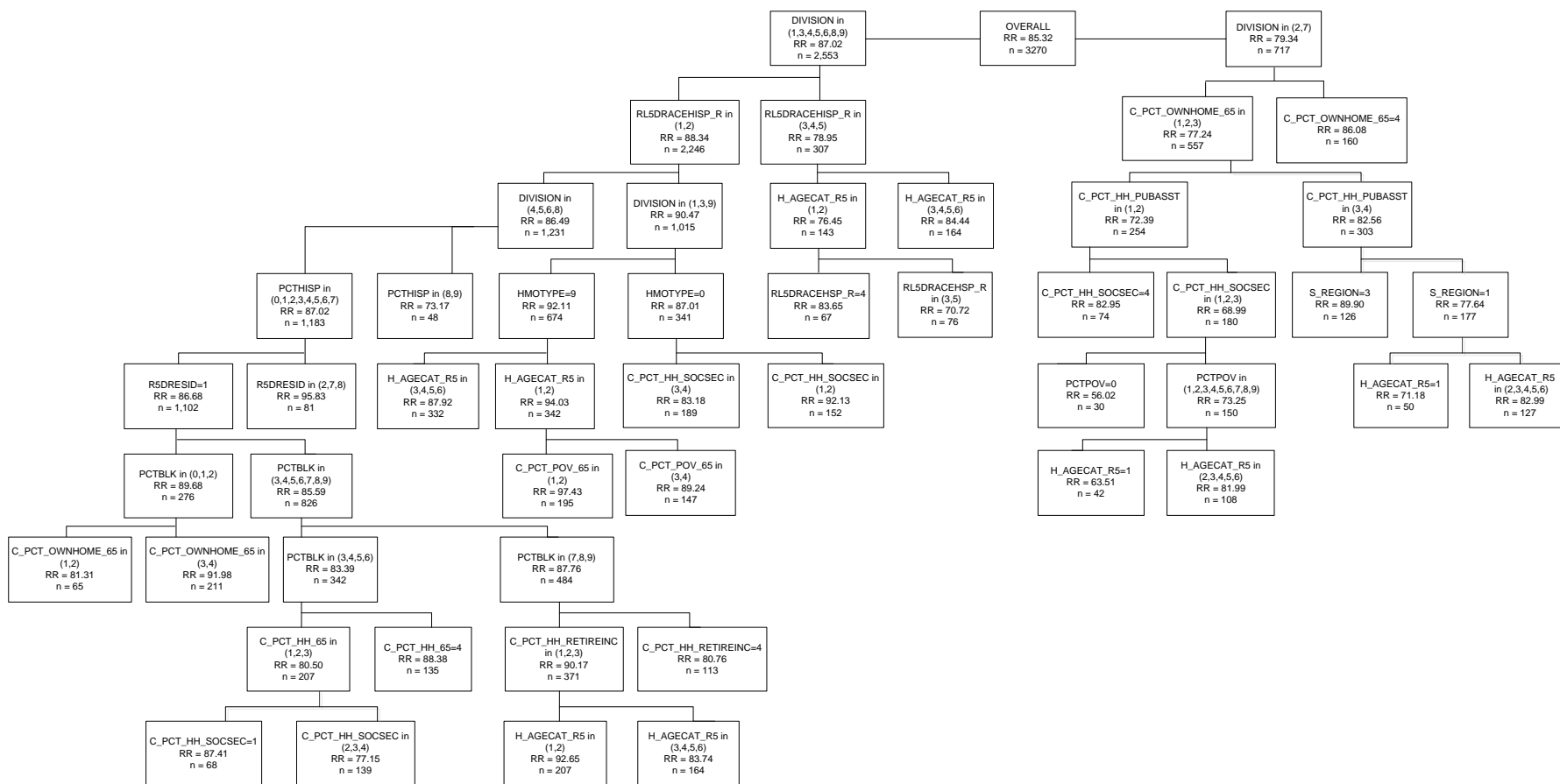
Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell

