

NATIONAL HEALTH AND AGING TRENDS STUDY (NHATS)
LONG-TERM CARE MARKET MEASURES USER GUIDE

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I. Overview of Long-Term Care Market Measures Files

This user guide describes the compilation of long-term care market measures (LTCMM) available to link to the National Health and Aging Trends Study (NHATS) and National Study of Caregiving (NSOC) in the NHATS Restricted Data Repository.

The LTCMM files include county-level market measures reflecting the availability of long-term care services and supports in the United States. Measures reflect several types of providers—including nursing home, hospice, home health, assisted living, and adult day care—and include number of facilities/providers/settings, beds and special (dementia) care units. All measures are reported as rates (per 100,000 adults ages 65 and older in the county) in the given year. The measures are not directly linkable to survey participants; rather, these data allow researchers to understand the long-term care context in counties where NHATS participants and their caregivers reside.

The 2023 release includes measures for 2010 through 2020. This guide provides an overview of data sources used to prepare the measures, the data files available to NHATS/NSOC users, and linking variables that have been provided. It also provides a description of the source for each LTCMM measure and how it was created. Finally, a data dictionary and list of variables available each year are provided in Appendices A and B.

II. Data Sources and Data Preparation

Data were sourced from publicly available databases, including:

- the US Census Bureau (for population estimates; with annual estimates for counties using boundary updates by the first of each year)¹
- LTCFocUS.org (for nursing home estimates); and
- the Centers for Medicare and Medicaid Services (CMS)'s Home Health Compare, Hospice Compare, Medicare Provider of Service, OSCAR/CASPER (for home health, hospice estimates).

In addition, data from the National Adult Day Services Association (NADSA) membership list were used to identify adult day care centers. For residential care/assisted living (RC/AL) measures, data were compiled using a published method for identifying RC/AL communities, which includes compiling state RC/AL licensing data.² Additional information on data sources and individual measures is provided in Section V. Long-Term Care Market Measures.

¹ Population estimates are from the US Census Bureau for annual FIPS boundaries:

<https://www2.census.gov/programs-surveys/popest/datasets/2010/2010-eval-estimates/>
<https://www2.census.gov/programs-surveys/popest/datasets/2010-2020/counties/asrh/>

²Thomas KS, Dosa D, Gozalo PL, Grabowski DC, Nazareno J, Makineni R, Mor V. A Methodology to Identify a Cohort of Medicare Beneficiaries Residing in Large Assisted Living Facilities Using

For each data source, data elements were aggregated to the county-level using county-level Federal Information Processing Series (FIPS) codes used by the US Census Bureau. County FIPS codes uniquely and uniformly identify counties across the United States, but do change occasionally over time. For all but LTCFocUS data, which relies on 2010 FIPS codes, we use current year FIPS codes. If publicly-available datasets did not already contain a county FIPS code, steps were taken to create these codes based on state and county variables. Population estimates from the US Census were then merged onto datasets by county FIPS code.

Market measures were created at the county level by dividing number of settings or providers by the population ages 65 or older in that county in that year and multiplying by 100,000. In counties with small older populations, creating rates of long-term care settings per 100,000 older adults sometimes results in outliers. Researchers should interpret such values with caution.

III. Data Files and Missing Values

Two sets of files were created: a long file with one observation per year for each county and a wide file with one observation for each county. In the wide file variables have been renamed with the year as the last four characters (e.g. cpop65 in the long file is renamed cpop652010- cpop652020 in the wide file).

Some measures are not available for every year or for every county. In the long file, values not available before or after a FIPS code change and nursing home variables for counties without a 2010 FIPS code are set to -1 and unavailable measures (not collected) appear as values of -9. On the wide file unavailable measures have been dropped. Values of 0 may mean 0 or that information was not available for that county. For details on measures available by year see Appendix B.

IV. Linking Variables

The numeric 5-digit County FIPS codes serves as the main linking variable for the long-term care market measures to NHATS and NSOC restricted geographic files (see Table 1). Two sets of FIPS codes have been provided: one using boundaries for counties set in 2010 and a second set using boundaries for 2020. For counties whose FIPS codes did not exist in either 2010 or 2020, missing values of -1 (Inapplicable) are assigned for years in which the FIPS code was not in use.³

Administrative Data. Med Care. 2018;56(2):e10-e5. doi: 10.1097/MLR.0000000000000659. PubMed PMID: 27820597; PMCID: PMC5418112.

