

NATIONAL HEALTH AND AGING TRENDS STUDY (NHATS)  
Development of Round 3 Survey Weights

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## **1. Introduction**

The NHATS public use data support weighted analysis of Medicare beneficiaries ages 65 and older living in the contiguous United States on September 30, 2010. The survey weights included with the Round 3 public use file account for differential probabilities of selection and adjust for potential bias related to unit nonresponse to the Rounds 1, 2, and 3 interviews.

For Round 3 of NHATS, as for Rounds 1 and 2, two types of sampling weights have been produced: a tracker weight (on the Tracker file with the variable name `w3trfinwgt0`) and an analytic weight (on the Sample Person file with the variable name `w3anfinwgt0`). For variance estimation (see Section 7), NHATS has also included replicate versions of these weights (`w3trfinwgt1-w3trfinwgt56` and `w3anfinwgt1-w3anfinwgt56`).

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 3 of NHATS, Table 1 shows how the disposition codes map into respondent, ineligible, and nonrespondent statuses.

For the Round 3 Tracker weight, only cases classified as Respondents and Ineligible are assigned a positive weight. 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. Those 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 3 tracker weights. Those who became ineligible for the Round 2 interview because they moved out of the contiguous U.S. by Round 2 or who completed a Round 2 Last Month of Life (LML) interview because they died between Rounds 1 and 2 also have positive tracker weights in Round 3. Because a Last Month of Life (LML) interview was attempted for each SP who died between Rounds 2 and 3, deceased SPs with a Round 3 LML interview completed by proxy (code 62) were also considered respondents and have a Round 3 tracker weight (n=523).

For the analytic weight, only Respondents (codes 60, 61, 62, 63; n=5,620) 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 3 NHATS Sample for Weight Development Purposes**

| Disposition code                                       | n             | Classification for Tracker Weight | Classification for Analytic Weight |
|--|---------------|-----------------------------------|------------------------------------|
| 60 Complete  | 4,838         | Respondent                        | Respondent                         |
| 61 Complete, NH facility                               | 213           | Respondent                        | Respondent                         |
| 62 Complete, SP deceased, proxy interview              | 523           | Respondent <sup>+</sup>           | Respondent <sup>+</sup>            |
| 63 Complete SP, FQ not complete                        | 46            | Respondent                        | Respondent                         |
| 64 Complete FQ, SP not complete                        | 179           | Respondent                        | Nonrespondent                      |
| 75 Physically/mentally unable to participate, no proxy | 22            | Nonrespondent                     | Nonrespondent                      |
| 76 Too ill to participate, no proxy                    | 45            | Nonrespondent                     | Nonrespondent                      |
| 77 Refusal, Sample Person                              | 568           | Nonrespondent                     | Nonrespondent                      |
| 78 Language barrier                                    | 12            | Nonrespondent                     | Nonrespondent                      |
| 79 Unable to locate                                    | 26            | Eligibility unknown <sup>++</sup> | Eligibility unknown <sup>++</sup>  |
| 80 Unavailable during field period                     | 18            | Nonrespondent                     | Nonrespondent                      |
| 82 Outside of Primary Sampling Unit                    | 12            | Nonrespondent                     | Nonrespondent                      |
| 83 Ineligible (moved out of contiguous US)             | 7             | Ineligible                        | Ineligible                         |
| 85 Refusal, facility                                   | 8             | Nonrespondent                     | Nonrespondent                      |
| 86 Deceased, no proxy                                  | 33            | Nonrespondent <sup>+</sup>        | Nonrespondent <sup>+</sup>         |
| 87 Refusal, proxy                                      | 21            | Nonrespondent                     | Nonrespondent                      |
| 88 Work stopped  | 0             | Nonrespondent                     | Nonrespondent                      |
| 89 Final other/specify*                                | 1             | Nonrespondent*                    | Nonrespondent*                     |
| Not attempted in Round 3                               |               |                                   |                                    |
| Deceased in Round 1 or Round 2                         | 1,200         | Ineligible                        | Ineligible                         |
| Other Round 1 or Round 2 ineligible                    | 108           | Ineligible                        | Ineligible                         |
| Round 1 or Round 2 nonrespondent                       | 4,531         | Nonrespondent**                   | Nonrespondent**                    |
| <b>Total and Number Assigned Weight</b>                | <b>12,411</b> | <b>7,114</b>                      | <b>5,620</b>                       |

<sup>+</sup> The weights of deceased SPs were adjusted separately from those of living SPs.

<sup>++</sup> 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 weights.

\* For Round 2, these were cases that had an FQ only in Round 1 (and were coded with dispositions 61 or 64 in Round 1) and were living in the community in Round 2; by design, the SP interview was not attempted with these cases. Thus, for Round 2 these were complete nonrespondents to the Round 2 data collection process, and likewise for Round 3

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

SP=Sample Person interview; FQ=Facility Questionnaire

### 3. Computation of Tracker Weights

The computation of the Round 3 tracker weight began with the Round 2 nonresponse adjusted tracker weight (prior to raking). This Round 2 weight accounted for differential probabilities of selection and included adjustments for nonresponse to the Round 1 and Round 2 interviews but is not raked to the HISKEW<sup>1</sup>. See Montaquila, Freedman, Spillman, and Kasper (2012) for details on the specific methodology used in computing and adjusting the R1 weights; also, refer to Montaquila, Freedman, Spillman, and Kasper (2014) for information about the specific adjustments applied in Round 2. To

<sup>1</sup> 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.

produce the Round 3 weight two additional adjustments were made to this Round 2 weight—an adjustment for Round 3 nonresponse and a raking adjustment to estimated population totals from the HISKEW file.