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


```
                          ┌─────────────────┐
                          │    OVERALL      │
                          │  RR = 96.07     │
                          │   n = 206       │
                          └─────────────────┘
            ┌──────────────────┴──────────────────┐
   ┌──────────────────┐                  ┌──────────────────┐
   │   PCTPOV in       │                  │ PCTPOV in (7,8,9) │
   │ (0,1,2,3,4,5,6)   │                  │   RR = 88.86      │
   │   RR = 98.20      │                  │    n = 54         │
   │    n = 152        │                  └──────────────────┘
   └──────────────────┘
        ┌────────┴────────┐
┌──────────────────┐  ┌──────────────────┐
│ DIVISION in      │  │ DIVISION in      │
│ (1,3,6,7,8)      │  │ (2,4,5,9)        │
│ RR = 100.00      │  │ RR = 97.02       │
│   n = 65         │  │   n = 87         │
└──────────────────┘  └──────────────────┘
```
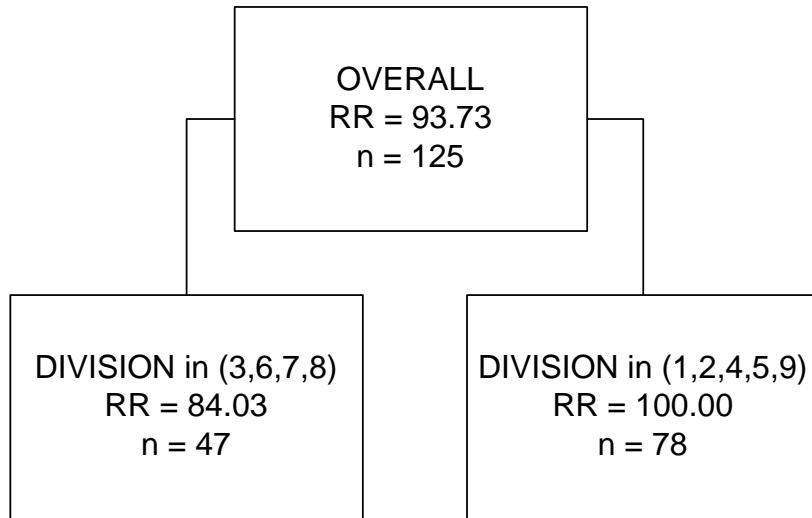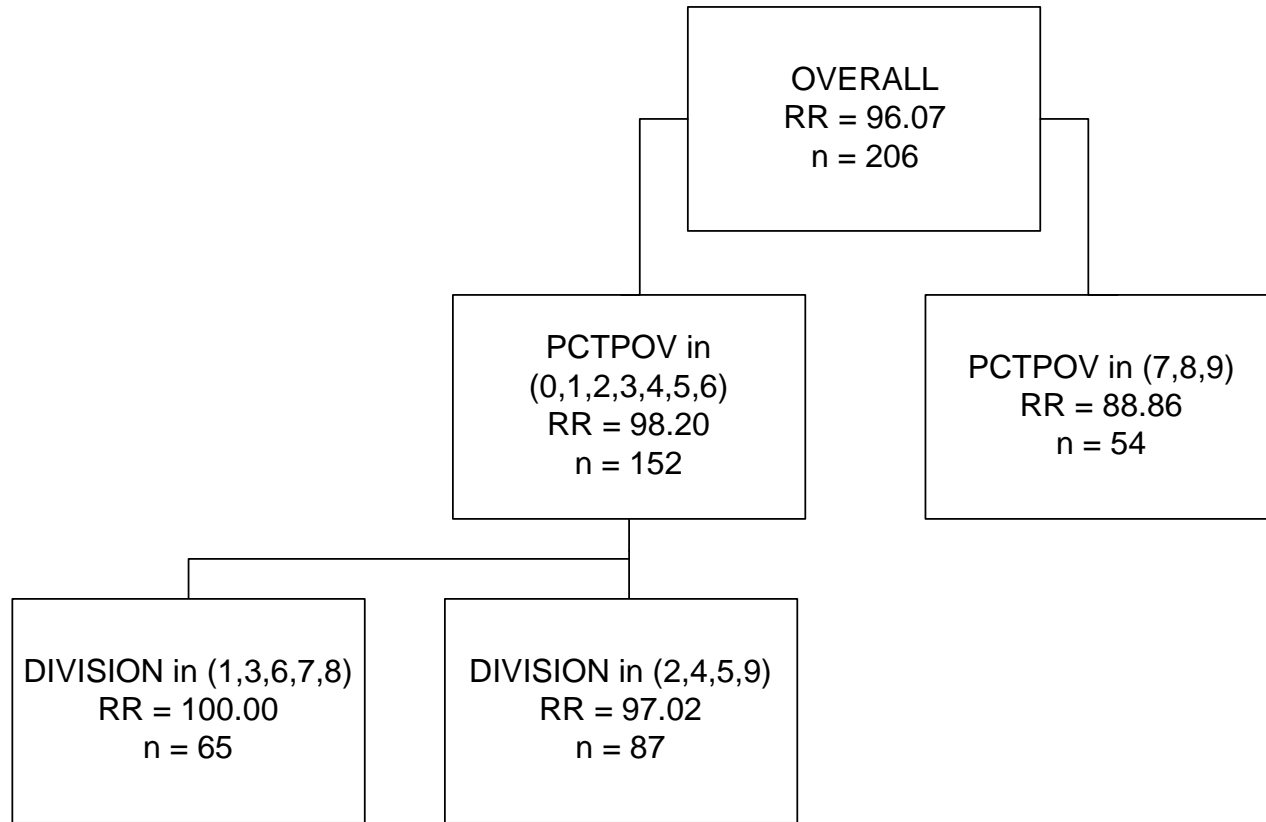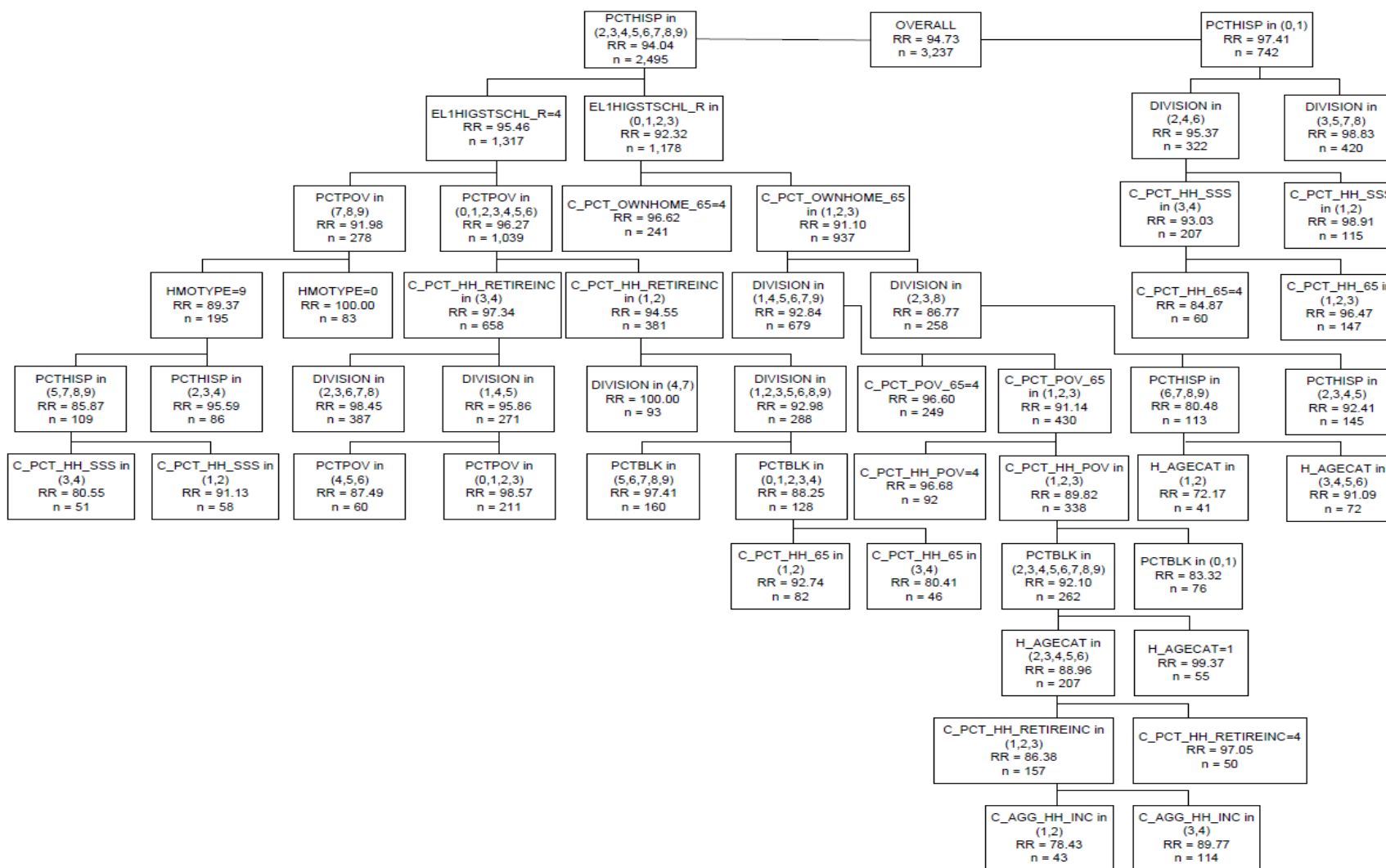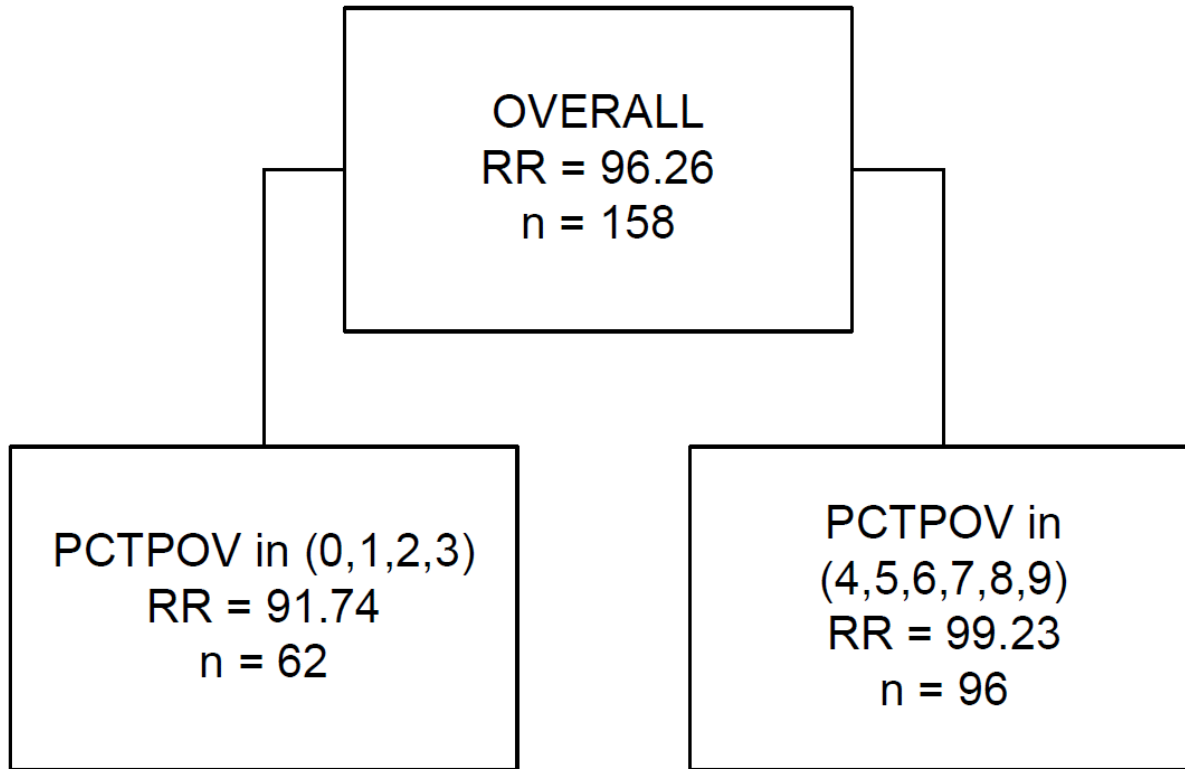
Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell

