

NATIONAL HEALTH AND AGING TRENDS STUDY (NHATS)
Development of Round 10 Survey Weights

July 8, 2021

Suggested Citation: DeMatteis, Jill M., Freedman, Vicki A., Jiao, Rui, and Kasper, Judith D. 2021. National Health and Aging Trends Study Development of Round 10 Survey Weights. NHATS Technical Paper #28. Baltimore: Johns Hopkins University School of Public Health. Available at www.NHATS.org. We thank David Ferraro, Benjamin Schneider, and Victoria Owens, who played an instrumental role in the development of the Round 10 weights and produced several tabulations that appear in this paper. This technical paper was prepared with funding from the National Institute on Aging (U01AG032947).

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 10, as for Rounds 5 through 9, 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 10 public use file account for differential probabilities of selection and adjust for potential bias related to unit nonresponse to the Round 1 through 10 interviews.

As in prior rounds, for Round 10 of NHATS, two types of sampling weights have been produced (for each cohort): a tracker weight (on the Tracker file with the variable names w10trfinwgt0 and w10tr2011wgt0) and an analytic weight (on the Sample Person file with the variable names w10anfinwgt0 and w10an2011wgt0). For variance estimation (see Section 7), NHATS has also included replicate versions of these weights (w10trfinwgt1-w10trfinwgt56 and w10anfinwgt1-w10anfinwgt56 for the 2015 Cohort; w10tr2011wgt1-w10tr2011wgt56 and w10an2011wgt1-w10an2011wgt56 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. For additional information on application of weights and variance estimation in NHATS analyses, see *Accounting for Sample Design in NHATS and NSOC Analyses: Frequently Asked Questions* (Freedman et al. 2020).

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 10 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 10 Tracker weight, only cases that were eligible as of September 30, 2014, and were classified in Round 10 as Respondents (including cases for whom a Round 10 Last Month of Life (LML) interview was completed) or Ineligible are assigned a positive weight (n=6,882). 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 10 interviews after they were selected, either due to death prior to their interview or due to moving outside the contiguous U.S., also have positive Round 10 Tracker weights

For the 2015 Cohort Round 10 Analytic weight, only Respondents (codes 60, 61, 62, 63; n=4,312) 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 10 Tracker weight, only original sample cases classified as Respondents and Ineligible are assigned a positive weight (N = 5,806). 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 10 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 10. Replenishment sample cases added in 2015 do not have positive 2011 Cohort Round 10 Tracker weights.

For the 2011 Cohort Round 10 Analytic weight, only original sample Respondents (codes 60, 61, 62, 63; n=2,209) 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 10 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	1,805	Respondent	Respondent	1,842	Respondent	Respondent
60-Complete, NH or residential care	190	Respondent	Respondent	95	Respondent	Respondent
61 Complete, NH facility	12	Respondent	Respondent	14	Respondent	Respondent
62 Complete, SP deceased, proxy interview	186	Deceased respondent ⁺	Respondent ⁺	139	N/A	N/A
63 Complete SP, FQ not complete	16	Respondent	Respondent	13	Respondent	Respondent
64 Complete FQ, SP not complete	42	Respondent	Nonrespondent	35	Respondent	Nonrespondent
75 Physically/mentally unable to participate, no proxy	2	Nonrespondent	Nonrespondent	0	Nonrespondent	Nonrespondent
76 Too ill to participate, no proxy	2	Nonrespondent	Nonrespondent	5	Nonrespondent	Nonrespondent
77 Refusal, Sample Person	34	Nonrespondent	Nonrespondent	80	Nonrespondent	Nonrespondent
78 Language barrier	1	Nonrespondent	Nonrespondent	0	Nonrespondent	Nonrespondent
79 Unable to locate	7	Eligibility unknown ⁺⁺	Eligibility unknown ⁺⁺	15	Eligibility unknown ⁺⁺	Eligibility unknown ⁺⁺
80 Unavailable during field period	0	Nonrespondent	Nonrespondent	2	Nonrespondent	Nonrespondent
82 Outside of Primary Sampling Unit	0	Nonrespondent	Nonrespondent	0	Nonrespondent	Nonrespondent
83 Ineligible (moved out of contiguous US)	1	Ineligible	Ineligible	1	Ineligible	Ineligible
85 Refusal, facility	0	Nonrespondent	Nonrespondent	0	Nonrespondent	Nonrespondent
86 Deceased, no proxy	8	nonrespondent ⁺	Nonrespondent ⁺	13	N/A	N/A
87 Refusal, proxy	27	Nonrespondent	Nonrespondent	16	Nonrespondent	Nonrespondent
88 Work stopped	0	Nonrespondent	Nonrespondent	0	Nonrespondent	Nonrespondent
89 Final other/specify*	0	Nonrespondent*	Nonrespondent*	0	Nonrespondent*	Nonrespondent*
Not attempted in Round 10						
Deceased in Round 1, 2, 3, or 4	2,127	Ineligible [#]	Ineligible [#]	0	N/A	N/A
Deceased in Round 5, 6, 7, 8, or 9	1,298	Ineligible	Ineligible	1,133	Ineligible	Ineligible
Other Round 1, 2, 3, or 4 ineligible	120	Ineligible [#]	Ineligible [#]	0	N/A	N/A
Other Round 5, 6, 7, 8, or 9 ineligible	9	Ineligible	Ineligible	51	Ineligible	Ineligible
Round 1, 2, 3, 4, 5, 6, 7, 8, or 9 nonrespondent	6,524	Nonrespondent ^{**}	Nonrespondent ^{**}	3,665	N/A	N/A
Total and number assigned weight	12,411	3,559 (5,806 ^{###})	2,209	7,119	3,323	2,103

⁺ 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, Round 8, Round 9, and Round 10 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, Round 8, Round 9, and Round 10 weights.

^{**}These cases were previously adjusted for in the Round 1, Round 2, Round 3, Round 4, Round 5, Round 6, Round 7, Round 8, or Round 9 nonresponse adjustment to the tracker weight; the Round 9 nonresponse adjusted tracker weight was used as input to the Round 10 weighting process, so these cases are not included in the Round 10 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 10 Tracker Weights

2015 Cohort Tracker Weights

To produce the 2015 Cohort Round 10 Tracker weight, two adjustments were made to the Round 9 nonresponse adjusted tracker weight—an adjustment for Round 10 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 10 nonresponse.

Potential variables for creating nonresponse cells for the 2015 Cohort Round 10 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 9 interviews (race/ethnicity, highest education, and residential settings); and
- For the replenishment sample, variables from the NHATS Rounds 5 through 9 interviews (race/ethnicity, highest education, and Rounds 5, 6, 7, 8, and 9 residential settings).

Appendix Table 1 provides weighted response rates (using the 2015 cohort Round 9 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). The nursing home residents include both Round 1 or Round 5 residents who were not required to complete an SP Interview during the recruitment round and new Rounds 2 through 9 nursing home cases who were eligible for the SP interview in Round 10. 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 10 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 9, final nonresponse cells included 15 indicators. For living SPs in the original sample who were living in nursing homes in Round 9, the sample size was small enough to form just a single nonresponse cell. For deceased SPs in the original sample, final nonresponse cells included two indicators. Combinations of these variables created 26 nonresponse cells among the original sample in the non-nursing home group, 1 nonresponse cell among the nursing home group, and 3 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 9, final nonresponse cells included 12 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 9, 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 2 final nonresponse cells included 1 indicator (See Appendix Figure 6).

