5. Appendices

Appendix A: Crosswalk of Research Priority Areas and Available Data Sources

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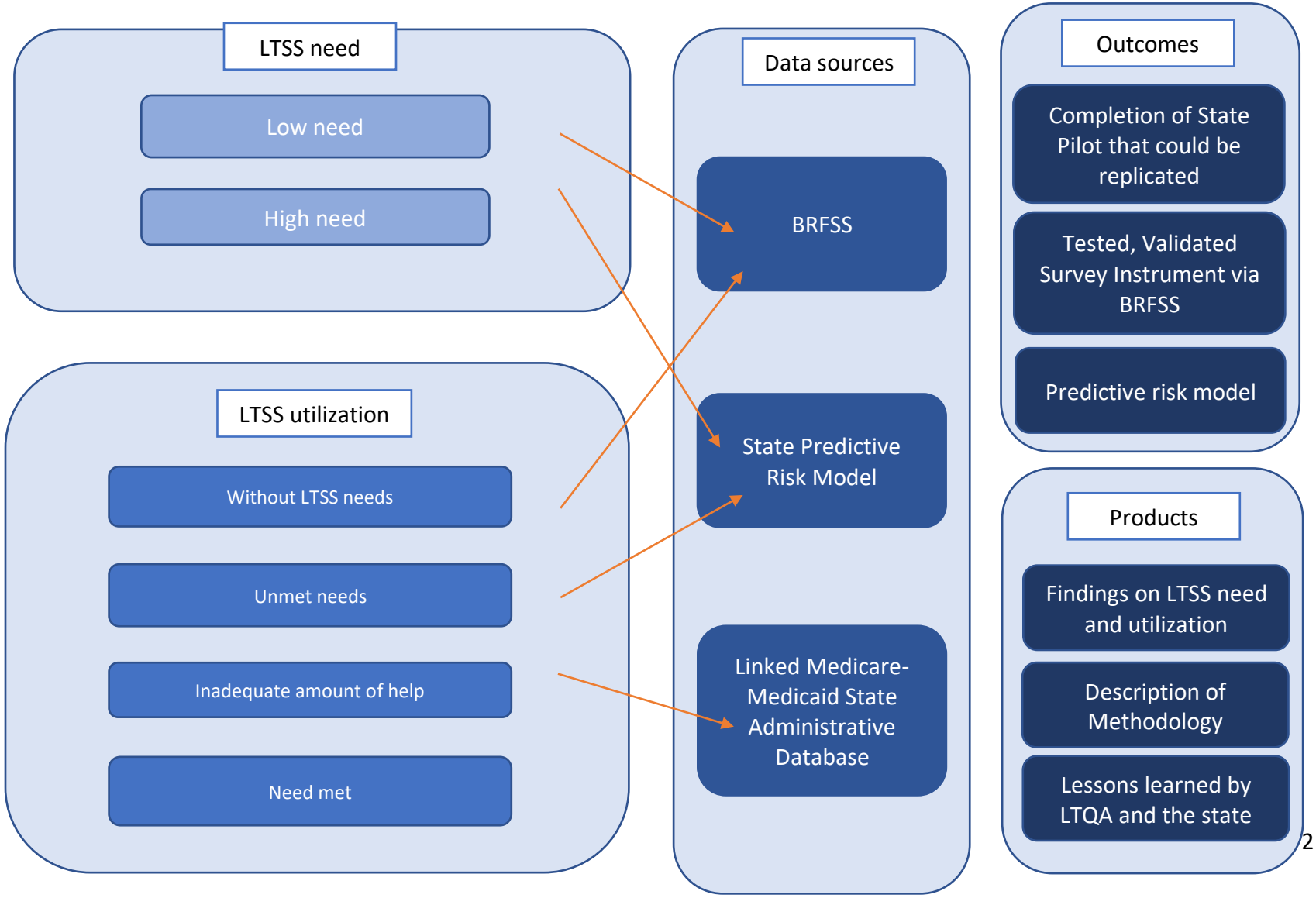
This figure graphically depicts how specific research topics will be addressed using different data sources. Note that for some of these topics of analysis, more than one data source (e.g., BRFSS Data, Predictive Risk Model, State Administrative Data) may apply.



Appendix B: Measuring LTSS Need Using the BRFSS

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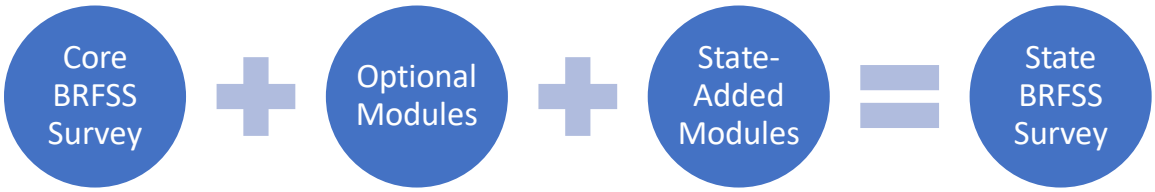
BRFSS Overview

The Behavioral Risk Factor Surveillance System (BRFSS), is the largest and longest-running national survey of adults in the US led by the Centers for Disease Control and Prevention (CDC) and administered by states. The BRFSS is a monthly telephone survey of randomly selected adults with the aim to collect data on health behaviors that contribute to the leading causes of death and chronic disease. The BRFSS uses both landlines and cell phones in its survey methodology. Each state's BRFSS consists of the core BRFSS survey, developed by the CDC. States may also select from a list of optional national modules, pre-approved by the CDC, as well as questions other departments in state governments submit for inclusion in the overall state BRFSS survey ("state-added modules") (see **Figure 1** below).

Figure 1. Composition of a State's BRFSS Survey



Several challenges presented by the BRFSS include the mode of delivery, the sampling frame, and the limited space for additional questions. First, because the BRFSS is administered telephonically, it may not reach people who do not typically communicate by phone or communicate without non-traditional communication supports. Also, since it is not a household survey, the survey would not capture any data on any members of the household other than the one answering the survey. Thus, if someone with a disability lives in the home but doesn't answer the phone, their data will not be included in the survey. Second, the BRFSS excludes people who reside in congregate residential settings, meaning it would omit a large population of individuals with disabilities and long-term services and supports (LTSS) need who live in these settings. Third, given that the BRFSS is already a lengthy survey, there is limited space for additional questions. The exact survey length varies by state, but many states aim for approximately twenty minutes in total. One state only allowed ninety seconds for optional questions, in addition to the core questions all states are required to include. Each state BRFSS coordinator can select additional modules (i.e., optional modules or state-added modules) to include in their state's BRFSS each year based on the state's priorities. While such restrictions must be taken into account, after engaging over fifty key opinion leaders, it was determined that the benefits of BRFSS were more attractive than other survey options, despite these limitations.

Core Disability Questions

The core BRFSS survey includes the six-item set from the Census Bureau's American Community Survey (ACS-6), which was designated by the Department of Health and Human Services (HHS) as the federal standard disability questions and is selected for use by most federal surveys. The six yes-or-no questions (listed below) ask respondents about difficulties hearing; seeing; concentrating, remembering, and making decisions; walking; dressing and bathing; and doing errands.

Core BRFSS Section 10: Disability

Response options for Section 10 Questions 1-6:

1 Yes
2 No

7 DON'T KNOW / NOT SURE
9 REFUSED

S10Q1. Some people who are deaf or have serious difficulty hearing use assistive devices to communicate by phone. Are you deaf or do you have serious difficulty hearing?

S10Q2. Are you blind or do you have serious difficulty seeing, even when wearing glasses?

S10Q3. Because of a physical, mental, or emotional condition, do you have serious difficulty concentrating, remembering, or making decisions?

S10Q4. Do you have serious difficulty walking or climbing stairs?

S10Q5. Do you have difficulty dressing or bathing?

S10Q6. Because of a physical, mental, or emotional condition, do you have difficulty doing errands alone such as visiting a doctor's office or shopping?

While the ACS-6 questions are currently being used to inform a wide range of state and federal programs and funding decisions, research over the past decade has highlighted a number of drawbacks to using the ACS-6 questions to measure disability. A recent Health Affairs study summarizes these limitations, which include incorrectly including people with temporary difficulties and systematically missing or undercounting certain subgroups of people, such as people with psychiatric disabilities and chronic illnesses that are disabling. Aside from these limitations, there is a high likelihood of systematically missing individuals with intellectual or developmental disabilities (I/DD) due to the survey being an individual, telephonic survey that does not ask about other members of the household (i.e., individuals with I/DD are unlikely to respond to the survey by phone).

Given these drawbacks, there are risks associated with using ACS-6 as the sole basis for identifying disability. However, on the other hand, there is also a risk of overstating disability by being overly inclusive and not differentiating based on the severity of these conditions; it is challenging to determine severity through a telephone survey. For example, counting individuals who self-report a mental illness or chronic illness without ascertaining the severity and whether the condition is functionally limiting may lead to significantly overestimating the population with disabilities.

While several national surveys now include the six standard disability questions, the disability rates estimated from different surveys are quite different. Using the same six questions, in 2019 the estimated disability rate from the ACS was 10.5 percent compared to 23.3 percent estimated from the 2019 BRFSS.[1]

LTSS Supplement Questions

Washington state added three supplemental questions related to LTSS (listed below), including need for help with Activities of Daily Living/Instrumental Activities of Daily Living (ADLs/IADLs), LTSS receipt and unmet need, and age of onset of health condition or disability.

The questions were asked of all respondents to the survey; exceptions include individuals who exited the survey before being asked the supplemental questions and individuals who reside in Washington State but have phone numbers with out-of-state area codes. Some of the cell phone surveys were collected by other states. When another state calls someone whose phone number suggests they live in that state, but they say they live in WA, then only the CDC core questions are asked. These cases are later re-assigned to the correct state but are missing data for the state-added questions (including the LTSS supplement questions). These cases are coded as missing.

(Note: in Texas, respondents were selected for the LTSS supplement if they responded "yes" to any of the ACS-6 or chronic illness questions – this was a broad net intended to pick up everyone who might have an LTSS need, but it addresses some of the limitations of the ACS-6.)

WA State Added Section 7: Long Term Support Services

In the last month, did you need assistance from another individual with any of these tasks because of a health condition or disability?

INTERVIEWER: Check all that apply

PLEASE READ:

[1] M. Mitra, et al. Addressing Health Equity and Reducing Health Disparities for People with Disabilities in the United States. Health Affairs 41, NO. 10 (2022): 1379–1386). Accessed at: https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2022.00499

1 Yes – Tasks like bathing/showering, getting dressed, eating/drinking, getting around your home, and using the toilet
2 Yes – Tasks like housework, preparing meals, managing medications, shopping, managing money

DO NOT READ:
8 No [EXCLUSIVE]
7 DON'T KNOW / NOT SURE [EXCLUSIVE]
9 REFUSED/Unclear/No Response [EXCLUSIVE]

WA7_2. In the last month, has anyone helped you on a regular basis at home or in the community with tasks like the ones mentioned previously?
PLEASE READ:
1 Yes – I am receiving the help I need
2 Yes – I am receiving *some* help but not enough

DO NOT READ:
8 No – I am not receiving any help [EXCLUSIVE]
7 DON'T KNOW / NOT SURE [EXCLUSIVE]
9 REFUSED/Unclear/No Response [EXCLUSIVE]

[ASK IF WA7_1=1,2 OR WA7_2=1,2]
WA7_3. You said that you need assistance because of a health condition or disability. Did this health condition / disability begin before the age of 18?
1 Yes
2 No

7 DON'T KNOW / NOT SURE
9 REFUSED

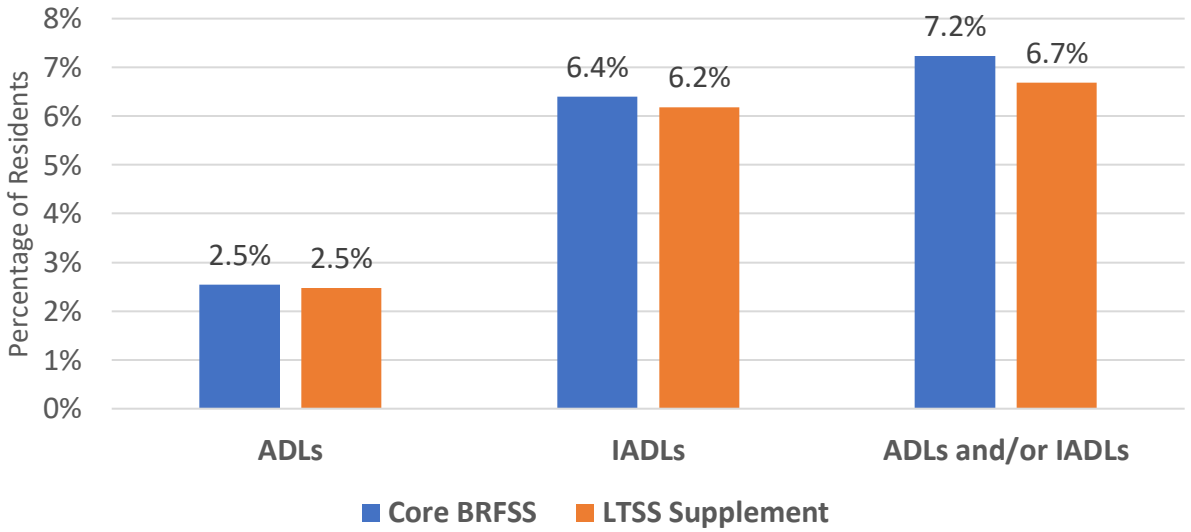
The first LTSS supplemental question is intended to capture whether the individual needs assistance with an ADL and/or IADL. Question 5 in the core disability questions (ACS-6) is also intended to capture ADLs and Question 6 is intended to capture IADLs. We found that the questions measuring ADLs and IADLs between the core BRFSS survey and the LTSS supplement resulted in similar estimates (Figure B2).

Table B1. Crosswalk of Questions to Measure Needing Help with ADLs and IADLs, Core BRFSS Disability Questions vs. LTSS Supplement

	Core BRFSS	LTSS Supplement
Needs help with ADLs	**S10Q5.** Do you have difficulty dressing or bathing?	In the last month, did you need assistance from another individual with any of these tasks because of a health condition or disability?

		1 Yes – Tasks like bathing/showering, getting dressed, eating/drinking, getting around your home, and using the toilet
Needs help with IADLs	**S10Q6.** Because of a physical, mental, or emotional condition, do you have difficulty doing errands alone such as visiting a doctor's office or shopping?	In the last month, did you need assistance from another individual with any of these tasks because of a health condition or disability? 2 Yes – Tasks like housework, preparing meals, managing medications, shopping, managing money

Figure B2. Percentage of Washington State Residents Ages 18-64 Reporting Needing Help with ADLs and IADLs, Core BRFSS Disability Questions vs. LTSS Supplement



Limitations of the LTSS Supplement:

- **Limited Granularity Due to Consolidated Question Design:** For question 1, due to limited space in the questionnaire, the questions measuring ADLs and IADLs were combined into a single question with ADLs and IADLs as separate response options. Originally, the question was designed to solicit a "yes/no" response to needing help with each individual activity (i.e., bathing/showering, getting dressed, eating/drinking, getting around your home, and using the toilet). The consolidated question design limits our ability to ascertain level of severity by presenting two broad response options with a variety of sample activities of daily living. Furthermore, in measuring LTSS need and unmet need using the BRFSS questions, it is important to note that the IADL-only responses may bring in individuals with functional limitations that would not meet state eligibility for LTSS services.
- **Possible Misinterpretation of Question Wording:** For question 2, some respondents who report receiving help did not report an ADL or IADL in question 1. Given the way the question was worded ("Did you need assistance from another individual with any of these tasks because of a health condition or disability?"), it is possible that these

individuals did not report needing help with an ADL or IADL in question 1 because they were already receiving help. However, since we do not have enough information to confirm this possible misinterpretation, and the levels of ADL and IADL reported were similar between the questions asked two different ways (i.e., core disability questions and LTSS supplemental questions), we decided to take their response to question 1 at face value. In order to estimate the prevalence of unmet need, those who report not needing assistance (LTSS1A=8) are excluded from those reporting not receiving help (LTSS2=8). This results in 10,433 cases being excluded from this analysis.