Potential variables for creating nonresponse cells for Round 3 came from four sources:

- Beneficiary information from the sampling frame (the 20% HISKEW File), including demographic characteristics of the beneficiary (e.g., age as of September 30, 2010, gender) and geographic information (e.g., census division, metro and micropolitan status) based on the beneficiary's address in CMS' Medicare Enrollment Database (EDB) and an indicator of sample release group (see Montaquila, Freedman, Edwards, and Kasper (2012) for details of the sample release process);
- 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 2006-2010 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 the NHATS Round 1 and Round 2 interviews (race/ethnicity, highest education, and Rounds 1 and 2 residential settings).

Appendix Table 1 provides weighted response rates (using the Round 2 nonresponse adjusted tracker weight prior to raking) 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.<sup>2</sup>

We fit separate classification trees for all living non-nursing home cases (Figure 1), Round 2 nursing home residents (Figure 2), and deceased SPs (Figure 3) because underlying nonresponse processes differed for these three groups. Unlike non-nursing home cases, nursing home residents include both R1 residents who were not required to complete an SP Interview and new R2 nursing home residents who were eligible for the SP interview. Similarly 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.

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<sup>2</sup> 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).

Appendix Table 1 indicates the variables used in the final non-response cells, with a + for the deceased SP tree, a ^ for the Round 2 nursing home residents tree, and a \* for the non-nursing home tree. For deceased SPs, final non-response cells included 4 indicators, resulting in 7 nonresponse cells. For living SPs who were in nursing homes in Round 2 and those living in the community and other residential settings (not nursing homes) in Round 2, final non-response cells included 2 and 13 indicators, respectively. Combinations of these variables created 3 nonresponse cells among the Round 2 nursing home residents and 26 nonresponse cells among the non-nursing home group (See Appendix Figures 1, 2, and 3).

The final step in creating the tracker weight involved raking the nonresponse adjusted weights to control totals developed from the 5% HISKEW (September 30 2010 HISKEW) 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 3, 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 and 2, four dimensions were used in this Round 3 raking adjustment<sup>3</sup>:

- (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.

#### **4. Computation of Analytic Weights**

The computation of the analytic weights begins with the final Round 3 tracker weight. 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 nonnursing home residential care in Round 3 who had completed a facility interview but not a Sample Person interview (n=179; designated as code 64). (Round 3 nursing home residents who were nursing home residents in Round 1 (code 61) were not eligible for an SP interview in R2, thus are not part of the analytic weight nonresponse adjustment). The approach was designed to preserve the tracker weight distributions by Round 3 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) to be adjusted to account for similar cases missing the SP Interview. See Figure 4.

Because 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 3 nursing home status, nonnursing home residential care status, and area of the facility where the SP lives were included (see Appendix Table 2). In order to preserve the tracker weight distribution by Round 3 residence type, the

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<sup>3</sup> For purposes of raking, age categories refer to age at sampling.

first split was forced to be Round 3 nursing home status. (All subsequent splitting was based on response propensities.) Seven variables (designated with \* in Appendix Table 2) were retained in the final classification tree, forming 9 cells (see Appendix Figure 4).

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. In order to limit the variation in the weights, after the raking adjustment, the tracker weights were trimmed and then re-raked; two cases with extreme weights were trimmed at this point. After the raking adjustment and trimming, the design effect for the final Round 3 tracker weights was 1.37.

The additional steps involved in creating the analytic weight (nonresponse adjustment and raking) had minimal effect on the estimated overall design effect (1.36 overall; 1.37 for living SPs and 1.33 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 September 30, 2010 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 3 analytic weight reproduces those alive and eligible for NHATS during the Round 2 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 3, a positive Round 3 weight sits in the tracker file and a zero Round 3 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 1, Round 2, or Round 3 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 or 3 (measured in the SP interview) or who was in a particular type of residential care in Round 2 or 3 (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 67 and older in Round 3, or the characteristics of those living in residential care settings in Round 3 as measured in the Round 3 FQ interview, the Round 3 weight should be used. The former would use the Round 3 analytic weight and the latter the Round 3 tracker weight.

## **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 w3varstrat and w3varunit, 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  $\pm 100(1-K)$  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. The final tracker replicate weights are provided in the variables w3trfinwgt1-w3trfinwgt56, and the analytic replicate weights are provided in the variables w3anfinwgt1-w3anfinwgt56. 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.

