

NATIONAL HEALTH AND AGING TRENDS STUDY (NHATS)

Mobility and Self-Care Accommodation Duration Measures
in the National Health and Aging Trends Study

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Introduction

Late-life disability is a fundamentally dynamic phenomenon. Older individuals may be able to accommodate loss of functioning by changing how they carry out an activity (with a cane or walker or with help), the nature of the activity (showering instead of bathing) or reducing how frequently they do an activity (going out less often) (Freedman et al. 2014). Some activity limitations may be chronic and persistent; for others, an acute event, such as a fall, may temporarily necessitate assistance; still others may experience conditions that flare up and require intermittent assistance.

Analyses based on existing national panel surveys, which typically contact respondents every two years, are not able to fully capture these dynamics. Instead, analysts generally must assume that if an individual is not receiving help at either round, they did not receive assistance in between rounds (and conversely that assistance at both interviews implies continual use in between). Yet analysis of local area studies suggests substantial numbers of episodes are missed by two-year intervals. For instance, analysis by National Health and Aging Trends Study (NHATS) investigators of the Women's Health and Aging Study in Baltimore suggests that among women ages 65 and older, substantially more initiation of compensatory strategies are captured using 1-year rather than 2-year intervals: 19% more reports of "holding on to a person while walking" and 53% more reports of "walking less often." Similarly, analysis of the Precipitating Events Project (PEP) in New Haven suggests that among people ages 70-79, 36% more episodes of difficulty with daily activities are detected with 1-year rather than 2-year intervals.

Based on these findings, NHATS proposed annual contact with participants in order to minimize the number of missing episodes that occur between contacts. An additional benefit of contacting respondents annually is that information may be collected about occurrences of activity limitations *between* interviews. Analysis by NHATS investigators of PEP data, which collected information prospectively on monthly occurrences and then asked retrospectively about occurrences, suggests that such retrospective reports are relatively unbiased for up to one year.

Consequently, NHATS includes two sections in each round: the **duration of mobility accommodations (DM)** section, which asks about duration of help from another person as well as mobility device use, and the **duration of self-care accommodations (DS)** section, which focuses on help from another person. In Round 1 the questions focus on the most recent year, but also include additional questions about respondents' situation around the time they turned 65 as well as the time since that milestone. Beginning with Round 2 questions focus on the one-year period since the previous interview. Sample persons for whom a Last Month of Life Interview (LML) is conducted have duration assessed between the last interview and the month in which they died. These particular outcomes (help, device use) were selected because they focus on discrete events rather than assessments of ability or difficulty level.

The DM and DS sections provide information on months of use of accommodations. For many NHATS participants the responses will produce a continuous history from age 65 onward. By linking together rounds (from age 65 to round 1, from round 1 to round 2, and so on), users will be able to produce long-term trajectories. In each round, NHATS also has included a set of derived variables that calculate duration of use. These variables can be summed over time, along with the initial assessment of duration in order to assess total months of accommodation from age 65 through the end of life.

Thus, unlike other national studies, NHATS allows two unique sets of variables to be created: 1) complete, unbroken representation of mobility and self-care assistance histories in months from age 65 to month of last contact (or death) for most sample persons; and 2) indicators of changes in disability

status for sample persons with partial history data. This information has the potential to support new research in important scientific and policy-relevant areas. For example, investigators can model onset and recovery from use of help more precisely than previously possible with a national sample; study the interplay of assistive devices and help from another person for mobility over time; examine the use of intermittent help and its implications for predicting various outcomes; improve upon estimates of active life expectancy (which commonly rely on point in time estimates at 2-year intervals); and characterize duration of help, for example, following acute care and post-acute care episodes.

This technical paper is intended as a guide for using the duration of mobility and self-care information in NHATS. We review the contents of the DM and DS sections and describe several potential applications for these unique national data.

Mobility (MO) and Self-Care (SC) Sections

Every round, NHATS respondents are asked (in the mobility [MO] section) whether in the last month they received help from another person with three mobility activities—getting outside, getting around inside, and getting out of bed—and (in the self-care [SC] section) for four self-care activities—bathing, dressing, toileting, eating. In addition, if the sample person reported using a cane, walker, wheelchair, or scooter in the last month (in the Mobility Device [MD] section) they are asked how often in the last month they used that/each of those devices to get outside, get around inside, and get out of bed.