The final step in creating the 2015 Cohort Round 10 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 10, 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 9, four dimensions were used in this Round 10 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 9, 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 10 Tracker weight applies only to the original sample, and followed the approach used to compute the Rounds 1 through 9 Tracker weights. This process began with the Round 9 nonresponse adjusted tracker weight (prior to raking). This Round 9 weight accounted for differential probabilities of selection and included adjustments for nonresponse to Rounds 1 through 9, 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, 2019, 2020) for information about the specific adjustments applied in Rounds 2 through 9, respectively.

To produce the 2011 Cohort Round 10 Tracker weight, two adjustments were made to the Round 9 nonresponse adjusted tracker weight—an adjustment for Round 10 nonresponse and a raking adjustment to estimated population totals from the EDB. Potential variables for creating nonresponse cells for the 2011 Cohort Round 10 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 9 (race/ethnicity, highest education, and residential settings).

Appendix Table 2 provides weighted response rates (using the Round 9 nonresponse adjusted tracker weights that were the basis for the 2011 Cohort Round 10 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 9 nursing home residents who were eligible for the SP interview in Round 10. 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 9 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 9, final nonresponse cells included 14 indicators; combinations of these variables created 26 nonresponse cells. Among living SPs who were nursing home residents in Round 9, the sample size was small enough to warrant a single nonresponse cell. 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 10 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 10, 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 9, four dimensions were used in this Round 10 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 10 Analytic Weights

As with the tracker weights, separate Round 10 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 10 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 10 who had completed a facility interview but not a Sample Person interview (n=42 for the 2015 Cohort and n=35 for the 2011 Cohort; designated as code 64). (Round 10 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 10, thus are not part of the analytic weight nonresponse adjustment). The approach was designed to preserve the tracker weight distributions by Round 10 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=330 for the 2015 Cohort and n=219 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 ten rounds, whereas Round 10 was the sixth contact and attempt at gaining cooperation with the replenishment sample), the two samples were adjusted separately for Round 10 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 10 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 10 residence type, the first split in each tree was forced to be Round 10 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 10 Tracker weights, the 2011 Cohort Round 10 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 10 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 10 residence type, the first split was forced to be Round 10 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 Tracker weights for Rounds 6 through 9 had overall design effects of 1.62, 1.64, 1.65, and 1.66, respectively. The nonresponse adjusted Round 10 Tracker weights had an overall design effect of 1.67. In order to limit the variation in the weights, after the raking adjustment, trimming of the tracker weights was considered; no cases were identified as influential outliers. After the raking adjustment, the design effect for the final 2015 Cohort Round 10 Tracker weights was 1.68.

After the adjustments applied in computing the analytic weight (nonresponse adjustment and raking), three 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 10 Analytic weights was 1.66 overall, and 1.64 for living SPs and 1.88 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, for Round 7 nonresponse, for Round 8 nonresponse, and for Round 9 nonresponse, the overall design effects were 1.32, 1.32, 1.31, and 1.30, respectively. After adjusting for Round 10 nonresponse, the overall design effect was 1.29. In order to limit the variation in

the weights, after the raking adjustment, the tracker weights were trimmed and then re-raked; five cases with extreme weights were trimmed at this point. After the raking adjustment and trimming, the design effect for the final 2011 Cohort Round 10 Tracker weights was 1.31.

After the adjustments applied in computing the analytic weight (nonresponse adjustment and raking), no cases were identified as influential outliers. After raking, the design effect for the final 2011 Cohort Round 10 Analytic weights was 1.30 overall; and 1.29 for living SPs and 1.33 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 10 Analytic weight reproduces those alive and eligible for NHATS during the Round 9 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 10, a positive Round 10 weight sits in the Tracker file and a zero Round 10 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 10, 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 Rounds 2 through 10 (measured in the SP interview) or who was in a particular type of residential care in Rounds 2 through 10 (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 10, or the characteristics of those living in residential care settings in Round 10 as measured in the Round 10 FQ interview, the Round 10 weight should be used. The former would use the Round 10 Analytic weight and the latter the Round 10 Tracker weight. To estimate characteristics (as of Round 10) of people 65 and older in Round 5, the 2015 Cohort Round 10 weight should be used. To examine associations between a characteristic in Round 10 and a characteristic in Round 1 (or any round prior to Round 5), the 2011 Cohort Round 10 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 10, the final tracker replicate weights are provided in the variables w10trfinwgt1-w10trfinwgt56 for the 2015 Cohort and w10tr2011wgt1- w10tr2011wgt56 for the 2011 Cohort, and the analytic replicate weights are provided in the variables w10anfinwgt1-w10anfinwgt56 for the 2015 Cohort and w10an2011wgt1-w10an2011wgt56 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 *Accounting for Sample Design in NHATS and NSOC Analyses: Frequently Asked Questions* (Freedman et al. 2020).

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Appendix: Variables Used in Nonresponse Adjustment for Round 10 NHATS Weights

Appendix Table 1. Response Rates by Various Indicators: NHATS Round 10 2015 Cohort

