

MN Elderly Waiver Enrollment Program Evaluation: Secondary Data Analysis

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Executive Summary

As part of a larger study of spenddown to Elderly Waiver (EW) eligibility for people in assisted living and in other community-based settings, the primary goal of the secondary data analysis was to leverage existing data resources to better understand different patterns and trajectories of participants prior to enrollment on EW. Data from several sources were selected to represent EW clients who were enrolled in the waiver program at some point during the calendar year 2019. Data from four sources (Long Term Care screenings, the Senior LinkAge Line (SLL), Minimum Data Set (MDS) assessments, and MN Health Care Program enrollment and utilization) were compiled and matched by the MN Department of Human Services team then sent to the research team as a de-identified data set for analysis. Frequencies and means were used to describe the characteristics of EW clients and a cluster analysis identified six natural groupings or clusters within the data.

Key Findings

- *New EW clients enrolling for the first time in 2019 represented approximately 16% of clients enrolled at any point during that year and were younger and more likely to have an informal caregiver than the full EW client population.*
- *Clusters of new enrollee clients indicate that, at the time of referral for EW, the largest proportion of clients live alone, lack an informal caregiver, need low levels of assistance with Activities of Daily Living (ADLs), particularly in toileting, and lower levels of need in Instrumental Activities of Daily Living (IADLs), and have persistently low income/low assets.*
- *It is not clear what proportion of EW clients enroll having been living in an assisted living (AL) facility, however they were likely concentrated in the cluster of new enrollees who were in congregated living. These clusters were characterized by high ADL/high IADL needs, high prevalence of cognitive impairment, and more recently qualifying for Medical Assistance.*
- *New enrollees appeared to have a mixed experience with Housing Options Counseling, with low utilization or more frequently declining Housing Options Counseling when offered.*
- *Linkage across other health-related datasets within MN, namely the SLL, MN Health Care Program data, and MDS data, provided evidence that by and large, enrollees have engagement with MN programs prior to EW. For example, nearly two-thirds of EW clients from 2019 had some record of contact with the SLL, 36% had a Skilled Nursing Facility (SNF) stay, and 57% had Medical Assistance enrollment at least 90 days prior to EW.*
- *Congregate living clusters each had the lowest average months between the date of first referral to EW enrollment (1.7 and 1.2 months, respectively) compared to all other clusters.*
- *The timing of the SNF stays was observed such that, other than within congregated living clusters, approximately 9-14% of clients had a SNF stay that began in the 90 days prior to EW enrollment. The frequency of NF admissions prior to EW enrollment was considerably higher among the congregated living clusters, approximately one-third of clients in both the moderate and high need congregated living clusters.*

- *Emergency department (ED) and hospitalizations were fairly common, with over 50% of clients in each cluster having had a prior ED visit, nearly 25% had multiple visits, and between 40-60% of clients had a hospitalization. Also notable is the high frequency of reported falls, which was between 40-55% of clients. Although a sizeable proportion of EW clients were observed to have Medical Assistance utilization claims, gaps in these data are highlighted by the MDS SNF stay observations. For example, the number of hospitalizations is far lower than expected given the high proportion of SNF stays, which are generally preceded by a hospitalization.*

1. Background

As the primary payer of long-term services and supports in the United States, state Medicaid programs are required to cover nursing home services for eligible adults. However, all states have also developed programs to provide optional home and community-based services (HCBS). These programs are typically approved via 1915(c) or 1115 waivers to cover additional services, or provide services to populations not covered according to Federal Medicaid regulations except as provided under special eligibility rules. As a result, there is considerable variation between states in the design and delivery of HCBS programs and services.

In Minnesota, the Elderly Waiver (EW) program provides payment for HCBS for Minnesotans aged 65 and older, eligible for Medical Assistance, who meet the level of need for nursing home care, and if services can be provided for less than the cost of care in a nursing home. This program includes services such as adult day, case management, family caregiver support, home-delivered meals, non-medical transportation, and skilled nursing visits. The EW program is one of several HCBS waivers in Minnesota.

Like many states, the EW program was part of a growing trend beginning in the 1980s of sustained investment in HCBS. In part, this investment was driven by the desire of Americans to remain in the community for as long as possible while also providing care that meets individuals' goals in a cost-effective manner.¹ In fact, several studies have observed higher levels of state-level spending on HCBS is associated with lower risk of long-term nursing home admissions,^{2,3,4,5,6} increased likelihood a hospital discharge is to the community,^{7,8} and

¹ Segelman, M., Intrator, O., Li, Y., Mukamel, D., Veazie, P., & Temkin-Greener, H. (2017). HCBS Spending and Nursing Home Admissions for 1915(c) Waiver Enrollees. *Journal of aging & social policy*, 29(5), 395–412. <https://doi.org/10.1080/08959420.2017.1319714>

² Blackburn, J., Locher, J. L., Morrissey, M. A., Becker, D. J., & Kilgore, M. L. (2016). The effects of state-level expenditures for home- and community-based services on the risk of becoming a long-stay nursing home resident after hip fracture. *Osteoporosis international : a journal established as result of cooperation between the European Foundation for Osteoporosis and the National Osteoporosis Foundation of the USA*, 27(3), 953–961. <https://doi.org/10.1007/s00198-015-3327-3>

³ Wang, S., Temkin-Greener, H., Simning, A., Konetzka, R. T., & Cai, S. (2021). Medicaid home- and community-based services and discharge from skilled nursing facilities. *Health services research*, 10.1111/1475-6773.13690. Advance online publication. <https://doi.org/10.1111/1475-6773.13690>

⁴ Thomas, K. S., Keohane, L., & Mor, V. (2014). Local Medicaid home- and community-based services spending and nursing home admissions of younger adults. *American journal of public health*, 104(11), e15–e17. <https://doi.org/10.2105/AJPH.2014.302144>

⁵ Muramatsu, N., Hoyem, R. L., Yin, H., & Campbell, R. T. (2008). Place of death among older Americans: does state spending on home- and community-based services promote home death?. *Medical care*, 46(8), 829–838. <https://doi.org/10.1097/MLR.0b013e3181791a79>

⁶ Miller N. A. (2011). Relations among home- and community-based services investment and nursing home rates of use for working-age and older adults: a state-level analysis. *American journal of public health*, 101(9), 1735–1741. <https://doi.org/10.2105/AJPH.2011.300163>

⁷ Muramatsu, N., Yin, H., Campbell, R. T., Hoyem, R. L., Jacob, M. A., & Ross, C. O. (2007). Risk of nursing home admission among older americans: does states' spending on home- and community-based services matter?. *The journals of gerontology. Series B, Psychological sciences and social sciences*, 62(3), S169–S178. <https://doi.org/10.1093/geronb/62.3.s169>

⁸ Segelman, M., Intrator, O., Li, Y., Mukamel, D., Veazie, P., & Temkin-Greener, H. (2017). HCBS Spending and Nursing Home Admissions for 1915(c) Waiver Enrollees. *Journal of aging & social policy*, 29(5), 395–412. <https://doi.org/10.1080/08959420.2017.1319714>

reduction in unmet needs of community-dwelling older adults.^{9,10} Although it is generally accepted that HCBS programs support important services which prevent or delay nursing home admissions, expansion of HCBS raised concerns that a “woodwork effect” might occur if large numbers of people sign up for non-institutional services who would have otherwise relied on family or other informal caregivers.^{11,12} The resulting increase in enrollment would drive up the overall costs of LTSS for the state, despite lower costs per person relative to nursing home costs. Concern of the “woodwork effect” along with an aging population have led states to carefully monitor and evaluate HCBS programs.

As part of a larger study of spenddown to EW eligibility for people in assisted living and in other community-based settings, the primary goal of the secondary data analysis was to leverage existing data resources to better understand different patterns and trajectories of participants prior to enrollment on EW. The aim is to detail the backstory of a cohort of EW participants, including prior interactions with the state’s programs and agencies, over time, in order to make observations about experiences and where/when people interact with the system and when/if people come into EW due to health-related crisis. One key anticipatory outcome of these analyses was the possible identification of points where policy changes can influence trajectories. Additionally, these analyses were intended to identify gaps in the existing available data and help guide future data acquisition or collection efforts.