³ See https://www2.census.gov/geo/docs/reference/codes/files/national_county.txt and https://www2.census.gov/geo/docs/reference/codes2020/national_county2020.txt for county FIPS codes in 2010 and 2020 and https://www.ddorn.net/data/FIPS_County_Code_Changes.pdf for changes in FIPS codes between 2010 and 2020.

Once the LTCMM variables have been linked to the NHATS/NSOC restricted geographic files, the geographic files may be linked to NHATS/NSOC survey files by spid (NHATS) or spid and opid (NSOC).

Variables: County FIPS codes (5 digit-2010 and 2020 boundaries), State (2 letter string), State FIPS code (numeric), Year

Years: 2010-2020

Source: United States Census Bureau.

Type of Linking Measure	LTCMM		NHATS/NSOC			
	Variable Name	Format	FILE	Variable Name	Label	Format
STATE	state	String (length 2)	-	-	-	-
STATE FIPS	statefips_n	Numeric (2 digits)	NHATS SP	re#spadrsstt	R# RE SP ADDRESS STATE	Numeric (2 digits)
			NSOC	c#cgadrsstt	C# CG ADDRESS STATE	
STATE-COUNTY FIPS (2010 boundaries)	cfips2010	Numeric (5 digits)	NHATS SP	re#spfpsstcy	R# RE SP ADDRESS FIPS STATE/COUNTY	Numeric (5 digits)
			NSOC	c#cgfpsstcy	R# RE SP ADDRESS FIPS STATE/COUNTY	
STATE-COUNTY FIPS (2020 boundaries)	cfips2020	Numeric (5 digits)	NHATS SP	re#spfpsstcy2020	R# RE SP ADDRESS FIPS STATE/COUNTY USING 2020 CENSUS BOUNDARIES	Numeric (5 digits)
			NSOC	c#cgfpsstcy2020	C# CG ADDRESS FIPS STATE/COUNTY USING 2020 CENSUS BOUNDARIES	
YEAR (long file only)	year	Numeric (4 digits)	-	In NHATS Round 1 is 2011, Round 2 is 2012, and so on. In NSOC, NSOC I=2011, NSOC II=2015, NSOC III=2017 and NSOC IV is annual starting in 2021		
NOTES	-	-	# in NHATS/NSOC variable names and labels indicates Round number			

V. Long-Term Care Market Measures

This section reviews creation of the long-term care market measures. Measures are grouped by setting and each subsection provides detail about the source and approach used to create each measure.

V.A. Older Adult Population Measure

Measure: Number of Older Adults (age 65+) in a County

Variable name: cpop65

Years: 2010-2020

Source: These data come from the United States Census Bureau's published estimates of the population for counties in each year based on estimate for 2010 and projections for 2011-2020 from the 2010 Census.

Reference: U.S. Census Bureau. Annual County Resident Population Estimate by Age, Sex, Race and Hispanic Origin. County Characteristics Resident Population Estimates Files (July Estimates; annual release dates). Available: <https://www2.census.gov/programs-surveys/popest/datasets/>

Measure construction: The population of adults over age 65 years (AGE65PLUS_TOT) and the 5-digit county FIPS, created by combining the state (STATE) and county FIPS (COUNTY) variables, were extracted for each year for the purpose of merging with the other county-level files. This measure was used to standardize the market measures by adjusting for the size of the older adult population.

Boundaries: Annually updated FIPS county boundaries.

V.B. Nursing Home Measures

Measures: Number of Nursing Homes per 100,000 Older Adults in a County, Number of Nursing Home Beds per 100,000 Older Adults in a County, Number of Nursing Home Beds with a Dementia Special Care Unit per 100,000 Older Adults in a County

Variable names: nhfreq, nhbeds, nhalz

Years: 2010-2020

Source: Data for all nursing home measures in these datasets come from LTCFocUS.org. LTCFocUS.org is sponsored by the National Institute on Aging (P01AG027296) through a cooperative agreement with the Brown University School of Public Health. The website hosts data regarding the health and functional status of nursing home residents, characteristics of care facilities, local markets, and state policies relevant to long-term care services and financing. The data presented on LTCfocUS.org come from a variety of data sources, including primary collected data and secondary data (e.g., OSCAR/CASPER, the Area Health Resource File, the Minimum Data Set) to provide information about nursing home care in the US.