## References

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## Appendix: Variables Used in Nonresponse Adjustment for Round 3 NHATS Weights

**Appendix Table 1. Response Rates by Various Indicators: NHATS Round 3**

| Variable & Values  | Weighted<br>Response<br>Rate | Variable & Values   | Weighted<br>Response<br>Rate |
|--|------------------------------|---|------------------------------|
| <b>OVERALL</b>   | <b>87.3%</b>                 | <b>TRACT-LEVEL INDICATORS (Quartiles)</b>                     |                              |
| <b>BENEFICIARY INDICATORS</b>                                  |                              | <b>Household Income<sup>3</sup></b> (C_AGG_HH_INC)            |                              |
| <b>Age<sup>1*</sup></b> (H_AGECAT)                             |                              | 1: 1 <sup>st</sup> quartile                                   | 85.6%                        |
| 1: 65-69   | 85.6%                        | 2: 2 <sup>nd</sup> quartile                                   | 87.2%                        |
| 2: 70-74   | 85.7%                        | 3: 3 <sup>rd</sup> quartile                                   | 88.7%                        |
| 3: 75-79   | 87.1%                        | 4: 4 <sup>th</sup> quartile                                   | 87.1%                        |
| 4: 80-84   | 90.3%                        | 9: Missing  | 100.0%                       |
| 5: 85- 89  | 92.7%                        | <b>Median Household Income<sup>3*</sup></b> (C_MED_HH_INC)    |                              |
| 6: 90+   | 92.5%                        | 1: 1 <sup>st</sup> quartile                                   | 88.2%                        |
| <b>Gender<sup>1*</sup></b> (H_SEX)                             |                              | 2: 2 <sup>nd</sup> quartile                                   | 86.9%                        |
| 1: Male  | 85.9%                        | 3: 3 <sup>rd</sup> quartile                                   | 87.4%                        |
| 2: Female  | 88.5%                        | 4: 4 <sup>th</sup> quartile                                   | 87.1%                        |
| <b>Census Region<sup>1^+ </sup></b> (S_REGION)                 |                              | 9: Missing  | 100.0%                       |
| 1: Northeast   | 85.7%                        | <b>Median Household Income 65+<sup>3</sup></b>                |                              |
| 2: Midwest   | 89.0%                        | (C_MED_HH_INC_65)   |                              |
| 3: South   | 86.8%                        | 1: 1 <sup>st</sup> quartile                                   | 87.1%                        |
| 4: West  | 88.0%                        | 2: 2 <sup>nd</sup> quartile                                   | 85.9%                        |
| <b>Census Division<sup>1*+ </sup></b> (DIVISION)               |                              | 3: 3 <sup>rd</sup> quartile                                   | 88.5%                        |
| 1: New England   | 85.4%                        | 4: 4 <sup>th</sup> quartile                                   | 87.9%                        |
| 2: Middle Atlantic   | 85.9%                        | 9: Missing  | 87.0%                        |
| 3: East North Central  | 89.6%                        | <b>% Households with Adult 65+<sup>3*</sup></b> (C_PCT_HH_65) |                              |
| 4: West North Central  | 88.3%                        | 1: 1 <sup>st</sup> quartile                                   | 87.6%                        |
| 5: South Atlantic  | 85.7%                        | 2: 2 <sup>nd</sup> quartile                                   | 88.0%                        |
| 6: East South Central  | 87.3%                        | 3: 3 <sup>rd</sup> quartile                                   | 87.0%                        |
| 7: West South Central  | 88.7%                        | 4: 4 <sup>th</sup> quartile                                   | 87.1%                        |
| 8: Mountain  | 93.0%                        | <b>% Households in Poverty<sup>3</sup></b> (C_PCT_HH_POV)     |                              |
| 9: Pacific   | 87.3%                        | 1: 1 <sup>st</sup> quartile                                   | 88.5%                        |
| <b>Census Metro/Micro Area Designation (2008)<sup>1</sup></b>  |                              | 2: 2 <sup>nd</sup> quartile                                   | 86.7%                        |
| (S_METMICRO)   |                              | 3: 3 <sup>rd</sup> quartile                                   | 86.5%                        |
| 1: Metropolitan area   | 87.0%                        | 4: 4 <sup>th</sup> quartile                                   | 87.8%                        |
| 2: Micropolitan area   | 88.1%                        | <b>% Households Reporting Public Assistance<sup>3</sup></b>   |                              |
| 3: Non-metro   | 90.8%                        | (C_PCT_HH_PUBASST)  |                              |
| <b>Health Maintenance Organization Beneficiary<sup>1</sup></b> |                              | 1: 1 <sup>st</sup> quartile                                   | 88.8%                        |
| (HMOTYPE)  |                              | 2: 2 <sup>nd</sup> quartile                                   | 87.7%                        |
| 0: Yes   | 87.4%                        | 3: 3 <sup>rd</sup> quartile                                   | 86.0%                        |
| 9: No  | 87.4%                        | 4: 4 <sup>th</sup> quartile                                   | 87.0%                        |
| <b>Age First Enrolled in Medicare<sup>1*</sup></b> (MEDIC_BEG) |                              | <b>% Households Reporting Retirement Income<sup>3</sup></b>   |                              |
| 1: Prior to age 65   | 83.5%                        | (C_PCT_HH_RETIREINC)  |                              |
| 2: At or after age 65  | 87.8%                        | 1: 1 <sup>st</sup> quartile                                   | 84.6%                        |
| <b>R1 RACE ETHNICITY<sup>4*</sup></b> (RL1DRACEHISP_R)         |                              | 2: 2 <sup>nd</sup> quartile                                   | 87.2%                        |
| 1: White, non-Hispanic   | 88.8%                        | 3: 3 <sup>rd</sup> quartile                                   | 88.5%                        |
| 2: Black, non-Hispanic   | 85.0%                        | 4: 4 <sup>th</sup> quartile                                   | 87.9%                        |
| 3: Other, non-Hispanic   | 78.9%                        | <b>% Households Reporting Social Security<sup>3</sup></b>     |                              |
| 4: Hispanic  | 78.9%                        | (C_PCT_HH_SOCSEC)   |                              |
| 5: DK/RF   | 74.7%                        | 1: 1 <sup>st</sup> quartile                                   | 86.7%                        |
| <b>R1 HIGHEST EDUCATION<sup>4</sup></b> (EL1HIGSTSCHL_R)       |                              | 2: 2 <sup>nd</sup> quartile                                   | 87.1%                        |
| 0: Not applicable  | 94.7%                        | 3: 3 <sup>rd</sup> quartile                                   | 87.4%                        |
| 1: DK/RF   | 77.0%                        | 4: 4 <sup>th</sup> quartile                                   | 87.9%                        |
| 2: Below high school   | 85.0%                        |   |                              |
| 3: High school   | 86.4%                        |   |                              |
| 4: Above High school   | 88.5%                        |   |                              |

