NATIONAL HEALTH AND AGING TRENDS STUDY (NHATS)
ROUND 12 SAMPLE DESIGN AND SELECTION

November 2023

Overview

The National Health and Aging Trends Study (NHATS) was initially designed to follow a nationally representative cohort of persons who were ages 65 and older and enrolled in Medicare as of September 30, 2010. The cohort has been interviewed annually. Replenishment samples took place in Round 5 and Round 12 so that the sample could be used to study disability trends as well as individual trajectories. The replenishment sample of Round 12 drew beneficiaries enrolled as of September 30, 2021.

The replenishment sample for Round 12 was drawn in two parts, each with a distinct scientific objective. The main replenishment sample was designed to replace both those in the youngest age groups (ages 65-71) and those who had died or been lost to follow-up in older age groups. The Hispanic supplement was designed to expand representation of the Hispanic population in NHATS across all age groups. Two independent two-stage samples were drawn within NHATS primary sampling units (PSUs). (See Montaquila, Freedman, and Kasper 2012 for discussion of the selection of PSUs.)

As in past replenishment rounds, the Medicare enrollment database served as the sampling frame.[1] The sample was selected using a stratified three-stage sample design, as follows:
    1) selection of primary sampling units (PSUs), which are individual counties or groups of counties,
    2) selection of secondary sampling units (SSUs), which are ZIP codes or ZIP code fragments within sampled PSUs, and
    3) selection of eligible beneficiaries within sampled SSUs.

Table 1 shows the numbers of PSUs, SSUs, and beneficiaries selected for the original and replenishment rounds (with release year shown parenthetically). Samples of beneficiaries enrolled as of September 30 of the prior calendar year were drawn (e.g. Round 12 [2022] was drawn from enrollees as of September 30, 2021). Like Rounds 1 and 5, the Round 12 replenishment oversampled older age groups and individuals identified as Black non-Hispanic on the enrollment file. New in Round 12, the Hispanic supplement sampled additional persons likely to be Hispanic according to information on the Medicare enrollment file. The probabilities of selection at each of the three stages were designed to yield equal probability samples and targeted sample sizes for sampling domains defined by age group and race/ethnicity. In Rounds 1 and 12, we selected another 20% of the sample to hold in reserve to offset response rate uncertainty. Table 1 shows the targeted sample sizes to be completed for each Round.

Table 1. Sample selection by round

	Round 1 (2011)[a]	Round 5 (2015)[b]	Round 12 (2022) Main Replenishment	Round 12 (2022) Hispanic Supplement
# PSUs selected [c]	95	95	95	95
# SSUs selected	655	668	666	620
# beneficiaries selected	14,643	7,119	12,225	3,151
Targeted sample size [d]	8,500	4,750	5,924	1,453

[a] For further details on Round 1 sample design see Montaquila et al., 2012.
[b] For further details on Round 5 sample design see Montaquila et al., 2016.
[c] The same 95 PSUs are used for all rounds.
[d] Targeted number of NHATS interviews to be completed with living respondents in Round 1 sample, Round 5 / Round 12 replenishment samples, or Round 12 Hispanic supplement.

[1] 96% of persons ages 65 and older in the United States are Medicare beneficiaries (see Freedman & Spillman 2016)

In Round 12, because of labor market conditions following the COVID-19 pandemic, we reduced the number of cases in the field after the replenishment samples had been released. To that end, a stratified random subsample of cases was selected to be removed from the field, i.e., "subsampled out." Consequently, we extended the replenishment to occur over two successive rounds (12 and 13). We therefore describe results related to Round 12 as interim.

This technical report provides details on the sample design and selection for the main replenishment and Hispanic supplement samples for Round 12 of NHATS. Section 1 describes the targeted sample sizes by age and race/ethnicity. Section 2 discusses targeted actual versus expected effective sample sizes. Section 3 describes the sample frame. Section 4 provides a brief overview of the formation and selection of the PSUs. Section 5 describes the procedures used to create and select ZIP clusters within the sampled PSUs. Section 6 describes the sampling of Medicare beneficiaries from the selected ZIP clusters. Section 7 explains the procedure used to subsample out cases. Sections 8 and 9 provide interim results for the Round 12-13 replenishment (response rates, actual sample sizes and effective sample sizes as of the end of Round 12) and provide an overview of the plan to continue replenishment during Round 13 data collection.