Reference: LTCFocUS Public Use Data sponsored by the National Institute on Aging (P01 AG027296) through a cooperative agreement with the Brown University School of Public Health. Available at lcfocus.org. <https://doi.org/10.26300/h9a2-2c26>

Measure construction: Variables for Provider ID (PROV1680), total beds (totbeds), presence of Alzheimer's unit (alzunit), county FIPS (county using 2010 County FIPS Codes), and state (state) were selected from the facility-level files. These data were aggregated to the county level to create the following variables (1) the number of unique nursing home Provider IDs per county, (2) the number of unique nursing home Provider IDs with an Alzheimer's care unit per county, and (3) the total number of nursing home beds per county. These data were all standardized by dividing by the total number of older adults (ages 65 and older) in the county and multiplying by 100,000.

Boundaries: 2010 FIPS county boundaries.

V.C. Home Health Measures

Two measures of home health availability are included: the number of home health agencies physically located in each county and the number of home health agencies servicing each county. These data come from the Medicare Provider of Service and CMS Home Health Compare website, respectively.

Measure: Number of Home Health Agencies Located in the County per 100,000 Older Adults

Variable name: hhafreq

Years: 2011-2020

Source: Medicare Provider of Service File. The Medicare Provider of Service file is a publicly available file, updated quarterly, containing descriptive information on healthcare facilities, including home health agencies, and is maintained by CMS.

Reference: Centers for Medicare and Medicaid Services. Provider of Services Current Files. Provider of Services File - Hospital & Non-Hospital Facilities. Available at: <https://www.cms.gov/Research-Statistics-Data-and-Systems/Downloadable-Public-Use-Files/Provider-of-Services>.

Measure construction: Using the last quarterly file for each year, variables for county FIPS (fips_cnty_cd), provider ID number (prvdr_num), state FIPS (fips_state_cd) and year (pos_year) were selected for observations with the provider category (prvdr_ctgry_label) "home health agency." The number of home health agencies were aggregated to the county level using 2010 County FIPS measures and the measure was divided by the total number of older adults in the county multiplied by 100,000.

Boundaries: Annually updated county boundaries.

Measure: Number of Home Health Agencies Servicing the County per 100,000 Older Adults

Variable name: hhaservng

Years: 2010-2020

Source: Medicare Home Health Compare Agency Data for the last quarter of each year obtained through CMS's provider data catalog and the Housing and Urban Development Zip Code-County Crosswalk.

References: Centers for Medicare and Medicaid Services. Provider Data Catalogue. Home Health Compare (Last Quarter, 2010-2020). Available at: <https://data.cms.gov/provider-data/>. Housing and Urban Development Zip Code-County Crosswalk (Last Quarter, 2010-2020). Available at: https://www.huduser.gov/portal/datasets/usps_crosswalk.html.

Measure construction: The Home Health Compare Files contain information on characteristics of home health agencies, such as addresses, ownership type, quality measures, and more for agencies registered with Medicare. Home Health Compare Files corresponding to the last quarter of 2010-2020 were used to create service area measures. The Home Health Compare

Files have 3 variables—state (State), CMS Certification Number (CCN), and ZIP code (ZIP Code)—that detail all of the ZIP codes served by each provider.

The HUD ZIP Code-County Crosswalk files using 2010 Census Geography for County for the last quarters of 2012-2020 were merged with the Home Health Compare data to assign 5-digit County FIPS to all Medicare registered home health agencies in each year. Because the 2011 HUD ZIP Code-County Crosswalk files rely on 2000 Census Geography for Counties, and a few counties changed substantially between 2000 and 2010⁴, 2011 ZIP codes were mapped into 2010 County FIPS using 2010 Zip Code Tabulation Areas (ZCTAs) as the crosswalk between the two sources. Because ZIP codes can cross county lines, it was assumed that ZIP codes served by home health agencies spanning multiple counties were considered to have served all counties falling in that ZIP code. We tabulated the frequency per 100,000 older adults of unique provider IDs, per county, per year.

Boundaries: Annually updated FIPS county boundaries.

V.D. Hospice Measures

Two measures of hospice availability are included: the number of hospice agencies physically located in each county (2011-2020) and the number of hospice agencies servicing each county (2017-2020). These data come from the CMS Provider of Service and CMS Hospice Compare website, respectively.

Measure: Number of Hospice Agencies Located in the County per 1000 Adults

Variable name: hospfreq

Years: 2011-2020

Sources: Medicare Provider of Service File for the last quarter of each year obtained through CMS's provider data catalog containing information on healthcare facilities (including hospice).

References: Centers for Medicare and Medicaid Services. Provider of Services Current Files. Provider of Services File - Hospital & Non-Hospital Facilities. Available at: <https://www.cms.gov/Research-Statistics-Data-and-Systems/Downloadable-Public-Use-Files/Provider-of-Services>.