Appendix C: Washington State's Administrative Data Sources

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Data Sources: Data for the analysis of Medicare and/or Medicaid beneficiaries age 18-64 organized the covered population into three groups:

- Medicare-only beneficiaries,
- Dual Beneficiaries (Medicare+Medicaid), and
- Medicaid-only beneficiaries.

Our analysis of Medicare and/or Medicaid beneficiary characteristics relied on both separate Medicare and Medicaid beneficiary and claims files, and linked Medicare-Medicaid files.

Medicare Data: Claims and beneficiary data for Washington Medicare beneficiaries came from Fee-for-Service claim files (inpatient, outpatient, SNF, carrier, home health, DME), the Medicare Master Beneficiary Summary Files (MBSF Base, Chronic Condition, Other Condition, Cost and Utilization), and Part D claims. Prevalence estimates for the entire Medicare population (FFS and Medicare Advantage) are based on FFS enrollment, assuming that the FFS and MA populations are similar.[2]

Data for Medicare beneficiaries who are also covered by Medicaid ("Dual Beneficiaries") was linked to their Medicaid claims and enrollment data.

Medicaid Data: – the WA State Medicaid payment system (**ProviderOne)** provided information on medical care, behavioral health care (mental health and substance use disorder services), and LTSS, including encounter data for services delivered under managed care. Information included services and treatments received, diagnostic codes, levels of service and identifiers that allow cross-matching with other systems such as CARE.
LTSS utilization included claims for in-home, residential, and nursing home services for 2018. In-home services include ALTSA in-home services (agency provided and individual providers) and DDA personal care (agency provided and individual provider). Residential includes ALTSA adult family home, assisted living and adult residential care, and DDA residential care. Nursing home includes ALTSA and DDA funded care.

Comprehensive Assessment Reporting Evaluation (CARE): LTSS Assessment tool used to determine functional eligibility for Medicaid funded LTSS. This tool is used on approximately 70,000 individuals each year. The types of data elements include age, diagnosis, behavior support needs, cognitive performance score, treatments and therapies, level of assistance with activities of daily living and instrumental activities of daily living and ADL score. The system also captures paid support providers, types of paid supports authorized, and identification of informal supports to meet identified needs. The assessment is used for individuals who need

[2] The MBSF condition files were critical for the analysis. Note that the CMS algorithms used to identify conditions rely on FFS claims.

personal care assistance of all ages and functional disabilities. The assessment also includes acuity-based categorization ability.

Data Analysis:

Enrollment Counts and Demographics of Medicare and/or Medicaid Enrolled Population:

Medicare and/or Medicaid enrollment and beneficiary characteristics for beneficiaries ages 18 to 64 are compared to WA State population totals and characteristics for the same age group. The data for this comparison come from several sources.

Total Washington State Population age 18-64.

Source: American Community Survey, ACS 1-Year Estimates Data Profiles, 2018.

- Race/ethnicity groups are not mutually exclusive, with the exception of White alone, Non-Hispanic.
- Individuals may report more than one race, and the sum across groups exceeds the total population.

Medicare Enrollment

Source: Medicare Master Beneficiary Summary File, CY 2018

- Counts are for beneficiaries with Washington as the reported state of residence.
- Counts include both Fee-For-Service and Medicare Advantage enrollment. Counts exclude dual eligibles.
- Counts include enrollees with at least one month of Medicare coverage in 2018.
- Estimates are determined using a person-year methodology. Total person-year counts are determined by summing the total number of months that each beneficiary is enrolled in Parts A and/or B during the year and dividing by 12. Months with dual eligibility are excluded.
- Medicare race data are mutually exclusive; enrollees are assigned to one race only.
- Unknown race-ethnicity includes both cases where race is not provided and cases where race is reported as 'Other'.
- Medicare race data report Asian and Pacific Islander as a single category.

Medicaid-only Enrollment

Source: Medicaid enrollment files, CY 2018.

- Counts include enrollees with at least 1 month of full benefit coverage in 2018.
- Estimates are determined using a person-year methodology. Total person-year counts are determined by summing the total number of months that each enrollee was covered by Medicaid in the year and dividing by 12. Months with dual eligibility are excluded.
- Race/ethnicity groups are not mutually exclusive, with the exception of White alone, Non-Hispanic. Individuals may report more than one race, and the sum across groups exceeds the total population.

- Unknown race-ethnicity includes cases where race is not provided and cases where race is reported as 'Other'.

Dual Eligibles Enrollment

Source: Medicaid enrollment files, CY 2018

- Counts include full and partial dual eligibles.
- Estimates are determined using a person-year methodology. Total person-year counts are determined by summing the total number of months that each enrollee was dual eligible in the year and dividing by 12.
- Race/ethnicity groups are not mutually exclusive, with the exception of White alone, Non-Hispanic.
- Gender was unknown for 4 enrollees.

Medicare and/or Medicaid Beneficiaries with Disabilities – Counts and Demographics

Beneficiaries with disabilities were identified from Medicare and Medicaid claims files based on an analysis of diagnosis codes entered in beneficiary medical records. Diagnosis codes for serious medical conditions were grouped into categories. In addition, codes for durable medical equipment related to substantial functional limitations were combined with diagnoses of physical conditions into a "physical/functional" disability category. (See Appendix F) for more detail).

Medicare-only beneficiaries

Source: Medicare claims data, 2017 and 2018

- Medicare-only estimates exclude all dual eligible beneficiaries.
- Disability prevalence rates are estimated on a subset of beneficiaries that have 6 or more months of Medicare Fee-for-Service coverage in both 2017 and 2018.

Medicaid-only beneficiaries

Source: Medicaid claims files, 2017 and 2018

- Medicaid-only estimates exclude dual eligible beneficiaries.
- Disability prevalence rates are estimated on the subset of enrollees that have at least 6 months of full-benefit coverage and no third-party liability coverage.

Dual-eligible beneficiaries

Source: Medicaid enrollment files and Medicaid and Medicare claims data, 2017 and 2018

- Dual-eligible estimates include full and partial dual beneficiaries.
- Enrollment data and demographics are based on Medicaid data.
- Disability prevalence estimates are based on both Medicaid and Medicare claims data. Conditions are included if identified by Medicaid or Medicare claims data.

LTSS Recipient Counts, Demographics and Category of Disability

LTSS recipients received supports and services through one or more Medicaid-funded programs (see Appendix E). LTSS recipient counts and demographic data for both dual-eligible and Medicaid-only beneficiaries come from Medicaid enrollment files. Recipient counts are based on a person-year methodology. Dual-eligible counts include both full and partial duals. Disability prevalence estimates were developed using Medicare and Medicaid claims data.

Medicaid-only LTSS recipients

Source: Medicaid enrollment and claims data, 2017 and 2018

- Medicaid-Only LTSS recipient counts exclude dual-eligibles. Recipient counts are based on a person-year methodology.
- Disability prevalence rates are estimated on the subset of LTSS recipients that have at least 6 months of full-benefit coverage in 2017 and 2018 and no third-party liability coverage.

Dual-Eligible LTSS recipients

Source: Medicare and Medicaid claims data, 2017 and 2018

- Dual eligible counts include full and partial duals.
- Enrollment data and demographics based on Medicaid data. Recipient counts are based on a person-year methodology.
- Disability prevalence estimates based on Medicare and Medicaid claims data. Prevalence rates are based on beneficiaries with 6 or more months of FFS coverage in 2017 and 2018.

LTSS Recipient Counts by Settings and Acuity Scores

Counts of Medicaid LTSS recipients from the Medicaid enrollment and claims files according to the settings in which care was delivered were grouped for this analysis into three main groups: in-home, community residential, and nursing home as follows:

In Home

- Own home/relative's home

Residential – licensure type

- Adult Family Home (AFH)
- Assisted Living (AL)
- Enhanced Service Facility (ESF) *(for RSW clients only)*

Nursing Home

- Skilled Nursing Facility (SNF) *(for Long-Term Care clients)*
- SNF or Residential Habilitation Centers/Intermediate Care Facilities *(for Developmental Disabilities clients)*

Data on acuity of care and level of services come from the CARE Assessment Tool and data base. More information on the CARE Assessment and how acuity scores were calculated are provided in Appendix D.

Appendix D: Washington State Assessment Tool and Scoring Methods

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Washington State uses the Comprehensive Assessment Reporting Evaluation (CARE) to determine functional eligibility for Medicaid-funded LTSS. Information on Washington State's long-term care services, including the CARE Assessment, can be accessed here. While this appendix includes the subsections on measuring Activities of Daily Living (ADLs) and determining classification groups, please see the webpage for more information on how the tool measures cognitive performance, clinical complexity, mood and behaviors, etc.

CARE Assessment

The States uses the CARE tool to assess criteria in the following four areas to place individuals into one of the 17 classification groups:

(1) Cognitive performance.
(2) Clinical complexity.
(3) Mood/behaviors symptoms.
(4) Activities of daily living (ADLs).

In particular, CARE determines an ADL score ranging from zero to twenty-eight for each of the following ADLs.

(a) Personal hygiene;
(b) Bed mobility;
(c) Transfers;
(d) Eating;
(e) Toilet use;
(f) Dressing;
(g) Locomotion in room;
(h) Locomotion outside room; and
(i) Walk in room.

The CARE tool assigns the following points to the level of self-performance for each of the ADLs:

ADL Scoring Chart	
If Self Performance is:	**Score Equals**
Independent	0
Supervision	1
Limited assistance	2
Extensive assistance	3
Total dependence	4
Did not occur/no provider	4
Did not occur/client not able	4
Did not occur/client declined	0

Please see the Personal Care Assessment Key (pg. 3) more details on Activity of Daily Living (ADL) scoring.

Note: In Washington State, Nursing Facility Level of Care (NFLOC) eligibility is generally based on the following functional impairment levels:

- unmet need with at least three ADLs; or
- unmet need with at least two ADLs requiring a higher level of assistance than the three ADL method;
- unmet need with at least one ADL in addition to a cognitive impairment

Classification

Based on the CARE criteria, individuals are placed in a classification group for residential facilities or for in-home care. Please see WAC 388-106-0125 for more information on in-home care group classification and WAC 388-106-0115 for information on residential group classification.

The classification groups are then mapped into acuity groupings accordingly (Group 1 = highest acuity, to Group 5 = lowest acuity):

Group #	Description	Label
Group 1	Extremely limited ADLs, often immobile	E-Medium E-High D-High
Group 2	Very limited ADLs, plus clients with cognitive deficits	D-Medium D-Medium-High C-High C-Medium-High
Group 3	Moderately limited ADL with clinical complex or behavior	D-Low C-Medium B-High
Group 4	Moderately limited ADL and/or behavior challenges	A-High B-Medium-High B-Medium C-Low
Group 5	Moderately limited ADL	A-Low A-Medium B-Low

Appendix E: Washington State Long-Term Care Settings and Programs

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Settings

In Washington State, long-term care services can be received in three different categories of settings.

In Home

- Own home/relative's home

Residential – licensure type

- Adult Family Home (AFH)
- Assisted Living (AL)
- Enhanced Service Facility (ESF) *(for RSW clients only)*

Nursing Home

- Skilled Nursing Facility (SNF) *(for Long-Term Care clients)*
- Skilled Nursing Facility (SNF) or Residential Habilitation Centers/Intermediate Care Facilities *(for Developmental Disabilities clients)*

Washington State LTSS Programs - State Plan Amendment and HCBS Waiver Programs

The Home and Community Services (HCS)/ Aging and Long-Term Support Administration (ALTSA) and the Developmental Disability Administration (DDA) operate the following State Plan programs:

- 1915(k)
- Long Term Care Manual
    - Chapter 7 b Community First Choice
    - Chapter 7c MPC (Medicaid Personal Care)

HCS operates the following HCBS waivers:

- Community Options Program Entry System (COPES)
- New Freedom
- Residential Support Waiver (RSW)

DDA operates the following HCBS waivers:

- Basic Plus
- Core

- Community Protection (CP)
- Children with Intensive In-home Behavioral Supports (CIIBS)
- Individual and Family Services (IFS)

Each relevant program is described in further detail below. **Table E1** displays the services included in each Washington State LTSS program. **Table E2** outlines eligibility for the LTSS programs under HCS/ALTSA (excludes those under DDA).

State Plan Programs

Community First Choice

Brief Description: Community First Choice (CFC) is a Medicaid State Plan option granted under 1915(k) of the Social Security Act. Level of care eligibility for CFC includes those who, without home and community-based attendant services and supports that are provided under CFC, would require the level of care provided in a/an:

- Hospital;
- Skilled Nursing Facility (SNF);
- Intermediate Care Facility for Individuals with Intellectual Disabilities (ICF/IID);
- Institution providing psychiatric services for individuals under age 21; or
- Institution for Mental Diseases (IMD) for individuals age 65 or over.

Home and Community Services (HCS)	Nursing Facility Level of Care (NFLOC)
Developmental Disabilities Administration (DDA)	Intermediate Care Facility for individuals with Intellectual Disabilities (ICF/IID) Level of Care or Nursing Facility Level of Care (NFLOC)

Services provided under CFC include personal care, which is assistance with the following Activities of Daily Living (ADLs), Instrumental Activities of Daily Living (IADLs), and health-related tasks (for example, nurse delegation and PERS units). Assistance for IADLs is available only when the client also needs assistance with ADLs. ADLs and IADLs as listed in Washington Administrative Code (WAC) 388-106-0010 include:

ADLs	• Bathing • Body Care • Dressing • Eating • Personal hygiene • Toilet use	• Medication management • Transfer • Bed mobility • Locomotion outside room • Locomotion in room & immediate living environment • Walk in room & immediate living environment
IADLs	• Meal preparation	• Wood supply *(when sole source of heat)*

	• Ordinary housework • Essential shopping	• Travel to medical services • Telephone use

Eligibility: To be eligible for this program, all of the below criteria must apply.

1. ***Age***

Home and Community Services (HCS)/Area Agency on Aging (AAA)	• Clients must be 18 years of age or older.
Developmental Disabilities Administration (DDA)	• Clients who meet DDA's determination of a developmental disability may be any age. • Clients under 18 who do not meet DDA's determination of a developmental disability but have functional disabilities may be served by DDA until age 18. DDA will refer young adults age 18 and over to HCS unless they remain in foster care placement.

2. ***Functional Eligibility/CARE Determination***
   - Meets NFLOC as outlined in WAC 388-106-0355(1), ***or***
   - ICF/IID as outlined in WAC 388-828-3080 and 388-828-4400, ***or***
   - Will likely need institutional level of care within 30 days unless services are provided.

3. ***Financial Eligibility***
   - To be financially eligible for CFC, a client must be eligible for Categorically Needy (CN) or Alternate Benefit Plan (ABP) scope of care in the community. See LTC Manual Chapter 7a for more information regarding financial eligibility for LTC programs.

Care Settings:
Clients enrolled in CFC may choose to receive services in one of the Home and Community Based Settings (i.e., not Nursing Homes).

Medicaid Personal Care (MPC)

Brief Description: "Personal care services" means physical or verbal assistance with activities of daily living (ADL) and instrumental activities of daily living (IADL) due to functional limitations. Assistance is evaluated with the use of assistive devices. (**WAC 388-106-0010)**

- Personal care assistance enables clients to accomplish tasks that they would normally do for themselves if they did not have a disability/functional limitation. Assistance may:

- Include hands-on assistance (actually performing a task for the person) or cuing to prompt the client to perform a task.
- Be provided on an episodic or on a continuing basis.

– Includes assistance with ADLs and IADLs
  - IADLs may not comprise the entirety of the service for a client, they must also have unmet need for and *accept* assistance with ADLs.
– May include tasks completed outside of the client's home as specified in the CARE service plan to:
  - Support clients in community activities or to access other services in the community.
  - Assist a client to function in the workplace or as an adjunct to the provision of employment services.

For in-home settings, clients may choose an Individual Provider (IP) employed through the Consumer Directed Employer (CDE) contracted vendor for Washington state, Consumer Direct Washington (CDWA), or a Home Care Agency provider. For Residential, settings, clients may choose an adult family home (AFH), or a licensed assisted living facility (ALF).

Eligibility: To be eligible for this program, all of the below criteria must apply.