Variable & Values	Weighted Response Rate	Variable & Values	Weighted Response Rate
OVERALL	94.7%	TRACT-LEVEL INDICATORS (Quartiles)	
BENEFICIARY INDICATORS		Household Income^{3d} (C_AGG_HH_INC)	
Age^{1ad} (H_AGECAT_R5)		1: 1 st quartile	93.9%
1: 65-69	92.8%	2: 2 nd quartile	96.5%
2: 70-74	96.2%	3: 3 rd quartile	94.6%
3: 75-79	95.9%	4: 4 th quartile	94.2%
4: 80-84	95.8%	9: Missing	0.0%
5: 85- 89	94.7%	Median Household Income^{3d} (C_MED_HH_INC)	
6: 90+	94.1%	1: 1 st quartile	93.7%
Gender^{1a} (H_SEX)		2: 2 nd quartile	95.3%
1: Male	95.0%	3: 3 rd quartile	95.4%
2: Female	94.5%	4: 4 th quartile	94.3%
Census Region² (S_REGION)		9: Missing	0.0%
1: Northeast	96.0%	Median Household Income 65+³	
2: Midwest	94.8%	(C_MED_HH_INC_65)	
3: South	93.4%	1: 1 st quartile	93.2%
4: West	95.9%	2: 2 nd quartile	94.5%
Census Division^{2acd} (DIVISION)		3: 3 rd quartile	95.8%
1: New England	96.5%	4: 4 th quartile	95.2%
2: Middle Atlantic	95.7%	9: Missing	28.9%
3: East North Central	95.0%	% Households with Adult 65+^{3a} (C_PCT_HH_65)	
4: West North Central	94.5%	1: 1 st quartile	92.3%
5: South Atlantic	94.1%	2: 2 nd quartile	94.9%
6: East South Central	92.5%	3: 3 rd quartile	94.3%
7: West South Central	92.4%	4: 4 th quartile	96.1%
8: Mountain	96.7%	% Households in Poverty³ (C_PCT_HH_POV)	
9: Pacific	95.8%	1: 1 st quartile	94.6%
Census Metro/Micro Area Designation (2013)² (S_METMICRO)		2: 2 nd quartile	95.4%
1: Metropolitan area	94.2%	3: 3 rd quartile	95.3%
2: Micropolitan area	96.1%	4: 4 th quartile	92.9%
3: Non-metro	98.2%	% Households Reporting Public Assistance^{3ad} (C_PCT_HH_PUBASST)	
Health Maintenance Organization Beneficiary^{1ad} (HMOTYPE)		1: 1 st quartile	95.4%
0: Yes	95.1%	2: 2 nd quartile	93.7%
9: No	94.5%	3: 3 rd quartile	95.4%
Age First Enrolled in Medicare¹ (MEDIC_BEG)		4: 4 th quartile	94.3%
1: Prior to age 65	92.5%	% Households Reporting Retirement Income^{3d}	
2: At or after age 65	94.9%	(C_PCT_HH_RETIREINC)	
R5 RACE ETHNICITY^{4ad} (RL5DRACEHISP_R)		1: 1 st quartile	92.1%
1: White, non-Hispanic	95.9%	2: 2 nd quartile	92.7%
2: Black, non-Hispanic	94.2%	3: 3 rd quartile	96.5%
3: Other, non-Hispanic	82.5%	4: 4 th quartile	95.9%
4: Hispanic	90.1%	% Households Reporting Social Security^{3ad}	
5: DK/RF	91.9%	(C_PCT_HH_SOCSEC)	
R5 HIGHEST EDUCATION^{4ad} (EL5HIGSTSCHL_R)		1: 1 st quartile	91.6%
0: Not applicable	100.0%	2: 2 nd quartile	94.9%
1: DK/RF	88.9%	3: 3 rd quartile	95.4%
2: Below high school	90.2%	4: 4 th quartile	95.6%
3: High school	94.3%		
4: Above High school	94.6%		

Variable & Values	Weighted Response Rate	Variable & Values	Weighted Response Rate
R1 HIGHEST EDUCATION^{4#} (EL1HIGSTSCHL_R)		TRACT-LEVEL INDICATORS (Quartiles)	
0: Not applicable	94.2%	% Households Reporting SSI³ (C_PCT_HH_SSS)	
1: DK/RF	100.0%	1: 1 st quartile	93.9%
2: Below high school	93.7%	2: 2 nd quartile	95.0%
3: High school	97.0%	3: 3 rd quartile	95.1%
4: Above High school	97.8%	4: 4 th quartile	94.8%
COUNTY LEVEL INDICATORS		% Households Owning Their Home³ (C_PCT_OWNSHOME)	
% Black 65+ (deciles)^{2 a c d} (PCTBLK)		1: 1 st quartile	92.9%
0: 1 st decile	95.5%	2: 2 nd quartile	93.6%
1: 2 nd decile	94.6%	3: 3 rd quartile	94.7%
2: 3 rd decile	96.7%	4: 4 th quartile	96.5%
3: 4 th decile	96.5%	% Households 65+ Owning Their Home^{3 a} (C_PCT_OWNSHOME_65)	
4: 5 th decile	96.5%	1: 1 st quartile	92.9%
5: 6 th decile	94.4%	2: 2 nd quartile	95.2%
6: 7 th decile	93.1%	3: 3 rd quartile	94.8%
7: 8 th decile	91.1%	4: 4 th quartile	95.3%
8: 9 th decile	91.9%	% Households 65+ Below Poverty^{3 a} (C_PCT_POV_65)	
9: 10 th decile	95.0%	1: 1 st quartile	93.9%
% Hispanic 65+ (deciles)^{2 a d} (PCTHISP)		2: 2 nd quartile	94.6%
0: 1 st decile	93.0%	3: 3 rd quartile	95.9%
1: 2 nd decile	95.9%	4: 4 th quartile	94.3%
2: 3 rd decile	96.7%	Per Capita Income^{3 a} (C_PER_CAP_INC)	
3: 4 th decile	97.2%	1: 1 st quartile	92.4%
4: 5 th decile	93.9%	2: 2 nd quartile	95.2%
5: 6 th decile	92.6%	3: 3 rd quartile	96.0%
6: 7 th decile	96.0%	4: 4 th quartile	94.5%
7: 8 th decile	96.4%	OTHER INDICATORS	
8: 9 th decile	93.0%	R9 RESIDENTIAL CARE STATUS^{4 a f} (R9DRESID)	
9: 10 th decile	92.1%	1: Community	94.4%
% Poverty (deciles)^{2 a d} (PCTPOV)		2: Residential Care Resident not nursing home (SP interview complete)	98.0%
0: 1 st decile	96.7%	3: Residential Care Resident not nursing home (FQ only)	93.0%
1: 2 nd decile	95.9%	4: Nursing home (SP interview complete)	97.9%
2: 3 rd decile	95.0%	5: Nursing home (FQ only)	98.5%
3: 4 th decile	95.7%	7: Residential Care Resident not nursing home in R1 and R5 (FQ only)	97.4%
4: 5 th decile	95.5%	8: Nursing home in R1 and R5 (FQ only)	100.0%
5: 6 th decile	91.7%		
6: 7 th decile	93.7%		
7: 8 th decile	95.1%		
8: 9 th decile	93.4%		
9: 10 th decile	93.3%		

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 9 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=4,601 (4,389 respondents and 212 non-respondents)
Variable names used in classification trees shown parenthetically.

Appendix Table 2. Response Rates by Various Indicators: NHATS Round 10 Cohort 2011