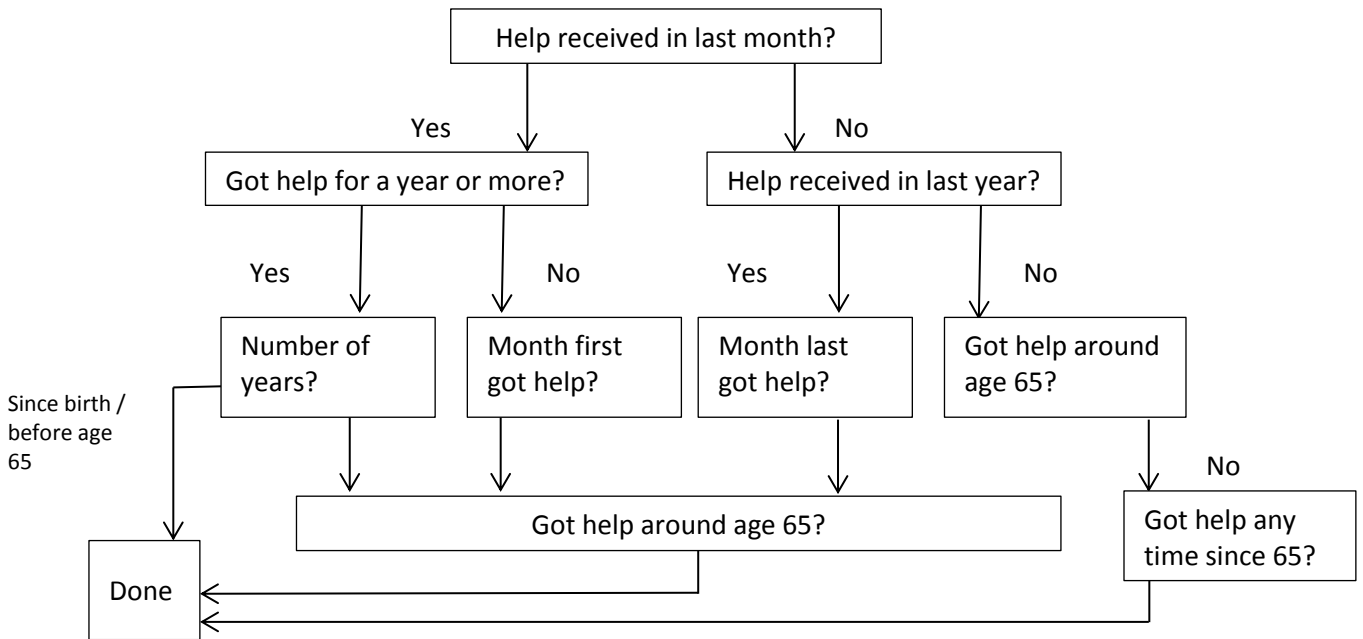
Information on whether help was received and whether devices were used in the last month is summarized in a set of derived variables (see www.nhats.org for annotated instruments for MO and SC and Kasper and Freedman, 2015).

Duration of Mobility Accommodations (DM) and Self-care Accommodations (DS) Sections

Initial Round

The DM and DS sections assess the duration of mobility-related help and device use and self-care-related help. In a sampled person's initial round (e.g. Round 1 or Round 5), persons who reported help in the last month with either going outside, getting around inside, or getting out of bed follow one path, while those who reported no help with all of these activities in the last month follow another (see Figure 1 for flow for DM help). In addition, assistance when the person turned age 65 is asked, and for persons reporting no use in the last year or at age 65, assistance between age 65 and initial Round is asked. Questions about duration of mobility device use and self-care-related help follow an identical flow.