| Variable & Values                               | Weighted Response Rate | Variable & Values  | Weighted Response Rate |
|---|------------------------|--|------------------------|
| <b>COUNTY LEVEL INDICATORS</b>                  |                        | <b>TRACT-LEVEL INDICATORS (Quartiles)</b>                                |                        |
| <b>% Black 65+ (deciles)<sup>2</sup> * +</b>    | (PCTBLK)               | <b>% Households Reporting SSI<sup>3</sup></b> C_PCT_HH_SSS)              |                        |
| 0: 1 <sup>st</sup> decile                       | 91.1%                  | 1: 1 <sup>st</sup> quartile  | 89.1%                  |
| 1: 2 <sup>nd</sup> decile                       | 89.3%                  | 2: 2 <sup>nd</sup> quartile  | 87.7%                  |
| 2: 3 <sup>rd</sup> decile                       | 88.1%                  | 3: 3 <sup>rd</sup> quartile  | 86.6%                  |
| 3: 4 <sup>th</sup> decile                       | 89.8%                  | 4: 4 <sup>th</sup> quartile  | 86.1%                  |
| 4: 5 <sup>th</sup> decile                       | 87.1%                  | <b>% Households Owning Their Home<sup>3</sup></b>                        |                        |
| 5: 6 <sup>th</sup> decile                       | 84.7%                  | (C_PCT_OWNSHOME)   |                        |
| 6: 7 <sup>th</sup> decile                       | 83.0%                  | 1: 1 <sup>st</sup> quartile  | 86.0%                  |
| 7: 8 <sup>th</sup> decile                       | 86.0%                  | 2: 2 <sup>nd</sup> quartile  | 86.3%                  |
| 8: 9 <sup>th</sup> decile                       | 86.2%                  | 3: 3 <sup>rd</sup> quartile  | 87.0%                  |
| 9: 10 <sup>th</sup> decile                      | 85.1%                  | 4: 4 <sup>th</sup> quartile  | 89.5%                  |
| <b>% Hispanic 65+ (deciles)<sup>2</sup> * ^</b> | (PCTHISP)              | <b>% Households 65+ Owning Their Home<sup>3</sup> *</b>                  |                        |
| 0: 1 <sup>st</sup> decile                       | 87.9%                  | (C_PCT_OWNSHOME_65)  |                        |
| 1: 2 <sup>nd</sup> decile                       | 89.3%                  | 1: 1 <sup>st</sup> quartile  | 84.1%                  |
| 2: 3 <sup>rd</sup> decile                       | 91.1%                  | 2: 2 <sup>nd</sup> quartile  | 86.0%                  |
| 3: 4 <sup>th</sup> decile                       | 88.1%                  | 3: 3 <sup>rd</sup> quartile  | 88.6%                  |
| 4: 5 <sup>th</sup> decile                       | 85.5%                  | 4: 4 <sup>th</sup> quartile  | 89.8%                  |
| 5: 6 <sup>th</sup> decile                       | 88.8%                  | <b>% Households 65+ Below Poverty<sup>3</sup></b>                        |                        |
| 6: 7 <sup>th</sup> decile                       | 86.8%                  | (C_PCT_POV_65)   |                        |
| 7: 8 <sup>th</sup> decile                       | 87.6%                  | 1: 1 <sup>st</sup> quartile  | 85.9%                  |
| 8: 9 <sup>th</sup> decile                       | 85.8%                  | 2: 2 <sup>nd</sup> quartile  | 88.7%                  |
| 9: 10 <sup>th</sup> decile                      | 81.7%                  | 3: 3 <sup>rd</sup> quartile  | 88.1%                  |
| <b>% Poverty (deciles)<sup>2</sup> * +</b>      | (PCTPOV)               | 4: 4 <sup>th</sup> quartile  | 86.5%                  |
| 0: 1 <sup>st</sup> decile                       | 88.3%                  | <b>Per Capita Income<sup>3</sup></b>                                     |                        |
| 1: 2 <sup>nd</sup> decile                       | 87.1%                  | (C_PER_CAP_INC)  |                        |
| 2: 3 <sup>rd</sup> decile                       | 89.7%                  | 1: 1 <sup>st</sup> quartile  | 86.9%                  |
| 3: 4 <sup>th</sup> decile                       | 86.7%                  | 2: 2 <sup>nd</sup> quartile  | 86.4%                  |
| 4: 5 <sup>th</sup> decile                       | 90.0%                  | 3: 3 <sup>rd</sup> quartile  | 88.2%                  |
| 5: 6 <sup>th</sup> decile                       | 88.2%                  | 4: 4 <sup>th</sup> quartile  | 87.8%                  |
| 6: 7 <sup>th</sup> decile                       | 84.6%                  | 9: Missing   | 100.0%                 |
| 7: 8 <sup>th</sup> decile                       | 84.5%                  | <b>OTHER INDICATORS</b>  |                        |
| 8: 9 <sup>th</sup> decile                       | 88.1%                  | <b>R2 RESIDENTIAL CARE STATUS<sup>4</sup> *</b>                          |                        |
| 9: 10 <sup>th</sup> decile                      | 85.3%                  | (R2DRESID)   |                        |
|   |                        | 1: R2 Community  | 86.6%                  |
|   |                        | 2: R2 Residential Care Resident not nursing home (SP interview complete) | 96.2%                  |
|   |                        | 3: R2 Residential Care Resident not nursing home (FQ only)               | 91.1%                  |
|   |                        | 4: R2 nursing home (SP interview complete)                               | 98.7%                  |
|   |                        | 5: R2 nursing home (FQ only)   | 90.8%                  |
|   |                        | 7: R1 Residential Care Resident not nursing home (FQ only)               | 92.8%                  |
|   |                        | 8: R1 nursing home   | 95.9%                  |