Variable & Values	Weighted Response Rate	Variable & Values	Weighted Response Rate
OVERALL	97.0%	TRACT-LEVEL INDICATORS (Quartiles)	
BENEFICIARY INDICATORS		Household Income³ (C_AGG_HH_INC)	
Age^{1 a c} (H_AGECAT)		1: 1 st quartile	94.3%
1: 65-69	97.9%	2: 2 nd quartile	96.9%
2: 70-74	97.1%	3: 3 rd quartile	97.0%
3: 75-79	96.2%	4: 4 th quartile	98.1%
4: 80-84	94.2%		
5: 85- 89	97.4%	Median Household Income^{3 a} (C_MED_HH_INC)	
6: 90+	93.3%	1: 1 st quartile	94.2%
Gender^{1 a} (H_SEX)		2: 2 nd quartile	97.1%
1: Male	97.1%	3: 3 rd quartile	98.1%
2: Female	96.9%	4: 4 th quartile	97.8%
Census Region^{1 a} (S_REGION)			
1: Northeast	96.5%	Median Household Income 65+³ (C_MED_HH_INC_65)	
2: Midwest	97.5%	1: 1 st quartile	95.3%
3: South	97.0%	2: 2 nd quartile	96.7%
4: West	97.0%	3: 3 rd quartile	97.4%
Census Division^{1 a c} (DIVISION)		4: 4 th quartile	98.0%
1: New England	97.2%	9: Missing	100.0%
2: Middle Atlantic	96.2%	% Households with Adult 65+³ (C_PCT_HH_65)	
3: East North Central	97.7%	1: 1 st quartile	98.4%
4: West North Central	97.2%	2: 2 nd quartile	97.2%
5: South Atlantic	97.3%	3: 3 rd quartile	96.3%
6: East South Central	98.5%	4: 4 th quartile	96.8%
7: West South Central	95.4%	% Households in Poverty³ (C_PCT_HH_POV)	
8: Mountain	97.4%	1: 1 st quartile	97.8%
9: Pacific	96.9%	2: 2 nd quartile	97.2%
Census Metro/Micro Area Designation (2013)² (S_METMICRO)		3: 3 rd quartile	97.7%
1: Metropolitan area	97.2%	4: 4 th quartile	94.6%
2: Micropolitan area	96.6%	% Households Reporting Public Assistance^{3 a} (C_PCT_HH_PUBASST)	
3: Non-metro	95.0%	1: 1 st quartile	97.4%
Health Maintenance Organization Beneficiary^{1 a} (HMOTYPE)		2: 2 nd quartile	97.6%
0: Yes	95.9%	3: 3 rd quartile	96.9%
9: No	97.4%	4: 4 th quartile	95.7%
Age First Enrolled in Medicare¹ (MEDIC_BEG)		% Households Reporting Retirement Income^{3 a} (C_PCT_HH_RETIREINC)	
1: Prior to age 65	95.5%	1: 1 st quartile	97.3%
2: At or after age 65	97.1%	2: 2 nd quartile	96.2%
R1 RACE ETHNICITY^{4 a} (RL1DRACEHISP_R)		3: 3 rd quartile	97.2%
1: White, non-Hispanic	97.7%	4: 4 th quartile	97.3%
2: Black, non-Hispanic	96.4%		
3: Other, non-Hispanic	93.6%	% Households Reporting Social Security^{3 a} (C_PCT_HH_SOCSEC)	
4: Hispanic	91.1%	1: 1 st quartile	99.0%
5: DK/RF	100.0%	2: 2 nd quartile	96.2%
R1 HIGHEST EDUCATION⁴ (EL1HIGSTSCHL_R)		3: 3 rd quartile	96.9%
0: Not applicable	95.1%	4: 4 th quartile	96.7%
1: DK/RF	100.0%		
2: Below high school	93.7%		
3: High school	97.1%		
4: Above High school	98.0%		

Variable & Values	Weighted Response Rate	Variable & Values	Weighted Response Rate
COUNTY LEVEL INDICATORS		TRACT-LEVEL INDICATORS (Quartiles)	
% Black 65+ (deciles)²	(PCTBLK)	% Households Reporting SSI^{3 a}	(C_PCT_HH_SSS)
0: 1 st decile	95.6%	1: 1 st quartile	97.8%
1: 2 nd decile	97.7%	2: 2 nd quartile	97.7%
2: 3 rd decile	96.3%	3: 3 rd quartile	97.2%
3: 4 th decile	96.5%	4: 4 th quartile	95.1%
4: 5 th decile	97.1%	% Households Owning Their Home³	(C_PCT_OWNSHOME)
5: 6 th decile	98.8%	1: 1 st quartile	95.6%
6: 7 th decile	94.8%	2: 2 nd quartile	97.7%
7: 8 th decile	97.2%	3: 3 rd quartile	96.5%
8: 9 th decile	98.5%	4: 4 th quartile	97.7%
9: 10 th decile	97.7%	% Households 65+ Owning Their Home³	(C_PCT_OWNSHOME_65)
% Hispanic 65+ (deciles)^{2 a}	(PCTHISP)	1: 1 st quartile	95.5%
0: 1 st decile	95.4%	2: 2 nd quartile	97.3%
1: 2 nd decile	96.6%	3: 3 rd quartile	97.0%
2: 3 rd decile	98.8%	4: 4 th quartile	97.7%
3: 4 th decile	98.0%	% Households 65+ Below Poverty³	(C_PCT_POV_65)
4: 5 th decile	97.1%	1: 1 st quartile	98.4%
5: 6 th decile	98.2%	2: 2 nd quartile	96.9%
6: 7 th decile	98.0%	3: 3 rd quartile	97.7%
7: 8 th decile	96.8%	4: 4 th quartile	95.5%
8: 9 th decile	96.3%	Per Capita Income³	(C_PER_CAP_INC)
9: 10 th decile	94.5%	1: 1 st quartile	93.7%
% Poverty (deciles)^{2 a}	(PCTPOV)	2: 2 nd quartile	97.1%
0: 1 st decile	98.0%	3: 3 rd quartile	98.0%
1: 2 nd decile	96.6%	4: 4 th quartile	98.0%
2: 3 rd decile	97.1%	OTHER INDICATORS	
3: 4 th decile	93.7%	R9 RESIDENTIAL CARE STATUS^{4 a}	(R9DRESID)
4: 5 th decile	99.4%	1: Community	96.9%
5: 6 th decile	97.4%	2: Residential Care Resident not nursing home (SP interview complete)	98.9%
6: 7 th decile	99.2%	3: Residential Care Resident not nursing home (FQ only)	98.2%
7: 8 th decile	98.1%	4: Nursing home (SP interview complete)	96.5%
8: 9 th decile	94.4%	5: Nursing home (FQ only)	97.4%
9: 10 th decile	94.9%	7: Residential Care Resident not nursing home in R1 and R5 (FQ only)	92.4%
		8: Nursing home in R1 and R5 (FQ only)	100.0%

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 9 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=2,332 (2,251 respondents and 81 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 10 2015 Cohort