⁹ Kemper, P., Weaver, F., Short, P. F., Shea, D., & Kang, H. (2008). Meeting the need for personal care among the elderly: does Medicaid home care spending matter?. *Health services research, 43*(1 Pt 2), 344–362. <https://doi.org/10.1111/j.1475-6773.2007.00762.x>

¹⁰ Muramatsu, N., Yin, H., & Hedeker, D. (2010). Functional declines, social support, and mental health in the elderly: does living in a state supportive of home and community-based services make a difference?. *Social science & medicine (1982), 70*(7), 1050–1058. <https://doi.org/10.1016/j.socscimed.2009.12.005>

¹¹ Kaye, H. S., LaPlante, M. P., & Harrington, C. (2009). Do noninstitutional long-term care services reduce Medicaid spending?. *Health affairs (Project Hope), 28*(1), 262–272. <https://doi.org/10.1377/hlthaff.28.1.262>

¹² Berish, D., Nelson, I., Mehdizadeh, S., & Applebaum, R. (2019). Is There a Woodwork Effect? Addressing a 200-Year Debate on the Impacts of Expanding Community-Based Services. *Journal of aging & social policy, 31*(1), 85–98. <https://doi.org/10.1080/08959420.2018.1528115>

2. Research Questions

The primary questions driving the secondary data analysis are listed below:

1. Describe the overall distribution and demographics of the EW participants in the 2019 cohort, including age at enrollment, race, education, geographic location (urban/rural), and other relevant characteristics.
2. Describe the proportion of EW participants linked to each data source and average number of data sources per participant, including the proportion without any data available.
3. What proportion of EW participants have a prior history of public program engagement? This may include the Return to Community Initiative, Alternative Care, Essential Community Supports and other programs for which data are available.
4. What proportion of EW participants appear to have no public program history, but have engaged with the Senior LinkAge Line or are noted as having a history of private pay?
5. Using primarily MDS data, describe the extent of experience with prior nursing home or skilled nursing facility stays (i.e. proportion of EW enrollees with any prior stays) and the intensity (i.e. frequency and length of stay for those with at least 1 stay).
6. Using data from all available sources, including MDS and nursing home pre-admission screening, describe the health status of EW participants at the time of and up to enrollment and in the prior 6 years. Of particular interest will be any evidence of a cognitive or physical function decline in the year prior to enrollment.

Additionally, exploratory analyses were discussed:

7. Using individual resident addresses and data on assisted living providers, identify the proportion of EW participants who may have been residing in an assisted living facility prior to EW enrollment.
8. Using available Medicare claims data, including full-duals, Specified Low-income Medicare Beneficiaries (SLMBs), and Qualified Medicare Beneficiaries (QMBs), identify those who had recent significant medical events prior to EW enrollment, such as hospitalizations for stroke, hip fracture, or head injury.
9. Using data from Senior LinkAge Line and potentially other sources, identify personal resource expenditures and the extent to which this data exists over time.

3. Data and Methods

3.1 Data Sources

As described below in 3.2 Study Population, data were selected to represent those EW clients who were participating in the waiver program at some point during calendar year 2019. Data representing clients in this cohort were obtained from four primary sources described below. Per the governing Institutional Review Board's approval, these data were provided to the research team as de-identified limited data sets with unique study identification numbers. In each of the data sets described below, any available data for each client in the prior six years, from 2013 through 2019, was obtained. The research team did not receive any person identifiable data.

Long Term Care Consultation Screening Data

A primary source of data for this analysis was derived from long term care consultation (LTCC) assessments. LTCC assessments are available to the general public to help identify needs and develop a community support plan. An LTCC assessment is also required to determine service eligibility for all of Minnesota's HCBS programs, except the Developmental Disability Waiver. Lead agencies (counties, and tribes or managed care organizations with a DHS contract to complete LTCC activity) complete LTCC assessments.

A standardized set of data captured during the LTCC assessment is entered into the Medicaid Management Information System (MMIS) in the Long Term Care Screening Document (LTC SDOC) subsystem. Preadmission screening (PAS) that occurs prior to a person's admission to a Medicaid-certified nursing facility and completed by the Senior Linkage Line are also captured in the LTC SDOC, as are Health Risk Assessments (HRAs) required for all seniors enrolled in MN MA managed care.

Once enrolled in an HCBS program, LTCC assessments are conducted at least once per year to establish ongoing HCBS eligibility, and to identify needed services to be included in the HBCS community support plan. Data for this analysis included any screening activity conducted by lead agencies, including initial assessments, re-assessments, assessments for managed care plan enrollment, and assessments which did not result in program enrollment. Assessment data entered into MMIS is reflected in DHS forms DHS-3427 and DHS-3428; LTCC assessments are completed face-to-face. PAS is completed using web-based tools, while HRAs can be completed face to face or via the telephone. See DHS Form 3427T and 3427H for the data captured in MMIS for PAS and HRAs, respectively.

Senior LinkAge Line (SLL) Data

The Senior LinkAge Line (SLL) is a free statewide service of the Minnesota Board on Aging in partnership with Minnesota's area agencies on aging.¹³ Staffed five days a week, the SLL is a resource to older adults and their families seeking answers to questions about topics such as aging in place, caregiving, or Medicare. For example, SLL staff assist consumers who have housing concerns, need financial support, or need services. Staff also provide help to link older adults and their families to the specific resources to address an individual's unique set of needs. For this analysis, de-identified data representing basic demographics for all SLL clients

¹³ MN State. (2021, June 4). Senior LinkAge Line. Minnesota.gov. <https://mn.gov/senior-linkage-line/>.

who called from 2013 to 2019 were provided, consistent with each of the other data sources described in this section. Data from this call center were provided for modules that represented specific service lines related to purpose of the call: Housing Options Counseling, the Return to Community Initiative, and calls in which a pre-admission screening was completed. In the state of Minnesota, Housing Options Counseling is required to be offered before older adults can move into an Assisted Living facility. Options counseling is done via the SLL, or when an LTCC Assessment is conducted. Thus, in the case of the SLL Housing Options Counseling data module, call records captured calls from individuals (or their family) seeking general information, as well as calls when a move to assisted living was imminent and Housing Options Counseling was required. In the latter case, whether the client accepted or declined Housing Options Counseling was noted.

Minimum Data Set Assessment

All residents in Centers for Medicare and Medicaid Services (CMS)-certified nursing homes or skilled nursing facilities are required to have periodic standardized assessments. These assessments are conducted upon admission, at discharge, and at least quarterly during the stay or when a significant change in condition is noted. The collection of the data generated from these assessments is known as the Minimum Data Set (MDS) (version 3.0), and contains data representing several aspects of residents' stay, including admission/discharge dates, physical functional limitations, cognitive function, and specific care needs. Data from MDS for the aforementioned EW clients participating during 2019 was obtained. These data represented all assessments for these clients conducted within certified facilities in the state of Minnesota between 2013 and 2019. Assessments were directly linked to 2019 EW clients using the unique Minnesota person identification number known as the PMI (Person Master Index, assigned to individuals and used across DHS systems) as provided by DHS staff for the analysis. Although de-identified, PMI data enabled tracking of skilled nursing facility stays, the length of stays, and the timing of those stays for EW clients for a period of six years.

MN Health Care Program Enrollment and Utilization Data

Minnesota's Medicaid program is called Medical Assistance, which includes both fee-for-service and managed care enrollment in several Managed Care Organizations (MCOs) under contract with DHS to provide health care services to Minnesotans. Relevant to older adults, the Minnesota Senior Health Options (MSHO) and the Minnesota Senior Care Plus (MSC+) are the two managed care products provided by the state's eight contracted MCO providers. The MSHO and MSC+ products include coverage for and access to EW and NF services for members. In 2019, 76,416 Minnesotans over 65 had Medical Assistance, 73% of whom were in a managed care program. Of managed care programs, 39,297 were in MSHO (70%) and 16,803 were in MSC+ (30%). Because MSHO combines Medicare and Medicaid benefits, data for dual Medicare-Medicaid eligible Minnesotans is available.

Health care program enrollment and utilization data for the 2019 EW study population were provided for both fee-for-service and managed care enrollees. These data represent any state-administered health care program enrollment, emergency department (ED) encounters, and hospitalizations for these EW clients that occurred between 2013 and 2019. As with the MDS data, health care program enrollment and utilization data were directly linked by DHS staff to EW data using the PMI. These data enabled identification of prior Medical Assistance or other health care program enrollment, and the timing of that enrollment history relative to EW enrollment, the type of eligibility (e.g. full Medical Assistance, etc.), and which managed care option the EW client participated in, if any.