1. Original Round 12 Targeted Sample Sizes

Main Replenishment. The original targeted sample size for the Round 12 (including the continuing and main replenishment samples) was 8,962 responding living beneficiaries. Table 2.1 shows the breakdown of this target sample size by age group and race/ethnicity, and by whether the sample is continuing or newly drawn in 2021. From the continuing sample, we anticipated that about 3,038 would be alive and responding to NHATS in Round 12. We therefore anticipated needing to complete 5,924 cases from the newly drawn sample. Accounting for non-response and mortality between the time of sampling and fielding, we targeted 10,184 cases altogether to be sampled from the frame. Table 2.1 shows the targeted numbers of completes and number to be sampled by age and race/ethnicity groups.

Table 2.1. Target sample sizes by age group and race/ethnicity without Hispanic supplement

Age group	Race/ethnicity	Overall target	CONTINUING[1] Expected number of respondents	MAIN REPLENISHMENT Target number of respondents	Number to be sampled
65-69	Non-Hispanic Black	428	-	428	647
	Other	1,300	-	1,300	2,203
	Total	1,727	-	1,727	2,850
70-74	Non-Hispanic Black	474	86	388	612
	Other	1,537	307	1,231	2,098
	Total	2,011	392	1,619	2,710
75-79	Non-Hispanic Black	463	178	284	447
	Other	1,385	731	654	1,130
	Total	1,848	910	939	1,577
80-84	Non-Hispanic Black	339	170	169	294
	Other	1,164	584	580	1,039
	Total	1,503	754	749	1,332

85-89	Non-Hispanic Black	208	109	98	160
	Other	788	459	329	614
	Total	996	568	428	774
90+	Non-Hispanic Black	148	79	68	163
	Other	729	335	394	778
	Total	877	415	462	941
Total		**8,962**	**3,038**	**5,924**	**10,184**

[1]Expected number of continuing respondents calculated by obtaining Round 11 counts, aging these, and applying age-race specific mortality and response rate assumptions.

Hispanic Supplement. The original targeted sample size for all Hispanic individuals in Round 12 (including the continuing, main replenishment, and Hispanic supplement samples) was 2,000 responding living Hispanic beneficiaries. We anticipated completing interviews with about 547 living Hispanic individuals from the continuing sample and the main replenishment sample combined. Thus, the targeted sample size for the Round 12 Hispanic supplement sample was 1,453 additional completed interviews with living Hispanic beneficiaries. Accounting for non-response and mortality between the time of sampling and fielding, we targeted an additional 2,611 cases to be sampled from the frame. For the supplement, the three oldest age groups (80-84, 85-89, 90+) were combined, forming four sampling domains in total, age groups 65-69, 70-74, 75-79, and 80+. Table 2.2 shows the targeted numbers of completes and number to be sampled by age group.

Table 2.2. Target sample sizes of Hispanics by age group with Hispanic supplement

Age group	Race/ethnicity	Overall target	CONTINUING/ MAIN REPLENISHMENT Expected number of respondents	HISPANIC SUPPLEMENT Target number of respondents	Number to be sampled
65-69	Hispanic	509	130	379	658
70-74	Hispanic	418	135	283	492
75-79	Hispanic	395	101	295	522
80+	Hispanic	678	181	497	938
Total		**2,000**	**547**	**1,453**	**2,611**

2. Round 12 Targeted Actual vs. Expected Effective Sample Sizes

Unlike targeted numbers of actual interviews to be completed, expected effective samples sizes take into account loss of precision related to variation in sampling probabilities. The loss of precision is referred to as the study's "design effect" (DEFF). As described below, in NHATS, there are several sources of variation in sampling probabilities, which vary by Round.