Variable & Values	Weighted Response Rate	Variable & Values	Weighted Response Rate
OVERALL	80.4%	COUNTY LEVEL INDICATORS	
BENEFICIARY INDICATORS		% Black 65+ (deciles)² (PCTBLK)	
Age¹ (H_AGECAT_R5)		0: 1 st decile	88.8%
1: 65-69	92.6%	1: 2 nd decile	78.0%
2: 70-74	76.9%	2: 3 rd decile	84.1%
3: 75-79	85.3%	3: 4 th decile	74.0%
4: 80-84	78.4%	4: 5 th decile	82.1%
5: 85- 89	78.6%	5: 6 th decile	79.3%
6: 90+	74.3%	6: 7 th decile	79.5%
R5 Race Ethnicity⁸ (RL5DRACEHISP_R)		7: 8 th decile	75.5%
1: White, non-Hispanic	82.2%	8: 9 th decile	84.5%
2: Black, non-Hispanic	72.6%	9: 10 th decile	78.1%
3: Other, non-Hispanic	83.3%		
4: Hispanic	82.1%	% Hispanic 65+ (deciles)² (PCTHISP)	
5: DK/RF	49.6%	0: 1 st decile	90.2%
Gender¹ (H_SEX)		1: 2 nd decile	75.4%
1: Male	77.8%	2: 3 rd decile	85.3%
2: Female	81.8%	3: 4 th decile	85.8%
Census Region¹ (S_REGION)		4: 5 th decile	91.6%
1: Northeast	78.1%	5: 6 th decile	77.0%
2: Midwest	83.7%	6: 7 th decile	80.2%
3: South	80.4%	7: 8 th decile	81.2%
4: West	79.2%	8: 9 th decile	60.5%
Census Division^{1 o} (DIVISION)		9: 10 th decile	79.2%
1: New England	71.5%		
2: Middle Atlantic	81.5%	% Poverty (deciles)^{2 r} (PCTPOV)	
3: East North Central	89.5%	0: 1 st decile	81.8%
4: West North Central	74.6%	1: 2 nd decile	82.9%
5: South Atlantic	79.5%	2: 3 rd decile	78.3%
6: East South Central	88.4%	3: 4 th decile	82.8%
7: West South Central	74.4%	4: 5 th decile	86.4%
8: Mountain	76.7%	5: 6 th decile	79.5%
9: Pacific	79.8%	6: 7 th decile	81.7%
Census Metro/Micro Area Designation (2013)¹ (S_METMICRO)		7: 8 th decile	70.0%
1: Metropolitan area	80.2%	8: 9 th decile	83.6%
2: Micropolitan area	74.0%	9: 10 th decile	73.2%
3: Non-metro	95.2%		
Health Maintenance Organization Beneficiary¹ (HMOTYPE)		OTHER INDICATORS	
0: Yes	79.2%	Facility Type Indicator³ (FQ10DLOCSP)	
9: No	80.9%	1: Independent living/other	84.1%
Age First Enrolled in Medicare¹ (MEDIC_BEG)		2: Assisted Living	80.3%
1: Prior to age 65	77.6%	3: Special care/memory care/Alzheimers unit	75.9%
2: At or after age 65	80.8%	4: Nursing home	75.9%
		8: Not reported	100.0%
		R1 RESIDENTIAL CARE STATUS^{4 #} (R1DRESID_R)	
		1: Community	87.4%
		2: Residential Care Resident not nursing home	70.0%
		R2 RESIDENTIAL CARE STATUS^{5 #} (R2DRESID_R)	
		1: Community in R2	87.5%
		2: Residential care in R2	72.9%
		3: Nursing home in R2	66.9%

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	88.5%
1: Yes	66.9%	2: Residential care in R3	74.9%
2: No	83.1%	3: Nursing home in R3	47.4%
R3 NURSING HOME STATUS^{6#} (R3NH)		R4 RESIDENTIAL CARE STATUS^{7#} (R4DRESID_R)	
1: Yes	47.4%	1: Community in R4	89.3%
2: No	84.3%	2: Residential care in R4	78.2%
R4 NURSING HOME STATUS^{7#} (R4NH)		3: Nursing home in R4	44.2%
1: Yes	44.2%	R5 RESIDENTIAL CARE STATUS^{8o} (R5DRESID_R)	
2: No	85.1%	1: Community in R5	89.4%
R5 NURSING HOME STATUS⁸ (R5NH)		2: Residential care in R5	64.7%
1: Yes	51.6%	3: Nursing home in R5	51.6%
2: No	81.0%	R6 RESIDENTIAL CARE STATUS⁹ (R6DRESID_R)	
R6 NURSING HOME STATUS⁹ (R6NH)		1: Community in R6	89.1%
1: Yes	52.1%	2: Residential care in R6	69.8%
2: No	81.7%	3: Nursing home in R6	52.1%
R7 NURSING HOME STATUS¹⁰ (R7NH)		R7 RESIDENTIAL CARE STATUS¹⁰ (R7DRESID_R)	
1: Yes	73.3%	1: Community in R7	87.5%
2: No	81.1%	2: Residential care in R7	74.8%
R8: NURSING HOME STATUS¹¹ (R8NH)		3: Nursing home in R7	73.3%
1: Yes	68.2%	R8 RESIDENTIAL CARE STATUS¹¹ (R8DRESID_R)	
2: No	82.2%	1: Community in R8	88.6%
R9: NURSING HOME STATUS¹² (R9NH)		2: Residential care in R8	78.4%
1: Yes	72.3%	3: Nursing home in R8	68.2%
2: No	82.4%	R9 RESIDENTIAL CARE STATUS¹² (R9DRESID_R)	
R10: NURSING HOME STATUS^{13o r} (R10NH)		1: Community in R9	89.8%
1: Yes	76.5%	2: Residential care in R9	80.6%
2: No	82.0%	3: Nursing home in R9	72.3%
		R10 RESIDENTIAL CARE STATUS¹³ (R10DRESID_R)	
		2: Residential care in R10	82.0%
		3: Nursing home in R10	76.5%

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.

¹²Based on responses to items in the Round 9 interview or interview process.

¹³Based on responses to items in the Round 10 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=407 (330 respondents and 77 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 10 2011 Cohort

Variable & Values	Weighted Response Rate	Variable & Values	Weighted Response Rate
OVERALL	87.3%	COUNTY LEVEL INDICATORS	
BENEFICIARY INDICATORS		% Black 65+ (deciles)² (PCTBLK)	
Age¹ (H_AGECAT)		0: 1 st decile	94.1%
1: 65-69	95.8%	1: 2 nd decile	90.1%
2: 70-74	89.0%	2: 3 rd decile	86.4%
3: 75-79	92.8%	3: 4 th decile	80.7%
4: 80-84	76.3%	4: 5 th decile	97.7%
5: 85- 89	72.5%	5: 6 th decile	82.1%
6: 90+	87.7%	6: 7 th decile	91.4%
		7: 8 th decile	89.2%
R1 Race Ethnicity⁴ (RL1DRACEHISP_R)		8: 9 th decile	80.0%
1: White, non-Hispanic	87.9%	9: 10 th decile	82.4%
2: Black, non-Hispanic	72.7%		
3: Other, non-Hispanic	93.5%	% Hispanic 65+ (deciles)² (PCTHISP)	
4: Hispanic	84.1%	0: 1 st decile	92.5%
5: DK/RF	78.6%	1: 2 nd decile	93.2%
Gender¹ (H_SEX)		2: 3 rd decile	86.6%
1: Male	92.9%	3: 4 th decile	95.5%
2: Female	85.1%	4: 5 th decile	92.4%
		5: 6 th decile	81.5%
Census Region¹ (S_REGION)		6: 7 th decile	78.2%
1: Northeast	83.0%	7: 8 th decile	82.2%
2: Midwest	91.8%	8: 9 th decile	80.6%
3: South	86.1%	9: 10 th decile	94.9%
4: West	88.5%		
Census Division^{1*} (DIVISION)		% Poverty (deciles)² (POVERTY_PCT)	
1: New England	68.6%	0: 1 st decile	77.1%
2: Middle Atlantic	86.8%	1: 2 nd decile	91.5%
3: East North Central	92.7%	2: 3 rd decile	88.6%
4: West North Central	90.1%	3: 4 th decile	89.8%
5: South Atlantic	83.2%	4: 5 th decile	89.5%
6: East South Central	100.0%	5: 6 th decile	98.1%
7: West South Central	85.6%	6: 7 th decile	80.9%
8: Mountain	95.5%	7: 8 th decile	91.4%
9: Pacific	86.7%	8: 9 th decile	82.7%
		9: 10 th decile	87.1%
Census Metro/Micro Area Designation (2013)² (S_METMICRO)		OTHER INDICATORS	
1: Metropolitan area	87.7%	Facility Type Indicator³ (FQ10DLOCSP)	
2: Micropolitan area	79.7%	1: Independent living/other	91.2%
3: Non-metro	100.0%	2: Assisted Living	90.2%
		3: Special care/memory care/Alzheimer's unit	100.0%
Health Maintenance Organization Beneficiary¹ (HMOTYPE)		4: Nursing home	76.9%
0: Yes	89.9%	8: Not reported	100.0%
9: No	86.4%		
		R1 RESIDENTIAL CARE STATUS⁴ (R1DRESID_R)	
Age First Enrolled in Medicare¹ (MEDIC_BEG)		1: Community	90.4%
1: Prior to age 65	83.4%	2: Residential Care Resident not nursing home	76.6%
2: At or after age 65	87.8%		