Using a subset of EW clients newly enrolled in EW in 2019 as the study population (described in section 3.2 below), an analysis of six years of observable data prior to initial EW enrollment was completed to calculate the average length of time between a client’s first enrollment in any Medical Assistance or Minnesota Care program and EW enrollment. This provided an indication of the timing of when a client met the income/assets eligibility criteria for MA. Because MA enrollment and EW enrollment may be linked, and include retroactive coverage, prior MA enrollment was defined as any MA coverage more than 90 days before the assessment recommending EW services. Hospitalization and ED encounter data included admission/discharge or date of service, as well as the primary ICD-10 diagnosis code, for individuals who were enrolled in a state-administered health care program; data for Medicare-only enrolled individuals were not available for this analysis. Notably, it is not clear that the absence of observed utilization in the data represents the absence of actual utilization—for example, some dual-eligible claims may not have been present.

3.2 Study Population

This secondary data analysis focused on EW clients enrolled for any length of time during the calendar year 2019, as determined by the Program Type field from the LTC Screening data. The predominate type of client in EW are those on the EW diversion program, which are those who are receiving services to remain in the community. Community, in this case, could be the client's home or apartment, or a congregate living setting such as foster care, and other than a nursing home. A smaller fraction of clients were enrolled in the EW conversion program, which are those who are transitioning from an institution back into the community with EW program support.

Identifying New EW Enrollees

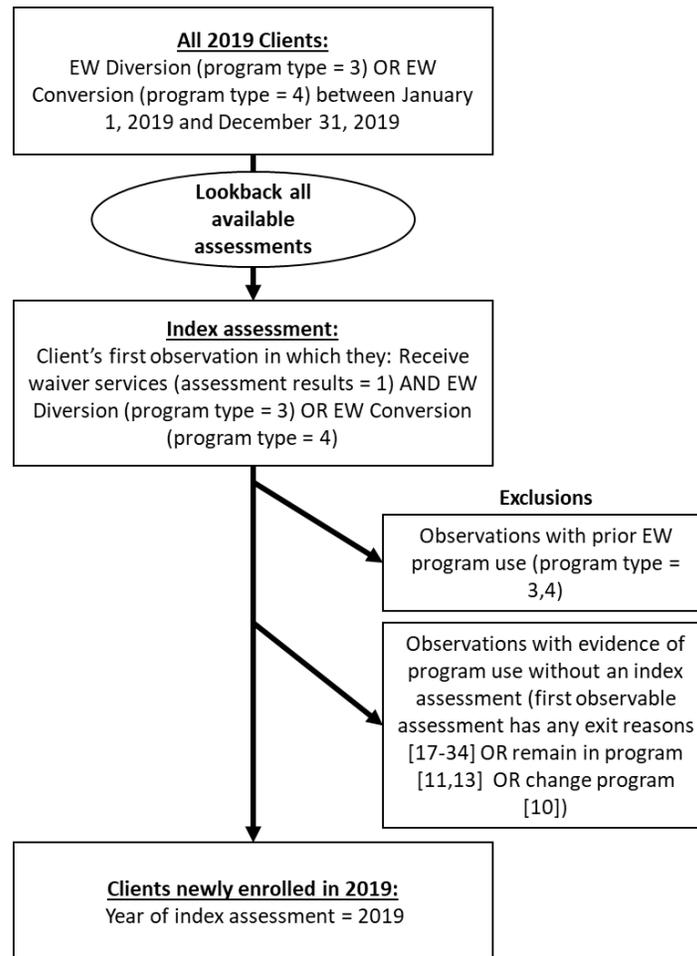
From the complete historical data representing clients enrolled at any point and for any duration during the calendar year 2019, an algorithm was developed to identify each client's initial LTC Screening Assessment. This was necessary to accomplish a primary goal of the analysis, which was to identify a subset of clients who appeared to be newly enrolled into the EW program for the first time in 2019, thus having a potential maximum of six years of historical data available for analysis. Figure 3.1 represents the algorithm used to identify these clients that were newly enrolled in 2019.

Clients were first determined to have been participating in EW during 2019 if they had any assessment that recorded the program type as being EW diversion or EW conversion. All prior assessments for these clients were then pooled, including Health Risk Assessments and those which did not result in any HCBS program eligibility.

An "index assessment" was then identified within the pool of any prior assessments. The index assessment is the first assessment for a client which recorded the Assessment Result indicating, "the person will remain in, or return to, the community with at least one AC, ECS, or waiver service." Additionally, this index assessment was that one which was specific to the EW program, meaning it was the first assessment paired with the Program Type field indicating EW diversion or EW conversion, as noted above. In order to be included in the "new EW enrollee" pool for 2019, the Assessment Date recorded on the identified index assessment must have fallen within CY 2019.

In this manner, individuals were excluded if a clear index assessment could not be identified, or if EW participation began prior to 2019. Once each client's index assessment was identified, an additional exclusion was made if the client had prior recorded assessment results that indicated prior program activity, as this would have been inconsistent with an index assessment. For example, this was done specifically to exclude individuals who might have been using EW (or any other programs) prior to 2013 (the first year included in the observable data), but where the index assessment may not be available within the observable data.

Figure 3.1. Diagram representing algorithm for identifying new enrollment Elderly Waiver clients



3.3 Methods

Frequencies and means were used to describe the characteristics of newly enrolled EW clients. These characteristics were typically taken from, or in relation to, the first LTC Screening Assessment that recommended EW services (i.e. the index assessment). Thus, in the case of variables like current living arrangements, current represents at the time of the index assessment and may change after the enroll began receiving EW services. Cross-tabulations and contingency tables were used to further elucidate important characteristics, including history of program and health care use, and highlight the similarities and differences within the EW population. Two important methodologies for data preparation and analysis were used and are described below.

Data Linkage

The research team did not have direct access to identifiable data. Thus, all data linkages using identifiable data, including names, PMI, Social Security Number (SSN) or other protected information were conducted by DHS staff with guidance and oversight by the research team. In some cases, client data from the SLL and pre-admission screening data from DHS could be directly linked using the State of Minnesota internal identifier known as a PMI or the client’s SSN. However, because neither PMI nor SSN are required fields for all call types

to SLL, these unique identifiers were not always present for each observation (i.e. a call to SLL). Because these identifiers are not tied to the provision of SLL services, the SLL may not have rigorous data validity/quality checks. Additionally, other data elements such as name and date of birth are not always complete for an individual; in some cases, the client calling refuses to provide the information, other times there may be partial information like first name only or birth year. Thus, an iterative process for linking these two sources of data was conducted.

First, the SLL data were cross-checked against the DHS data warehouse to assess the level of confidence that PMI and SSN were recorded accurately within the SLL data when it was recorded. Of the nearly 530,000 SLL client records, PMI was recorded for 280,702 (53%). Of those, approximately 1000 (<0.4%) had indication of potential errors in the PMI, based on duplication processes and redundancy checks. Deduplication within each data set was then done on the basis of combinations of data elements including PMI, first name, last name, SSN, and date of birth. To account for name abbreviations or misspellings, fuzzy matching on names was used based on the Jaccard index, a measure which indicates the number of letters shared by name in both observations considered. Manual review confirmed many of the “matches” within the SLL data to be highly indicative of the same client.

Following deduplication, linking the unique EW clients’ data to the SLL client data was conducted. Using primarily PMI and a combination of other variables including first name, last name, SSN, and date of birth, approximately 48% of all EW clients in the study population were identified within the corresponding SLL client data. Additionally, using those combination of variables without PMI, an additional 18% of EW clients were linked to SLL data. Finally, fuzzy matching points was used to identify an additional 3% of EW clients. The full matching specification can be viewed in Appendix A.

Cluster Analysis

The set of methodologies which aim to identify natural groupings within data is known as cluster analysis. The applications of these techniques are wide ranging and are often used in the business sector to identify market segments of customers with similar needs.¹⁴ In fact, cluster analysis has previously been used to identify different types of clients eligible for HCBS.¹⁵ Conceptually, a simple cluster analysis can be the subjective grouping of data or observations around factors selected by expert researchers.

However, multidimensional data requires automatic classification procedures based on computer algorithms, typically involving a measure of distance between data elements, which is then used to gauge the dissimilarity between objects. For multidimensional data, the dissimilarity must be calculated between all elements to create a matrix. Based on the dissimilarity matrix, data can be grouped into elements most alike one another which forms natural clusters. The number of clusters within the data can be optimized using the average amount of dissimilarity of objects within an iterative number of clusters. For instance, the number of clusters within a multidimensional dataset does not need to be specified *a priori*; in fact, using an iterative process better captures the natural patterns within the data more accurately.