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

<sup>2</sup>Based on county-level information from the CMS 5% HISKEW File linked to the beneficiary's EDB address.

<sup>3</sup>Based on tract-level information from the 2006-2019 5-year American Community Survey file linked to the beneficiary's EDB address.

<sup>4</sup>Based on responses to items in the Round 2 interview.

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

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

+ =retained in classification tree analysis for deceased SP branch

N=6,565 (5,799 respondents and 766 non-respondents)

Variable names used in classification trees shown parenthetically.

**Appendix Table 2. Sampled Person Interview Response Rates Among Cases with Completed Facility Questionnaires, by Various Indicators: NHATS Round 3**

| Variable & Values  | Weighted Response Rate | Variable & Values  | Weighted Response Rate |
|--|------------------------|--|------------------------|
| <b>OVERALL</b>   | 65.8%                  | <b>COUNTY LEVEL INDICATORS</b>                               |                        |
| <b>BENEFICIARY INDICATORS</b>  |                        | <b>% Black 65+ (deciles)<sup>2</sup></b> (PCTBLK)            |                        |
| <b>Age<sup>1</sup> *</b> (H_AGECAT)  |                        | 0: 1 <sup>st</sup> decile                                    | 61.9%                  |
| 1: 65-69   | 69.4%                  | 1: 2 <sup>nd</sup> decile                                    | 74.4%                  |
| 2: 70-74   | 76.1%                  | 2: 3 <sup>rd</sup> decile                                    | 67.9%                  |
| 3: 75-79   | 72.4%                  | 3: 4 <sup>th</sup> decile                                    | 66.1%                  |
| 4: 80-84   | 63.9%                  | 4: 5 <sup>th</sup> decile                                    | 57.0%                  |
| 5: 85- 89  | 57.3%                  | 5: 6 <sup>th</sup> decile                                    | 61.7%                  |
| 6: 90+   | 67.0%                  | 6: 7 <sup>th</sup> decile                                    | 66.1%                  |
|  |                        | 7: 8 <sup>th</sup> decile                                    | 85.3%                  |
| <b>R1 Race Ethnicity<sup>4</sup></b> (RL1DRACEHISP_R)                      |                        | 8: 9 <sup>th</sup> decile                                    | 51.8%                  |
| 1: White, non-Hispanic   | 65.8%                  | 9: 10 <sup>th</sup> decile                                   | 73.9%                  |
| 2: Black, non-Hispanic   | 75.0%                  | <b>% Hispanic 65+ (deciles)<sup>2</sup> *</b> (PCTHISP)      |                        |
| 3: Other, non-Hispanic   | 58.7%                  | 0: 1 <sup>st</sup> decile                                    | 46.0%                  |
| 4: Hispanic  | 78.3%                  | 1: 2 <sup>nd</sup> decile                                    | 65.7%                  |
| 5: DK/RF   | 0.0%                   | 2: 3 <sup>rd</sup> decile                                    | 74.9%                  |
|  |                        | 3: 4 <sup>th</sup> decile                                    | 60.5%                  |
| <b>Gender<sup>1</sup></b> (H_SEX)  |                        | 4: 5 <sup>th</sup> decile                                    | 74.5%                  |
| 1: Male  | 68.7%                  | 5: 6 <sup>th</sup> decile                                    | 65.0%                  |
| 2: Female  | 64.7%                  | 6: 7 <sup>th</sup> decile                                    | 61.3%                  |
|  |                        | 7: 8 <sup>th</sup> decile                                    | 54.7%                  |
| <b>Census Region<sup>1</sup></b> (S_REGION)                                |                        | 8: 9 <sup>th</sup> decile                                    | 83.8%                  |
| 1: Northeast   | 68.7%                  | 9: 10 <sup>th</sup> decile                                   | 62.6%                  |
| 2: Midwest   | 61.3%                  | <b>% Poverty (deciles)<sup>2</sup> *</b> (POVERTY_PCT)       |                        |
| 3: South   | 65.5%                  | 0: 1 <sup>st</sup> decile                                    | 53.8%                  |
| 4: West  | 69.8%                  | 1: 2 <sup>nd</sup> decile                                    | 73.2%                  |