Variable & Values		Weighted Response Rate	Variable & Values		Weighted Response Rate
OTHER INDICATORS			OTHER INDICATORS		
R2 NURSING HOME STATUS⁵	(R2NH)		R2 RESIDENTIAL CARE STATUS⁵	(R2DRESID_R)	
1: Yes		62.3%	1: Community in R2		91.0%
2: No		87.7%	2: Residential care in R2		77.9%
R3 NURSING HOME STATUS⁶	(R3NH)		3: Nursing home in R2		62.3%
1: Yes		48.1%	R3 RESIDENTIAL CARE STATUS⁶	(R3DRESID_R)	
2: No		88.4%	1: Community in R3		91.7%
R4 NURSING HOME STATUS⁷	(R4NH)		2: Residential care in R3		79.2%
1: Yes		55.3%	3: Nursing home in R3		48.1%
2: No		88.5%	R4 RESIDENTIAL CARE STATUS⁷	(R4DRESID_R)	
R5 NURSING HOME STATUS⁸	(R5NH)		1: Community in R4		91.5%
1: Yes		55.5%	2: Residential care in R4		82.4%
2: No		88.5%	3: Nursing home in R4		55.3%
R6 NURSING HOME STATUS⁹	(R6NH)		R5 RESIDENTIAL CARE STATUS^{8*}	(R5DRESID_R)	
1: Yes		62.1%	1: Community in R5		93.3%
2: No		88.8%	2: Residential care in R5		79.8%
R7 NURSING HOME STATUS¹⁰	(R7NH)		3: Nursing home in R5		55.5%
1: Yes		74.9%	R6 RESIDENTIAL CARE STATUS⁹	(R6DRESID_R)	
2: No		88.9%	1: Community in R6		93.4%
R8 NURSING HOME STATUS¹¹	(R8NH)		2: Residential care in R6		82.0%
1: Yes		75.4%	3: Nursing home in R6		62.1%
2: No		89.1%	R7 RESIDENTIAL CARE STATUS¹⁰	(R7DRESID_R)	
R9 NURSING HOME STATUS¹²	(R9NH)		1: Community in R7		93.5%
1: Yes		76.9%	2: Residential care in R7		84.6%
2: No		89.7%	3: Nursing home in R7		74.9%
R10 NURSING HOME STATUS^{13*}	(R10NH)		R8 RESIDENTIAL CARE STATUS¹¹	(R8DRESID_R)	
1: Yes		77.4%	1: Community in R8		92.4%
2: No		91.2%	2: Residential care in R8		87.4%
			3: Nursing home in R8		75.4%
			R9 RESIDENTIAL CARE STATUS¹²	(R9DRESID_R)	
			1: Community in R9		92.9%
			2: Residential care in R9		88.9%
			3: Nursing home in R9		76.9%
			R10 RESIDENTIAL CARE STATUS¹³	(R10DRESID_R)	
			2: Residential care in R10		91.2%
			3: Nursing home in R10		77.4%

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.

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

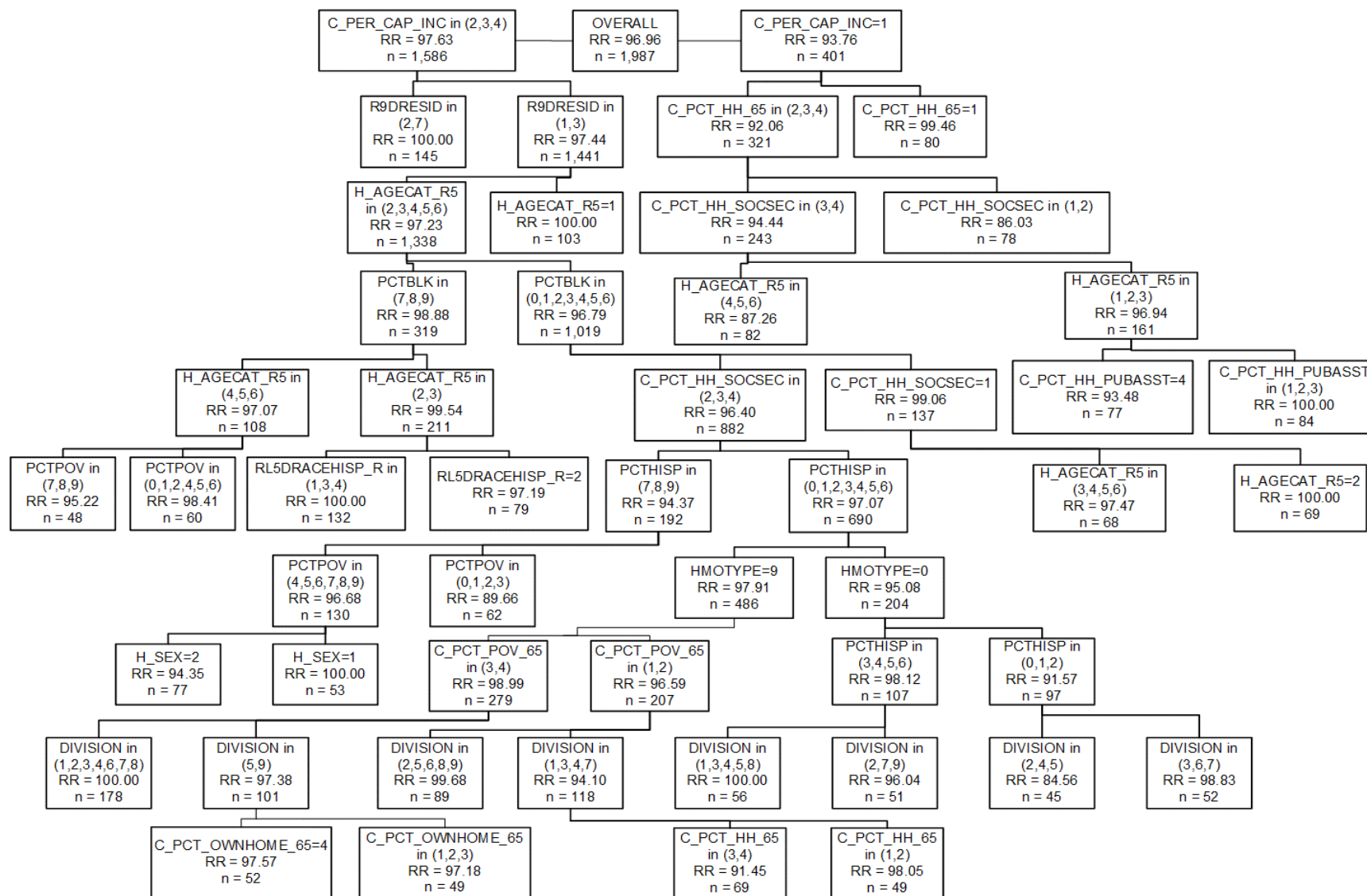
¹²Based on responses to items in the Round 9 interview or interview process.