Sources of DEFF in Rounds 1 and 5. In Round 1, the 8,500 targeted actual sample was expected to yield an effective sample size of 6,831. The study's expected DEFF (1.24) was attributable to differential probabilities of selection by age group and race/ethnicity. In Round 5, the 8,500 targeted sample was expected to yield an effective sample size of 6,619 (DEFF=1.28) because there were two additional sources of differential probabilities of selection: 1) for the continuing sample, each 5-year age group was

composed of 4 single years of age that were sampled at one rate and a 5th single year of age sampled at a rate consistent with the next highest age group; 2) for each age-race group, the replenishment sample was sampled at a lower rate than the continuing sample.

Sources of DEFF in Round 12 Main Replenishment. Round 12 main replenishment has several sources of DEFF. Like Rounds 1 and 5, differential probabilities of selection were used for each age-race group. In addition, like Round 5, the Round 12 sample has differential probabilities within some age groups. That is, within each 5-year age group (except the 65-69 year old group, which was fully replenished) beneficiaries were sampled using at least two or three different sampling rates. In addition, like Round 5, each age group by race/ethnicity sampling domain in the main replenishment sample for Round 12 used a lower rate than Round 1.

In developing the sample design for the Round 12 main replenishment, we attempted to maximize the overall effective sample size and at the same time attain expected effective sample sizes in the range of about 1,300-1,800 for each of the 5-year age domains between 65 and 84, with smaller effective sample sizes for ages 85-89 and 90+, as in the original design. Table 3.1 shows Round 12 target sample and expected effective sample sizes before adding the Hispanic supplement. In Round 12, the 8,962 target sample was expected to yield an effective sample size of 7,570 (DEFF=1.18).

Table 3.1. Targeted actual and expected effective sample sizes by age group and race/ethnicity: Rounds 1, 5 and Round 12 with Main Replenishment

Age group	Round 1			Round 5			Round 12 with Main Replenishment		
	Non-Hispanic Black	White/ Other	Total	Non-Hispanic Black	White/ Other	Total	Non-Hispanic Black	White/ Other	Total
65-69	371	1,287	1,658	346	1,188	1,535	428	1,300	1,727
	(361)	(1,272)	(1,474)	(340)	(1,180)	(1,397)	(428)	(1,300)	(1,584)
70-74	359	1,299	1,658	370	1,291	1,662	474	1,537	2,011
	(346)	(1,281)	(1,477)	(340)	(1,211)	(1,407)	(462)	(1,515)	(1,799)
75-79	349	1,309	1,658	391	1,260	1,651	463	1,385	1,848
	(314)	(1,296)	(1,492)	(375)	(1,207)	(1,412)	(430)	(1,354)	(1,573)
80-84	310	1,348	1,658	321	1,268	1,590	339	1,164	1,503
	(302)	(1,342)	(1,516)	(296)	(1,225)	(1,410)	(318)	(1,105)	(1,280)
85+	272	1,596	1,868	386	1,677	2,063	355	1,517	1,872
	(272)	(1,501)	(1,604)	(340)	(1,445)	(1,641)	(329)	(1,374)	(1,569)
85-89	163	870	1,033	212	906	1,119	208	788	996
	(163)	(861)	(953)	(183)	(793)	(898)	(199)	(759)	(872)
90 +	108	727	835	174	771	945	148	729	877
	(108)	(722)	(805)	(166)	(701)	(800)	(135)	(675)	(762)
Total 65+	1,661	6,840	8,500	1,815	6,685	8,500	2,059	6,903	8,962
	(1,464)	(5,968)	(6,831)	(1,524)	(5,693)	(6,619)	(1,903)	(6,435)	(7,570)

NOTE: Effective sample sizes for completed interviews with living sample persons are shown in parentheses.

Sources of DEFF in Round 12 Hispanic Supplement. The Hispanic supplement was added to increase the sample representation and statistical power for analysis of Hispanic individuals. This addition did not affect the targeted actual and effective sample sizes for other race/ethnic groups. Since Hispanic

individuals are also included in the continuing sample and the Round 12 main replenishment sample, estimates using all Hispanic individuals are subject to the sources of differential probabilities of selection described above and the higher probabilities of selection for the Hispanic supplement than for the main (continuing and new) samples.