1. ***Age***

Home and Community Services (HCS)/Area Agency on Aging (AAA)	• Clients must be 18 years of age or older.
Developmental Disabilities Administration (DDA)	• Clients who meet DDA's determination of a developmental disability may be any age. • Clients under 18 who do not meet DDA's determination of a developmental disability but have functional disabilities may be served by DDA until age 18. DDA will refer young adults age 18 and over to HCS unless they remain in foster care placement.

2. ***Functional Eligibility/CARE Determination***
   - The individual has an unmet or partially met need as defined in WAC 388-106-0210; and
   - Does not meet institutional level of care as outlined in WAC 388-106-0355(1).

3. ***Financial Eligibility***
   - To be financially eligible for MPC, an individual must be eligible for non-institutional categorically needy (CN) or alternative benefit plan (ABP) medical. See Chapter 7a of the Long-Term Care (LTC) manual for more information regarding financial eligibility for LTC programs.

HCS/ALTSA Waivers

Core eligibility: a person must either be receiving SSI or be SSI-related. MAGI-based medical coverage groups are not eligible for HCBS waiver services, though they may apply, and be related to SSI via a non-grant medical assistance (NGMA) determination (a disability / blindness determination).

All HCS/ALTSA HCBS waivers follow the same financial eligibility rules described in Chapter 182-515 WAC. However, some HCBS waivers may only be offered in certain settings. See LTC Manual Chapter 7 for more information regarding settings.

DDA HCBS waivers also follow the same financial eligibility rules in Chapter 182-515 WAC; however, there are one key differences in financial eligibility between HCS and DDA HCBS waivers:

- Income eligibility for DDA HCBS waivers is capped at the special income level (SIL), whereas HCS HCBS waiver recipients can have income above the SIL.

Community Options Program Entry System (COPES)

Brief Description: Provides the opportunity for individuals who, in the absence of the home and community-based services and supports provided under COPES, would otherwise require the level of care furnished in a nursing facility.

Services in the COPES waiver act as a wraparound to services available to the Community First Choice (CFC) State Plan program. Since July 1, 2015, it would be highly unusual for a person to be enrolled in COPES and not also be enrolled in CFC because personal care is no longer available in COPES. Rules governing the COPES waiver can be found in WAC 388-106-0300 through 0335.

Eligibility: To be eligible for this program, all of the below criteria must apply.

1. ***Age***
   - Clients must be:
     - Eighteen or older and blind or have a disability, as defined in WAC **182-512-0050**; or
     - Sixty-five or older.

2. ***Functional Eligibility/CARE Determination***
   - Meets NFLOC as outlined in WAC 388-106-0355(1), (or will likely need institutional level of care within 30 days unless COPES services are provided); and
   - Client chooses community services under the waiver instead of nursing facility services.

3. ***Financial Eligibility***
    - A client's income and resources must fall within the limits set in WAC **182-515-1505**, community options program entry system (COPES).
        - Meet the Supplemental Security Income (SSI) disability criteria; and
        - Be eligible for institutional categorically needy (CN) medical coverage group.
        - See Chapter 7a of the LTC manual for more information regarding financial eligibility for LTC programs.

4. ***Individual must have needs that exceed what is available in CFC.***

New Freedom (NF)

Brief Description: Allows eligible Participants to receive services in their home and community while managing their own service plan and budget. NF offers older adults and adults with disabilities the option to manage a budget and decide for themselves what mix of services/goods will best meet their care needs.

NF provides flexibility to quickly adjust services and allows consumers to exercise more decision-making authority and to take primary responsibility for obtaining services. An individual budget and spending plan is developed based on the Participants' assessed needs and preferences and includes goods and services (including hiring and managing employees) that will best meet the identified needs. They may use their service budgets to hire their own personal care aides as well as purchase items or services that help them live independently.

Eligibility: To be eligible for this program, all of the below criteria must apply.

1. ***Age***
    - Clients must be:
        - Eighteen or older and blind or have a disability, as defined in WAC **182-512-0050**; or
        - Sixty-five or older.

2. ***Functional Eligibility/CARE Determination***
    - Meets NFLOC as outlined in WAC 388-106-0355(1).

3. ***Financial Eligibility***
    - Client must meet financial eligibility requirements described in WAC **182-513-1315**. The department must determine if the client's income and resources fall within the limits, and determine the amount the client may be required to contribute, if any, toward the cost of your care as described in WAC **182-515-1505**.

4. ***Reside in a county where New Freedom is offered.***

5. ***Reside in the client's own home, or will be living in their own home by the time NFCDS start.***

6. ***The client is:***
   - ***Not eligible for Medicaid Personal Care (MPC); or***
   - ***Eligible for MPC services, but the department determines that the amount, duration, or scope of the client's needs is beyond what MPC can provide.***

Residential Support Waiver (RSW)

Brief Description: Designed to provide personal care, community options, and specialized services for eligible clients with personal care and behavioral support needs. The RSW provides a cohesive and comprehensive continuum of specialized services targeted to adults with extremely challenging behavior. All clients who receive RSW services should also receive behavior support services.

The RSW serves clients who are returning to the community from state hospitals or community hospital psychiatric units, or have a history of failed/denied community residential settings, or are at risk of losing their current community residential setting due to behavioral challenges.

Eligibility: To be eligible for this program, all of the below criteria must apply.

1. ***Age***
   - Clients must be:
     - Eighteen or older and blind or have a disability, as defined in WAC **182-512-0050**; or
     - Sixty-five or older.

2. ***Functional Eligibility/CARE Determination***
   - Meets NFLOC as outlined in WAC 388-106-0355(1), (or will likely need institutional level of care within 30 days unless residential support waiver services are provided.

3. ***Financial Eligibility***
   - A client's income and resources must fall within the limits set in WAC **182-515-1505** and meet the income and resource criteria for home and community based waiver programs and hospice clients.

4. ***Client has been assessed as medically and psychiatrically stable and one or more of the following applies:***

   (i) Currently resides at a state mental hospital or the psychiatric unit of a hospital and the hospital has found you are ready for discharge to the community;
   (ii) Has a history of frequent or protracted psychiatric hospitalizations; or
   (iii) Has a history of an inability to remain medically or behaviorally stable for more than six months and;

(A) Has exhibited serious challenging behaviors[3] within the last year; or
(B) Has had problems managing your medication which has affected their ability to live in the community;

5. ***Because of the protracted nature of their behavior and clinical complexity, the client has no other placement options and have found no community placement with a qualified community provider;***

6. ***Client has behavioral or clinical complexity that requires staffing supports available only in the qualified community settings provided through the residential support waiver; and***

7. ***Client requires caregiving staff with specific training in providing personal care, supervision, and behavioral supports to adults with challenging behaviors.***

DDA Waivers

As noted above, DDA HCBS waivers also follow the same financial eligibility rules in Chapter 182-515 WAC; however, there are one key differences in financial eligibility between HCS and DDA HCBS waivers:

- Income eligibility for DDA HCBS waivers is capped at the special income level (SIL), whereas HCS HCBS waiver recipients can have income above the SIL.

For waiver eligibility for all DDA waivers, recipients must meet all criteria:

- Be an eligible client of DDA per RCW 71A.10.020(5).
- Have a disability according to criteria established in the Social Security Act.
- Apply for long-term care services/Medicaid and have verified income that does not exceed 300% of the SSI federal benefit standard.
    - If a child, parent's income and resources are not considered.
    - If an adult living with a spouse, the spouse's income and resources are not considered.
- Have resources less than $2,000 or be in the Apple Health for Workers with Disabilities (HWD) program.
- Meets the level of care provided in an intermediate care facility for Individuals with intellectual disabilities as determined by the DDA assessment.
- A person-centered service plan shows how health, safety, and habilitation needs can be met in the community with a monthly waiver service and/or monitoring.
- Agree to accept home and community-based services rather than an ICF/IID.

[3] Under this section, "challenging behaviors" means a persistent pattern of behaviors or uncontrolled symptoms of a cognitive or mental condition that inhibit the individual's functioning in public places, the facility, or integration within the community that have been present for long periods of time or have manifested as an acute onset.

Basic Plus

Brief Description: Supports individuals who require waiver services to meet their assessed health and safety needs in the community. Services are provided in their own home, family home, in an adult family home or adult residential center. The Basic Plus waiver serves individuals of all ages.

Eligibility: General criteria identified for all DDA waivers above.

Core

Brief Description: Offers residential options to individuals at immediate risk of institutional placement or have an identified health and welfare need for services that cannot be met by the Basic Plus Waiver. Age 0+

Eligibility: General criteria identified for all DDA waivers above.

Community Protection (CP)

Brief Description: Offers therapeutic residential supports for individuals assessed to require 24-hour, on-site staff supervision to ensure the safety of others. Participants voluntarily agree to follow the Community Protection guidelines. Individuals served are age 18 and older.

Eligibility: For Community Protection only, one must also:

- Be age 18 or older; and
- Meet eligibility criteria in WAC 388-831-0030

Children with Intensive In-home Behavioral Supports (CIIBS)

Brief Description: Supports youth at risk of out-of-home placement due to challenging behaviors. The CIIBS model involves wraparound planning and family-centered positive behavior support. The CIIBS waiver serves persons aged between 8 and 20.

Eligibility: CIIBS participants must also:

- Be age 8 through 17 for initial enrollment.
- Be determined in their CARE assessment to be at high or severe risk for out-of-home placement due to challenging behaviors.
- Live with family member who agrees to participate in the CIIBS program.
- Live with family member who agrees to participate in the CIIBS program

Individual and Family Services (IFS)

Brief Description: Supports individuals who require waiver services to remain in the family home. Individuals must live with a family member. Services are limited by the amount of the annual allocation, which is determined by the DDA assessment ($1,200; $1,800; $2,400; or $3,600)

Eligibility: For IFS only, a person must also:

- Live in the family home. This means living with at least one other family member; a spouse, natural, adoptive or stepparent, child, stepchild, sibling, stepsibling, aunt, uncle, grandparent, first cousin, niece or nephew.

Table E1. Service Comparison Chart for Washington State LTSS Programs

Note: "X" means the service is available in the program *Administrative activity available to all clients **ARC only ***Residential settings only	DDA 1915(c) Waivers					ALTSA (HCS) 1915(c) Waivers			State Plan Programs	
	BASIC PLUS	CORE	CP	CIIBS	IFS	COPES	RESIDENTIAL SUPPORT WAIVER (RSW)	NEW FREEDOM (King & Pierce Counties only)	1915(k) Option CFC (DDA & HCS)	MPC (DDA & HCS)
Adult Day Care						X				
Adult Day Health						X	X			
Adult Family Home Specialized Behavior Support Service							X			
Assistive Technology				X	X				X	
Assistive/Adaptive Equipment										
Behavioral Health Stabilization Services – Behavioral Health Crisis Diversion Bed Services	X	X	X	X						
Behavioral Health Stabilization Services – Positive Behavior Support and Consultation	X	X	X	X	X					
Behavioral Health Stabilization Services – Specialized Psychiatric Services	X	X	X		X					
Caregiver Assistance Services										
Caregiver Management Training*						X	X		X	X
Chemical Extermination of Bed Bugs	X	X	X			X (Residential to in-home only)				
Client Support Training (HCS: also see Wellness Education)						X	X			
Community Choice Guiding (CCG)						X	X (limited)		X (HCS: CTS)	
Community Engagement					X					
Community Guide	X	X								
Community Inclusion	X	X								
Community Support: Goods and Services						X (Residential to in-home only)				
Community Transition Services (CTS)		X	X						X	
Emergency Assistance	X									
Enhanced Residential Services							X			
Environmental Adaptations	X	X	X	X	X	X		X		
Evidence-based Exercise Programs										

Note: "X" means the service is available in the program *Administrative activity available to all clients **ARC only ***Residential settings only	DDA 1915(c) Waivers					ALTSA (HCS) 1915(c) Waivers			State Plan Programs	
	BASIC PLUS	CORE	CP	CIIBS	IFS	COPES	RESIDENTIAL SUPPORT WAIVER (RSW)	NEW FREEDOM (King & Pierce Counties only)	1915(k) Option CFC (DDA & HCS)	MPC (DDA & HCS)
Expanded Community Services							X			
Health Maintenance & Therapy Supports										
Home Delivered Meals						X				
Home Safety Evaluation										
Housework/Errands										
Individual Directed Goods, Services, and Supports								X		
Individual Supported Employment/ Group Supported Employment	X	X	X							
Individualized Technical Assistance	X	X	X							
Minor Home Modifications/Repairs										
Nurse Delegation	X	X	X	X	X		X		X	X***
Occupational Therapy	X	X	X		X					
Peer Mentoring					X					
Personal Assistance Services								X		
Personal Care In-home	X								X	X
Personal Care licensed Adult Family Home									X	X
Personal Care licensed Assisted Living Facilities									X	X**
Personal Emergency Response System									X	
Person-Centered Planning Facilitation					X					
Physical Therapy	X	X	X		X					
Positive Behavior Support & Consultation	X	X	X	X	X					
Prevocational Services										
Relief Care									X	
Residential Habilitation		X	X							
Respite Care	X	X		X	X					
Risk Assessment	X	X	X	X	X					

Note: "X" means the service is available in the program *Administrative activity available to all clients **ARC only ***Residential settings only	DDA 1915(c) Waivers					ALTSA (HCS) 1915(c) Waivers			State Plan Programs	
	BASIC PLUS	CORE	CP	CIIBS	IFS	COPES	RESIDENTIAL SUPPORT WAIVER (RSW)	NEW FREEDOM (King & Pierce Counties only)	1915(k) Option CFC (DDA & HCS)	MPC (DDA & HCS)
Skilled Nursing	X	X	X		X	X	X			
Skills Acquisition Training									X	
Specialized Clothing				X	X					
Specialized Medical Equip. & Supplies	X	X	X	X	X	X	X			
Specialized Psychiatric Services	X	X	X		X					
Speech, Hearing & Language Services	X	X	X		X					
Staff/Family Consultation & Training	X	X	X	X	X					
Support Groups										
Supported Parenting Services					X					
Therapeutic Equipment & Supplies				X	X					
Training and Educational Supports								X		
Transportation (non-Medicaid Broker)	X	X	X	X	X	X				
Treatment and Health Maintenance								X		
Vehicle Modifications				X	X			X		
Wellness Education	X	X			X	X				
Wellness Programs & Activities										

Table E2. Eligibility Matrix for LTSS Programs Under HCS/ALTSA (Excludes DDA)

	State Plan Programs		Waiver Programs		
	CFC	**MPC**	**COPES**	**New Freedom**	**RSW**
Personal Care	X	X		X	X
Age	65+	65+	18+ and blind or disability; 65+	18+ and blind or disability; 65+	18+ and blind or disability; 65+
Setting*	In Home AFH AL	In Home AFH AL	In Home AFH AL	In Home	AFH AL ESF
Functional Eligibility	NFLOC	NOT NFLOC	NFLOC	NFLOC	NFLOC
Other	Can be combined with COPES	State Plan	Can be combined with CFC; provides wrap around services	Participant-directed services Voluntary Limited geographic availability: King (Seattle) and Pierce Counties	RSW serves clients who are returning to the community from state hospitals or community hospital psychiatric units, or have a history of failed/denied community residential settings, or are at risk of losing their current community residential setting due to behavioral challenges

**Not all services within a waiver are provided in all settings (e.g. home delivered meals for clients in residential settings.*

Appendix F: Categorized Conditions for Disability

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Disability Categories

Analysts at RDA developed predictive risk models to identify the factors most strongly associated with receipt of Medicaid Long-Term Services and Supports (LTSS). These factors include selected medical conditions, mental illnesses, intellectual and developmental disabilities, substance use disorders, and durable medical equipment utilization. Factors that substantially increase the odds of LTSS receipt were grouped into seven complex condition or disability categories. Less-intensive conditions that would not normally relate to disability were omitted.

The seven disability categories were:

- **Physical/Functional –** Mobility impairments, bed confinement, visual impairment, potentially disabling conditions
- **Severe Mental Illness –** Schizophrenia, psychotic disorders
- **Other Mental Illness –** Anxiety, depression, bipolar disorder, personality disorders
- **Substance Use Disorder –** Alcohol use disorders, drug use disorders
- **Intellectual/Developmental Disability –** Autism, downs syndrome, developmental delays
- **Cognitive Disability –** Traumatic brain injury, Alzheimer's disease
- **Complex Conditions –** Heart and vascular diseases, kidney disease, COPD, diabetes

TABLE F1.