For this analysis, the clustering procedure Partitioning Around Medoids (PAM) was used. This method uses a dissimilarity matrix and, using a representative object within each cluster, a “medoid,” which is least dissimilar to all other objects within a cluster. The specific data elements used in the PAM analysis are listed in Appendix

¹⁴ L. Kaufman and P.J. Rousseeuw. *Finding Groups in Data: An Introduction to Cluster Analysis*. John Wiley & Sons, New York, 1990.

¹⁵ Weaver, R. H., & Roberto, K. A. (2017). Home and Community-Based Service Use by Vulnerable Older Adults. *The Gerontologist*, 57(3), 540–551. <https://doi.org/10.1093/geront/gnv149>

B. These data were derived predominately from fields representing ADL/IADL assistance and/or dependency, housing type, and living arrangements at the time of the LTC screening assessment (notably, this could have changed following EW enrollment).

This also included the variables in Section E of the LTC Screening Document (DHS-3427) under Professional Conclusions. This section contains 16 variables that are a synthesis of other assessment variables collected. Notably, need for assistance on ADLs/IADLs was captured within the cluster analysis in multiple ways including:

- the overall number of ADLs/IADLs that each client needed any assistance with (i.e. could not perform completely independently),
- binary variables representing each of the individual ADL/IADL measures, coded to represent any assistance needed,
- case mix (which is calculated as a function of ADL scores), and finally
- the professional opinion of the assessor that the client had an ADL or IADL condition or limitation.

Because the data contained both binary and categorical variables, the Gower distance was used to generate the dissimilarity matrix.¹⁶ To estimate the optimal number of clusters, the average silhouette width was used. The silhouette width of a cluster is the amount of dissimilarity between members of a cluster and their data. Large average silhouette indicates less dissimilarity, ranging from 1 to -1. Specifically, the PAM procedure was repeated specifying 1 to 10 potential clusters within the data. The average silhouette width for each potential number of clusters was assessed using a graphical plot, as shown in Appendix C.

Following cluster analysis, descriptive labeling of clusters was done based on key defining characteristics common within each distinct cluster. Defining characteristics were determined to be those wherein the presence or absence was observed among an extensive majority of a cluster. Although these characteristics were deemed important to include in the cluster analysis, the defining characteristics were not selected *a priori*.

¹⁶ Shendre, S. (2020, May 11). Clustering datasets having both numerical and categorical variables. Medium. <https://towardsdatascience.com/clustering-datasets-having-both-numerical-and-categorical-variables-ed91cdca0677>.

4. Results

4.1 Overall Characteristics of 2019 EW Clients

A total of 33,481 clients were identified as participating in EW during calendar year 2019. Frequencies of descriptive characteristics of this population is shown in Table 4.1. Characteristics presented below are for all clients and was taken from the most recent assessment completed in 2019; for people newly enrolled in EW in 2019, the data is taken from the “index” assessment as defined above.

Notably, the population was majority female (70.4%), white (67.6%), spoke English as their primary language (74.5%), and were first enrolled after 2013 (60.9%). Of those participating in EW during 2019, 5,284 (15.8%) were determined to be newly-enrolled clients—they had no evidence of prior EW participation during the previous 6 years. New clients were similar to the full client population but tended to be younger, with 25.7% aged 65 to 69 compared to 15.4% overall and more frequently white (72.4% vs 67.6%), and male (33.7% vs 29.6%).

Table 4.1. Demographic characteristics of Elderly Waiver clients participating during 2019 (n=33,481)

	All clients, N (%)	Newly Enrolled in 2019, N (%)
Clients using Elderly Waiver during 2019	33,481 (100)	5,284 (15.8)
Age		
65 to 69	5,156 (15.4)	1,359 (25.7)
70 to 74	6,554 (19.6)	888 (16.8)
75 to 79	6,313 (18.9)	810 (15.3)
80 to 84	5,761 (17.2)	796 (15.1)
85 to 89	4,788 (14.3)	721 (13.6)
90+	4,909 (14.7)	710 (13.4)
Gender		
Male	9,913 (29.6)	1,781 (33.7)
Female	23,568 (70.4)	3,503 (66.3)
Race		
White	22,633 (67.6)	3,825 (72.4)
Black	5,167 (15.4)	640 (12.1)
Asian	4,211 (12.6)	492 (9.3)
Other	532 (1.6)	85 (1.6)
More than one race	55 (0.2)	8 (0.2)
Unknown	883 (2.6)	234 (4.4)
Hispanic Ethnicity	766 (2.3)	112 (2.1)
Primary Spoken Language		
English	24,929 (74.5)	4,459 (84.4)
Somalian	2,203 (6.6)	183 (3.5)
Hmong	1,664 (5.0)	157 (3.0)
Russian	1,174 (3.5)	48 (0.9)
Vietnamese	636 (1.9)	63 (1.2)
Spanish	452 (1.4)	72 (1.4)

	All clients, N (%)	Newly Enrolled in 2019, N (%)
Other	2,423 (7.2)	302 (5.7)
Marital Status		
Single, never married	3,971 (11.9)	675 (12.8)
Divorced	8,020 (24.0)	1,082 (20.5)
Widowed	13,412 (40.1)	1,851 (35.0)
Married	6,449 (19.3)	1,235 (23.4)
Legally separated	836 (2.5)	82 (1.6)
Unknown	793 (2.4)	359 (6.8)
First enrollment in or after 2013	20,385 (60.9)	-
First enrollment before 2013	13,097 (39.1)	-
Year of first enrollment		
2013	949 (2.8)	-
2014	1,501 (4.5)	-
2015	1,803 (5.4)	-
2016	2,652 (7.9)	-
2017	3,540 (10.6)	-
2018	4,481 (13.4)	-
2019	5,284 (15.8)	-
2020	174 (0.5)	-

Time-dependent characteristics of clients, including their case mix, housing, and living arrangements are shown in Table 4.2, using the most recent screening assessment. Because these characteristics represent data derived from the most recent screening assessment, regardless of the type of assessment, changes in the current housing or living arrangements may have been imminent. The majority of clients were in the EW diversion program (95.4%), and the most common case mix was “L – Very low ADL/Age 65+,” which was 23.2% of the population. Most clients lived in their own home at the time of assessment (72.3%), with the next most common housing being board and lodge (23.0%). Current living arrangements, at the time of the assessment, included a mix of living alone (38.0%), living in congregate settings (27.6%), and living with family, friends, or significant other (18.2%). The majority of clients did not have an informal caregiver (56.6%) at the time of this assessment. The average time from first referral¹⁷ to this most recent assessment was 25.2 months, with a range of 0 to 312 months.

Table 4.2. Case mix and living arrangements of all Elderly Waiver clients participating during 2019 based on their most recent screening assessment (n=33,481)

	N (%)
Elderly Waiver Diversion Program	31,938 (95.4)
Elderly Waiver Conversion Program	1,543 (4.6)
Case mix	
A – Low ADL	2,330 (7.0)
B – Low ADL Behavior	6,579 (19.7)
C – Low ADL Special Nursing	270 (0.8)
D – Medium ADL	4,227 (12.6)
E – Medium ADL Behavior	4,726 (14.1)

¹⁷ Clients may have been referred and assessed previously and not enrolled into EW (or any program) at that time.

	N (%)
F – Medium ADL Special Nursing	272 (0.8)
G – High ADL	1,856 (5.5)
H – High ADL Behavior	2,277 (6.8)
I – Very High ADL (Eating 3-4)	1,514 (4.5)
J – High ADL Sev. Neuro. Impair./3+ Behavior	1,107 (3.3)
K – High ADL Special Nursing	534 (1.6)
L – Very Low ADL/Age 65+	7,761 (23.2)
Current Housing	
Own Home/Apartment	24,195 (72.3)
Board & Lodge	7,702 (23.0)
Institution NF/certified boarding	963 (2.9)
Foster Care	406 (1.2)
Institution Hospital	84 (0.3)
Non-certified boarding	66 (0.2)
Homeless	43 (0.1)
Institution ICF/DD	-- (<0.1)
Correctional Facility	-- (<0.1)
Unknown	15 (<0.1)
Current Living Arrangements	
Living Alone	12,721 (38.0)
Living in congregate setting	9,243 (27.6)
Living with family/friends/significant other	6,107 (18.2)
Living with spouse/parents	3,014 (9.0)
Homeless without planned housing	2,335 (7.0)
Homeless	47 (0.1)
Unknown	14 (<0.1)
Has Informal Caregiver	
Yes	10,148 (30.3)
No	18,968 (56.7)
Unknown	4,365 (13.0)

Table 4.3 focuses on time-dependent characteristics of the 2019 newly-enrolled clients, using information from their index assessment—presumably the characteristics which influenced the assessment results and likely enrollment in EW. However, as previously noted, current housing and living arrangements reflected what was noted at the time of the assessment. In some cases, enrollment on EW would have prompted a change in both housing and living arrangements.