Measure construction: Variables for County FIPS (fips_cnty_cd), provider ID number (prvdr_num), state FIPS (fips_state_cd) and year (pos_year) were selected for observations with the provider category (prvdr_ctgry_label) "hospice." Counties are coding using 2010 County FIPS Codes.

Boundaries: Annually updated FIPS county boundaries.

Measure: Number of Hospice Agencies Servicing County per 1000 Older Adults

Variable name: hospsserving

⁴ <https://www.census.gov/programs-surveys/geography/technical-documentation/county-changes.2010.html#list-tab-957819518>

Years: 2017-2020

Source: Data come from the Medicare Hospice Compare provider data. Data corresponding to the last quarter of 2017-2020 were downloaded from the CMS Hospice Compare website

References: ([Hospice care data archive | Provider Data Catalog](#)). : Centers for Medicare and Medicaid Services. Provider Data Catalogue. Hospice Care Data Archive (Last Quarter, 2017-2020). Available at: <https://data.cms.gov/provider-data/>. Housing and Urban Development Zip Code-County Crosswalk (Last Quarter, 2017-2020). Available at: https://www.huduser.gov/portal/datasets/usps_crosswalk.html.

Measure construction: Data corresponding to the last quarter of 2017-2020 were used to create service area measures. The Hospice Compare dataset has 3 variables—state (State), CMS Certification Number (CCN), and ZIP code (ZIP code), which detail the ZIP codes served by each provider. The HUD ZIP Code-County Crosswalk files using 2010 Census Geography for County for the last quarters of 2017-2020 were merged with the Hospice Compare dataset to assign 5-digit County FIPS codes to all Medicare registered home health agencies in each year. Because ZIP codes can cross county lines, it was assumed that ZIP codes served by home health agencies spanning multiple counties were considered to have served all counties of that ZIP code. We tabulated the frequency of unique provider IDs, per county, per year.

V.E. Adult Day Care Measures

Measure: Number of Adult Day Care Providers in the County per 1000 Older Adults

Variable name: adcfreq

Years: 2018, 2020

Sources: Data were provided by the National Adult Day Services Association, which included the names, cities, states, and ZIP codes of their members. County codes were assigned using the corresponding year's cartography files from the US Census Bureau. This file use county boundaries from the 2010 Census with major updates to the current year incorporated.

References: "Find a Center". National Adult Day Services Association. Available at <https://www.nadsa.org/locator/>. Cartography files available at: <https://www.census.gov/geographies/mapping-files/time-series/geo/carto-boundary-file.html>

Measure construction: Counties were assigned to adult day care providers using ARCGIS Pro. Adult day care providers' addresses were geocoded and then spatially joined with geographic census data. These data were aggregated to the county level. Counts were divided by the total number of older adults (ages 65 and older) in the county and multiplied by 1000.

Boundaries: Annually updated FIPS county boundaries.

V.F. Assisted Living/Residential Care Measures

Measures come from a national directory of operating residential care/assisted living (RC/AL) communities that are either licensed or registered by state agencies. This directory was created by researchers at Brown University's Center for Gerontology and Health Care Research.

Measures: Number of Licensed RC/AL Settings in the County per 1000 Older Adults, Number of RC/AL Beds in the County per 1000 Older Adults, Number of Licensed Dementia Special Care RC/AL Settings in the County per 1000 Older Adults

Variable names: rcalfreq, rcalbeds, rcalalz

Years: 2019

Source: Information was collected about all licensed/registered, operating RC/AL communities from state websites and state agents for all 50 states and D.C. during 2019. This information formed a national RC/AL directory.

Reference: Thomas KS, Smith L, Gadkari G, Hua C, Cornell P. Identifying a National Cohort of Medicare Beneficiaries Residing in Assisted Living Settings: An Updated Method. *JAMDA*. In Press.

Measure construction: The RC/AL directory has information for every RC/AL that includes its name, address, capacity and license information. Duplicate observations were removed. If 2 observations had the same name, street, address and ZIP code, they were considered to be the same RC/AL, hence only one observation was retained. In cases where only 1 out of the 3 variables was different, observations were manually checked to determine if they were duplicate RC/ALs. Using these addresses, every RC/AL was geocoded in ArcGIS Pro, and then assigned to counties by spatially joining those data with the census cartography boundary files before calculating the total number of RC/AL communities and total beds, by county. County codes were assigned using the corresponding year's cartography files from the US Census Bureau. This file uses county 2010 boundaries with major updates to the current year incorporated. Note, the licensed dementia special care RC/AL settings data are only available for some states. States excluded from the RC/AL dementia special care unit measures are AZ, CA, CT, DE, GA, HI, KS, KY, LA, MD, MA, NH, NM, ND, SD, TN, UT, and WV; these values are set to missing (-9) in the dataset.