The sampling rates for Hispanic supplement were designed to mirror those for non-Hispanic Black individuals in each age group in Round 1; this was done with an eye toward maintaining the overall Hispanic effective sample size. Table 3.2 shows Round 12 target sample sizes and expected effective sample sizes for the Hispanic sampling domains. The 2,000 target sample size was expected to yield an effective sample size of 1,721 Hispanic sample by age group (DEFF=1.16).

Combining all cases from other race ethnicity groups, Round 12 had a targeted actual sample size of 10,415 and an expected effective sample size of 7,753 (DEFF=1.34).

Table 3.2. Hispanic targeted actual and expected effective sample sizes by age group

| Age group | Round 12 Hispanic | | |
	In Continuing / Main Replenishment	In Hispanic supplement	Total Hispanic
65-69	130	379	509 (509)
70-74	135	283	418 (406)
75-79	101	295	395 (381)
80 +	181	497	678 (647)
Total 65+, Hispanic	547	1,453	2,000 (1,721)
Total 65+			10,415 (7,753)

NOTE: Expected effective sample sizes for completed interviews with living sample persons are shown in parentheses.

The sample sizes in Tables 3.1 and 3.2 were determined to be sufficient to support the key analytic goals involving estimation of trends and trajectories by 5-year age groups (65-69, 70-74, 75-79, 80-84, 85-89, and 90+) and by race/ethnicity (non-Hispanic Black, Hispanic, and White/Other). (See Appendix Table A1 for minimum detectable differences and half-widths of 95% confidence intervals.)

3. **Sampling Frame**

Random subsamples from the Medicare enrollment database (EDB) served as the sampling frame for NHATS. For the Round 12 Main Replenishment and Hispanic Supplement, records were excluded from the frame if:
- the beneficiary's age was less than 65 as of September 30, 2021 or the record included a date of death on or prior to this date; or
- the beneficiary's residence was outside the contiguous United States.

4. Selection of Primary Sampling Units

For the Round 12 Main Replenishment and Hispanic Supplement, new samples of beneficiaries were selected from the PSUs selected in Round 1. Briefly, in Round 1, an initial 5 percent random sample was used for PSU formation and selection, including calculation of the PSU measure of size. A stratified sample of 95 PSUs was selected from the contiguous United States (i.e., excluding Alaska, Hawaii, and Puerto Rico). The PSUs were sampled with probability proportionate to size. Eighteen domains (6 age groups by 3 race/ethnicity groups) were taken into account in computing the PSU measure of size. A total of 1,951 PSUs were constructed (58% of which were single county PSUs and 31% of which had two adjacent counties). 11 PSUs that would have had a probability of selection of 0.75 or greater were selected with certainty. Remaining noncertainty PSUs were sorted into 42 strata and two PSUs were systematically selected with probabilities proportionate to the PSU measure of size from each stratum. These procedures resulted in the selection of 95 PSUs, including 11 certainty and 84 noncertainty PSU. See Montaquila et al. (2012) for further details.

5. Selection of ZIP Clusters

The second stage of the design involved selection of secondary sampling units (SSUs) within sampled PSUs. Separate SSUs were selected for the Round 12 replenishment sample and the Hispanic supplement sample. The approach for selecting SSUs for the Round 12 replenishment and Hispanic supplement samples was identical to that used for selecting SSUs for the Round 1 and Round 5 samples. The SSUs were ZIP clusters that were formed from ZIP fragments (entire ZIP codes if within one county, and the portion of the ZIP code within a county for ZIP codes that span multiple counties). The ZIP cluster sampling frame was constructed from a 20 percent subsample of persons enrolled in Medicare as of September 30, 2021 who resided in the 95 PSUs sampled for NHATS in Round 1.[2] The file was subset to individuals age 65 or older as of September 30, 2021 with no date of death as of that date. For the Hispanic supplement, the file was also subset to only Hispanic individuals based on the enhanced Hispanic origin data on the 20 percent file. ZIP codes that reflected a single location (point on a map) were subsumed in the surrounding ZIP code as part of the process of forming ZIP clusters.