Disability Type Definitions

Disability types include the following risk factors. [1]

FUNCTIONAL/PHYSICAL	
Functional	
Factor	**Description**
Hospital Beds	Hospital bed utilization based on durable medical equipment (DME) codes
Wheelchairs	Wheelchair utilization based on DME codes
Wheelchair Dependence	Wheelchair dependence based on diagnoses codes
Mobility Impairments	Mobility impairments based on diagnoses codes
Other reduced mobility	Other reduced mobility diagnosis code
Bed confinement	Bed confinement based on diagnoses codes
Physical	
Factor	**Description**
Cerebral Palsy	Based on diagnoses codes
Epilepsy and Other Seizures	Based on diagnoses codes
Multiple Sclerosis	Based on diagnoses codes
Muscular Dystrophy	Based on diagnoses codes
Spina Bifida	Based on diagnoses codes
Parkinson's	Based on diagnoses codes

Central Nervous System, High	CDPS condition category (e.g., Quadriplegia, amyotrophic lateral sclerosis) [2]
Blindness and Visual Impairment	Based on diagnoses codes
SCHIZOPHRENIA/PSYCHOTIC DISORDERS	
Factor	**Description**
Schizophrenia/Psychotic Disorders	Based on diagnoses codes
OTHER MENTAL ILLNESS	
Factor	**Description**
Anxiety Disorders	Based on diagnoses codes
Depression	Based on diagnoses codes
Bipolar Disorder	Based on diagnoses codes
Personality Disorders	Based on diagnoses codes
Depression/Anxiety Rx	Based on MRx code sets [3]
SUBSTANCE USE DISORDERS (SUD)	
Factor	**Description**
Alcohol Use Disorders	Based on diagnoses codes
Drug Use Disorders	Based on diagnoses codes
INTELLECTUAL/DEVELOPMENTAL	
Factor	**Description**
Autism Spectrum Disorders	Based on diagnoses codes
Intellectual Disabilities	Based on diagnoses codes
Other Developmental Delays	Based on diagnoses codes [4]
DD, low	CDPS condition category
COGNITIVE	
Factor	**Description**
Alzheimer's Rx	Based on MRx code sets
Alzheimer's	Based on diagnoses codes
Traumatic Brain Injury	Based on diagnoses codes
COMPLEX CONDITION	
Factor	**Description**
Acute Myocardial Infarction	Based on diagnoses codes
Congestive Heart Failure	Based on diagnoses codes
Peripheral Vascular Disease	Based on diagnoses codes
Diabetes	Based on diagnoses codes
COPD	Based on diagnoses codes
Chronic Kidney Disease	Based on diagnoses codes
Diabetes Rx	Based on MRx code sets

(1) See Appendix Table G1 for diagnoses and DME code set sources.

(2) CDPS refers to the Chronic Illness and Disability Payment System, developed by researchers at the University of California, San Diego.

(3) MRx refers to Medicaid Rx Model, also developed by researchers at the University of California, San Diego. NDC codes are mapped to conditions.

(4) Other developmental delays include: developmental disorder of scholastic skills (F819), specific developmental disorder of motor function (F82), other disorders of psychological development (F88), and unspecified disorder of psychological development (F89).

Prevalence counts were produced for each of the seven disability categories. The prevalence counts included duplicate counts of beneficiaries with multiple diagnoses that would place them in more than one disability category.

Separately, beneficiaries were also grouped according to whether they had a single disability category or multiple "co-occurring" disability categories. The co-occurring categories are defined below (Table F2). Certain categories were displayed in the graphics on prevalence but were not labeled as part of a co-occurring disability in the analysis of co-occurring disabilities. Cognitive disability was rare in the 18-64 age group overall and not a major factor in co-occurring disabilities. Complex condition had a high prevalence overall, but a very small percentage aa a single disability category. Complex condition was viewed as a complicating factor in all of the co-occurring disability categories but was not considered by itself to result in a disability.

TABLE F2.

Disability and Comorbidity Categories

This table describes the algorithm used to allocate adults into single disability and co-occurring disability categories.

KEY: 1 = YES, 0 = NO

DISABILITY TYPES	Functional/ Physical	Schizophrenia	Other MI	SUD	Cognitive	I/DD	Complex Condition
DISABILITY NOT IDENTIFIED (1)	0	0	0	0	0	0	0
SINGLE DISABILITY							
Only Functional/Physical	1	0	0	0	0	0	0,1 (2)
Only Schizophrenia/Psychotic	0	1	0	0	0	0	0,1
Only Other MI	0	0	1	0	0	0	0,1
Only SUD	0	0	0	1	0	0	0,1
Only I/DD	0	0	0	0	0	1	0,1
Only Cognitive	0	0	0	0	1	0	0,1
Only Complex	0	0	0	0	0	0	1
COMOBIDITIES							
CO-OCCURING WITH I/DD							
IDD+Mental	0	AT LEAST ONE OF SCHIZOPHRENIA, OTHER MI, SUD, OR COGNITIVE				1	0,1
IDD+Physical	1	0	0	0	0,1	1	0,1
IDD+Physical+BH	1	AT LEAST ONE OF SCHIZOPHRENIA, OTHER MI, OR SUD			0,1	1	0,1
CO-OCCURING WITH PHYSICAL-BEHAVIORAL							
Physical+Mental/BH	1	AT LEAST ONE OF SCHIZOPHRENIA, OTHER MI, SUD, OR COGNITIVE				0	0,1
CO-OCCURING SMI-MI-SUD							
Mental/BH	0	AT LEAST TWO OF SCHIZOPHRENIA, OTHER MI, SUD, OR COGNITIVE				0	0,1

(1) Potential reasons for LTSS recipients not being assigned a disability category include:
Limited enrollment spans resulting in diagnoses not being reported in the claims analyzed.
Limited clinical contacts for some LTSS recipients.

The exclusion of risk factors that result in disability with lower frequency (e.g., stroke).
(2) 0,1 implies the category includes those with and without the given disability type.

Appendix G: Predictive Model

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I. Entry into Medicaid Long-Term Services and Supports among Washington Medicare Beneficiaries

We developed predictive risk models to identify the factors associated with entry into Medicaid Long-Term Services and Supports (LTSS) among Medicare beneficiaries in Washington State. Separate models were estimated for two subpopulations – working-age adults (ages 20 to 64) and elders (65 and older). We focus on the analysis for working-age adults below, though we briefly contrast the findings between working-age and elder beneficiaries.

Linked Medicare-Medicaid Data

Our analysis uses Medicare data for Washington State beneficiaries from 2013 to 2018. These data include: Fee-for-Service claim files (inpatient, outpatient, SNF, carrier, home health, DME), the Medicare Master Beneficiary Summary Files (MSBF Base, Chronic Condition, Other Condition, Cost and Utilization), and Part D claims. We had access to only two years of MedAdvantage encounter data, and our analysis was restricted to Fee-For-Service (FFS) beneficiaries.[4]

We link data for Medicare beneficiaries to Medicaid LTSS claims for in-home, residential, and nursing home services from 2018 to 2020. In-home services include ALTSA in-home services (agency provided and individual providers) and DDA personal care (agency provided and individual provider). Residential includes ALTSA adult family home, assisted living and adult residential care, and DDA residential care. Nursing home includes ALTSA and DDA funded care.

Beneficiary Characteristics

Demographic characteristics (age, gender, race, and ethnicity) and Medicare enrollment characteristics (e.g., Part B and D enrollment status) are provided in the MSBF Summary Files.

The Medicare data do not include information on household income. We used two income proxies in our analysis: Medicare Part D Subsidy receipt, which is reported in the MSBF files, and ZIP code-based income estimates, which we linked to beneficiaries. The Low-Income Subsidy provides assistance with Part D prescription drug coverage costs for eligible beneficiaries. Dual eligibles automatically receive the subsidy, and we include the Part D subsidy proxy in the LTSS entry models, not the Medicaid entry models. [5] The zip-code based income proxies (percent of families below the federal poverty line, percent of households with incomes above $100,000) are based on American Community Service data for census tracts, which we link to beneficiary zip codes, using weighted crosswalks between tracts and zip-code areas.

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[4] The MSBF condition files were critical for the analysis. Note that the CMS algorithms used to identify conditions rely on FFS claims.

[5] We performed a sensitivity analysis regarding inclusion of the Part D subsidy variable. We present, in appendix tables, Medicaid entry models with the Part D subsidy and LTSS models without the subsidy.

We also examine Z-code diagnoses associated with limited economic resources (e.g., low-income, homeless, lack of adequate food). Z-codes are used to record factors that affect health status and health care services. These indicators sometimes have significant effects in our models, but these diagnoses are reported infrequently.

Risk Factors

The analysis examined a host of potential risk factors associated with Medicaid entry and LTSS receipt, including: utilization of disability-related durable medical equipment; diagnosed disabling central nervous system conditions (e.g., Alzheimer's, multiple sclerosis); intellectual disabilities and developmental conditions, sensory and mobility impairments; frailty-related diagnoses (e.g., altered mental status, incontinence); medical comorbidities (e.g., cardiovascular diseases, diabetes); mental illnesses (e.g., schizophrenia, bipolar disorder, depression); and substance use disorders.

Table G1 provides a complete list for the risk factors used in the analysis and their sources.

These sources include:

- CDPS[6] Diagnostic Risk Groups applied to Medicare claims,
- MRX[7] Pharmacy Risk Groups applied to Medicare Part D event files,
- Medicare Master Beneficiary Summary File (MBSF) Condition files,
- MSBF Cost and Utilization files,
- DME code sets (from various sources) applied to Medicare claims, and
- Frailty codes sets (from various sources) applied to Medicare claims.

There is some overlap between the CDPS and MSBF condition categories. The CDPS groups often distinguish between the severity of a condition (e.g., diabetes low and medium). The MBSF conditions are often more specific (e.g., schizophrenia vs psychiatric high). The MRX indicators, based on drug NDC codes, have the advantage of identifying treated conditions.

TABLE G1.

Beneficiary Characteristics and Risk Factors

Demographics

VARIABLE NAME	DESCRIPTION	SOURCE
AGE	Age	MSBF Summary Files (1)
MALE	Male	MSBF Summary Files
BLACK	Black	MSBF Summary Files
OTHER	Other Race	MSBF Summary Files
ASIAN_PI	Asian/Pacific Islander	MSBF Summary Files
HISPANIC	Hispanic	MSBF Summary
AIAN	American Indian/Alaska Native	MSBF Summary

Coverage

VARIABLE NAME	DESCRIPTION	SOURCE

[6] CDPS refers to the Chronic Illness and Disability Payment System, developed by researchers at the University of California, San Diego.

[7] MRX refers to Medicaid Rx Model, also developed by researchers at the University of California, San Diego.

ESRD	ESRD Enrollment	MSBF Summary Files
NO_PARTB	No Part B Coverage	MSBF Summary Files
NO_PARTD	No Part D Coverage	MSBF Summary Files
ANY_MEDADVANTAGE	Any Medicare Advantage Months	MSBF Summary Files

Income

VARIABLE NAME	DESCRIPTION	SOURCE
PARTD_SUBSIDY	Part D Subsidy Receipt	MSBF Summary Files
PCT_FAM_POV	Percent Families Below Poverty Line	American Community Survey (Census Tract Linked To ZIPs)
PCT_HH_100K	Percent Households with Income >= $100,000	American Community Survey (Census Tract Linked To ZIPs)

Z-Code Dx Indicators

VARIABLE NAME	DESCRIPTION	SOURCE
LOW_INCOME	Poverty, Low income, Inadequate resources	Constructed Dx Code Set Applied to Medicare Claims
ALONE	Living alone, Problems from living alone	Constructed Dx Code Set Applied to Medicare Claims
HOMELESS	Homeless	Constructed Dx Code Set Applied to Medicare Claims
HOUSING	Inadequate housing	Constructed Dx Code Set Applied to Medicare Claims
FOOD	Lack of adequate food	Constructed Dx Code Set Applied to Medicare Claims

Disability DME Indicators

VARIABLE NAME	DESCRIPTION	SOURCE
Breathing	Breathing aids	Constructed DME Code Set Applied to Medicare Claims
Commode	Commode chair	Constructed DME Code Set Applied to Medicare Claims
DM_Footwear	Diabetic footwear	Constructed DME Code Set Applied to Medicare Claims
Hosp_bed	Hospital beds and associated supplies	Constructed DME Code Set Applied to Medicare Claims
Humidifiers	Humidifiers and nebulizers with related equipment	Constructed DME Code Set Applied to Medicare Claims
Oxygen	Oxygen delivery systems and related supplies	Constructed DME Code Set Applied to Medicare Claims
Walking_Aids	Walking aids and attachments	Constructed DME Code Set Applied to Medicare Claims
Wheelchair	Wheelchairs, components, and accessories	Constructed DME Code Set Applied to Medicare Claims

Potential Disabling Conditions – Central Nervous System

VARIABLE NAME	DESCRIPTION	SOURCE
CNSH	CNS, high	CDPS Code Sets Applied to Medicare Claims (2)
CNSL	CNS, low	CDPS Code Sets Applied to Medicare Claims
CNSM	CNS, medium	CDPS Code Sets Applied to Medicare Claims
MRX2	Alzheimer's Rx	MRX Code Sets Applied To Medicare Claims (3)
MRX33	Multiple Sclerosis / Paralysis Rx	MRX Code Sets Applied To Medicare Claims
MRX38	Parkinson's / Tremor Rx	MRX Code Sets Applied To Medicare Claims
PARKINSONS	Parkinson's Disease	Constructed Dx Code Set Applied to Medicare Claims
ALZH_E	Alzheimer's Disease (ever diagnosed)	MSBF Conditions Files
AUTISM_MEDICARE_E	Autism Spectrum Disorders (ever diagnosed)	MSBF Conditions Files
CERPAL_MEDICARE_E	Cerebral Palsy (ever diagnosed)	MSBF Conditions Files
EPILEP_MEDICARE_E	Epilepsy (ever diagnosed)	MSBF Conditions Files
MULSCL_MEDICARE_E	Multiple Sclerosis (ever diagnosed)	MSBF Conditions Files
MUSDYS_MEDICARE_E	Muscular Dystrophy (ever diagnosed)	MSBF Conditions Files
SPIBIF_MEDICARE_E	Spina Bifida (ever diagnosed)	MSBF Conditions Files

Potential Disabling Conditions – Developmental

VARIABLE NAME	DESCRIPTION	SOURCE
DDL	DD, low	CDPS Code Sets Applied to Medicare Claims
DDM	DD, medium	CDPS Code Sets Applied to Medicare Claims
INTDIS_MEDICARE_E	Intellectual Disabilities (ever diagnosed)	MSBF Conditions Files
LEADIS_MEDICARE_E	Learning Disabilities (ever diagnosed)	MSBF Conditions Files
OTHDEL_MEDICARE_E	Other Developmental Delays (ever diagnosed)	MSBF Conditions Files

Potential Disabling Conditions – Sensory

VARIABLE NAME	DESCRIPTION	SOURCE

VISUAL_MEDICARE_E	Blindness and Visual Impairment (ever diagnosed)	MSBF Conditions Files
HEARIM_MEDICARE_E	Deafness and Hearing Impairment (ever diagnosed)	MSBF Conditions Files

Potential Disabling Conditions – Skeletal

VARIABLE NAME	DESCRIPTION	SOURCE
SKCL	Skeletal, low	CDPS Code Sets Applied to Medicare Claims
SKCM	Skeletal, medium	CDPS Code Sets Applied to Medicare Claims
SKCVL	Skeletal, very low	CDPS Code Sets Applied to Medicare Claims
MRX36	Osteoporosis / Paget's Rx	MRX Code Sets Applied to Medicare Claims
HIP_FRACTURE_E	Hip/Pelvic Fracture (ever diagnosed)	MSBF Conditions Files
MOBIMP_MEDICARE_E	Mobility Impairments (ever diagnosed)	MSBF Conditions Files
OSTEOPOROSIS_E	Osteoporosis (ever diagnosed)	MSBF Conditions Files
RA_OA_E	Rheumatoid Arthritis/Osteoarthritis (ever diagnosed)	MSBF Conditions Files
SPIINJ_MEDICARE_E	Spinal Cord injury (ever diagnosed)	MSBF Conditions Files
FALLS	Fall-related Dx codes	Constructed Dx Code Set Applied to Medicare Claims
FRACTURE	Fragility or fracture	Constructed Dx Code Set Applied to Medicare Claims
OSTEOPOR	Osteoporosis	Constructed Dx Code Set Applied to Medicare Claims