The majority of newly enrolled clients lived in their own home (71%) at the time of the index assessment and were considered “high need,” meaning their case mix was between B-K (67.6%). Less than half of the newly enrolled clients had an informal caregiver (48.2%). The plurality of new clients lived alone at the time of the index assessment (35.5%) followed by lived in a congregate setting (28.4%). Finally, although not shown in Table 4.3, none of the newly enrolled clients had assessments indicating prior use of Alternative Care or Essential Community Supports.

Table 4.3. Characteristics of clients newly enrolled in Elderly Waiver during 2019, data from index assessment at the time of enrollment

	N (%)
Elderly Waiver Diversion Program	5,060 (95.8)
Elderly Waiver Conversion Program	224 (4.2)
Case mix	
A – Low ADL	444 (8.4)
B – Low ADL Behavior	1,347 (25.5)
C – Low ADL Special Nursing	63 (1.2)
D – Medium ADL	595 (11.3)
E – Medium ADL Behavior	751 (14.2)
F – Medium ADL Special Nursing	53 (1.0)
G – High ADL	190 (3.6)
H – High ADL Behavior	265 (5.0)
I – Very High ADL (Eating 3-4)	137 (2.6)
J – High ADL Sev. Neuro. Impair./3+ Behavior	105 (2.0)
K – High ADL Special Nursing	50 (1.0)
L – Very Low ADL/Age 65+	1,281 (24.2)
Current Housing	
Own Home/Apartment	3,751 (71.0)
Board & Lodge	1,022 (19.3)
Institution NF/certified boarding	372 (7.0)
Institution Hospital	46 (0.9)
Foster Care	38 (0.7)
Non-certified boarding	24 (0.5)
Homeless	28 (0.5)
Institution ICF/DD	1 (<0.1)
Correctional Facility	2 (<0.1)
Current Living Arrangements	
Living Alone	1,872 (35.4)
Living in congregate setting	1,490 (28.2)
Living with family/friends/significant other	1,059 (20.0)
Living with spouse/parents	598 (11.3)
Homeless without planned housing	235 (4.5)
Homeless	30 (0.6)
Has Informal Caregiver	
Yes	2,544 (48.2)
No	2,353 (44.5)
Unknown	387 (7.3)
Primary Reason for Referral from Index Assessment	
Change in functional capacity	1,702 (31.7)
Health Risk Assessment	1,160 (21.6)
Current services not adequate	715 (13.3)
Reassessment ^a	365 (6.8)
Coordination of new and acute services	312 (5.8)
Behavioral or emotional problem	162 (3.0)
Disorientation or confusion	159 (2.6)
Request relocation to community from any facility	139 (2.6)

	N (%)
Informal caregiver needs support	138 (2.6)
Health status change	111 (2.1)
MCO Enrollee Requested Assessment	63 (1.2)
Other problems (not listed)	311 (5.8)

^aReasons for referral were taken directly from the LTC Screening Assessment document from the index assessment, which is the first assessment in which services were recommended and the individual was eligible. Reassessment, in this case, may reflect prior assessments generated from a variety of processes, before services were recommended or the individual was eligible to receive them.

4.2 EW Clients with Calls to SLL

From 2013 through 2019, a total of 539,225 clients called the SLL. After matching the SLL clients with the 33,481 EW clients participating in 2019, linkages were completed for 23,868 (71.2%) of EW clients.

Table 4.4 shows the demographic characteristics of all SLL clients and the EW-SLL linked clients. Clients calling SLL for any reason were 59.2% female, 63.0% urban, 75.4% white, and most commonly from the Twin Cities (8.5% from Minneapolis, 8.3% from St. Paul). The EW-SLL linked clients were similar to the overall SLL client population, although a larger majority were female (70.7%).

Table 4.4. Characteristics of all Senior Linkage Line clients compared with matched Elderly Waiver clients who called the Senior Linkage Line between 2013 and 2019. Data source: SLL database

	All SLL (%) N=539,225	EW-SLL (%) N=23,868
Female	312,694 (59.2)	17,417 (70.7)
Male	197,836 (37.4)	7,004 (28.4)
Urban-Rural		
Urban	333,050 (63.0)	15,345 (62.3)
Large Rural	77,805 (14.7)	4,108 (16.7)
Small Rural	58,963 (11.2)	2,713 (11.0)
Isolated	47,938 (9.1)	2,329 (9.5)
Missing	10,893 (2.1)	153 (0.6)
Marital Status		
Unknown	230,173 (41.4)	6,761 (27.4)
Married	137,533 (24.7)	4,198 (17.0)
Widowed	96,324 (17.3)	6,455 (26.2)
Not Married	55,825 (10.0)	3,847 (15.6)
Divorced	30,731 (5.5)	2,944 (11.9)
Separated	2,658 (0.5)	234 (1.0)
N/A	1,916 (0.3)	174 (0.7)
Partner/Significant Other	1,067 (0.2)	35 (0.1)
Race		
White	419,608 (75.4)	18,577 (75.4)
Black	14,791 (2.7)	1,953 (7.9)
Asian	5,471 (1.0)	917 (3.7)
American Indian	4,251 (0.8)	266 (1.1)
Latino	4,126 (0.7)	374 (1.5)
Multiple Races	1,264 (0.2)	235 (1.0)

	All SLL (%) N=539,225	EW-SLL (%) N=23,868
Other	6,059 (1.1)	869 (3.5)
Unknown	100,657 (18.1)	1,457 (5.9)
Top 10 Cities where clients reside		
Minneapolis	44,671 (8.5)	2,959 (12.0)
St. Paul	43,593 (8.3)	1,993 (8.1)
Duluth	11,638 (2.2)	691 (2.8)
Rochester	10,486 (2.0)	471 (1.9)
Bloomington	10,103 (1.9)	270 (1.1)
St. Cloud	7,777 (1.5)	400 (1.6)
Mankato	6,974 (1.3)	284 (1.2)
Burnsville	5,085 (1.0)	259 (1.1)
Edina	4,850 (0.9)	174 (0.7)
Minnetonka	4,406 (0.8)	171 (0.7)

Table 4.5 outlines client characteristics for people who had call records with SLL specifically for Housing Options Counseling, including those who were EW clients and those who were not. Of the 539,225 calls to SLL between 2013 and 2019, 73,176 (13.6%) were related to Housing Option Counseling. By comparison, of the 23,686 EW clients participating in 2019 that were identified in the SLL data, 5,622 (23.7%) had called SLL for housing options within the prior six years.

Of the EW clients who had calls to SLL for housing options, the majority (96.5%) called a single time, and called an average of 0.2 years prior to 2019 (range 0 to 6 years). Notably, of those with Housing Options Counseling calls, 62.5% declined that counseling. Although more specific details of imminent moves were not available in the data, some of the clients who declined Housing Options Counseling may have been planning a move to an assisted living setting and needed to meet the requirement of being offered Options Counseling before moving in. Furthermore, among those with calls, the primary reason clients said they were moving or planning a move was because they had a need for services (56.6%) followed by safety concerns (27.8%). Family decision (14.2%) and family recommendation (10.1%) were other reasons provided.

Based on the characteristics from the available data, EW clients were similar to all SLL clients with calls for Housing Options Counseling.