As in Round 1 and Round 5, the target number of new ZIP clusters to be selected in each PSU for the Round 12 replenishment and Hispanic supplement samples was set at eight. This approach was designed to balance the increased travel-related costs associated with a larger number of sampled ZIP clusters within each PSU against the increased clustering design effects with a smaller number of sampled ZIP clusters. The ZIP clusters were selected using probability proportional to size sampling.

The measure of size was constructed to reflect the variable sampling rates to be applied by age and race/ethnicity. The measures of size for the main replenishment sample were computed in the same manner as in Round 1 and Round 5; that is, a weighted sum of Medicare beneficiaries in the ZIP fragment, in which domain-level beneficiary counts were weighted by the domain sampling rate. For the Hispanic supplement, the measures of size were computed as a weighted sum of Hispanic Medicare beneficiaries in the ZIP fragment. Each ZIP fragment measure of size was checked against the minimum measure of size (to ensure that the overall sampling rate for each sampling domain could be achieved if a ZIP fragment

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[2] The use of the 20 percent file at this stage rather than the 5 percent file made it possible to limit the geographic sizes of the SSUs.

was sampled), and if found to be below the minimum, was combined with one or more nearby ZIP fragments to form ZIP clusters.

ZIP clusters having a measure of size that was at least as large as the within-PSU sampling interval for selecting ZIP clusters were selected with certainty. For each certainty ZIP cluster, the number of hits was calculated (the ratio of the ZIP cluster measure of size to the within-PSU ZIP cluster sampling interval). The number of noncertainty ZIP clusters to be sampled in a PSU was obtained by subtracting the total number of hits of certainty ZIP clusters from 8.

Prior to sampling, noncertainty ZIP clusters were sorted using a geographically based serpentine sort within each PSU. Noncertainty ZIP clusters were selected by independently sampling within each PSU from the sorted file of noncertainty ZIP clusters; the ZIP clusters were systematically sampled with probabilities proportionate to the ZIP cluster measure of size. Table 4 shows the number of ZIP clusters available in selected PSUs and the number of ZIP clusters sampled for the Round 12 main replenishment and Hispanic supplement samples.

Table 4. Round 12 ZIP Clusters

	Round 12 ZIP Clusters			
	Main Replenishment		Hispanic Supplement	
	# In Selected PSUs	# Selected	# In Selected PSUs	# Selected
Certainty[1]	117	117	130	130
Non-certainty	3,174	549	2,825	490
Total	3,291	666	2,955	620

[1] All in non-certainty PSUs

6. Selection of Beneficiaries

The final stage of sample selection was the selection of beneficiaries within sampled ZIP clusters. The Round 12 main replenishment and Hispanic supplement samples were selected independently within their corresponding ZIP cluster samples. The 20 percent file was used for this purpose. The beneficiary sampling frame was created by subsetting this file to:
- beneficiaries age 65 or older as of September 30, 2021 with no date of death as of that date; and
- beneficiaries with an address indicating that they resided in one of the sampled ZIP clusters.

For the Hispanic supplement sample, the frame was further subset to Hispanic beneficiaries based on the enhanced Hispanic origin data available in the 20 percent file.

Prior to sampling, beneficiaries in the frame file were sorted by ZIP cluster, race/ethnicity (non-Hispanic Black, Hispanic, non-Hispanic White/other), age group, and then randomly within age group. A measure of size was also assigned to each beneficiary to facilitate sample selection. This measure was equal to the desired conditional probability of selecting the person for the sample, given that the corresponding PSU and ZIP cluster had been selected (i.e., the target sampling rate for the beneficiary's sampling domain, divided by the overall probability of selection of the beneficiary's ZIP cluster).

Prior to selection, the sampling rates were uniformly inflated to allow for a roughly 20% reserve sample. In addition, we inflated the sampling rates for Hispanic supplement to account for the possibility of a small portion of selected cases overlapping with individuals selected in the main replenishment sample. We

selected beneficiaries for the main replenishment and Hispanic supplement samples using systematic sampling. Table 5 shows the number of beneficiaries selected for both samples. Twenty-two Hispanic beneficiaries were selected for both the main replenishment and Hispanic supplement samples. Selected beneficiaries were further split (by systematic sample with equal probability in the same sort order as the initial selection) into full sample and reserve sample. Table 5 shows how many cases were assigned to the full sample and held in reserve sample.