¹³Based on responses to items in the Round 10 interview or interview process.

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

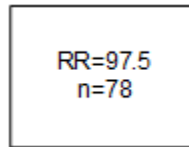
N=261 (219 respondents and 42 nonrespondents); Variable names used in classification trees shown parenthetically.

Figure 1. Round 10 2015 Cohort Tracker weight nonresponse adjustment cells – non nursing home cases in original sample



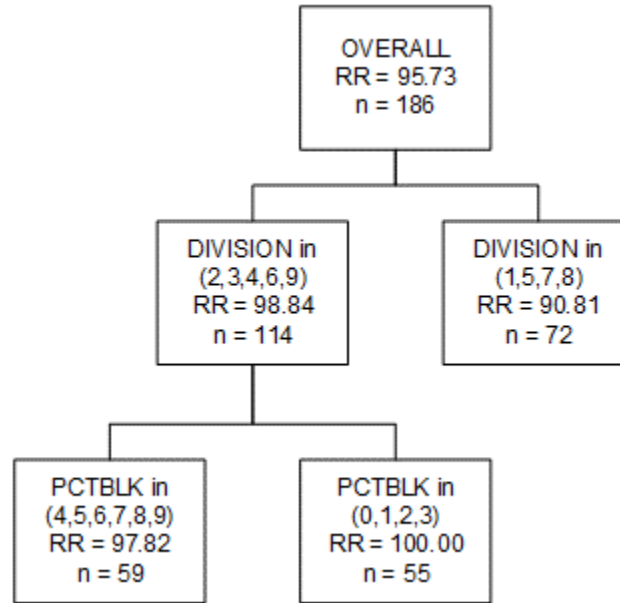
Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell

Figure 2. Round 10 2015 Cohort Tracker weight nonresponse adjustment cells – nursing home cases in original sample



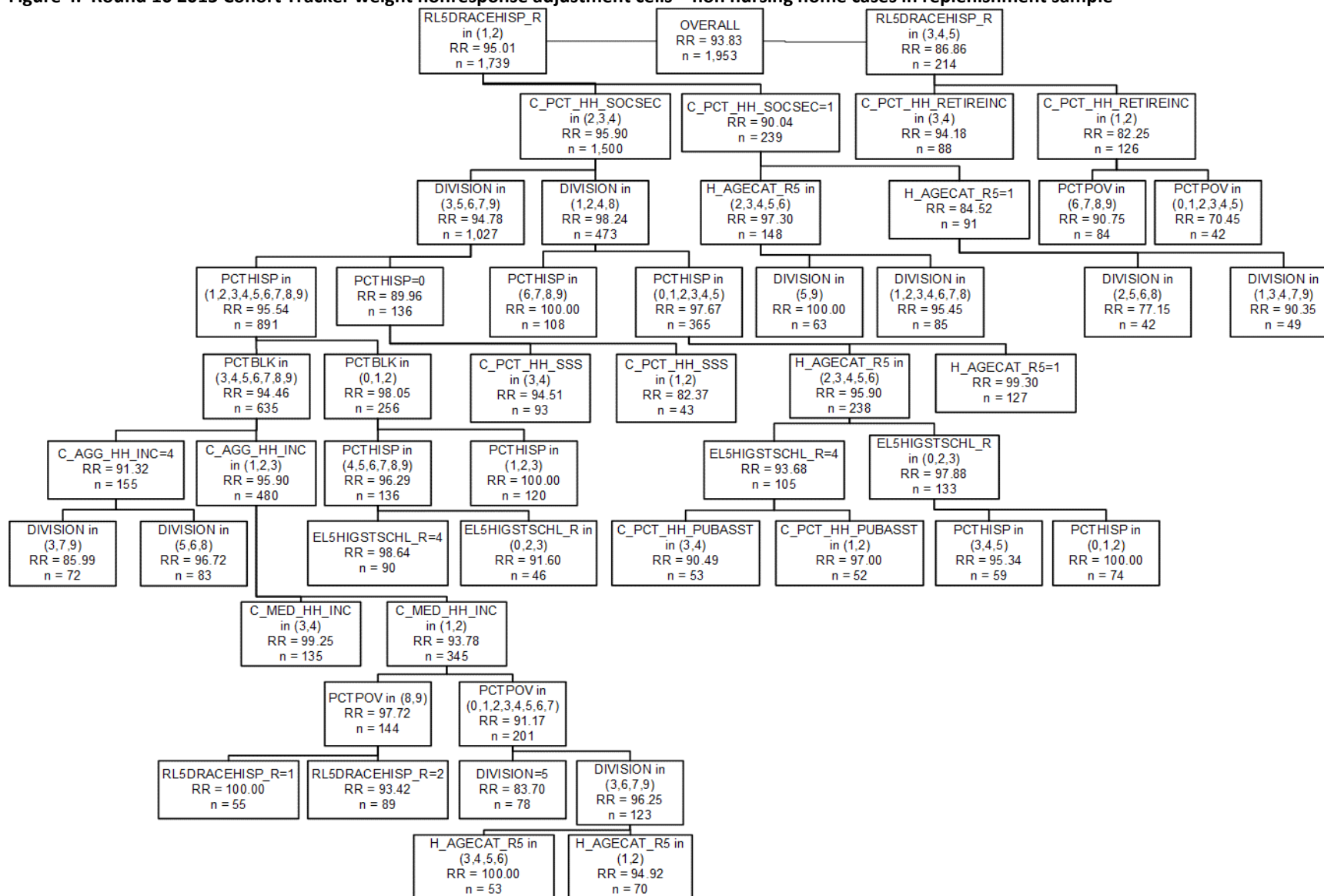
Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell

Figure 3. Round 10 2015 Cohort Tracker weight nonresponse adjustment cells – deceased cases in original sample



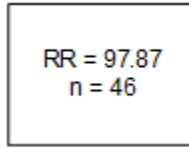
Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell

Figure 4. Round 10 2015 Cohort Tracker weight nonresponse adjustment cells – non nursing home cases in replenishment sample