28

Figure 7. Round 6 2011 Cohort Tracker weight nonresponse adjustment cells – non nursing home cases in original sample

PCTHISP in (2,3,4,5,6,7,8,9)
RR = 94.04
n = 2,495

OVERALL
RR = 94.73
n = 3,237

PCTHISP in (0,1)
RR = 97.41
n = 742

EL1HIGSTSCHL_R=4
RR = 95.46
n = 1,317

EL1HIGSTSCHL_R in (0,1,2,3)
RR = 92.32
n = 1,178

DIVISION in (2,4,6)
RR = 95.37
n = 322

DIVISION in (3,5,7,8)
RR = 98.83
n = 420

PCTPOV in (7,8,9)
RR = 91.98
n = 278

PCTPOV in (0,1,2,3,4,5,6)
RR = 96.27
n = 1,039

C_PCT_OWNHOME_65=4
RR = 96.62
n = 241

C_PCT_OWNHOME_65 in (1,2,3)
RR = 91.10
n = 937

C_PCT_HH_SSS in (3,4)
RR = 93.03
n = 207

C_PCT_HH_SSS in (1,2)
RR = 98.91
n = 115

HMOTYPE=9
RR = 89.37
n = 195

HMOTYPE=0
RR = 100.00
n = 83

C_PCT_HH_RETIREINC in (3,4)
RR = 97.34
n = 658

C_PCT_HH_RETIREINC in (1,2)
RR = 94.55
n = 381

DIVISION in (1,4,5,6,7,9)
RR = 92.84
n = 679

DIVISION in (2,3,8)
RR = 86.77
n = 258

C_PCT_HH_65=4
RR = 84.87
n = 60

C_PCT_HH_65 in (1,2,3)
RR = 96.47
n = 147

PCTHISP in (5,7,8,9)
RR = 85.87
n = 109

PCTHISP in (2,3,4)
RR = 95.59
n = 86

DIVISION in (2,3,6,7,8)
RR = 98.45
n = 387

DIVISION in (1,4,5)
RR = 95.86
n = 271

DIVISION in (4,7)
RR = 100.00
n = 93

DIVISION in (1,2,3,5,6,8,9)
RR = 92.98
n = 288

C_PCT_POV_65=4
RR = 96.60
n = 249

C_PCT_POV_65 in (1,2,3)
RR = 91.14
n = 430

PCTHISP in (6,7,8,9)
RR = 80.48
n = 113

PCTHISP in (2,3,4,5)