Table 5. Round 12 Beneficiaries

	Round 12	
	Main Replenishment	**Hispanic Supplement**
Total beneficiaries selected	12,225	3,129[1]
Full sample	10,187[2]	2,608
Reserve	2,038	521

[1] 22 of the cases selected for Hispanic supplement sample were also selected in the main replenishment sample; these were excluded from the 3,129 cases.

[2] As noted in section 1, the original targeted sample sizes for the main replenishment and Hispanic supplement were 10,184 and 2,611, respectively. However, since the samples of beneficiaries were selected using systematic sampling from a sorted list (as described in section 6), the realized sample sizes differed slightly from the target (due to non-integer-valued sampling intervals).

7. Change to Replenishment over Two Rounds

Midway through Round 12 data collection, we opted to resize the fieldwork to better fit available interviewer resources and extend replenishment over two successive rounds (12 and 13). Consequently, a subsample of cases that had been released were pulled back from the field. This approach allowed NHATS to concentrate existing fieldwork resources, which were constrained by tight labor market conditions, on the remaining cases.

To "subsample out" Round 12 cases and set them aside for Round 13 replenishment, the following procedures were implemented. Cases were grouped into five subsampling strata based on their dispositions at the time of subsampling. The PSUs were first divided into adequately staffed PSUs and the PSUs with limited labor resources. Among the adequately staffed PSUs, three "underworked" strata were formed: (1) cases that had not received any contact attempt, (2) cases that were attempted but not available during the contact attempt, (3) cases that had been contacted and expressed initial resistance. Stratum 4 included the cases in PSUs with limited labor resources, with slightly different inclusion criteria for the main replenishment and Hispanic supplement cases. For the main replenishment sample assigned to stratum 4, cases needed to meet one of the three "underworked" definitions; for the Hispanic supplement assigned to stratum 4, cases needed to have been attempted but not finalized. The remaining cases were placed in stratum 5.

Two independent subsamples were randomly selected from the main replenishment and the Hispanic supplement. The subsamples were drawn from strata 1 through 4 with varying probabilities of selection. We used the lowest subsampling out rate (the highest subsampling in rate) for stratum 1 and intentionally selected sampling out rates for other strata to control the variation across strata. This approach resulted in 3,600 subsampled-out cases and 6,587 subsampled-in cases for the main replenishment, and 1,200 subsampled-out and 1,408 subsampled-in for the Hispanic supplement. Table 6.1 shows the subsampling results by stratum.

Table 6.1 Sample sizes by subsampling stratum

Stratum	Main Replenishment			Hispanic Supplement		
	Total	Subsample out	Retain in sample	Total	Subsample out	Retain in sample
1. No attempt	1,674	637	1,037	469	268	201
2. Not available	2,239	1,135	1,104	734	504	230
3. Initial resistance	1,674	849	825	342	235	107
4. PSUs with insufficient resources	1,545	979	566	282	194	88
5. All else	3,055	N/A	3,055	781	N/A	781
Total	10,187	3,600	6,587	2,608	1,200	1,408

Probabilities of being subsampled-in by subsampling stratum are shown in Table 6.2. Subsample factors are the inverse of the probabilities of selection, which were used for the response rates calculation in Section 8.

Table 6.2 Probabilities of selection ("subsample in") by subsampling stratum

Stratum	Main Replenishment		Hispanic Supplement	
	Probabilities of selection	Subsample factor	Probabilities of selection	Subsample factor
1. No attempt	0.62	1.61	0.43	2.33
2. Not available	0.49	2.04	0.31	3.23
3. Initial resistance	0.49	2.04	0.31	3.23
4. PSUs with insufficient resources	0.37	2.70	0.31	3.23
5. All else	1.00	1.00	1.00	1.00
Total	0.65	N/A	0.54	N/A

8. Interim Replenishment Response Rates for Round 12

Given the subsampling conducted during data collection, the interim replenishment response rates are reported two ways: for the sample that remained in the field through the end of fieldwork (that is, excluding those subsampled out) and for all sample cases released to the field including those subsampled out, where rates take into account the subsampling procedure.