Figure 1. Flow of questions for Duration of Mobility Accommodations in Initial Round



Follow-up Rounds

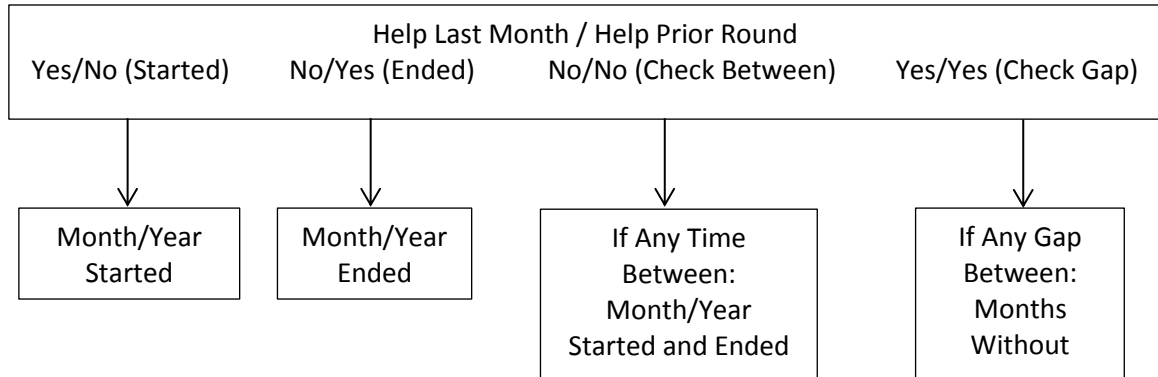
In follow-up rounds, there are four possible paths based on current and prior round reports of mobility help, mobility device use, and self-care help (see Figure 2 for flow for DM help).

- Persons who **started** getting help (using devices) – those who reported help (device use) in the last month but not at the prior round – are asked in what month since the last interview help (device use) started.
- Persons who **stopped** getting help (using devices) – those who reported no help (device use) in the last month but reported help (device use) at the prior round – are asked what month since the last interview help (device use) ended.
- Persons who reported **no help (device use) in the last month at either round** are asked whether they ever had help (device use) since the last interview and if yes, what month the help (device use) started and ended.¹
- Persons who reported **help (device use) in the last month at both rounds** – are asked whether

¹For this group only, the month help (device use) ended was inadvertently skipped in Rounds 2 and 3 but was corrected in Round 4 and forward.

they went without help (device use) for a month or longer since the last interview and if yes, for how many months.

Figure 2. Flow of questions for Duration of Mobility Accommodations in Follow-up Rounds



Questions ask about months between the prior interview month and year and the current interview month and year. When a Last Month of Life (LML) interview is administered, the time frame refers to months between the prior interview month and year and the month and year of death. Questions about duration of mobility device use and self-care help follow an identical flow.

Skips Around the DM DS Sections

There are a few relatively rare skips of which the user should be aware.

In Rounds 2 and 3 only, the DM and DS Sections were not administered for a small number of deceased persons who were not alert in the last month (based on PD6) and the DM Section was skipped for persons who were not mobile in the last month (based on PD7). These skips were removed beginning in Round 4.

In Rounds 2 and 3 only, a small number of individuals with missing data (DK, RF) in the prior or current round on help (device use) in the last month were not routed through DM and DS correctly; these cases are indicated in a derived variable (see next section) and skips were revised beginning in Round 4.

In Rounds 3 and 4 only, a small number of individuals with a current round interview who were not interviewed in the prior round (that is, with $r\#dresid = 3$ or 5 in the prior round) were routed through the DM and DS questions. However, since their prior round information was missing they routed incorrectly. In Round 3 these cases followed the path with other missing data cases; in Round 4 they routed through as if they answered “no” to the items. In Rounds 5 and forward, they are not administered the DM and DS sections. We recommend dropping the information that was collected for these cases in Rounds 3 or 4 using values of $dm\#flag$ and $ds\#flag$ (see derived variables).

Finally, in all follow-up Rounds, individuals who died within one month of the previous interview or whose month of death was not known were not administered the DM or DS sections.

Derived Variables

NHATS provides users with summary variables to simplify use of data from the DM and DS sections (see Appendix Tables 1 and 2 for details).