Table 4.5. Characteristics of Senior Linkage Line clients who placed calls regarding Housing Options Counseling between 2013-2019

	EW-SLL N=5,622	SLL only N=73,176
Declined options counseling	3,613 (62.5)	48,790 (66.7)
Prior Options Counseling calls		
0	5,572 (96.5)	72,506 (99.1)
1	178 (3.1)	650 (0.9)
2	27 (0.5)	45 (0.1)
Year of First Observed Options Counseling		
2013	557 (9.9)	10,371 (14.2)
2014	567 (10.1)	9,986 (13.7)
2015	756 (13.5)	9,955 (13.6)
2016	814 (14.5)	9,790 (13.4)
2017	984 (17.5)	10,497 (14.3)
2018	1,083 (19.3)	10,942 (15.0)
2019	861 (15.3)	11,635 (15.9)
Average years since counseling call to 2019 (SD); range	0.2 (0.3); 0 – 6	0.2 (0.3); 0 – 6
Reason for move on most recent call (client may have listed more than one)		
Need for services	3,269 (56.6)	36,829 (50.4)
Safety concerns	1,605 (27.8)	17,904 (24.5)
Family decision	821 (14.2)	9,363 (12.8)
Family recommended	584 (10.1)	6,880 (9.4)
Nursing home discharge	354 (6.1)	3,725 (5.1)
Socialization	323 (5.6)	4,724 (6.5)
Inadequate housing	188 (3.3)	3,425 (4.7)
Hospital discharge	156 (2.7)	1,944 (2.7)
Spouse needs services	160 (2.8)	3,235 (4.4)
Death of spouse	23 (0.4)	657 (0.9)
Other	844 (14.6)	13,151 (18.0)

4.3 Cluster analysis of EW Clients newly enrolled in 2019

Following the completion of the cluster analysis of the variables input, the optimal number of clusters was determined to be six based on the maximized value of the average silhouette width. Thus, based on the naturally-occurring patterns within the data, there were six groupings of clients who had similar characteristics among those who were newly enrolled in EW during 2019. Names for the six clusters were assigned based on distinguishing characteristics of the cluster. Based on examination of the distribution of all characteristics, two key distinguishing features were observed: current living arrangement and level of need for assistance.¹⁸

Current living arrangement labels were defined by three groups:

- Living alone – this also included a small number of clients who reported being homeless at the time of assessment.
- Lives with others – in this case others could be a spouse, partner, friends, or other family member
- Congregate setting – this is most often room and board, but in some cases could have been a SNF at the time of assessment and the client moved back to their home or another community setting

Need category labels were assigned based on a composite of characteristics, each which measured the need for assistance in different ways. Labels were assigned at the cluster level, which represented the characteristics of the cluster overall relative to other clusters. Need category was assigned based on the following included variable distributions: the average number of ADLs or IADLs which any assistance was needed, the frequency needing constant supervision or physical assistance on a single ADL, and frequency of case mix, which is based on a combination of ADL performance, age, behavior, and other diagnoses. Thus, the need category labels were defined by three groups:

- Low need – compared to other clusters, these clients have fewer ADL and IADLs that they need assistance with and the case mix for the majority is defined as low need
- Moderate need – compared to other clusters, these clients have more ADL and IADL assistance needs than the low need group but fewer than other clusters and the case mix for the majority is defined as high need
- High need – compared to other clusters, these clients need at least some assistance on the majority of ADLs and IADLs, while the case mix for nearly the whole clusters is defined as high need

Additional details of these features, and the specific frequencies that were used in creating these labels, are discussed below and shown in subsequent tables and figures.

Figure 4.1 provides the proportion of each cluster among all 5,284 newly enrolled EW clients.

- The most frequent cluster of new EW enrollees lived alone with relatively low needs, representing approximately one in three new enrollees during 2019 (32%).
- The second largest cluster of new EW enrollees lived with others with moderate needs, representing approximately one in five new enrollees (20%).

¹⁸ Although the variables that were selected for inclusion in the cluster analysis were chosen based on a strong scientific premise, the labels were created ex-post based on examination of the distribution of the characteristics within each cluster; in other words, the choice of a “living along, low ADL need cluster” was not known ex ante.

- Two clusters with similar size were characterized by congregate living and had high or moderate needs. Each cluster represented approximately one in seven new enrollees (14%).
- The second the smallest cluster was EW clients who lived with others and had high needs, representing approximately one in nine new enrollees (11%).
- The smallest cluster was characterized by those who lived alone but had high needs, representing approximately one in eleven new enrollees (9%)

Figure 4.1. Identified clusters of Elderly Waiver clients newly enrolled during 2019

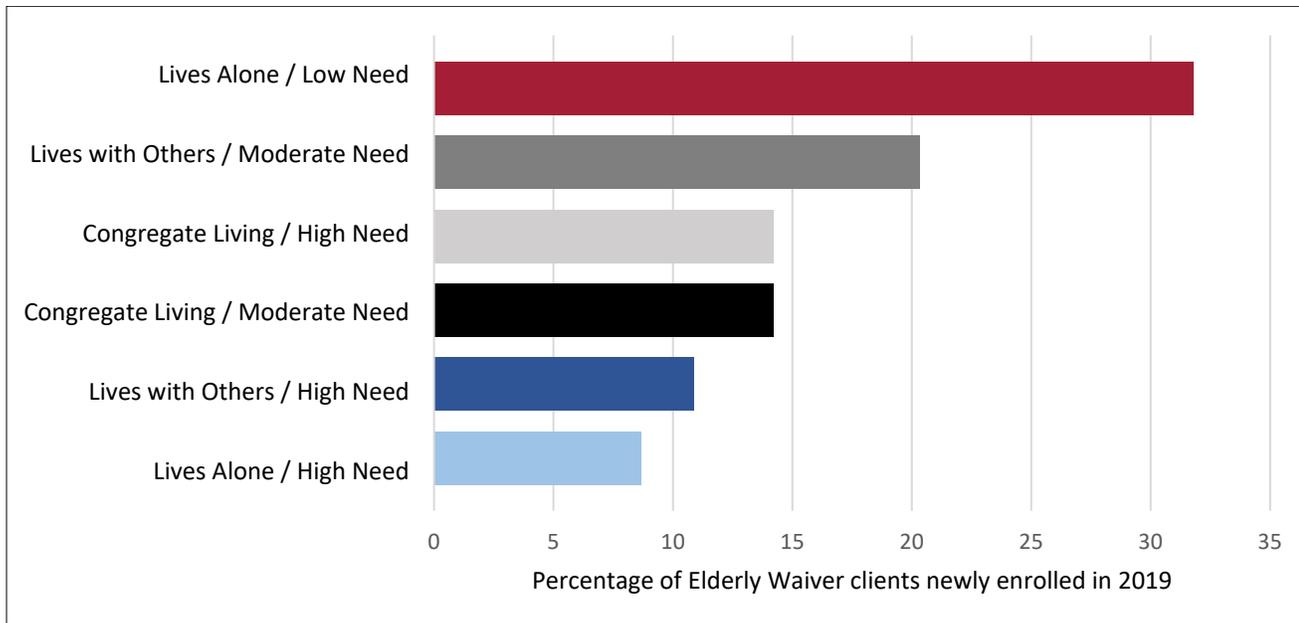


Table 4.6 provides a more comprehensive description of the characteristics of each cluster, with specific frequencies. This table (and subsequent tables presenting the results of the cluster analysis) is organized such that each living arrangement cluster is separated into a dyad based on need. The first two columns represent EW clients that lived alone and had low versus high needs, the second two columns are those that live with others and have moderate versus high needs, and the third two columns are those in congregate living with moderate versus high needs.

The distributions of the defining characteristics of each cluster are:

- The variable on current living arrangements demonstrated the highest discriminatory properties for cluster definitions as can be seen in the first three rows of Table 4.6.
- Another key defining characteristic of high need clusters was the professional conclusion that constant supervision or physical assistance during toileting was needed. In each of the high need clusters, regardless of living arrangement, 100% of clients were noted as having this specific ADL need, whereas no clients in any other cluster had this determination made.
- Case mix had a sizeable influence on clusters:
 - In the low need cluster, 55.7% of clients had a case mix in categories A or L, whereas 44.3% had case mix in categories B through K.
 - In the moderate need cluster in which clients lived with others, 57.4% had a high need case mix (B through K) and 42.5% were low need (A or L) and moderate need clients who were in congregate living were 69.2% in high need and 30.8% in low need.

- In each of the three high need clusters, over 90% of clients were noted as being high need case mix.
- The frequency of at least one ADL that needed some level of assistance was such that the low need cluster had 64% of clients needing at least assistance on at least one ADL, the moderate need clusters were 77.2% and 92.7%, and the high need clusters were 91.9%, 93.2%, and 96.6%.
- The average number of ADL categories that clients needed at least some level of assistance on were such that the low need cluster average was 1.2 per client, the moderate need clusters 2.1 per client, and the high need clusters between 5.4-5.8 per client.
- The average number of IADL categories that clients needed at least some level of assistance provided less discriminatory properties across clusters than other variables but did reflect a similar pattern as the equivalent ADL variable. The low need cluster average was 5.6 IADLs per client, the moderate need clusters were 6.4 and 7.1 per client, and the high need ranged from 7.4-7.7 per client.