RR = 92.41
n = 145

C_PCT_HH_SSS in (3,4)
RR = 80.55
n = 51

C_PCT_HH_SSS in (1,2)
RR = 91.13
n = 58

PCTPOV in (4,5,6)
RR = 87.49
n = 60

PCTPOV in (0,1,2,3)
RR = 98.57
n = 211

PCTBLK in (5,6,7,8,9)
RR = 97.41
n = 160

PCTBLK in (0,1,2,3,4)
RR = 88.25
n = 128

C_PCT_HH_POV=4
RR = 96.68
n = 92

C_PCT_HH_POV in (1,2,3)
RR = 89.82
n = 338

H_AGECAT in (1,2)
RR = 72.17
n = 41

H_AGECAT in (3,4,5,6)
RR = 91.09
n = 72

C_PCT_HH_65 in (1,2)
RR = 92.74
n = 82

C_PCT_HH_65 in (3,4)
RR = 80.41
n = 46

PCTBLK in (2,3,4,5,6,7,8,9)
RR = 92.10
n = 262

PCTBLK in (0,1)
RR = 83.32
n = 76

H_AGECAT in (2,3,4,5,6)
RR = 88.96
n = 207

H_AGECAT=1
RR = 99.37
n = 55

C_PCT_HH_RETIREINC in (1,2,3)
RR = 86.38
n = 157

C_PCT_HH_RETIREINC=4
RR = 97.05
n = 50

C_AGG_HH_INC in (1,2)
RR = 78.43
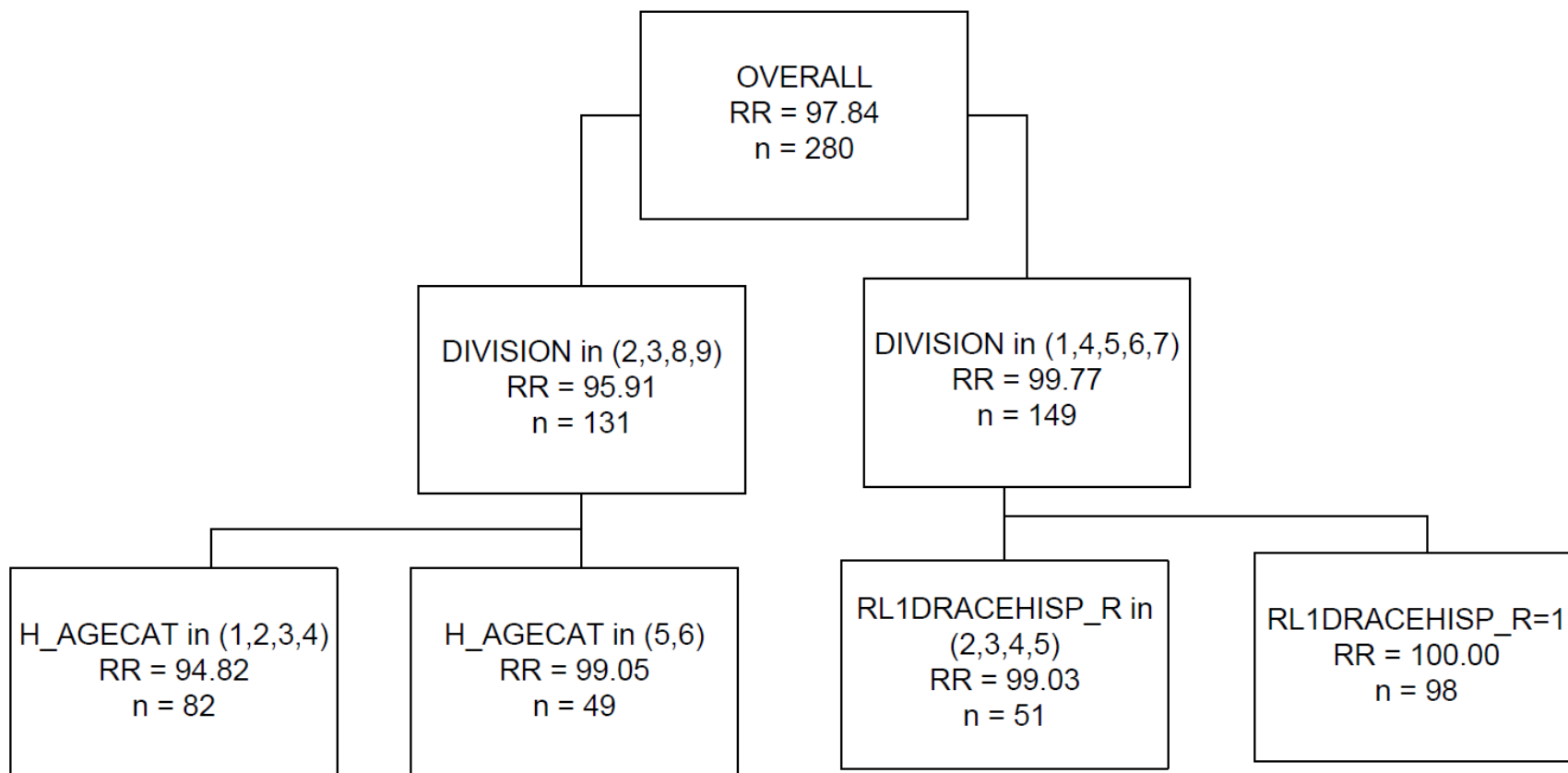n = 43

C_AGG_HH_INC in (3,4)
RR = 89.77
n = 114

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

Figure 8. Round 6 2011 Cohort Tracker weight nonresponse adjustment cells – nursing home cases in original sample

OVERALL
RR = 96.26
n = 158

PCTPOV in (0,1,2,3)
RR = 91.74
n = 62

PCTPOV in (4,5,6,7,8,9)
RR = 99.23
n = 96

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

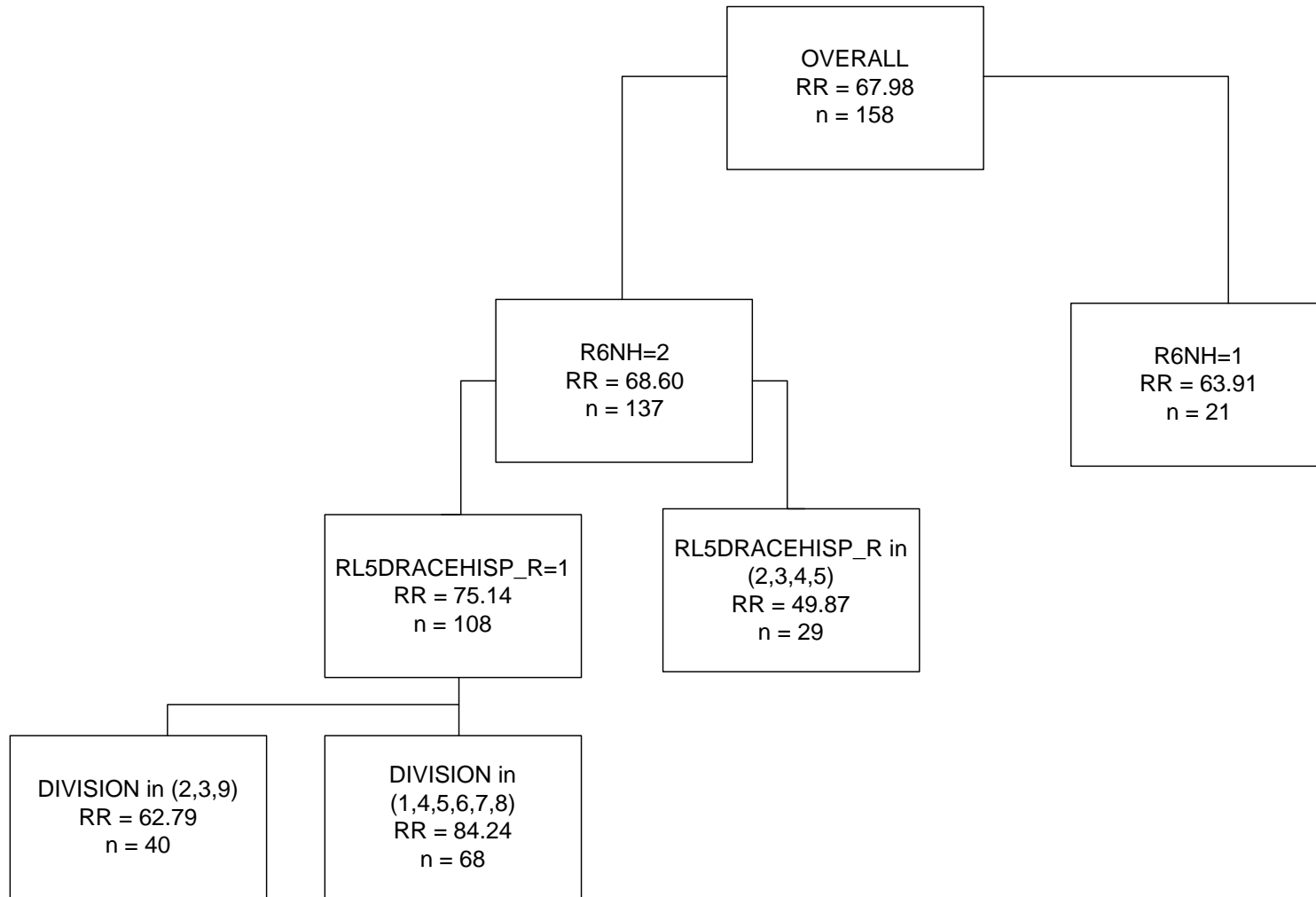**Figure 9. Round 6 2011 Cohort Tracker weight nonresponse adjustment cells – deceased cases in original sample**