Initial Round

Derived variables were developed for the initial round from these sections to reflect any help (device use) in the last year, months if started in the last year, months if ended in the last year, and years if longer than 1 year.²

Follow-up Rounds

For each follow-up round, four variables are created:

- dm#dmohlpgr, dm#dmodevgr, ds#dschlpgr: An indicator of **group** that captures type of transition since last interview; e.g., whether help/use:
 1. Started
 2. Ended
 3. Was in place at both interviews with a gap in between
 4. Was in place at both interviews with no gaps
 5. Was not in place at either interview but occurred in between
 6. Was not in place at either interview or between

In addition, for a small number of cases values are provided with an additional “1” on the end to indicate type of transition but with missing information on timing (e.g. 11=Started but Month Started Missing). Note that in Rounds 2 and 3, end month was inadvertently skipped for all those in group 5; this skip has been corrected in Round 4 and forward. Group 5 is relatively rare and since individuals in this group are only transitory recipients, estimates of months of accommodation for individuals calculated by summing across multiple survey waves are not likely to be substantially biased by this omission.

- dm#dmohlp, dm#dmodev, ds#schlp: **Duration** as a count of the number of months of help/use. Note that a value of -13 on this variable indicates 0 and a value of 0 indicates less than 1 month. Special values were created for users to indicate different types of missing data and include:
 - 12 a report was outside of range
 - 10 not able to be calculated because of missing (skipped) information
 - 9 missing because the SP interview was not administered
 - 8 the respondent reported they did not know
 - 7 the respondent refused to provide information

²As noted in Appendix IV (DM and DS Sections) of the NHATS User Guide (Kasper and Freedman 2015) for dm1dhlpnd (the number of months since mobility help ended), dm1ddeviend (the number of months since mobility device use ended), and ds1dhlpnd (the number of months since self-care help ended), the label for a value of 0 is not correct on the public use file. The label for a value of 0 should be “Between 11 and 12 months since help (device use) ended” instead of “less than 1 month since help (device use) ended”. This error was corrected for sample persons whose initial round was round 5.

Respondents could also indicate that they disagreed with the information about last round, and those cases were coded '90'.

- **dmds#dintvl:** A variable indicating the length of the interval between interviews (or between last interview and death) . -9 is used for cases that do not have a current SP interview and -8 for those missing month of death.
- **dm#flag and ds#flag:** A variable indicating that cases that were routed around these sections for special reasons. For the vast majority of such cases, this variable is set to -1 (inapplicable). In Rounds 2 and 3, this flag also took on values ranging from 1 to 7; in subsequent rounds, only values of 1, 2 and 3 were applicable:
 - 1 No SP interview last Round. These cases were asked DM and DS, but routed as if no help/device use last round, which may not be correct, so group and duration were coded as inapplicable (-1) .
 - 2 Died and month of death missing. These cases skipped DM and DS, so group was coded but duration was coded as not ascertained (-10).
 - 3 Died <=1 month after last interview. These cases skipped DM and DS, but because the interval was known, group and duration were both coded.
 - 5 Died and not mobile (fl2notmobile=1). In Rounds 2 and 3 only these cases skipped DM and DS
 - 6 Died and not alert (fl2notalert =1). In Rounds 2 and 3 only these cases skipped DM and DS
 - 7 Skipped 1 or more help questions. In Rounds 2 and 3 only, a small number of cases improperly routed through DM or DS, sometimes obtaining extra information and sometimes missing information. Group and duration were coded for a subset of these cases.

Completeness of Duration of Accommodations

Table 1 summarizes the completeness of the data for the first 4 rounds of NHATS for mobility help, mobility device use, and self-care help. Estimates are weighted. Two distinct forms of missing information are shown: 1) among those known to have experienced a transition (accommodation started or ended since prior interview or occurred between interviews) the month of transition is missing (“timing unknown”); 2) whether or not a transition occurred is unknown (“transition unknown”).

In Round 2, for example, among those who survived and completed an SP interview, 6.6% reported receiving help with mobility in both Round 1 and Round 2; 7.7% reported help at one interview and not the other or sometime in between; 6.8% had a transition (started or ended help or had an episode in between interviews) but the exact duration was not known; and for 0.2% it was unknown whether a transition occurred. Note that the “timing unknown” group is larger in rounds 2 and 3 than in round 4 (due to the skip-logic issues mentioned previously that have been corrected). Both types of missing information are also more prevalent among the deceased subgroup than among survivors (again, related to skip logic that has been updated in round 4). As of round 4, timing is unknown for only about 3%-4% of cases (depending on the outcome) and transitions are unknown for <1% of the sample.