Table 4.6. Defining characteristics of clusters of newly enrolled Elderly Waiver clients

	Lives Alone Low Need (n=1,679)	Lives Alone High Need (n=458)	Lives with Others Moderate Need (n=1,075)	Lives with Others High Need (n=582)	Congregate Living Moderate Need (n=750)	Congregate Living High Need (n=740)
Lives with spouse/family/friends	0 (0.0)	0 (0.0)	1,075 (100)	582 (100)	0 (0.0)	0 (0.0)
Lives alone	1,679 (100)	458 (100)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Lives in congregate setting	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	750 (100)	740 (100)
Case mix						
Low need (A, L)	936 (55.7)	31 (6.8)	457 (42.5)	45 (7.7)	231 (30.8)	25 (3.3)
High need (B-K)	743 (44.3)	427 (93.2)	617 (57.4)	535 (91.9)	519 (69.2)	715 (96.6)
Needs assistance on at least 1 ADL	1,074 (64.0)	452 (98.7)	830 (77.2)	581 (99.8)	695 (92.7)	740 (100)
No. of ADLs needing assistance, mean (standard deviation)	1.2 (1.6)	5.4 (2.0)	2.1 (2.1)	5.4 (1.9)	2.1 (1.8)	5.8 (1.8)
No. of IADL needing assistance, mean (standard deviation)	5.6 (2.0)	7.4 (1.0)	6.4 (1.8)	7.5 (1.0)	7.1 (1.1)	7.7 (0.6)
Needs constant supervision or physical assistance during toileting (<i>based on professional conclusion</i>)	-	458 (100)	-	582 (100)	-	740 (100)

Figure 4.2 displays the percentage of EW clients who needed any level assistance with each ADL, separated by cluster. The living alone, low need cluster had noticeably fewer clients that needed assistance on any of the eight ADLs proportionate to all other clusters; needing some level of assistance with bathing (30%) and dressing (approx. 20%) were most common within this cluster.

Clients in the two moderate need clusters corresponding to living with others or congregate living, were similar across clusters in ADL assistance needs. The mid-range need for ADL assistance is visible, with these clusters clearly needing more assistance on ADLs than the low need cluster and for some ADLs (e.g. toileting) much less need than the high need clusters.

Clients in each of the high need clusters were fairly homogenous across all living arrangements and represented a substantially greater need for ADL assistance than any of the other clusters denoted as low or moderate need. For example, in seven of the eight ADLs, over 50% of clients in the three high need clusters needed some level of assistance, regardless of living arrangement. Bed mobility was the lone exception. Consistent with the frequency of clients who had a professional conclusion of toileting supervision or physical assistance, over 90% clients in each of these three high need clusters required some assistance toileting.

Figure 4.2. Percentage of Elderly Waiver clients in each cluster that needs any assistance with Activities of Daily Living

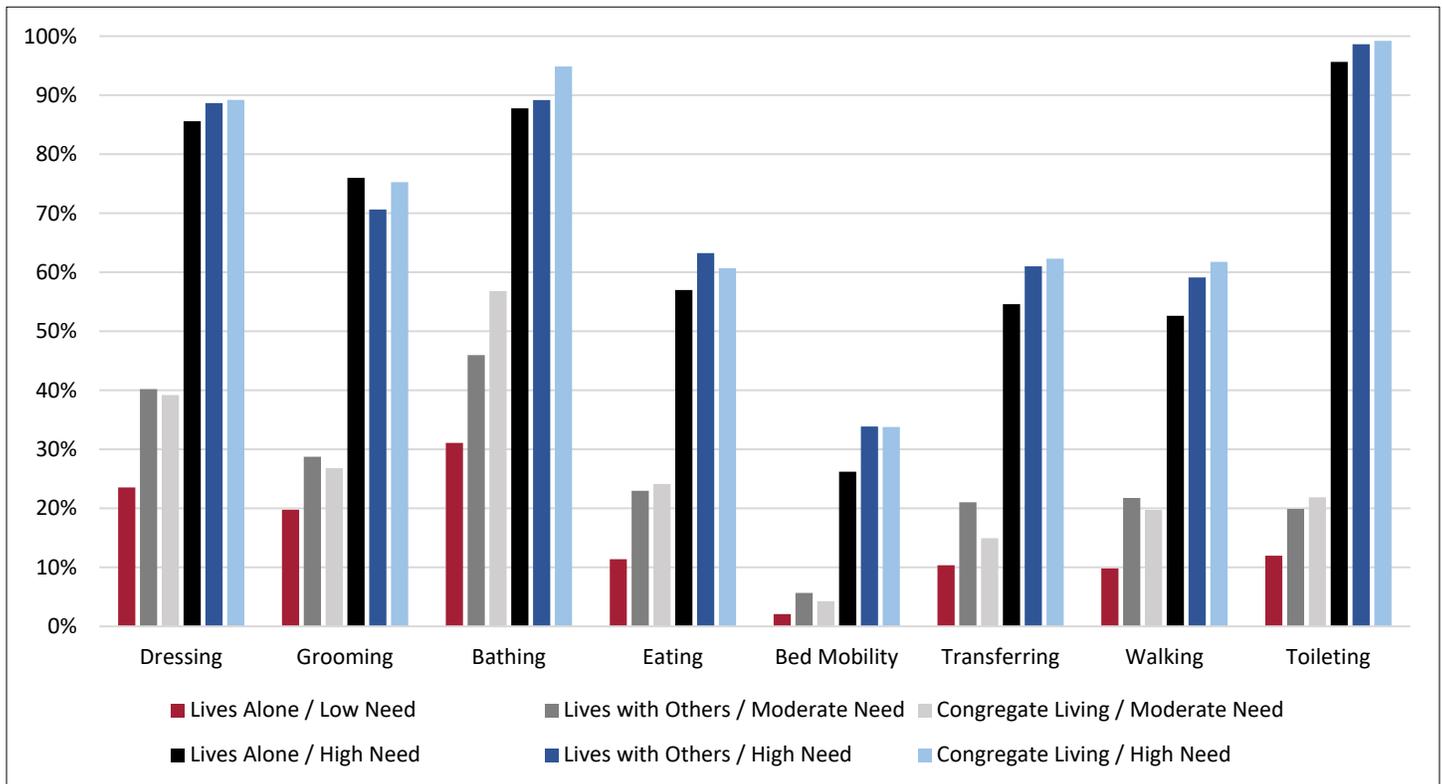


Figure 4.3 displays the percentage of EW clients who needed any level of assistance with each IADL, separated by cluster. Notably, the living alone, low need cluster had substantially fewer IADLs needing any level of assistance than all other clusters. For this cluster, each of the eight IADLs had less than 30% of clients needing some level of assistance. Conversely, among all of the other clusters, 80% of clients needed some assistance in five of eight IADLs. Clients in the lives with others / moderate need cluster less frequently need assistance on medication management, phone calls, or finances. When considering the three highest need clusters, over 90% needed assistance on seven of eight IADLs.

Figure 4.3. Percentage of Elderly Waiver clients in each cluster that needs any assistance with Instrumental Activities of Daily Living