| <b>Census Division<sup>1</sup> *</b> (DIVISION)                            |                        | 2: 3 <sup>rd</sup> decile                                    | 70.2%                  |
| 1: New England   | 75.8%                  | 3: 4 <sup>th</sup> decile                                    | 60.4%                  |
| 2: Middle Atlantic   | 66.3%                  | 4: 5 <sup>th</sup> decile                                    | 81.3%                  |
| 3: East North Central  | 67.0%                  | 5: 6 <sup>th</sup> decile                                    | 67.0%                  |
| 4: West North Central  | 55.1%                  | 6: 7 <sup>th</sup> decile                                    | 59.0%                  |
| 5: South Atlantic  | 66.6%                  | 7: 8 <sup>th</sup> decile                                    | 61.7%                  |
| 6: East South Central  | 65.1%                  | 8: 9 <sup>th</sup> decile                                    | 65.5%                  |
| 7: West South Central  | 62.3%                  | 9: 10 <sup>th</sup> decile                                   | 62.8%                  |
| 8: Mountain  | 69.9%                  | <b>OTHER INDICATORS</b>                                      |                        |
| 9: Pacific   | 69.8%                  | <b>Facility Type Indicator<sup>3</sup> *</b> (FQ3DLOCSP)     |                        |
|  |                        | 1: Independent living/other                                  | 70.0%                  |
| <b>Census Metro/Micro Area Designation (2008)<sup>1</sup></b> (S_METMICRO) |                        | 2: Assisted Living   | 63.1%                  |
| 1: Metropolitan area   | 68.0%                  | 3: Special care/memory care/Alzheimers unit                  | 70.4%                  |
| 2: Micropolitan area   | 58.3%                  | 4: Nursing home  | 62.3%                  |
| 3: Non-metro   | 57.6%                  | 8: Facility type not reported                                | 32.4%                  |
|  |                        | <b>R1 RESIDENTIAL CARE STATUS<sup>4</sup> *</b> (R1DRESID_R) |                        |
| <b>Health Maintenance Organization Beneficiary<sup>1</sup></b> (HMOTYPE)   |                        | 1: Community   | 83.2%                  |
| 0: Yes   | 75.7%                  | 2: Residential Care Resident not nursing home                | 54.5%                  |
| 9: No  | 62.1%                  | <b>R2 RESIDENTIAL CARE STATUS<sup>5</sup></b> (R2DRESID_R)   |                        |
|  |                        | 1: Community in R2   | 82.6%                  |
| <b>Age First Enrolled in Medicare<sup>1</sup></b> (MEDIC_BEG)              |                        | 2: Residential care in R2                                    | 60.2%                  |
| 1: Prior to age 65   | 75.3%                  | 3: Nursing home in R2  | 68.7%                  |
| 2: At or after age 65  | 64.5%                  | <b>R3 RESIDENTIAL CARE STATUS<sup>6</sup></b> (R3DRESID_R)   |                        |
|  |                        | 2: Residential care in R3                                    | 66.9%                  |
|  |                        | 3: Nursing home in R3  | 62.3%                  |

| Variable & Values                         | Weighted<br>Response<br>Rate | Variable & Values                           | Weighted<br>Response<br>Rate |
|---|------------------------------|---|------------------------------|
| <b>OTHER INDICATORS</b>                   |                              |   |                              |
| <b>R2 NURSING HOME STATUS<sup>5</sup></b> | (R2NH)                       | <b>R3 NURSING HOME STATUS<sup>6</sup> *</b> | (R3NH)                       |
| 1: Yes                                    | 68.7%                        | 1: Yes                                      | 62.3%                        |
| 2: No                                     | 65.5%                        | 2: No                                       | 66.9%                        |

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

<sup>2</sup>Based on county-level information from the CMS 5% HISKEW File linked to the beneficiary's EDB address.

<sup>3</sup>Based on the responses to two items on the type of facility from the FQ, FQ6 (fq3facdescri; including answers from FQ6A) and FQ10 (fq3faaretype).

<sup>4</sup>Based on responses to items in the Round 1 interview or interview process.