Frailty Dx Indicators

VARIABLE NAME	DESCRIPTION	SOURCE
GAIT	Abnormal gait/difficulty walking	Constructed Dx Code Set Applied to Medicare Claims
THRIVE	Adult failure to thrive	Constructed Dx Code Set Applied to Medicare Claims
ALTERED	Altered mental status	Constructed Dx Code Set Applied to Medicare Claims
BEDDX	Bed confinement status	Constructed Dx Code Set Applied to Medicare Claims
WHEELCHAIRDX	Dependence on a wheelchair	Constructed Dx Code Set Applied to Medicare Claims
MACHINEDX	Dependence on other enabling machines and devices	Constructed Dx Code Set Applied to Medicare Claims
VERTIGO	Dizziness or Vertigo	Constructed Dx Code Set Applied to Medicare Claims
CVDEFFECT	Effects of cerebrovascular disease	Constructed Dx Code Set Applied to Medicare Claims
HYPO	Hypotension / Syncope	Constructed Dx Code Set Applied to Medicare Claims
COORD	Lack of coordination	Constructed Dx Code Set Applied to Medicare Claims
DISAB	Limitation of activities due to disability	Constructed Dx Code Set Applied to Medicare Claims
MALAISE	Malaise/Fatigue	Constructed Dx Code Set Applied to Medicare Claims
MUSCLE	Muscle weakness/wasting	Constructed Dx Code Set Applied to Medicare Claims
NEEDASSIST	Need for assistance/supervision	Constructed Dx Code Set Applied to Medicare Claims
NUTRITION	Nutritional deficiencies	Constructed Dx Code Set Applied to Medicare Claims
OTHMOBILITY	Other reduced mobility	Constructed Dx Code Set Applied to Medicare Claims
PEPTIC	Peptic Ulcer	Constructed Dx Code Set Applied to Medicare Claims
BREATH	Dyspnea/Shortness of breath	Constructed Dx Code Set Applied to Medicare Claims
INCONTINENT	Urinary Incontinence	Constructed Dx Code Set Applied to Medicare Claims
WEIGHTLOSS	Weight Loss (Cachexia)	Constructed Dx Code Set Applied to Medicare Claims
ULCERS_MEDICARE	Pressure Ulcers and Chronic Ulcers	MSBF Conditions Files

Comorbidities – Aids

VARIABLE NAME	DESCRIPTION	SOURCE
AIDSH	AIDS, high	CDPS Code Sets Applied to Medicare Claims
HIVM	HIV, medium	CDPS Code Sets Applied to Medicare Claims
MRX22	HIV Rx	MRX Code Sets Applied to Medicare Claims
HIVAIDS_MEDICARE_E	HIV/AIDS (ever diagnosed)	MSBF Conditions Files

Comorbidities – Cancer

VARIABLE NAME	DESCRIPTION	SOURCE
CANH	Cancer, high	CDPS Code Sets Applied to Medicare Claims
CANL	Cancer, low	CDPS Code Sets Applied to Medicare Claims
CANM	Cancer, medium	CDPS Code Sets Applied to Medicare Claims

CANVH	Cancer, very high	CDPS Code Sets Applied to Medicare Claims
MRX32	Malignancies Rx	MRX Code Sets Applied to Medicare Claims
CANCER_BREAST	Breast cancer (ever diagnosed)	MSBF Conditions Files
CANCER_COLORECTAL	Colorectal cancer (ever diagnosed)	MSBF Conditions Files
CANCER_PROSTATE	Prostate cancer (ever diagnosed)	MSBF Conditions Files
CANCER_LUNG	Lung cancer (ever diagnosed)	MSBF Conditions Files
CANCER_ENDOMETRIAL	Endometrial cancer (ever diagnosed)	MSBF Conditions Files
LEUKLYMPH_MEDICARE	Leukemias and Lymphomas	MSBF Conditions Files

Comorbidities – Cardiovascular/Cerebrovascular

VARIABLE NAME	DESCRIPTION	SOURCE
CAREL	Cardiovascular, extra low	CDPS Code Sets Applied to Medicare Claims
CARL	Cardiovascular, low	CDPS Code Sets Applied to Medicare Claims
CARM	Cardiovascular, medium	CDPS Code Sets Applied to Medicare Claims
CARVH	Cardiovascular, very high	CDPS Code Sets Applied to Medicare Claims
CERL	Cerebrovascular, low	CDPS Code Sets Applied to Medicare Claims
MRX3	Anti-coagulants Rx	MRX Code Sets Applied to Medicare Claims
MRX7	Cardiac Rx	MRX Code Sets Applied to Medicare Claims
MRX23	Hyperlipidemia Rx	MRX Code Sets Applied to Medicare Claims
AMI_E	Acute Myocardial Infarction (ever diagnosed)	MSBF Conditions Files
ATRIAL_FIB_E	Atrial Fibrillation (ever diagnosed)	MSBF Conditions Files
CHF_E	Heart Failure (ever diagnosed)	MSBF Conditions Files
HYPERL_E	Hyperlipidemia (ever diagnosed)	MSBF Conditions Files
HYPERT_E	Hypertension (ever diagnosed)	MSBF Conditions Files
ISCHEMICHEART_E	Ischemic Heart Disease (ever diagnosed)	MSBF Conditions Files
PVD_MEDICARE_E	Peripheral Vascular Disease (ever diagnosed)	MSBF Conditions Files
STROKE_TIA_E	Stroke/Transient Ischemic Attack (ever diagnosed)	MSBF Conditions Files

Comorbidities – Diabetes

VARIABLE NAME	DESCRIPTION	SOURCE
DIA1H	Diabetes, type 1 high	CDPS Code Sets Applied to Medicare Claims
DIA1M	Diabetes, type 1 medium	CDPS Code Sets Applied to Medicare Claims
DIA2L	Diabetes, type 2 low	CDPS Code Sets Applied to Medicare Claims
DIA2M	Diabetes, type 2 medium	CDPS Code Sets Applied to Medicare Claims
MRX10	Diabetes Rx	MRX Code Sets Applied to Medicare Claims
DIABETES_E	Diabetes (ever diagnosed)	MSBF Conditions Files

Comorbidities – Gastric

VARIABLE NAME	DESCRIPTION	SOURCE
GIH	Gastro, high	CDPS Code Sets Applied to Medicare Claims
GIL	Gastro, low	CDPS Code Sets Applied to Medicare Claims
GIM	Gastro, medium	CDPS Code Sets Applied to Medicare Claims
MRX15	Gastric Acid Disorder	MRX Code Sets Applied to Medicare Claims

Comorbidities – Blood Disorders

VARIABLE NAME	DESCRIPTION	SOURCE
HEMEH	Hematological, extra high	CDPS Code Sets Applied to Medicare Claims
HEML	Hematological, low	CDPS Code Sets Applied to Medicare Claims
HEMM	Hematological, medium	CDPS Code Sets Applied to Medicare Claims
HEMVH	Hematological, very high	CDPS Code Sets Applied to Medicare Claims
MRX29	Iron Deficiency	MRX Code Sets Applied to Medicare Claims
ANEMIA	Anemia	MSBF Conditions Files
SCD_MEDICARE_E	Sickle Cell Disease (ever diagnosed)	MSBF Conditions Files

Comorbidities – Infectious Diseases

VARIABLE NAME	DESCRIPTION	SOURCE
INFH	Infectious, high	CDPS Code Sets Applied to Medicare Claims

INFL	Infectious, low	CDPS Code Sets Applied to Medicare Claims
INFM	Infectious, medium	CDPS Code Sets Applied to Medicare Claims
MRX24	Infections, high Rx	MRX Code Sets Applied to Medicare Claims
MRX25	Infections, medium Rx	MRX Code Sets Applied to Medicare Claims
MRX26	Infections, low Rx	MRX Code Sets Applied to Medicare Claims
MRX20	Hepatitis Rx	MRX Code Sets Applied to Medicare Claims
MRX45	Tuberculosis Rx	MRX Code Sets Applied to Medicare Claims
HEPVIRAL_MEDICARE_E	Viral Hepatitis (ever diagnosed)	MSBF Conditions Files

Comorbidities – Metabolic

VARIABLE NAME	DESCRIPTION	SOURCE
METH	Metabolic, high	CDPS Code Sets Applied to Medicare Claims
METM	Metabolic, medium	CDPS Code Sets Applied to Medicare Claims
METVL	Metabolic, very low	CDPS Code Sets Applied to Medicare Claims
MRX43	Thyroid Disorder RX	MRX Code Sets Applied to Medicare Claims
MRX17	Gout Rx	MRX Code Sets Applied to Medicare Claims
MRX27	Inflammatory /Autoimmune Rx	MRX Code Sets Applied to Medicare Claims
MRX8	Cystic Fibrosis Rx	MRX Code Sets Applied to Medicare Claims
HYPOTH_E	Acquired Hypothyroidis (ever diagnosed)	MSBF Conditions Files
CYSFIB_MEDICARE_E	Cystic Fibrosis/Other Metabolic Developmental (ever diagnosed)	MSBF Conditions Files

Comorbidities – Pulmonary

VARIABLE NAME	DESCRIPTION	SOURCE
PULH	Pulmonary, high	CDPS Code Sets Applied to Medicare Claims
PULL	Pulmonary, low	CDPS Code Sets Applied to Medicare Claims
PULM	Pulmonary, medium	CDPS Code Sets Applied to Medicare Claims
PULVH	Pulmonary, very high	CDPS Code Sets Applied to Medicare Claims
MRX4	Asthma/COPD	MRX Code Sets Applied to Medicare Claims
ASTHMA_E	Asthma (ever diagnosed)	MSBF Conditions Files
COPD_E	Chronic Obstructive Pulmonary Disease (ever diagnosed)	MSBF Conditions Files

Comorbidities – Kidney/Liver

VARIABLE NAME	DESCRIPTION	SOURCE
RENEH	Renal, extra high	CDPS Code Sets Applied to Medicare Claims
RENL	Renal, low	CDPS Code Sets Applied to Medicare Claims
RENM	Renal, medium	CDPS Code Sets Applied to Medicare Claims
RENVH	Renal, very high	CDPS Code Sets Applied to Medicare Claims
MRX12	ESRD / Renal	MRX Code Sets Applied to Medicare Claims
MRX35	Neurogenic bladder	MRX Code Sets Applied to Medicare Claims
MRX31	Liver Disease	MRX Code Sets Applied to Medicare Claims
CHRONICKIDNEY_E	Chronic Kidney Disease (ever diagnosed	MSBF Conditions Files
LIVER_MEDICARE_E	Liver Disease, Cirrhosis (ever diagnosed)	MSBF Conditions Files

Comorbidities – Miscellaneous Conditions

VARIABLE NAME	DESCRIPTION	SOURCE
SKNH	Skin, high	CDPS Code Sets Applied to Medicare Claims
SKNL	Skin, low	CDPS Code Sets Applied to Medicare Claims
SKNVL	Skin, very low	CDPS Code Sets Applied to Medicare Claims
GENEL	Genital, extra low	CDPS Code Sets Applied to Medicare Claims
MRX37	Pain	MRX Code Sets Applied to Medicare Claims
MRX44	Transplant	MRX Code Sets Applied to Medicare Claims
HYPERP_E	Benign Prostatic Hyperplasia (ever diagnosed)	MSBF Conditions Files
FIBRO_MEDICARE_E	Fibromyalgia, Chronic Pain and Fatigue (ever diagnosed)	MSBF Conditions Files
MIGRAINE_MEDICARE_E	Migraine and Chronic Headache (ever diagnosed)	MSBF Conditions Files

OBESITY_MEDICARE_E	Obesity (ever diagnosed)	MSBF Conditions Files

Mental Illness

VARIABLE NAME	DESCRIPTION	SOURCE
PSYH	Psychiatric, high	CDPS Code Sets Applied to Medicare Claims
PSYL	Psychiatric, low	CDPS Code Sets Applied to Medicare Claims
PSYM	Psychiatric, medium	CDPS Code Sets Applied to Medicare Claims
PSYML	Psychiatric, medium low	CDPS Code Sets Applied to Medicare Claims
MRX5	Attention Deficit Rx	MRX Code Sets Applied to Medicare Claims
MRX9	Depression / Anxiety Rx	MRX Code Sets Applied to Medicare Claims
MRX40	Psychotic Illness / Bipolar Rx	MRX Code Sets Applied to Medicare Claims
ACP_MEDICARE_E	ADHD, Conduct Disorders (ever diagnosed)	MSBF Conditions Files
ANXI_MEDICARE_E	Anxiety Disorders (ever diagnosed)	MSBF Conditions Files
BIPL_MEDICARE_E	Bipolar Disorder (ever diagnosed)	MSBF Conditions Files
DEPRESSION_E	Depression (ever diagnosed)	MSBF Conditions Files
DEPSN_MEDICARE_E	TO10 Depression (includes depression Dx; ever diagnosed))	MSBF Conditions Files
PSDS_MEDICARE_E	Personality Disorders (ever diagnosed)	MSBF Conditions Files
SCHI_MEDICARE_E	Schizophrenia (ever diagnosed)	MSBF Conditions Files
SCHIOT_MEDICARE_E	Schizophrenia and Other Psychotic Disorders (ever diagnosed)	MSBF Conditions Files
BRAINJ_MEDICARE_E	Traumatic Brain Injury, Brain Damage (ever diagnosed)	MSBF Conditions Files
PTRA_MEDICARE_E	Post-Traumatic Stress Disorder (ever diagnosed)	MSBF CONDITIONS FILES

Substance Use Disorders

VARIABLE NAME	DESCRIPTION	SOURCE
SUBL	Substance abuse, low	CDPS Code Sets Applied to Medicare Claims
SUBVL	Substance abuse, very low	CDPS Code Sets Applied to Medicare Claims
MRX1	Alcoholism	MRX Code Sets Applied to Medicare Claims
TOBA_MEDICARE	Tobacco Use	MSBF Conditions Files
ALCO_MEDICARE_E	Alcohol Disorders (ever diagnosed)	MSBF Conditions Files
DRUG_MEDICARE_E	Drug Use Disorders (ever diagnosed)	MSBF Conditions Files

(1) MSBF refers to the Medicare Master Beneficiary Summary Files.
(2) CDPS refers to the Chronic Illness and Disability Payment System, developed by researchers at the University of California, San Diego.
(3) MRx refers to Medicaid Rx Model, also developed by researchers at the University of California, San Diego. NDC codes are mapped to conditions.

Risk Model Structure

The LTSS entry models predict the probability of receiving Medicaid LTSS within the next two years. The models examine the effects of risk factors, measured in a base year, on outcomes measured in subsequent years. The data include two base years (2017, 2018) and LTSS outcome data for three years (2018, 2019, and 2020). We impose a two-year 'clean period' during which the beneficiary must not receive LTSS. We also require that the beneficiary have at least 6 months of Fee-For-Service (FFS) coverage during the base year and be covered by Medicare in the outcome year.

The models are estimated using logistic regression, and machine learning techniques (stepwise selection, backward selection) were used to help identify which risk factors provided the best fit.

LTSS Entry Model, Working-Age Beneficiaries

In 2018, approximately 23,800 (12%) working-age Medicare beneficiaries in Washington State received Medicaid LTSS services. The LTSS entry model estimates and risk factor prevalence for working-age Medicare beneficiaries are presented in Tables G2. The model fits the data well with a c-statistic of 0.791.[8]

The following factors are strongly associated with LTSS entry among working-age beneficiaries.