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

Figure 10. Round 6 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
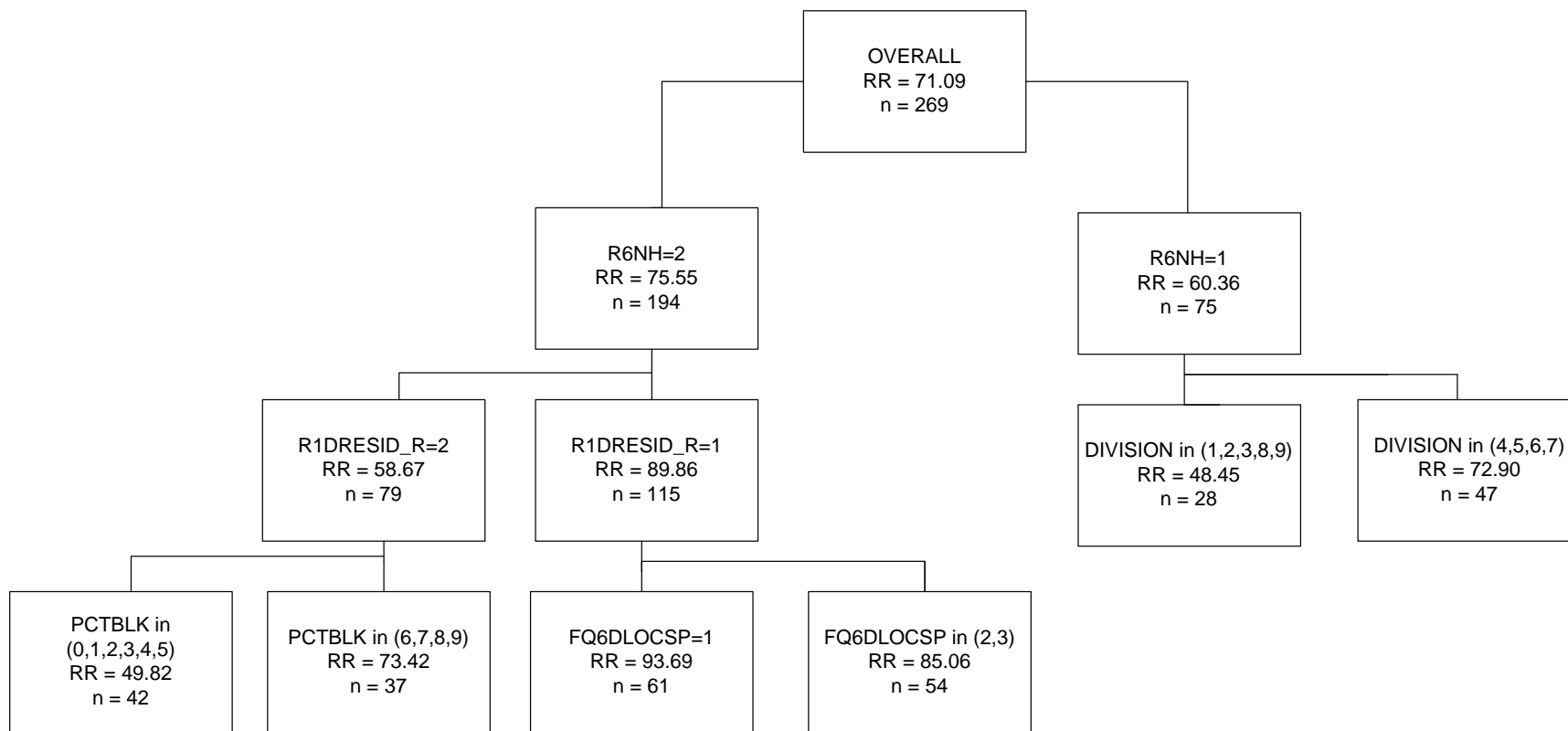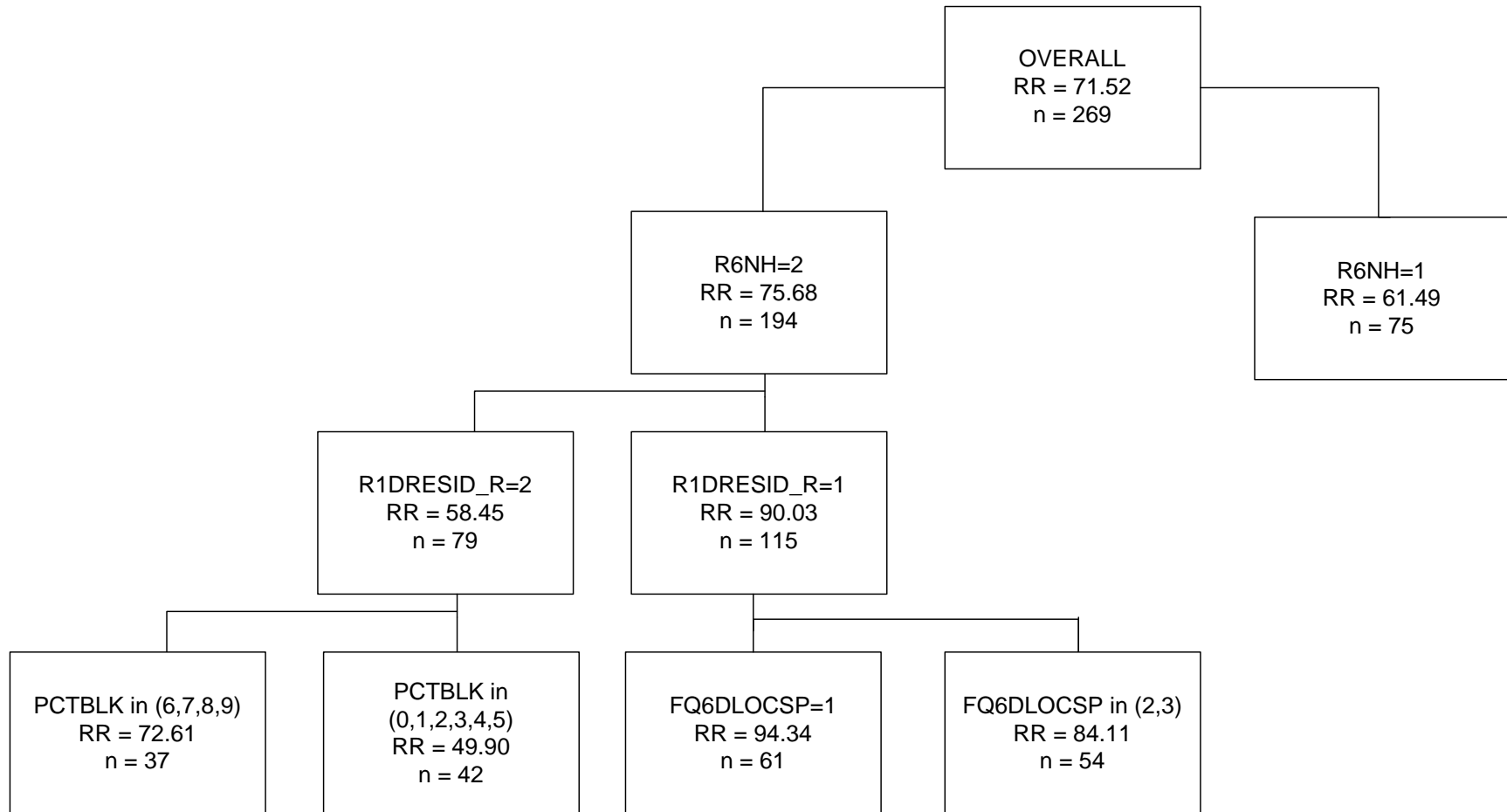

Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell

Figure 11. Round 6 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 6 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