Tables 2 and 3 contrast estimates of accommodations using the NHATS DM and DS data with what would be generated from using only information provided at 2-year intervals. As shown in Table 2 using

data from Rounds 1 to 3, for mobility help, having a one-year interval for interviews with questions about limitations between interviews increases the percentage of older adults experiencing help by 50% (from 16% to 24%) over using only information provided at 2-year intervals. A greater percentage is missed for men than for women and at younger ages relative to older ages.

Table 3 shows the extent of bias produced by assuming responses at 2-year intervals hold for the entire interval. For the sample as a whole 6.5% receive mobility help at both round 1 and round 3, two years later. However, only 4.2% of the sample reports having received help continuously throughout the two-year interval; in the absence of the DM data the prevalence of continuous receipt of help would have been overstated by 35%. The biases are particularly large for the youngest age groups, reaching nearly 70% among those less than 80 years old. The final 3 columns of Table 3 show the corresponding patterns among those not receiving help at either round 1 or round 3. The biasing effect of inappropriately assuming that no help was received at any point during the two-year interval are smaller in relative terms—12% in the sample overall, and ranging from 10% to 16% across age groups—but they are still substantial .

References

Freedman, Vicki A., Judith Kasper, Brenda Spillman, Emily Agree, Vincent Mor, Robert Wallace and Douglas Wolf. 2014. Behavioral Adaptation and Late-Life Disability: A New Spectrum for Assessing Public Health Impacts. *American Journal of Public Health* 104(2):e88-94. doi: 10.2105/AJPH.2013.301687. PMID: PMC3935680.

Kasper, Judith D. and Freedman, Vicki A. 2015. National Health and Aging Trends Study User Guide: Rounds 1, 2, 3 & 4 Final Release. Baltimore: Johns Hopkins University School of Public Health. Available at <http://www.nhats.org/>

Table 1. Completeness of Activity Limitation Histories Between Interviews: Weighted Percentages by Round

	Round 1 (n=7609)	Round 2 (n=6412)		Round 3 (n=5265)		Round 4 (n=4321)	
		Alive (n=6056)	Deceased (n=356)	Alive (n=4869)	Deceased (n=396)	Alive (n=4017)	Deceased (n=304)
<u>Mobility Help</u>							
No Transition							
No limitation	82.6	78.8	15.8	77.4	14.0	77.2	13.7
Limitation	8.4	6.6	30.0	7.1	29.5	8.4	30.9
Known Transition							
Timing known	8.0	7.7	27.0	7.6	33.0	11.1	47.5
Timing unknown	0.8	6.8	17.0	7.8	15.9	3.3	5.0
Transition Unknown	0.2	0.2	10.1	0.1	7.6	0.0	3.0
<u>Mobility Device Use</u>							
No Transition							
No limitation	71.1	67.3	15.3	66.2	16.3	63.2	22.2
Limitation	17.9	16.2	38.4	17.7	39.5	19.3	44.1
Known Transition							
Timing known	9.9	10.0	18.4	9.5	18.1	15.2	27.9
Timing unknown	0.8	6.0	18.6	6.2	18.7	2.0	4.8
Transition Unknown	0.3	0.5	9.3	0.5	7.3	0.3	1.0
<u>Self-Care Help</u>							
No Transition							
No limitation	84.5	80.4	11.9	79.5	13.0	77.9	12.9
Limitation	7.2	7.2	34.4	7.7	36.3	8.8	41.5
Known Transition							
Timing known	7.3	9.5	35.9	10.3	28.8	10.3	37.8
Timing unknown	0.8	2.8	8.5	2.4	11.2	3.0	5.2
Transition Unknown	0.2	0.1	9.3	0.0	10.6	0.0	2.6

Table 2. Estimates of mobility assistance measured at 2-year intervals and at any time over two years.