- **Age –** Among working-age beneficiaries, the adjusted odds[9] of entering LTSS are higher among those aged 20-29 and 50-64, relative to those aged 30-49.
- **Income –** Part D subsidy receipt in the base year and living in a lower income area are strongly associated with LTSS entry.
- **Mental Illness –** Having schizophrenia/psychotic disorders substantially increases the odds of LTSS receipt. Among working-age LTSS recipients, 22% have been diagnosed with these conditions.
- **Substance Use Disorders –** Alcohol use disorder significantly increases the odds of LTSS entry. The prevalence of drug use disorders is relatively high among working-age beneficiaries, but equally so for those that do and do not receive Medicaid LTSS.
- **Intellectual and Developmental –** Autism, intellectual disabilities, and other developmental delays substantially increase LTSS odds. Among adult beneficiaries receiving Medicaid LTSS, 25% have intellectual disabilities, 17% have other developmental delays, and 9% have autism.
- **Mobility –** Mobility impairments and falls substantially increase the odds of LTSS entry. Among working-age beneficiaries receiving Medicaid LTSS, 18% have a diagnosed mobility impairment and 22% have a history of falls.
- **CNS Conditions –** Higher odds of LTSS entry are associated with Parkinson's, cerebral palsy, epilepsy and other seizures, MS, and muscular dystrophy. Among working-age LTSS recipients, 10% have cerebral palsy and 23% have epilepsy and other seizures.
- **Frailty –** The more important frailty indicators are abnormal gait, altered mental status, and pressure ulcers.
- **Utilization –** Multiple emergency department visits and other inpatient stays (psychiatric, rehabilitation) are the more impactful utilization indicators.
- **Medical Conditions –** Important comorbidities include diabetes, congestive heart failure, hypertension, peripheral vascular disease, chronic kidney disease, COPD, and obesity.

TABLE G2.

[8] The c-statistic (concordance) measures goodness of fit for logistic models. It gives the probability that a randomly selected individual with the outcome has a higher estimated risk score than an individual who does not have the outcome. Models with higher c-statistics do a better job of discriminating between those with and without the outcome.

[9] Adjusted odds provide a measure for a factor's effect, controlling for other variables in the model. Higher adjusted odds indicate a greater probability of the outcome.

Medicaid LTSS Entry Model, Working-Age Medicare Beneficiaries

Logistic Regression	
Study Population	Fee-For-Service (FFS) Medicare beneficiaries, age 20-64, not receiving Medicaid LTSS in base year
Dependent Variable	Medicaid LTSS entry within 2 years
Number of Observations	209,950
Model C-statistic	0.791

Analysis of Maximum Likelihood Estimates					Factor Prevalence (%)		
Parameter	**Estimate**	**Standard Error**	**Pr > ChiSq**	**Adjusted Odds Ratio**	**All Beneficiaries**	**LTSS Recipients**	**No LTSS Receipt**
Intercept	-5.1482	0.1163	<.0001				
DEMOGRAPHICS							
AGE 20-29	0.4178	0.0753	<.0001	1.519	4.6%	8.4%	4.1%
AGE 40-49	0.0986	0.0559	0.0777	1.104	19.1%	20.5%	18.9%
AGE 50-64	0.3568	0.0510	<.0001	1.429	63.1%	54.0%	64.4%
Male	-0.2234	0.0315	<.0001	0.800	53.6%	51.2%	54.0%
Black	0.1354	0.0535	0.0113	1.145	6.6%	6.5%	6.7%
Other Race	0.4288	0.1327	0.0012	1.535	0.9%	1.2%	0.8%
Asian/Pacific Islander	0.0596	0.0763	0.4342	1.061	3.6%	4.4%	3.5%
Hispanic	-0.0914	0.0562	0.1040	0.913	7.1%	7.2%	7.1%
American Indian/Alaska Native	-0.0938	0.0862	0.2766	0.910	2.5%	2.5%	2.6%
MEDICARE COVERAGE CHARACTERISTICS							
No Part B Coverage	-0.2295	0.0891	0.0100	0.795	11.5%	0.3%	13.1%
No Part D Coverage	-0.1716	0.0737	0.0200	0.842	30.8%	1.2%	35.0%
Any MedAdvantage Months	0.2177	0.0650	0.0008	1.243	3.6%	3.5%	3.6%
2018 Base Year	-0.0357	0.0286	0.2106	0.965			
SOCIOECONOMIC STATUS							
Part D Subsidy Receipt	1.3271	0.0580	<.0001	3.770	57.5%	98.7%	51.6%
Living Alone (Z-code)[1]	0.2409	0.2007	0.2299	1.272	0.2%	0.8%	0.2%
Homeless (Z-code)[1]	0.1172	0.0638	0.0665	1.124	3.1%	2.4%	3.2%
% Families Below Poverty Line	0.6723	0.4554	0.1399	1.959	8.8%	8.9%	8.8%
% Households with Income >= $100,000	-0.5790	0.1899	0.0023	0.560	27.4%	27.6%	27.4%
MENTAL ILLNESS							
Anxiety Disorders[2]	-0.0705	0.0370	0.0569	0.932	39.7%	48.8%	38.4%
Bipolar Disorder[2]	-0.0741	0.0411	0.0718	0.929	18.2%	22.1%	17.6%
Depression[2]	-0.0210	0.0361	0.5603	0.979	51.9%	59.2%	50.9%
Personality Disorders[2]	-0.0557	0.0548	0.3094	0.946	7.0%	9.9%	6.5%
Schizophrenia/Psychotic Disorders[2]	0.5005	0.0416	<.0001	1.650	13.7%	22.0%	12.5%
PTSD[2]	-0.1594	0.0475	0.0008	0.853	12.3%	12.4%	12.3%
SUBSTANCE USE DISORDERS							
Alcohol Use Disorders[2]	0.0843	0.0436	0.0534	1.088	11.0%	10.5%	11.1%
Opioid Use Disorder[2]	-0.0063	0.0467	0.8925	0.994	12.4%	14.0%	12.2%

Analysis of Maximum Likelihood Estimates					Factor Prevalence (%)		
Parameter	**Estimate**	**Standard Error**	**Pr > ChiSq**	**Adjusted Odds Ratio**	**All Beneficiaries**	**LTSS Recipients**	**No LTSS Receipt**
Other Drug Disorders[(2)]	0.0461	0.0446	0.3013	1.047	10.6%	9.3%	10.8%
INTELLECTUAL AND DEVELOPMENTAL							
Autism Spectrum Disorders[(2)]	0.4996	0.1165	<.0001	1.648	1.8%	8.7%	0.9%
Intellectual Disabilities[(2)]	0.6260	0.0825	<.0001	1.870	4.4%	25.2%	1.4%
Learning Disabilities[(2)]	-0.0152	0.1457	0.9170	0.985	1.2%	5.7%	0.5%
Other Developmental Delays[(2)]	0.5204	0.0978	<.0001	1.683	3.0%	17.1%	1.0%
COGNITIVE IMPAIRMENTS							
Alzheimer's[(2)]	0.9897	0.1543	<.0001	2.691	0.5%	2.1%	0.3%
Traumatic Brain Injury	0.3200	0.1380	0.0204	1.377	0.8%	2.4%	0.6%
DURABLE MEDICAL EQUIPMENT							
Diabetic footwear	0.3061	0.0815	0.0002	1.358	1.6%	4.9%	1.2%
Hospital beds	-0.3000	0.2727	0.2713	0.741	0.5%	2.7%	0.1%
Oxygen	0.2990	0.0717	<.0001	1.349	3.3%	8.3%	2.6%
Walking aids	0.1911	0.0613	0.0018	1.211	3.4%	6.2%	3.0%
Wheelchairs	0.1860	0.1016	0.0670	1.204	2.3%	12.1%	0.9%
MOBILITY IMPAIRMENTS							
Skeletal, medium	0.0737	0.0422	0.0807	1.076	12.1%	17.2%	11.4%
Hip/Pelvic Fracture[(2)]	0.2494	0.1196	0.0371	1.283	0.9%	2.6%	0.7%
Mobility Impairments[(2)]	0.3547	0.0683	<.0001	1.426	5.1%	17.6%	3.3%
Spinal Cord injury[(2)]	0.1781	0.1208	0.1405	1.195	1.2%	3.5%	0.9%
Falls	0.1690	0.0404	<.0001	1.184	12.0%	22.1%	10.6%
Other reduced mobility	0.2617	0.0936	0.0052	1.204	1.9%	7.2%	1.1%
Wheelchair dependence	0.1855	0.1198	0.1215	1.299	1.8%	9.3%	0.7%
CENTRAL NERVOUS SYSTEM CONDITIONS							
CNS, high	0.4044	0.1331	0.0024	1.498	1.4%	7.2%	0.6%
Parkinson's	0.7274	0.1380	<.0001	2.070	0.6%	1.6%	0.5%
Cerebral Palsy[(2)]	0.4921	0.1292	0.0001	1.636	1.7%	9.6%	0.6%
Epilepsy and other seizures[(2)]	0.1278	0.0506	0.0116	1.136	8.0%	23.5%	5.8%
Multiple Sclerosis[(2)]	0.2037	0.0914	0.0259	1.226	2.3%	3.8%	2.1%
Muscular Dystrophy[(2)]	1.0287	0.1945	<.0001	2.797	0.3%	0.8%	0.2%
Spina Bifida[(2)]	0.1652	0.1586	0.2977	1.180	0.8%	3.2%	0.5%
SENSORY IMPAIRMENTS							
Blindness and Visual Impairment[(2)]	0.2359	0.1193	0.0480	1.266	1.0%	3.1%	0.7%
FRAILTY INDICATORS							
Abnormal gait	0.2855	0.0496	<.0001	1.330	8.0%	21.4%	6.1%
Failure to thrive	0.6138	0.1213	<.0001	1.847	0.7%	2.9%	0.4%
Altered mental status	0.3109	0.0499	<.0001	1.365	6.0%	14.6%	4.8%
Hypotension	0.1630	0.0451	0.0003	1.177	8.6%	16.7%	7.4%
Coordination	0.1580	0.0780	0.0428	1.171	2.6%	9.7%	1.6%
Incontinence	0.1930	0.0541	0.0004	1.213	6.3%	19.4%	4.4%
Weight Loss	0.1781	0.0605	0.0033	1.195	4.2%	8.0%	3.6%
Pressure Ulcers	0.4988	0.0723	<.0001	1.647	3.6%	11.2%	2.5%
SERVICE UTILIZATION							
One ED Visit	0.0986	0.0399	0.0133	1.104	15.2%	17.5%	14.8%

Analysis of Maximum Likelihood Estimates					Factor Prevalence (%)		
Parameter	**Estimate**	**Standard Error**	**Pr > ChiSq**	**Adjusted Odds Ratio**	**All Beneficiaries**	**LTSS Recipients**	**No LTSS Receipt**
Two or more ED Visits	0.2743	0.0402	<.0001	1.316	15.8%	22.7%	14.8%
Any Acute Inpatient Stays	0.0847	0.0648	0.1909	1.088	13.0%	22.0%	11.7%
Any SNF Stays	0.2438	0.0883	0.0058	1.276	1.9%	7.2%	1.1%
Any Other Inpatient Stays (psych,rehab)	0.3602	0.0666	<.0001	1.434	2.4%	2.5%	2.4%
Any Home Health	0.2203	0.0746	0.0032	1.247	2.9%	10.6%	1.8%
Any Inpatient ED Visits	0.1168	0.0682	0.0869	1.124	9.7%	17.8%	8.5%
MEDICAL CONDITIONS							
Diabetes[(2)]	0.2257	0.0386	<.0001	1.253	22.9%	34.2%	21.3%
Acute Myocardial Infarction[(2)]	0.1820	0.0833	0.0289	1.200	1.9%	2.5%	1.8%
Atrial Fibrillation[(2)]	0.0880	0.0699	0.2079	1.092	3.1%	4.8%	2.8%
Congestive Heart Failure[(2)]	0.1300	0.0479	0.0067	1.139	10.2%	19.1%	8.9%
Hyperlipidemia[(2)]	-0.0727	0.0358	0.0423	0.930	38.2%	51.0%	36.3%
Hypertension[(2)]	0.1098	0.0371	0.0031	1.116	43.5%	51.8%	42.3%
Ischemic Heart Disease[(2)]	-0.0600	0.0437	0.1696	0.942	14.9%	20.6%	14.1%
Peripheral Vascular Disease[(2)]	0.2019	0.0527	0.0001	1.224	6.3%	17.4%	4.7%
Stroke[(2)]	0.0755	0.0612	0.2169	1.078	4.9%	10.4%	4.1%
ESRD Enrollment	0.0522	0.0969	0.5899	1.054	2.7%	3.9%	2.6%
Neurogenic bladder Rx	0.2508	0.0679	0.0002	1.285	3.1%	8.9%	2.3%
Chronic Kidney Disease[(2)]	0.1294	0.0398	0.0012	1.138	21.2%	32.3%	19.6%
Gastro, high	-0.2773	0.0926	0.0027	0.758	2.5%	6.0%	2.0%
Gastro, low	-0.1485	0.0400	0.0002	0.862	21.1%	28.3%	20.1%
Gastro, medium	-0.1044	0.0524	0.0465	0.901	8.1%	10.2%	7.8%
Gastric Acid Disorder Rx	0.1131	0.0369	0.0022	1.120	24.0%	42.6%	21.3%
Hematological, extra high	0.8090	0.4380	0.0647	2.246	0.1%	0.1%	0.0%
Hematological, very high	-0.3113	0.4781	0.5149	0.732	0.1%	0.1%	0.1%
Iron Deficiency Rx	0.0592	0.1012	0.5589	1.061	2.0%	3.6%	1.7%
Anemia[(2)]	0.0997	0.0345	0.0039	1.105	29.7%	47.1%	27.1%
Infectious, high	-0.0379	0.1313	0.7730	0.963	0.8%	2.1%	0.6%
Viral Hepatitis[(2)]	0.0427	0.0526	0.4169	1.044	5.8%	5.8%	5.8%
Metabolic, high	0.1137	0.0644	0.0773	1.120	3.6%	5.7%	3.3%
Thyroid Disorder Rx	0.1353	0.0439	0.0021	1.145	9.1%	18.0%	7.8%
Gout Rx	0.1163	0.0820	0.1563	1.123	1.9%	3.2%	1.7%
Cystic Fibrosis Rx	0.0475	0.1550	0.7592	1.049	0.5%	1.2%	0.4%
Pulmonary, very high	0.0118	0.0862	0.8912	1.012	2.4%	6.3%	1.8%
COPD[(2)]	0.1653	0.0371	<.0001	1.180	16.7%	23.2%	15.7%
Skin, high	0.0256	0.1006	0.7988	1.026	2.2%	9.2%	1.2%
Pain Rx	-0.2008	0.0356	<.0001	0.818	40.3%	48.8%	39.1%
Fibromyalgia, Chronic Pain[(2)]	-0.1312	0.0353	0.0002	0.877	38.9%	38.6%	38.9%
Obesity[(2)]	0.1434	0.0340	<.0001	1.154	27.5%	39.5%	25.8%
Cancer, high	0.0167	0.0944	0.8595	1.017	1.9%	2.2%	1.8%
Cancer, low	-0.3356	0.0982	0.0006	0.715	2.6%	2.4%	2.6%
Cancer, medium	0.3075	0.1388	0.0267	1.360	0.8%	1.0%	0.7%
Cancer, very high	0.3657	0.1170	0.0018	1.442	1.1%	1.2%	1.1%
Prostate cancer	0.4778	0.2308	0.0385	1.612	0.3%	0.2%	0.3%
Endometrial cancer	0.4947	0.2575	0.0548	1.640	0.2%	0.3%	0.1%

(1) Z-Codes are diagnoses used to record factors that affect health status and health services.
(2) Condition ever diagnosed.

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	79.1	Somers' D	0.582
Percent Discordant	20.9	Gamma	0.582
Percent Tied	0	Tau-a	0.029
Pairs	1112136256	c	0.791

LTSS Risk Factors Among Elder Versus Working-Age Beneficiaries

We estimated a similar LTSS entry model for elder Medicare beneficiaries aged 65 and older.[10] Between the elder and working-age adult populations, we observed similarities and differences in the factors associated with each outcome. Table G3 presents the effects of prominent risk factors for LTSS receipt, based on adjusted odds and factor prevalence. Adjusted odds provide a measure for a factor's effect, controlling for other variables in the model. The prevalence figures in the table report the percentage of beneficiaries with the factor, among those receiving LTSS. We summarize the results across risk factor categories below.