The sample excluding those subsampled out consist of sample persons (1) not eligible for subsample selection, and (2) eligible for subsampling but retained in sample. The overall unweighted response rate excluding the subsampled out cases is 59% (see Table 7.1).

Table 7.1 Round 12 unweighted response rates, sample remaining in field

Sample person	Continuing sample			Main Replenishment / Hispanic Supplement			Total		
	N[1]	C[2]	RR[3] (%)	N[1]	C[2]	RR[3] (%)	N[1]	C[2]	RR[3] (%)
Not eligible for subsample (1)	3,462	3,245	-	3,208	2,222	-	6,670	5,467	-
Cases subsampled in (2)	-	-	-	4,054	860	-	4,054	860	-
Sample that remained in field (1+2)	3,462	3,245	93.7	7,262	3,082	42.4	10,724	6,327	59.0

[1] Number of sample persons excluding those identified to be ineligible. Sample persons who were deceased in the main replenishment sample and Hispanic supplement, or who have moved out of country in any sample are ineligible.

[2] Number of respondents: living respondents in any sample plus proxies of deceased people in the continuing sample who responded to the LML interview.

[3] Response rate computed as the ratio of number of respondents (C) to the number of sample persons excluding the ineligibles (N).

To appropriately account for the subsampling in the calculation of response rates, a subsample factor is applied to each of the cases eligible for subsampling that were retained in the sample. The subsample factor is the inverse of the probability of being subsampled-in, which varies by subsampling strata. After adjusting for subsampling, the overall unweighted response rate is 47.5% (See Table 7.2).

Table 7.2 Round 12 unweighted response rates, sample remained in field + subsampled-out

Sample person	Continuing sample			Main Replenishment / Hispanic Supplement			Total		
	N[1]	C[2]	RR[3] (%)	N[1]	C[2]	RR[3] (%)	N[1]	C[2]	RR[3] (%)
Not eligible for subsample (1)	3,462	3,245	-	3,208	2,222	-	6,670	5,467	-
Cases subsampled in, adjusted by subsample factor, 1.61-3.23 (3)	-	-	-	8,732	1,842	-	8,732	1,842	-
Sample adjusted for subsample design (1+3)	3,462	3,245	93.7	11,940	4,064	34.0	15,402	7,309	47.5

[1] Number of sample persons excluding those identified to be ineligible. Sample persons who were deceased in the main replenishment sample and Hispanic supplement, or who have moved out of country in any sample are ineligible.

[2] Number of respondents: living respondents in any sample plus proxies of deceased people in the continuing sample who responded to the LML interview.

NHATS plans to re-release the subsampled out cases in Round 13 in order to complete replenishment. In addition, cases that were fielded in Round 12 but deemed to have not received enough attempts ("not fully worked cases") will be re-released, along with the sample of continuing cases, and reserve sample from Round 12 that was never released to the field. Round 13 will also include a freshly drawn sample of Hispanic beneficiaries. With these efforts, we will finish building the replenishment cohort by Round 13, and we anticipate response rates closer to 70% in Round 13.

9. Interim Replenishment Actual and Effective Sample Sizes Round 12

Round 12 data collection yielded a total of 6,087 living respondents. The actual and effective sample sizes (taking into account rather than ignoring subsampling out) are shown in Table 8. The total effective sample size is 2,793 (DEFF=2.2). The added DEFF incurred in Round 12 due to subsampling will be removed in Round 13 as a result of fielding the subsampled-out cases. In addition, with the re-release of not fully worked cases, reserve sample and fresh sample, and anticipated high response rates among continuing sample, we expect sample sizes and effective sample sizes at the end of replenishment (Round 13) will approach levels intended in the original Round 12 sample design.