Boundaries: Annually updated FIPS county boundaries.

VI. Obtaining Long-Term Care Market Measures Files

LTC Market Measures Files are available in the NHATS Restricted Data Repository as both SAS and Stata Files. To apply for access to these data in the enclave, go to Sensitive and Restricted Data on the NHATS website. Download the document titled "Obtaining National Health and Aging Trends Study Restricted Data from the NHATS Restricted Data Repository" and follow the instructions for requesting access.

Appendix A. Data Dictionary for Long-Term Care Market Measures

Variable	Label	File (year) %	Description/Notes
countyfips_n	State and Count FIPS Code (Numeric 5 digit)	2010-2020	2 digit State and 3 digit County FIPS code
state	State (String – 2 letter)	2010-2020	Two letter state code
state_n	State FIPS Code (Numeric 2 digit)	2010-2020	FIPS two digit state code
year	Year	2010-2020	Year
pop65	COUNTY POPULATION 65 OR OLDER	2010-2020	Population of older adults per county
nhfreq	NUM NHS PER 1000 OLDER ADULTS	2010-2020	Number of nursing homes located in a county per 1000 older adults
nhbeds	NUM NH BEDS PER 1000 OLDER ADULTS	2010-2020	Number of nursing home beds located in a county per 1000 older adults
nhalz	NUM NHS WTH DEMENTIA SPECIAL CARE UNIT PER 1000 OLDER ADULTS	2010-2020	Number of nursing home facilities with dementia special care units located in a county per 1000 older adults
hhafreq	NUM HHAS PER 1000 OLDER ADULTS	2011-2020	Number of home health agencies located in a county per 1000 older adults
hhaserving	NUM HHAS SERVING COUNTY PER 1000 OLDER ADULTS	2010-2020	Number of home health agencies serving a county per 1000 older adults
hospfreq	NUM HOSPICE AGENCIES PER 1000 OLDER ADULTS	2011-2020	Number of hospice agencies located in a county per 1000 older adults
hospserving	NUM HOSPICE AGENCIES SERVING COUNTY PER 1000 OLDER ADULTS	2017-2020	Number of hospice agencies serving a county per 1000 older adults
adcfreq	NUM ADC PROVIDERS PER 1000 OLDER ADULTS	2018, 2020	Number of adult day care providers located in a county per 1000 older adults
rcalfreq	NUM RC AL SETTINGS PER 1000 OLDER ADULTS	2019	Number of residential care/assisted living settings located in a county per 1000 older adults
rcalbeds	NUM RC AL BEDS PER 1000 OLDER ADULTS	2019	Number of residential care/assisted living beds located in a county per 1000 older adults
rcalalz*	NUM RC AL SETTINGS LICENSED FOR DEMENTIA SPECIAL CARE PER 1000 OLDER ADULTS	2019	Number of residential care/assisted living settings licensed for dementia special care located in a county per 1000 older adults*

Notes. NH=nursing home; HHA=home health agency; RC/AL= residential care/assisted living; ADC=adult day care; *RC/AL with dementia special care units not available for all states in 2019. Excluded states are AZ, CA, CT, DE, GA, HI, KS, KY, LA, MD, MA, NH, NM, ND, SD, TN, UT, and WV.

Appendix B. Available Long-Term Care Market Measures by Year

Variable	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
year	x	x	x	x	x	x	x	x	x	x	x
state & statefips_n	x	x	x	x	x	x	x	x	x	x	x
countyfips_n	x	x	x	x	x	x	x	x	x	x	x
cpop65	x	x	x	x	x	x	x	x	x	x	x
nhfreq	x	x	x	x	x	x	x	x	x	x	x
nhbeds	x	x	x	x	x	x	x	x	x	x	x
nhalz	x	x	x	x	x	x	x	x	x	x	x
hhafreq		x	x	x	x	x	x	x	x	x	x
hhaserving	x	x	x	x	x	x	x	x	x	x	x
hospfreq		x	x	x	x	x	x	x	x	x	x
hospserving								x	x	x	x
adcfreq									x		x
rcalfreq										x	
rcalbeds										x	
rcalalz*										x	

Note: * RC/AL with dementia special care units not available for all states in 2019. Excluded states are AZ, CA, CT, DE, GA, HI, KS, KY, LA, MD, MA, NH, NM, ND, SD, TN, UT, and WV.