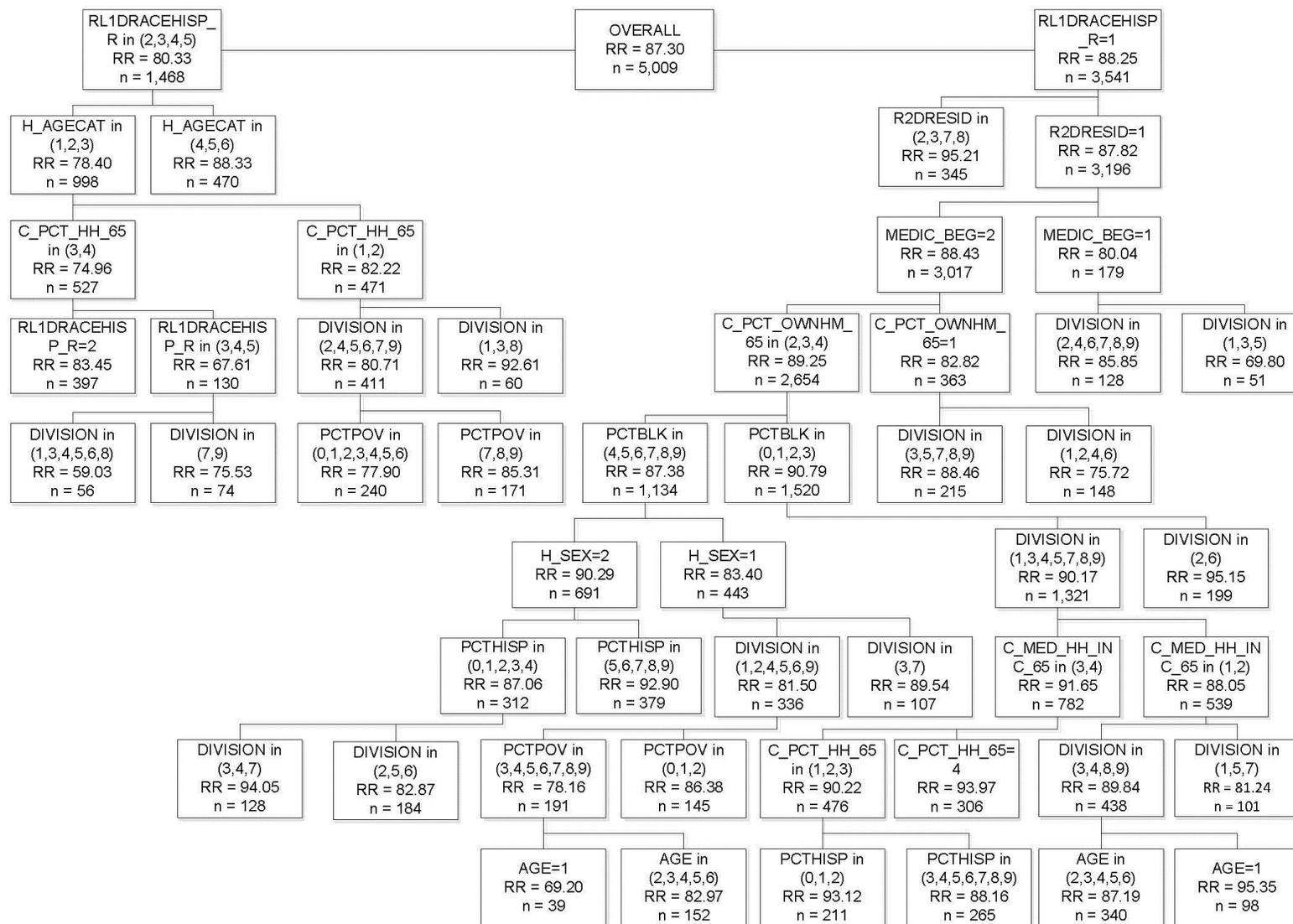
<sup>5</sup>Based on responses to items in the Round 2 interview or interview process.

<sup>6</sup>Based on responses to items in the Round 3 interview or interview process.

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

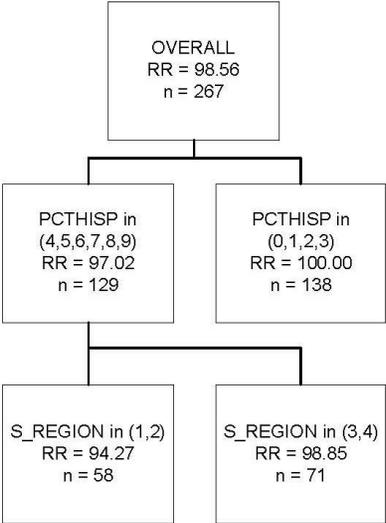
N=509 (330 respondents and 179 nonrespondents); Variable names used in classification trees shown parenthetically.