- **Mental Illness –** Among mental illnesses, Schizophrenia and other psychotic disorders had the largest effects on entry into LTSS for elders and, especially, working-age beneficiaries. Twenty-two percent of working-age beneficiaries receiving LTSS in 2018 were diagnosed with these conditions. Bipolar disorder and depression were also important factors for the elder population. However, these disorders were not significantly associated with LTSS receipt among the working-age beneficiaries, despite the relatively high rates of prevalence in this population. The conditions were relatively common among both those who received LTSS and those who did not.
- **Substance Use Disorders –** Alcohol and drug use disorders had large, significant effects on LTSS entry among elder beneficiaries. Despite higher overall SUD prevalence among working-age beneficiaries, the adjusted odds for SUDs were relatively low or insignificant. Again, SUD prevalence was high among both LTSS and non-LTSS working-age beneficiaries, so these factors were not strong predictors of who among this high-risk subpopulation would enter into LTSS. However, SUD prevalence is an important condition among this group—11% were diagnosed with alcohol use disorder, 14% opioid use disorder, and 9% other drug use disorders.
- **Cognitive Impairment –** Alzheimer's substantially increases the odds of LTSS entry among both working-age and elder beneficiaries. Whereas the condition is relatively rare among working-age beneficiaries, 21% of elder beneficiaries receiving LTSS were diagnosed with Alzheimer's.
- **Intellectual and Developmental –** Intellectual disability and developmental delays increase the odds of LTSS receipt. In this case, prevalence is low among the elder population and

[10] The LTSS entry model for elder beneficiaries had the same structure and used similar data to that for working-age beneficiaries. The model c-statistic for elders was 0.881.

high among working-age beneficiaries. Twenty-five percent of working-age LTSS recipients have an intellectual disability.

- **Central Nervous System (CNS) Conditions –** Potentially disabling CNS conditions (Parkinson's, cerebral palsy, epilepsy, and multiple sclerosis) increase the odds of LTSS receipt. Prevalence varies by population. Among elder LTSS recipients, 5% have Parkinson's and 2% have MS. Among working-age recipients, 10% have cerebral palsy and 23% have epilepsy and other seizures.
- **Mobility Impairments –** Diagnosed mobility impairments, a history of falls, and durable medical equipment use (e.g., wheelchairs, oxygen) are associated with higher LTSS odds in both populations. Among both elder and working-age LTSS recipients, about 18% have diagnoses indicating a mobility impairment; 11-12% use wheelchairs, and 8-10% use oxygen delivery equipment. Falls are especially prevalent among elders.
- **Frailty Indicators –** "Frailty" is a geriatric syndrome characterized by fatigue and decreased activity. It differs from chronic conditions in that it is not linked to specific diagnoses or diseases. Frailty indicators have been used to identify persons at high risk for receipt of long-term services and supports. Abnormal gait, altered mental status, incontinence, unexplained weight loss, and pressure ulcers are associated with higher odds of entry in both populations. Prevalence of these indicators is higher among elders, but is still substantial among working-age LTSS recipients.
- **Utilization –** Utilization of some services during the base year helps to predict LTSS entry in subsequent years for both populations. Multiple emergency department (ED) visits, ED visits that result in hospital admissions, skilled nursing facility (SNF) stays, and home health services are associated with higher odds of future LTSS receipt. Having other inpatient stays (psychiatric, rehabilitation) also increases LTSS odds for working-age beneficiaries, though utilization is relatively low.
- **Medical Conditions –** Diabetes, congestive heart failure, peripheral vascular disease, chronic kidney disease, and COPD are associated with higher odds of entry in both populations. These conditions are more prevalent among elders, but also occur in substantial numbers among working-age LTSS recipients.

TABLE G3.

Selected Adjusted Odds of LTSS Entry and Risk Factor Prevalence among Elder and Working-age Medicare Beneficiaries

		Elder Beneficiaries (65+)		Working-age Beneficiaries	
Category	**Factor**	Odds[(1)]	Prevalence[(2)]	Odds	Prevalence
Mental Illness	Bipolar Disorder	1.12	9.8%	0.93[(ns)]	22.1%
	Depression	1.34	63.3%	0.98[(ns)]	59.2%
	Schizophrenia/Psychotic Disorders	1.26	17.3%	1.65	22.0%
Substance Use Disorders	Alcohol Use Disorders	1.41	8.0%	1.09	10.5%
	Opioid Use Disorder	1.08	10.2%	0.99[(ns)]	14.0%
	Other Drug Disorders	1.25	4.7%	1.05[(ns)]	9.3%

Cognitive	Alzheimer's	2.04	21.2%	2.69	2.1%
Intellectual and Developmental	Intellectual Disabilities	1.76	3.8%	1.87	25.2%
	Other Developmental Delays	1.88	3.4%	1.68	17.1%
CNS Conditions	Parkinson's	1.50	5.1%	2.07	1.6%
	Cerebral Palsy	1.38	1.4%	1.64	9.6%
	Epilepsy and other seizures	1.07(ns)	9.7%	1.14	23.5%
	Multiple Sclerosis	1.50	2.0%	1.23	3.8%
Mobility	Mobility Impairments	1.41	17.8%	1.43	17.6%
	Falls	1.17	34.0%	1.18	22.1%
	Oxygen (DME)	1.14	9.9%	1.35	8.3%
	Wheelchairs (DME)	1.21	11.0%	1.20	12.1%
Frailty Indicators	Abnormal gait	1.16	41.2%	1.33	21.4%
	Altered mental status	1.42	28.3%	1.37	14.6%
	Incontinence	1.19	29.6%	1.21	19.4%
	Weight Loss	1.21	14.8%	1.20	8.0%
	Pressure Ulcers	1.18	14.9%	1.65	11.2%
Utilization	Two or more ED Visits	1.49	22.3%	1.32	22.7%
	Any SNF Stays	1.30	18.8%	1.28	7.2%
	Any Home Health	1.17	20.1%	1.25	10.6%
	Any Inpatient ED Visits	1.27	28.0%	1.12	17.8%
	Any Other Inpatient Stays (psych,rehab)	1.16	1.5%	1.43	2.5%
Medical Conditions	Diabetes	1.25	51.4%	1.25	34.2%
	Congestive Heart Failure	1.11	45.5%	1.14	19.1%
	Peripheral Vascular Disease	1.20	43.3%	1.22	17.4%
	Chronic Kidney Disease	1.22	56.4%	1.14	32.3%
	COPD	1.20	39.1%	1.18	23.2%
	Obesity	1.17	32.0%	1.15	39.5%

(ns) Not statistically significant.

(1) Adjusted odds of entry into LTSS within two years. The adjusted odds control for all other factors in the model.

(2) Prevalence refers to the percentage with a given factor among Medicare beneficiaries receiving LTSS in 2018.

II. Predictive Models Used to Identify Working-Age Individuals at High Risk of Needing LTSS

In order to assess the characteristics of adults with unmet LTSS need, we used predictive risk models to identify working-age Medicare, Medicaid, and dual eligible enrollees who were not receiving LTSS through Medicaid, but who are at high risk for needing LTSS. These models are similar to those discussed above. They use the same set of risk factors and rely on machine learning techniques (stepwise selection) to identify which factors provide the best fit. There are, however, two important differences.

First, the dependent variable in these models is LTSS status rather than entry. Logistic regressions are estimated to predict receipt of Medicaid LTSS during 2018. The models are concurrent (i.e., outcomes and risk factors are both measured in 2018).[11] Secondly, in addition to Medicare and dual beneficiaries, this analysis also includes Medicaid-only enrollees (non-dual eligibles).[12] We estimate one model for Medicare beneficiaries (including dual eligibles) and another for Medicaid enrollees. Both models fit the data well with c-statistics above 0.90.

The models are used to generate LTSS risk scores (i.e., predicted probabilities of LTSS receipt). We identify three groups among the working-age Medicare and Medicaid populations—(1) Medicaid LTSS recipients, (2) a high-risk group with high LTSS risk but who are not currently receiving it, and (3) a low-risk group who are not receiving it and have low predicted risk of doing so. The high-risk group is identified by selecting beneficiaries with higher risk scores, where the threshold score set so that the average risk score for the high-risk group is equal to the average risk score for LTSS recipients.

LTSS Status Model for Working-Age Medicare Beneficiaries and Dual Eligibles

Table G4 summarizes LTSS status model for Medicare beneficiaries and dual eligibles. The risk factors for this model are derived from the same data sources as in the LTSS entry models discussed above.

TABLE G4.

LTSS Status Model, Working-age Medicare Beneficiaries and Dual Eligibles

Logistic Regression	
Study Population	Medicare beneficiaries and dual eligibles aged 18-64
Dependent Variable	LTSS receipt in 2018
Number of Observations	120,678
Model C-statistic	0.905
NOTE:	Model restricted to beneficiaries with 6+ months of Fee-For-Service Medicare coverage.

[11] Risk factors are measured as of 2018. However, the typical look-back period to identify a factor is typically two or three years, and many of the indicators were constructed to reflect ever being diagnosed with a condition. So, the indicators are actually based on multiple years of claims.

[12] Among the roughly 40 thousand working-age individuals who received Medicaid-funded LTSS in 2018, approximately 18 thousand were Medicaid-only enrollees. These counts are based on person years.

Analysis of Maximum Likelihood Estimates				
Parameter	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > ChiSq**
Intercept	-1.0792	0.0633	290.33	<.0001
DEMOGRAPHICS				
Age	-0.0307	0.0012	676.61	<.0001
Male	-0.1658	0.0246	45.55	<.0001
Black	0.1831	0.0448	16.71	<.0001
Other Race	0.4381	0.1078	16.52	<.0001
Asian/Pacific Islander	0.3841	0.0533	51.89	<.0001
Hispanic	0.0696	0.0418	2.77	0.0961
American Indian/Alaska Native	-0.1054	0.0700	2.27	0.1322
MEDICARE COVERAGE CHARACTERISTICS				
No Part B Coverage	-1.2244	0.1386	78.09	<.0001
No Part D Coverage	-2.9970	0.0822	1330.77	<.0001
Any MedAdvantage Months	-0.1748	0.0563	9.64	0.0019
SOCIOECONOMIC STATUS				
Living Alone	0.3507	0.1698	4.27	0.0389
Homeless	-0.6418	0.0751	72.96	<.0001
% Families Below Poverty Line	0.5744	0.2522	5.19	0.0228
MENTAL ILLNESS				
Anxiety Disorders	-0.1029	0.0279	13.58	0.0002
Bipolar Disorder	-0.2604	0.0331	61.85	<.0001
Depression	-0.2522	0.0286	77.81	<.0001
Depression / Anxiety Rx	0.3127	0.0306	104.47	<.0001
Psychotic Illness / Bipolar Rx	0.6885	0.0356	373.02	<.0001
SUBSTANCE USE DISORDERS				
Alcohol Use Disorders	-0.1925	0.0391	24.28	<.0001
Drug Use Disorders	-0.1506	0.0314	23.02	<.0001
INTELLECTUAL AND DEVELOPMENTAL				
Autism Spectrum Disorders	1.4346	0.0606	560.72	<.0001
DD, low	1.1288	0.0634	317.04	<.0001
DD, medium	1.2003	0.2338	26.37	<.0001
Intellectual Disabilities	1.5844	0.0529	898.47	<.0001
Learning Disabilities	0.1461	0.0862	2.88	0.0899
Other Developmental Delays	1.3350	0.0559	569.71	<.0001
Attention Deficit Rx	-0.1371	0.0582	5.54	0.0185
COGNITIVE IMPAIRMENTS				
Alzheimer's	0.8325	0.1268	43.10	<.0001
Alzheimer's Rx	0.6613	0.1173	31.80	<.0001
Traumatic Brain Injury	0.4982	0.0623	63.95	<.0001
DURABLE MEDICAL EQUIPMENT				
Diabetic footwear	0.6817	0.0639	113.81	<.0001
Hospital beds	1.1548	0.1464	62.25	<.0001
Oxygen	0.5019	0.0548	83.82	<.0001
Walking aids	0.3094	0.0506	37.33	<.0001
Wheelchairs	0.9832	0.0611	258.67	<.0001
MOBILITY IMPAIRMENTS				
Hip/Pelvic Fracture	0.2265	0.0974	5.40	0.0201

Analysis of Maximum Likelihood Estimates				
Parameter	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > ChiSq**
Mobility Impairments	0.6296	0.0512	151.38	<.0001
Falls	0.1413	0.0328	18.52	<.0001
Bed confinement	0.2647	0.1275	4.31	0.0379
Wheelchair dependence (diagnosis)	0.5289	0.0741	51.00	<.0001
Other reduced mobility	0.4269	0.0633	45.47	<.0001
CENTRAL NERVOUS SYSTEM CONDITIONS				
CNS, high	0.8279	0.0800	107.17	<.0001
Parkinson's Rx	0.1364	0.0426	10.26	0.0014
Parkinson's	0.5253	0.1203	19.07	<.0001
Cerebral Palsy	1.4323	0.0694	426.55	<.0001
Epilepsy	0.6377	0.0346	339.99	<.0001
Multiple Sclerosis	0.1121	0.0673	2.78	0.0957
Muscular Dystrophy	0.7182	0.1568	20.98	<.0001
Spina Bifida	0.2434	0.0999	5.93	0.0148
SENSORY IMPAIRMENTS				
Blindness and Visual Impairment	0.6216	0.0860	52.21	<.0001
Deafness and Hearing Impairment	0.1701	0.0450	14.28	0.0002
FRAILTY INDICATORS				
Abnormal gait	0.4153	0.0381	118.61	<.0001
Failure to thrive	0.3588	0.1049	11.71	0.0006
Altered mental status	0.1981	0.0442	20.08	<.0001
Effects of cerebrovascular disease	-0.3042	0.1115	7.44	0.0064
Hypotension	0.0811	0.0381	4.55	0.033
Coordination	0.2435	0.0598	16.59	<.0001
Muscle weakness	0.2359	0.0430	30.07	<.0001
Shortness of breath	-0.1126	0.0315	12.76	0.0004
Incontinence	0.5923	0.0392	228.41	<.0001
Weight Loss	0.1994	0.0483	17.06	<.0001
Pressure Ulcers	-0.2624	0.0857	9.38	0.0022
SERVICE UTILIZATION				
One ED Visit	-0.1891	0.0314	36.21	<.0001
Two or more ED visits	-0.2235	0.0343	42.59	<.0001
Any Acute Inpatient stays	-0.2380	0.0392	36.84	<.0001
Any SNF stays	0.9271	0.0708	171.40	<.0001
Any other inpatient Stays	-0.8512	0.0810	110.55	<.0001
Any home health visits	0.3995	0.0570	49.05	<.0001
Any hospital readmissions	-0.2194	0.0692	10.04	0.0015
MEDICAL CONDITIONS				
HIV/AIDS	-0.2003	0.1066	3.53	0.0603
Cancer, low	-0.2216	0.0718	9.53	0.002
Cancer, medium	0.1969	0.1159	2.89	0.0894
Cancer, very high	-0.1986	0.1084	3.36	0.0669
Malignancies Rx	0.1001	0.0633	2.50	0.1141
Endometrial cancer	0.4339	0.2271	3.65	0.056
Leukemias and Lymphomas	-0.2205	0.1170	3.55	0.0596
Cardiovascular, low	0.0826	0.0316	6.83	0.009
Cerebrovascular, low	0.4777	0.0647	54.58	<.0001