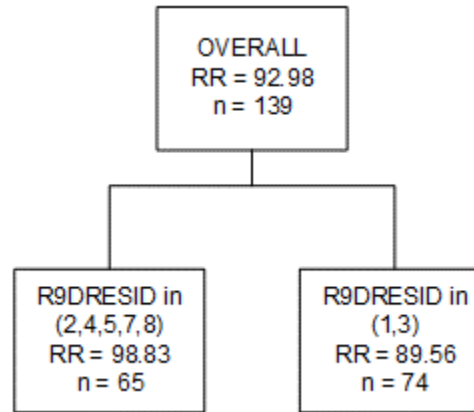
Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell

Figure 5. Round 10 2015 Cohort Tracker weight nonresponse adjustment cells – nursing home cases in replenishment sample



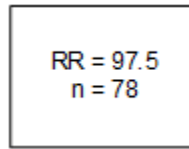
Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell

Figure 6. Round 10 2015 Cohort Tracker weight nonresponse adjustment cells – deceased cases in replenishment sample



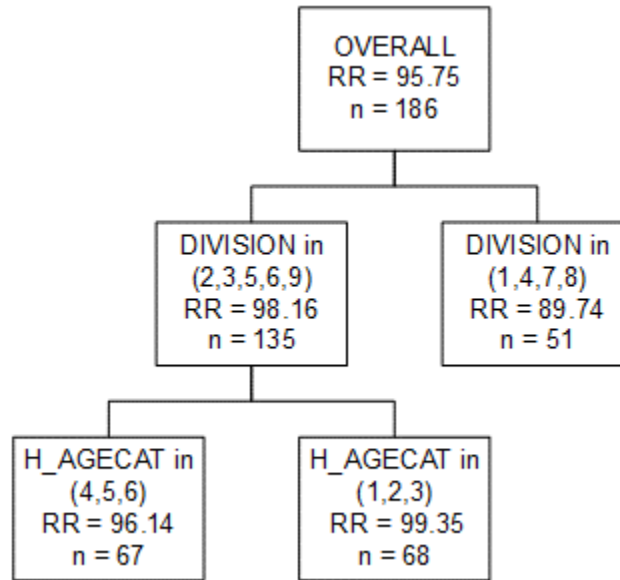
Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell

Figure 8. Round 10 2011 Cohort Tracker weight nonresponse adjustment cells – nursing home cases in original sample



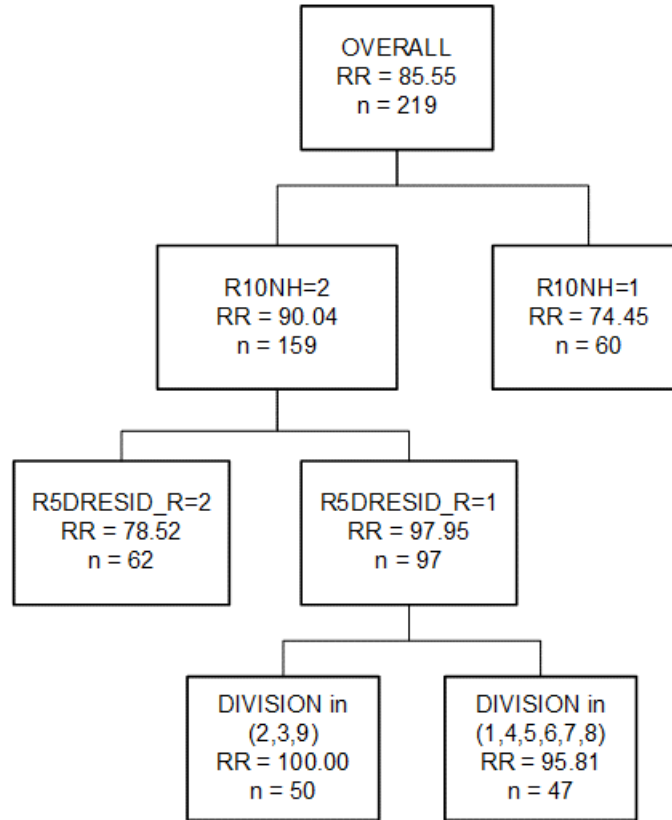
Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell

Figure 9. Round 10 2011 Cohort Tracker weight nonresponse adjustment cells – deceased cases in original sample



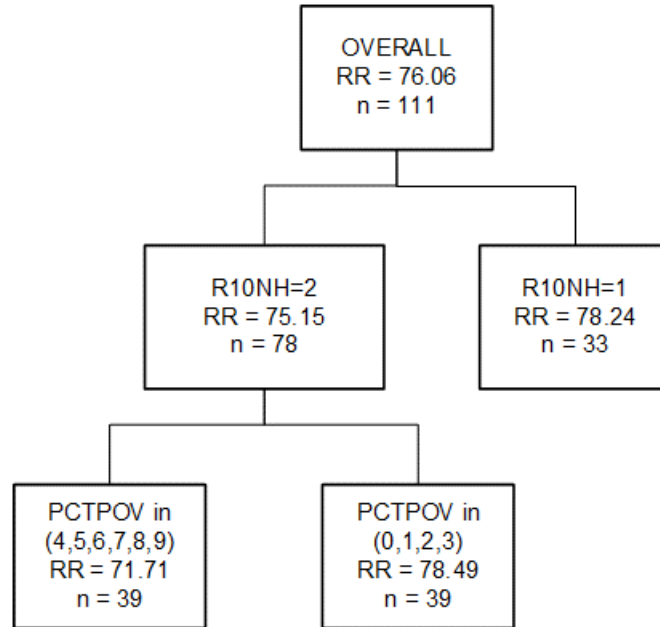
Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell

Figure 10. Round 10 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



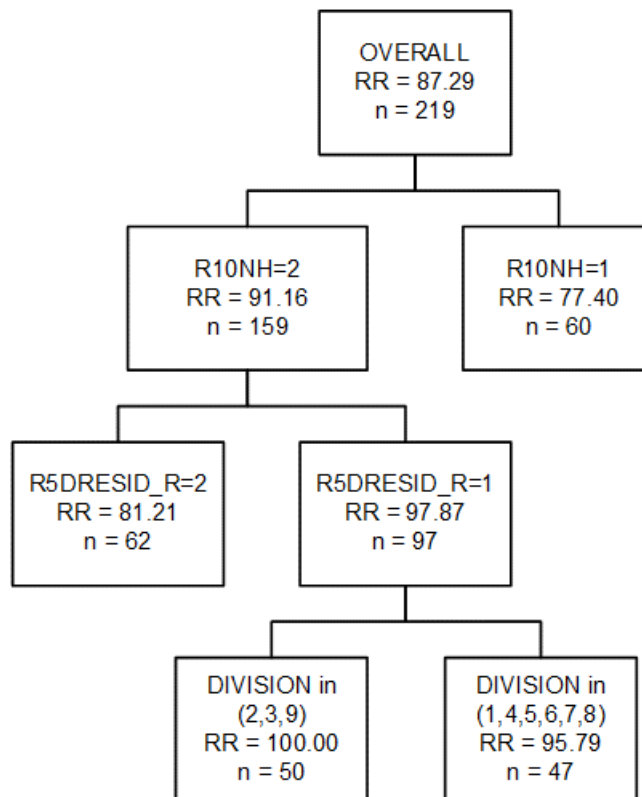
Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell

Figure 11. Round 10 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 10 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