Table 8. Actual and Effective Round 12 NHATS Sample Sizes

| Age group | Race/ethnicity | Actual sample size | | | Total effective sample size |
		Continuing sample	Main Replenishment / Hispanic Supplement	Total sample	
65-69	Non-Hispanic Black	-	201	201	165
	Hispanic	-	186	186	144
	Other	-	498	498	419
	Total	-	885	885	599
70-74	Non-Hispanic Black	85	208	293	215
	Hispanic	23	128	151	113
	Other	283	475	758	523
	Total	391	811	1,202	712
75-79	Non-Hispanic Black	169	131	300	210
	Hispanic	41	120	161	111
	Other	694	277	971	636
	Total	904	528	1,432	833
80-84	Non-Hispanic Black	172	101	273	196
	Hispanic	32	118	150	104
	Other	550	244	794	539
	Total	754	463	1,217	709
85-89	Non-Hispanic Black	107	27	134	115
	Hispanic	25	57	82	58
	Other	421	127	548	354

	Total	553	211	764	457
90 +	Non-Hispanic Black	75	30	105	84
	Hispanic	13	28	41	27
	Other	315	126	441	297
	Total	403	184	587	366
65+	Non-Hispanic Black	608	698	1,306	689
	Hispanic	134	637	771	490
	Other	2,263	1,747	4,010	2,059
Total 65+		3,005	3,082	6,087	2,793

NOTE: The age category is based on age as of September 30, 2021, from the beneficiary's month and date of birth provided on the 20% CMS Medicare EDB extract files. The race/ethnicity classification is based on the enhanced race and Hispanic origin data from the 20% EDB extract file. The effective sample size accounts for design effect due to variations in probabilities of selection, adjustments for subsampling, compositing factors, nonresponse adjustment in R12 for the new sample, and nonresponse adjustments through R12 for the continuing sample.

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Appendix

Table A1 illustrates the statistical power of the original targeted 2023 NHATS sample size (n=10,415). The table includes a set of minimum detectable differences in estimates of the prevalence of limitations in activities of daily living (ADL)/instrumental activities of daily living (IADL) over time (trends by age and race/ethnicity) and by race/ethnicity (disparities) and by race/ethnicity over time (trends in disparities). It also includes estimates of the precision of cross-sectional estimates of percentage estimates. That is, the table presents half-widths of the 95% confidence intervals for estimated percentages of 10, 30 and 50% respectively. The figures in this table account for expected design effects due to variations in probabilities of selection, compositing factors, and weighting adjustments.

Table A1. Minimum detectable differences and half-widths of 95% confidence intervals for targeted sample size of 10,415[1]

	N	Percentage with ADL/IADL limitations[2] at baseline	Change in % with ADL/IADL limitations (since baseline)	Racial differences in % with ADL/IADL limitation	Change in racial differences since baseline	10%	30%	50%
			Minimum detectable difference in			**Half-width of 95% confidence intervals for estimates of**		
AGE GROUP								
65-69	2,106	10.5	2.8			1.4	2.2	2.4
70-74	2,293	11.2	3.1			1.4	2.2	2.3
75-79	2,143	16.0	3.7			1.6	2.4	2.6
80-84	1,771	23.0	4.7			1.7	2.6	2.8
85-89	1,142	36.3	6.8			2.1	3.2	3.5
90+	959	53.8	8.1			2.2	3.3	3.6
Total 65+	10,415	17.7	1.8			0.7	1.1	1.2
Total 85+	2,101	41.9	5.2			1.5	2.4	2.6
RACE/ETHNICITY								
White/Other, non-Hispanic	6,356	16.2	2.0			0.8	1.3	1.4
Black, non-Hispanic	2,059	23.2	3.9			1.5	2.3	2.5
Hispanic	2,000	30.8	8.4[3]			1.4	2.2	2.4
DISPARITIES								
White/Other vs. Black, non-Hispanic				2.7	4.4			
White/Other vs. Hispanic				2.9	8.6[4]			

[1]These estimates assume a two-tailed test, with alpha=0.05, and power=0.8.
[2]The source for these prevalence estimates is the 2011 (Round 1) NHATS.
[3]The larger MDD for Hispanic than that for non-Hispanic Black is due to the smaller sample size of Hispanics at baseline.
[4]The larger MDD for disparities between White/Other and Hispanic than that for disparities between White/Other and non-Hispanic Black is due to the smaller sample size of Hispanics at baseline.