	Estimates with 2-Year Interval			NHATS estimate	Missed Episodes with 2-year cross sections (percentage points)	Percentage increase in Episodes with NHATS design
	Round 1	Round 3	Round 1 or Round 3	Any Time Round 1-3		
Mobility help						
All	10.1	14.3	17.9	27.6	9.7	54%
Male	6.4	9.2	11.9	19.9	8.0	67%
Female	13.0	18.2	22.5	33.4	10.9	48%
Age 65-69	5.8	6.7	10.0	19.9	9.9	99%
70-74	6.2	9.8	12.1	20.7	8.6	71%
75-79	9.7	13.7	17.4	29.1	11.7	67%
80-84	13.2	19.3	23.9	33.4	9.5	40%
85-89	23.3	34.0	39.6	48.5	8.9	22%
90+	35.6	50.8	57.1	64.4	7.3	13%

Table 3. Estimates of continuous mobility assistance or no assistance using measures at 2-year intervals and at any time over two years.

	Round 1 and Round 3	All the Time Round 1-3	Extra Episodes with 2-year cross sections (Percentage points)	Percentage decrease in Episodes with 1-year intervals and DM/DS	Not Round 1 and Not Round 3	None of the Time Rounds 1-3	Extra Episodes with 2-year cross sections (Percentage points)	Percentage decrease in Episodes with 1- year intervals and DM/DS
Mobility help								
All	6.5	4.2	2.3	35%	82.1	72.5	9.6	12%
Male	3.7	2.2	1.5	41%	88.1	80.2	7.9	9%
Female	8.7	5.8	2.9	33%	77.5	66.7	10.8	14%
Age 65-69	3.4	1.1	2.3	68%	90.0	80.1	9.9	11%
70-74	4.8	1.5	3.3	69%	87.9	79.5	8.4	10%
75-79	6.0	4.2	1.8	30%	82.6	70.9	11.7	14%
80-84	8.6	6.6	2.0	23%	76.1	66.6	9.5	12%
85-89	17.7	13.4	4.3	24%	60.4	51.9	8.5	14%
90+	29.3	21.2	8.1	28%	42.9	35.9	7.0	16%

Appendix Table 1. DM and DS Variables in Initial Round (1, 5)

Duration of Mobility Accommodations		
Item	Variable Name	Variable Label
DM1	dm#helpmobil	R# DM1 GET HELP WITH MOBILITY
DM2	dm#helpymor	R# DM2 GETTING HELP YR OR MORE
DM3A	dm#yrsgethlp	R# DM3A HOW MANY YRS GETTING HELP
DM3B	dm#mthgethlp	R# DM3B MNTH FIRST LAST GET HLP
DM4	dm#lstycane	R# DM4 IN LST YR USE CANE WALKER
DM5	dm#caneforyr	R# DM5 USD CANE, ETC. YR OR MORE
DM6A	dm#yrsuscane	R# DM6A YEARS USING A CANE, ETC
DM6B	dm#mfrtcane	R# DM6B MTH FST LST USE CANE ETC
DM7	dm#mobhelp65	R# DM7 GETTING HLP W MOBIL AGE 65
DM8	dm#snc65mohl	R# DM8 SINCE 65 EV GET HLP W MOB
DM9	dm#at65uscan	R# DM9 USE CANE, ETC WHEN TRN 65
DM10	dm#snc65uscn	R# DM10 SINCE TURNED 65 USD CANE
DM Derived Variable	dm#dhlpyr	R# D ANY MOBILITY HELP LAST YEAR
DM Derived Variable	dm#dhlpst	R# D MTHS MOBILITY HELP STARTED
DM Derived Variable	dm#dhlpend	R# D MONTHS MOBILITY HELP ENDED
DM Derived Variable	dm#dhlpyrs	R# D YEARS OF MOBILITY HELP
DM Derived Variable	dm#ddeviyr	R# D MOB DEVICE USE LAST YR
DM Derived Variable	dm#ddevist	R# D MTHS DEVICE USE SINCE START
DM Derived Variable	dm#ddeviend	R# D MONTHS DEVICE USE SINCE END
DM Derived Variable	dm#ddeviyr	R# D YEARS OF DEVICE USE
Duration of Self-Care Accommodations		
DS1	ds#gethlpeat	R# DS1 GET HELP WITH EATING, ETC
DS2	ds#hlpmrtnyr	R# DS2 GET HELP FOR YEAR OR MORE
DS3A	ds#yrsgethlp	R# DS3A HOW MANY YRS GETTING HLP
DS3B	ds#mthgethlp	R# DS3B MNTH FIRST/LAST GET HELP
DS4	ds#gthptrn65	R# DS4 GET HLP ARND TIME TRND 65
DS5	ds#gthpsin65	R# DS5 GETTING HLP SNCE TRND 65
DS Derived Variable	ds#dhlpyr	R# D ANY SELF CARE HELP LAST YEAR
DS Derived Variable	ds#dhlpst	R# D MTHS SINCE SLF CARE HELP ST
DS Derived Variable	ds#dhlpend	R# D MTHS SINCE SLF CARE HLP END
DS Derived Variable	ds#dhlpyrs	R# D YEARS HELP IN CARING 4 SELF