**Figure 1. Tracker weight nonresponse adjustment cells – non nursing home cases in Round 2**



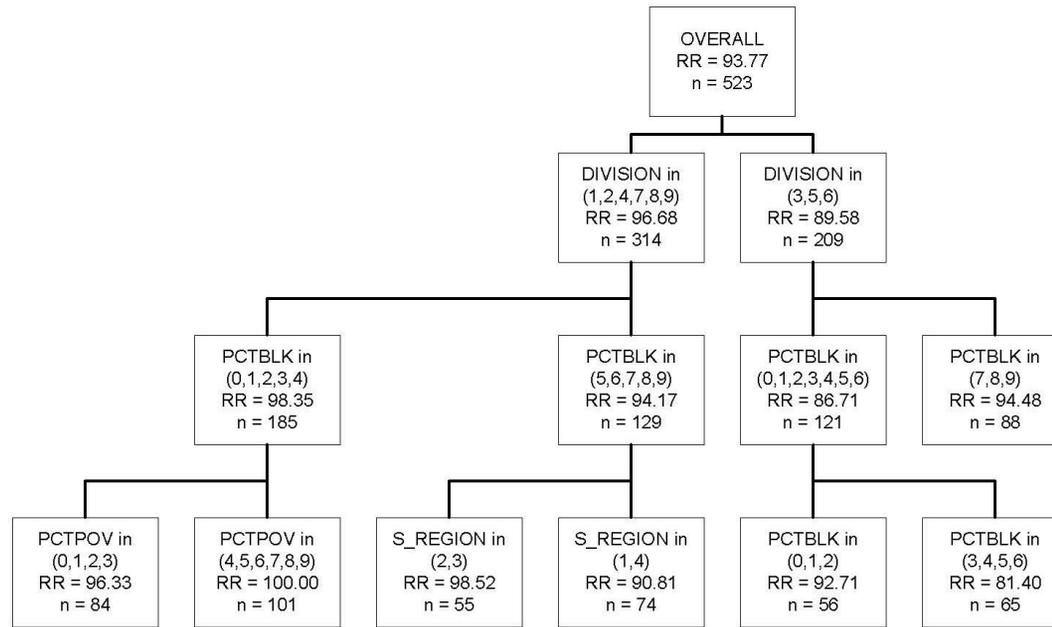
Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell

Figure 2. Tracker weight nonresponse adjustment cells – nursing home cases in Round 2



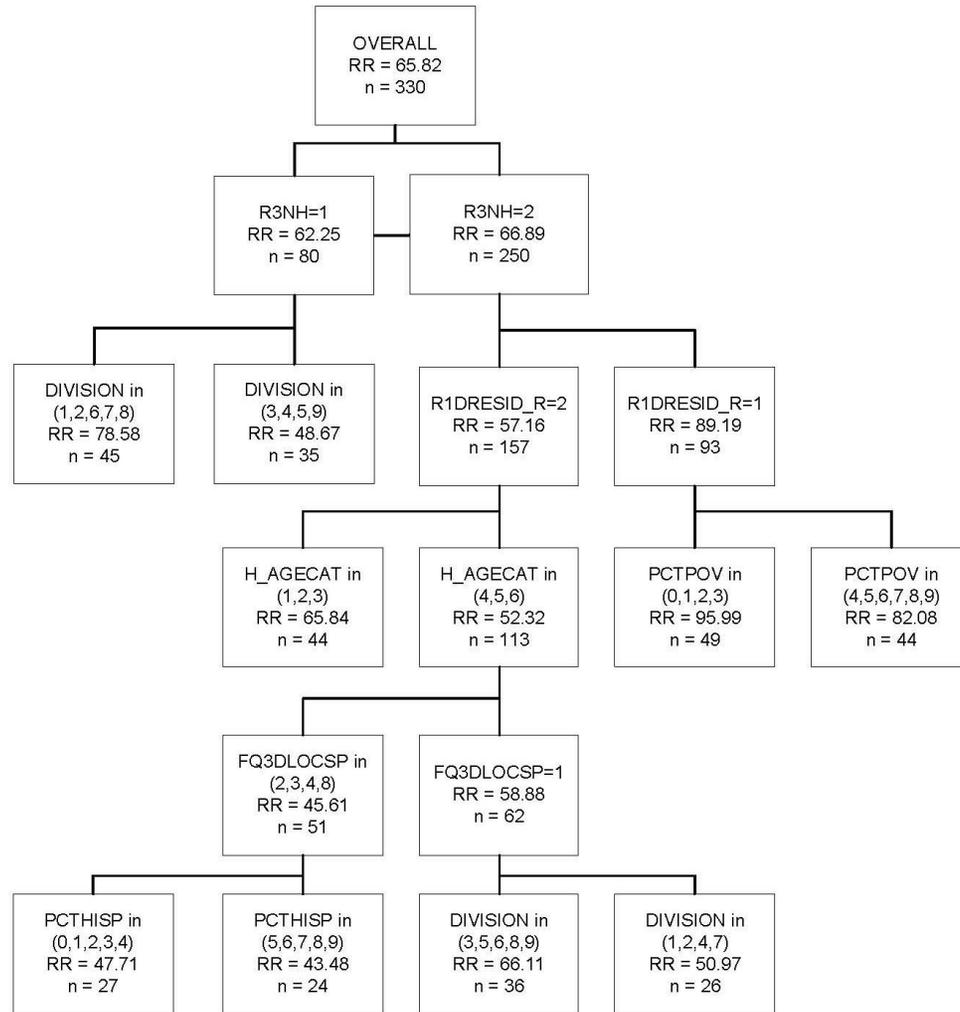
Note: "RR" is the weighted response rate for the particular cell, and "n" is the number of respondents in the cell

**Figure 3. Tracker weight nonresponse adjustment cells – deceased cases in Round 3**



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

Figure 4. Analytic weight nonresponse adjustment cells – Round 3 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