Analysis of Maximum Likelihood Estimates				
Parameter	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > ChiSq**
Anti-coagulants Rx	-0.0599	0.0389	2.38	0.1231
Cardiac Rx	-0.0754	0.0277	7.43	0.0064
Hyperlipidemia Rx	0.1549	0.0319	23.55	<.0001
Acute Myocardial Infarction	-0.1641	0.0757	4.70	0.0302
Congestive Heart Failure	0.2166	0.0385	31.59	<.0001
Hyperlipidemia	0.0526	0.0300	3.07	0.0799
Peripheral Vascular Disease	0.5328	0.0404	173.52	<.0001
Diabetes, type 1 high (CDPS)	-0.5095	0.1030	24.45	<.0001
Diabetes, type 2 low (CDPS)	-0.1158	0.0489	5.60	0.0179
Diabetes, type 2 medium (CDPS)	0.0849	0.0499	2.90	0.0884
Diabetes (CMS)	0.2003	0.0433	21.41	<.0001
Gastro, low	-0.0576	0.0288	3.99	0.0457
Gastric Acid Disorder Rx	0.2358	0.0282	69.76	<.0001
Iron Deficiency Rx	0.1797	0.0681	6.96	0.0083
Anemia	0.1554	0.0273	32.51	<.0001
Infectious, high	-0.2694	0.1075	6.27	0.0123
Viral Hepatitis	0.1604	0.0473	11.51	0.0007
Metabolic, very low	0.4810	0.0367	171.98	<.0001
Gout Rx	-0.2706	0.0689	15.44	<.0001
Inflammatory Rx	-0.1944	0.0288	45.51	<.0001
Cystic Fibrosis Rx	0.2956	0.1170	6.39	0.0115
Acquired Hypothyroidism	0.1261	0.0302	17.41	<.0001
Cystic Fibrosis	0.2117	0.0764	7.67	0.0056
Pulmonary, low	-0.1119	0.0320	12.25	0.0005
Pulmonary, very high	0.1714	0.0675	6.44	0.0111
Asthma/COPD Rx	0.2487	0.0313	63.10	<.0001
COPD	0.2301	0.0333	47.65	<.0001
Neurogenic bladder Rx	0.2759	0.0493	31.34	<.0001
Chronic Kidney Disease	-0.0879	0.0330	7.08	0.0078
Skin, high	0.6985	0.0908	59.14	<.0001
Skin, low	0.3108	0.0778	15.95	<.0001
Pain Rx	-0.2393	0.0279	73.69	<.0001
Fibromyalgia, Chronic Pain	-0.0858	0.0284	9.10	0.0026
Migraine	-0.1449	0.0346	17.54	<.0001
Obesity	0.1064	0.0265	16.08	<.0001
Osteoporosis	0.3020	0.0530	32.49	<.0001
Osteoporosis Rx	0.1844	0.0804	5.26	0.0219

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	90.5	Somers' D	0.81
Percent Discordant	9.5	Gamma	0.81
Percent Tied	0	Tau-a	0.187
Pairs	1678747896	c	0.905

LTSS Status Model for Medicaid-Only Enrollees

Table G5 summarizes the LTSS status model for Medicaid-only enrollees. Enrollee demographic characteristics were derived from Medicaid enrollment files for 2018. Risk factors were estimated using Medicaid claims data from 2016-2018. The risk factors used in the analysis include all CDPS and MRx indicators. We derived selected CMS, DME and frailty indicators by applying the code sets to Medicaid claims.

TABLE G5.

LTSS Status Model, Working-age Medicaid Enrollees

Logistic Regression	
Study Population	Medicaid enrollees with 6+ months of Full-Benefit TXIX Coverage
Dependent Variable	LTSS receipt in 2018
Number of Observations	816,596
Model C-statistic	0.943
NOTES:	Enrollees with any month of full Third Party Liability (TPL) were excluded. Risk factors were estimated using Medicaid claims data from 2016-2018. The model was estimated with data for both Medicaid-only and dual eligible enrollees. Predicted risk scores were generated only for Medicaid-only (non-dual) enrollees.

Analysis of Maximum Likelihood Estimates				
Parameter	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > ChiSq**
Intercept	-7.3617	0.0285	66512.08	<.0001
DEMOGRAPHICS				
Age	0.0741	0.0005	25712.75	<.0001
Male	-0.2148	0.0122	307.99	<.0001
American Indian/Alaska Native	-0.3015	0.0346	76.14	<.0001
Asian	-0.1895	0.0228	69.14	<.0001
Black	-0.0235	0.0232	1.03	0.3098
Hispanic	-0.4691	0.0213	484.46	<.0001
Native Hawaiian/Pacific Islander	-0.2336	0.0360	42.03	<.0001
MENTAL ILLNESS				
Anxiety	0.1798	0.0166	117.71	<.0001
Bipolar Disorder	-0.2457	0.0246	99.40	<.0001
Schizophrenia/Psychotic Disorders	0.1721	0.0338	25.95	<.0001
Personality Disorders	-0.7916	0.0716	122.35	<.0001
Psychiatric, high	0.8326	0.0364	523.42	<.0001
Psychiatric, low	0.3574	0.0151	560.10	<.0001
Psychiatric, medium	0.5325	0.0239	495.11	<.0001
Psychiatric, medium low	0.3994	0.0159	631.53	<.0001
Depression / Anxiety Rx	-0.4025	0.0163	609.29	<.0001
Psychotic Illness / Bipolar Rx	0.2606	0.0227	132.00	<.0001
SUBSTANCE USE DISORDERS				
Alcohol Use Disorders	0.0696	0.0414	2.82	0.0933
Drug Use Disorders	-0.3746	0.0267	197.22	<.0001
Substance abuse, low	-0.1007	0.0270	13.94	0.0002

Analysis of Maximum Likelihood Estimates				
Parameter	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > ChiSq**
Substance abuse, very low	-0.5368	0.0389	190.00	<.0001
INTELLECTUAL AND DEVELOPMENTAL				
DD, low	3.0410	0.0442	4728.21	<.0001
DD, medium	3.4827	0.1690	424.48	<.0001
Intellectual Disabilities	1.2884	0.0534	583.12	<.0001
Other Developmental Delays	1.8575	0.0557	1111.20	<.0001
Autism Spectrum Disorders	2.9667	0.0456	4241.05	<.0001
COGNITIVE IMPAIRMENTS				
Alzheimer's	1.2017	0.0586	420.13	<.0001
Alzheimer's Rx	0.6343	0.0781	66.01	<.0001
Traumatic Brain Injury	0.5232	0.0511	105.02	<.0001
DURABLE MEDICAL EQUIPMENT				
Hospital beds	1.8785	0.0964	379.33	<.0001
Wheelchairs	1.8303	0.0357	2627.58	<.0001
MOBILITY IMPAIRMENTS				
Mobility Impairments	1.0648	0.0289	1355.23	<.0001
Other reduced mobility	0.8319	0.0367	513.11	<.0001
Wheelchair dependence	1.2534	0.0574	476.38	<.0001
Bed confinement	1.1932	0.0895	177.69	<.0001
CENTRAL NERVOUS SYSTEM CONDITIONS				
Cerebral Palsy	2.7397	0.0689	1579.30	<.0001
Multiple Sclerosis	0.7134	0.0637	125.25	<.0001
Muscular Dystrophy	1.7553	0.1322	176.21	<.0001
Epilepsy	0.7154	0.0254	796.10	<.0001
Parkinson's	0.7655	0.0597	164.28	<.0001
Spina Bifida	0.5444	0.0791	47.37	<.0001
CNS, high	1.0159	0.0547	344.69	<.0001
CNS, low	0.7967	0.0150	2802.38	<.0001
CNS, medium	0.4924	0.0373	174.43	<.0001
Multiple Sclerosis Rx	-0.2877	0.0172	279.27	<.0001
SENSORY IMPAIRMENTS				
Blindness and Visual Impairment	1.2887	0.0685	353.75	<.0001
MEDICAL CONDITIONS				
Acute Myocardial Infarction	-0.3840	0.0493	60.73	<.0001
Congestive Heart Failure	0.0899	0.0319	7.95	0.0048
Chronic Kidney Disease	0.0886	0.0201	19.52	<.0001
COPD	0.2392	0.0165	208.96	<.0001
Diabetes, type 1 high	-0.0251	0.0779	0.10	0.7469
Diabetes, type 1 medium	0.3341	0.0367	82.87	<.0001
Diabetes, type 2 low	0.4864	0.0201	587.22	<.0001
Diabetes, type 2 medium	0.3423	0.0236	211.08	<.0001
Diabetes Rx	-0.5947	0.0230	669.15	<.0001
Cardiovascular, extra low	0.2226	0.0144	237.68	<.0001
Cardiovascular, low	0.2049	0.0151	183.55	<.0001
Cardiovascular, medium	0.3192	0.0274	136.20	<.0001
Peripheral Vascular Disease	0.5299	0.0231	524.92	<.0001

Analysis of Maximum Likelihood Estimates				
Parameter	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > ChiSq**
Cancer, high	0.2677	0.0357	56.12	<.0001
Cancer, medium	0.1916	0.0417	21.07	<.0001
Cancer, very high	0.0712	0.0507	1.97	0.1606
Cardiovascular, very high	0.2306	0.0514	20.10	<.0001
Hematological, extra high	0.3443	0.2733	1.59	0.2078
Hematological, very high	0.6694	0.2329	8.26	0.0041
Pulmonary, high	0.0660	0.0542	1.48	0.223
Pulmonary, very high	0.6167	0.0316	381.92	<.0001
Renal, extra high	0.3983	0.0546	53.27	<.0001
Renal, very high	0.2655	0.0237	125.88	<.0001
Skeletal, medium	0.4134	0.0172	575.45	<.0001
Liver Disease Rx	0.8420	0.0618	185.85	<.0001
Pain Rx	-0.3757	0.0141	714.81	<.0001

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	94.3	Somers' D	0.887
Percent Discordant	5.7	Gamma	0.887
Percent Tied	0	Tau-a	0.101
Pairs	61970405388	c	0.943

Appendix H: Summary of Prior Studies Related to LTSS Receipt

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Our modelling efforts were informed by prior studies that examined determinants of long-term care utilization and receipt of Medicaid Long-Term Services and Supports (LTSS). Disability underlies the need for long-term care, and disability, in turn, is determined by a host of factors – complex medical conditions, mental illness, substance abuse, and geriatric syndromes. Other characteristics also play a role in determining who receives LTSS, such as demographics, income, living arrangements, and medical service utilization.

Disability

Disability, caused by physical or cognitive impairments, is the underlying factor responsible for entry into long-term care. Disability is defined as difficulty in performing basic or instrumental activities of daily living (Kim and Schneeweiss, 2014). Activities of daily living (ADLs) are basic self-care tasks, such as eating, bathing, mobility, and dressing. Serious physical impairment is defined as having difficulty with two or more ADLs (Willink, Davis, and Schoen, 2016). Instrumental activities of daily living (IADLs) include skills such as handing finances, shopping, and managing medications.

Studies have found that having multiple ADLs is a strong predictor of nursing home admission (Gaugler et al., 2007; Luppa et al., 2010a; Fong et al., 2015; Willink, Davis, and Schoen, 2016; Kurichi et al., 2017; Kurichi et al., 2017b; Ko et al., 2018). Unfortunately, information on ADLs and IADLs is typically not available for the general population. However, proxies for disability status have been developed using diagnosis codes, medical services, and prescription drug information reported in claims data.

Faurot and colleagues (2015) developed a claims-based algorithm to predict dependency in activities of daily living (ADL). Their model included demographics (age, race), diagnosed comorbidities (stroke, heart failure, cancer), geriatric syndromes (falls, hip fracture, pneumonia, dehydration, fecal impaction, delirium), and use of durable medical equipment (home hospital bed, wheelchair, home oxygen, walker). Davidoff and colleagues (2013) also developed a model to predict disability status based on health care service utilization and durable medical equipment.

Cognitive Impairment

Studies have found that cognitive impairment substantially increases the probability of nursing home entry (Gaugler et al., 2007; Luppa et al., 2010a; Kurichi et al., 2017; Ko et al., 2018; Willink and Schoen, 2016). Cognitive impairment is typically indicated by a diagnosis of Alzheimer's or related dementia.

Albrecht and colleagues (2018) note that only half of all individuals with dementia receive a diagnosis. They developed an algorithm to predict a diagnosis of dementia within two years, using healthcare utilization, comorbidities, and symptoms reported in claims data. Important comorbidities included: Parkinson's disease, multiple sclerosis, epilepsy, schizophrenia, and bipolar disorder. Symptoms included: weight loss, coordination difficulty, dizziness, and memory complaints.

Serious Mental Illness & Substance Use Disorders

Luppa and colleagues (2010a) found that, after controlling for other factors, a diagnosis of major depressive disorder increases the probability of nursing home admission. Willink, Davis, and Schoen (2016) found depression and 'psychiatric, emotional or nervous problems' to have significant effects on nursing home admission. Kurichi and colleagues (2017) found 'mental or psychiatric disorder' to be a factor.

Nursing homes are serving an increasing proportion of persons with serious mental illness (SMI), including schizophrenia, bipolar disorder, and major depressive disorder (Jester et al., 2020; Fashaw et al., 2020; Miller et al., 2012). This may be due, in part, to reductions in long-term psychiatric hospitalization (Donovan et al., 2013).

Fornaro and colleagues (2020) conducted a meta-analysis on the prevalence of SMI among nursing home residents. Based on studies for North America, they report that about 25% of residents have major depressive disorder. They concluded that there were too few studies on which to base a pooled estimate for the prevalence of schizophrenia.

Ko and colleagues (2018) found that nearly one-third of adult Medicaid beneficiaries who receive long-term services and supports (LTSS) are older adults and persons with disabilities who are not eligible for Medicare. These Medicaid-only beneficiaries have high rates of mental illness, as well as central nervous system disorders and substance use disorders.

Comorbidities

Studies find that several chronic conditions are predictive of nursing home entry. These conditions include: diabetes, stroke, chronic heart failure, myocardial infarction, cancer, and severe bladder incontinence (Willink et al., 2016; Kurichi et al., 2017; Luppa et al., 2010a; Maxwell et al., 2013; Rodriquez-Sanchez et al., 2017; Gaugler et al., 2007).

Frailty

"Frailty" is a geriatric syndrome characterized by fatigue, weakness, and decreased activity (Faurot et al., 2015). It affects one in 10 older adults living in the community, and one in every two nursing home residents (Kim, 2020). Frailty can help to predict functional decline, hospitalization, nursing home admission, and receipt of long-term services and supports (Kim and Schneeweiss, 2014; Kinosian et al., 2018).

There are two clinical assessments used to identify frailty.[13] However, frailty assessment data are not available for the general populations at risk for LTSS. In the absence of assessment data, studies have attempted to measure frailty using demographic information; health conditions[14]; health care service utilization; and diagnoses[15] (Kim, 2020; Cuthbertson et al., 2018; Pajewski et al., 2019; and Segal et al., 2017).

Utilization, Income, and Medicaid Entry

Medical service utilization, as noted above, has been used as a proxy for disability status and frailty. The expense of high utilization may also play a role in becoming dual eligible. Large medical expenses contribute to "spend down" toward meeting Medicaid eligibility guidelines. Keohane and colleagues (2017) examine the effects of healthcare utilization on Medicaid entry among Medicare beneficiaries. Controlling for other factors, they find that three types of utilization increase Medicaid entry—hospital inpatient days, skilled nursing facility days, and total number of months of nursing home care. They note that there are several potential reasons for this link, including poor health, large health expenses, and access to assistance with Medicaid applications.

Researchers have also examined the effects income on receipt Medicaid LTSS. Keohane and colleagues (2017) find that lower socioeconomic status (SES) among Medicare beneficiaries, measured by an index based on ZIP code-level statistics, and participation in financial assistance programs are associated with higher entry into Medicaid.

Willink, Davis and Schoen (2016) note that a disproportionate share of older persons with physical or cognitive impairments have incomes below 200 percent of the federal poverty level. They conclude that "the high costs of long-term services and supports are out of reach for many older Medicare beneficiaries, resulting in either individuals going without needed supports and services, or spending down their savings to qualify for Medicaid."

[13] These include the frailty phenotype and the frailty index (Kim and Schneeweiss, 2014; Kim et al., 2018; Campitelli et al., 2016).

[14] A partial list of conditions used in these studies includes: diabetes, congestive heart failure, peripheral vascular disease, myocardial infarction, stroke, renal disease, brain injury, skin ulcers, dementia, hypertension, hypotension, lipid abnormality, paralysis, Parkinson's disease, anemia, arthritis, cancers, osteoporosis, peptic ulcer, pulmonary disease, and thyroid disease.

[15] For example, studies have included: falls, vertigo, weakness, bladder dysfunction, dyspnea, fragility or fracture, hearing impairment, blindness and other vision defects, urinary incontinence, weight loss, and chronic pain.

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