Appendix Table 2. DM and DS Variables in Follow-Up Rounds (2-5)

Duration of Mobility Accommodations		
Item	Variable Name	Variable Label
DM1	dm#helpmobil	R# DM1 GET HELP WITH MOBILITY
DM3C	dm#helpstmo	R# DM3C MONTH MOBIL HELP STARTED
DM3C1	dm#helpstyr	R# DM3C1 YEAR MOBIL HELP STARTED
DM3D	dm#helpendmo	R# DM3D MONTH MOBIL HELP ENDED
DM3D1	dm#helpendyr	R# DM3D1 YEAR MOBIL HELP ENDED
DM3E	dm#nohelp	R# DM3E NO MOBIL HELP MTH PLUS
DM3F	dm#nohelpmos	R# DM3F MONTHS OF NO MOBIL HELP
DM4	dm#lstycane	R# DM4 IN LST YR USE CANE WALKER
DM6C	dm#devstmo	R# DM6C MONTH DEVICE USE STARTED
DM6C1	dm#devstyr	R# DM6C1 YEAR DEVICE USE STARTED
DM6D	dm#devendmo	R# DM6D MONTH DEVICE USE ENDED
DM6D1	dm#devendyr	R# DM6D1 YEAR DEVICE USE ENDED
DM6E	dm#nodev	R# DM6E NO DEVICE MONTH PLUS
DM6F	dm#nodevmos	R# DM6F MONTHS OF NO DEVICE
DM Derived Variable	dm#dmohlp	R# D MONTHS OF MOBILITY HELP
DM Derived Variable	dm#dmodev	R# D MONTHS OF MOBILITY DEVICE HELP
DM Derived Variable	dm#dmohlpgr	R# D MOBILITY HELP GROUP
DM Derived Variable	dm#dmodevgr	R# D MOBILITY DEVICE GROUP
DM Derived Variable	dm#dintvl	R# D MONTHS BETWEEN LAST INT AND EITHER CURRENT INT OR DATE OF DEATH
DM Derived Variable	dm#flag	R# D SPECIAL CASES DM SECTION ROUTE
Duration of Self-Care Accommodations		
DS1	ds#gethlpeat	R# DS1 GET HELP WITH EATING, ETC
DS3C	ds#helpstmo	R# DS3C MONTH SELF CARE HLP START
DS3C1	ds#helpstyr	R# DS3C1 YEAR SELF CARE HELP STARTED
DS3D	ds#helpendmo	R# DS3D MONTH SELF CARE HELP ENDED
DS3D1	ds#helpendyr	R# DS3D1 YEAR SELF CARE HELP ENDED
DS3E	ds#nohelp	R# DS3E NO SELF CARE HELP MTH PLUS
DS3F	ds#nohelpmos	R# DS3F MONTHS OF NO SELF CARE HELP
DS Derived Variable	ds#dschlp	R# D MONTHS OF SELF CARE HELP
DS Derived Variable	ds#dschlpgr	R# D SELF CARE HELP GROUP
DS Derived Variable	ds#flag	R# D SPECIAL CASES DS SECTION ROUTE