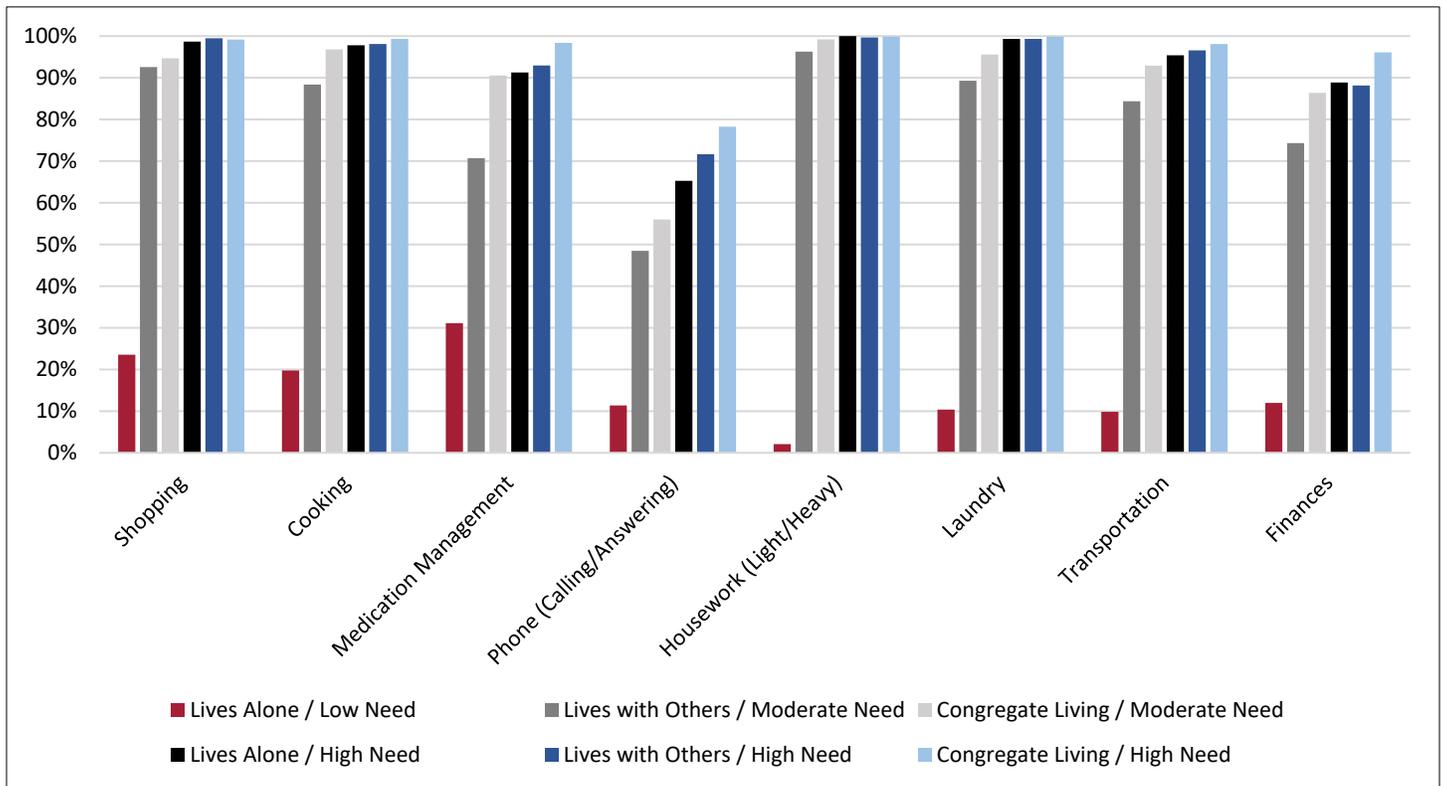


Table 4.7 provides additional demographic and descriptive characteristics of the EW clients within each cluster. Over 99% of new clients who lived alone or with others were enrolled in the diversion program; for those living in congregate settings it was 84.9% and 88.7% for the moderate need and high need clusters, respectively. The age distribution within each cluster shows that those living alone and those with less needs tended to be younger. Conversely, an older age distribution was observed among the congregate living clusters and high need. For example, 36.4% of the lives alone / low need cluster were aged 65 to 69 years old and 8.9% were 90+ years old, whereas within the congregate living / high need cluster, only 6.6% were in the 65 to 69 years old category and 28.1% were aged 90 years or older. The presence of an informal caregiver was least frequent among the congregate living / moderate need cluster (34.7%), followed by the lives alone/ low need cluster (38.9%), then the congregate living / high need cluster (42.7%). Informal caregivers were considerably more common in other clusters. For example, in the lives alone / high need cluster, 61.4% had an informal caregiver and among those who were living with others, 57.8% and 71.0% had informal caregivers based on moderate and high need, respectively. Although the need for frequent clinical monitoring was low overall, it was most common among those in the congregate living clusters. Overall, 17.1% in the moderate need and 21.5% in the high need were noted as requiring any clinical monitoring within these clusters. The majority of reasons why clients were referred on their index assessment were: “change in functional capacity,” “health risk assessment,” or “current services inadequate.” This likely is a reflection of the multiple assessments clients have before services are recommended.

Table 4.7. Characteristics of clusters of newly enrolled Elderly Waiver clients

	Lives Alone Low Need (n=1,679)	Lives Alone High Need (n=458)	Lives with Others Moderate Need (n=1,075)	Lives with Others High Need (n=582)	Congregate Living Moderate Need (n=750)	Congregate Living High Need (n=740)
Enrolled in EW diversion	1,667 (99.3)	456 (99.6)	1,066 (99.2)	578 (99.3)	637 (84.9)	656 (88.7)
Enrolled in EW conversion	12 (0.7)	2 (0.4)	9 (0.8)	4 (0.7)	113 (15.1)	84 (11.4)
Age						
65 to 69	611 (36.4)	83 (18.1)	361 (33.6)	152 (26.1)	103 (13.7)	49 (6.6)
70 to 74	319 (19.0)	54 (11.8)	236 (22.0)	118 (20.3)	92 (12.3)	69 (9.3)
75 to 79	239 (14.2)	57 (12.5)	179 (16.7)	116 (19.9)	120 (16.0)	99 (13.4)
80 to 84	194 (11.6)	74 (16.2)	147 (13.7)	90 (15.5)	137 (18.3)	154 (20.8)
85 to 89	167 (10.0)	82 (17.9)	93 (8.7)	70 (12.0)	137 (18.3)	161 (21.8)
90+	149 (8.9)	108 (23.6)	59 (5.5)	36 (6.2)	161 (21.5)	208 (28.1)
Female	1,115 (66.4)	332 (72.5)	705 (65.6)	348 (59.8)	505 (67.3)	498 (67.3)
Has an informal caregiver	653 (38.9)	281 (61.4)	621 (57.8)	413 (71.0)	260 (34.7)	316 (42.7)
Unknown informal caregiver	63 (3.8)	27 (5.9)	68 (6.3)	43 (7.4)	80 (10.7)	106 (14.3)
Requires clinical monitoring	125 (7.4)	60 (13.1)	89 (8.3)	61 (10.5)	128 (17.1)	159 (21.5)
At least once every 24 hours	103 (6.1)	38 (8.3)	65 (6.1)	36 (6.2)	90 (12.0)	111 (15.0)
At least once every 8 hours	22 (1.3)	22 (4.8)	24 (2.2)	25 (4.3)	38 (5.1)	48 (6.5)
Current Housing Type						
Own home	1,648 (98.2)	451 (98.5)	1,067 (99.3)	577 (99.1)	3 (0.4)	5 (0.7)
Board & Lodge	-	-	1 (0.1)	-	493 (65.7)	528 (71.4)
Institution, NF/Certified boarding care	1 (0.1)	1 (0.2)	-	-	210 (28.0)	160 (21.6)
Other	30 (1.8)	6 (1.3)	7 (0.7)	5 (0.9)	44 (5.9)	47 (6.4)
Primary reason for referral						
Change in functional capacity	526 (31.3)	190 (41.5)	281 (26.1)	166 (28.5)	240 (32.0)	266 (36.0)
Health Risk Assessment	470 (28.0)	50 (10.9)	350 (32.6)	130 (22.3)	87 (11.6)	67 (9.1)
Current services not adequate	225 (13.4)	65 (14.2)	135 (12.6)	86 (14.8)	87 (11.6)	96 (13.0)
Reassessment ^a	144 (8.6)	29 (6.3)	95 (8.8)	61 (10.5)	22 (2.9)	9 (1.2)
Coordination of new and acute services	83 (4.9)	20 (4.4)	53 (4.9)	26 (4.5)	66 (8.8)	64 (8.7)
Behavioral or emotional problem	33 (2.0)	12 (2.6)	20 (1.9)	14 (2.4)	39 (5.2)	40 (5.4)

	Lives Alone Low Need (n=1,679)	Lives Alone High Need (n=458)	Lives with Others Moderate Need (n=1,075)	Lives with Others High Need (n=582)	Congregate Living Moderate Need (n=750)	Congregate Living High Need (n=740)
Disorientation or confusion	16 (1.0)	15 (3.3)	21 (2.0)	17 (2.9)	33 (4.4)	53 (7.2)
Request relocation to comm. from facility	12 (0.7)	4 (0.9)	0 -	1 (0.2)	80 (10.7)	41 (5.5)
Informal caregiver needs support	26 (1.6)	11 (2.4)	37 (3.4)	51 (8.8)	8 (1.1)	9 (1.2)
Health status change	34 (2.0)	5 (1.1)	22 (2.1)	10 (1.7)	23 (3.1)	11 (1.5)
Other listed reasons	30 (1.8)	9 (2.0)	33 (3.1)	11 (1.9)	15 (2.0)	6 (0.8)
Other problems (not listed)	80 (4.8)	48 (10.5)	28 (2.6)	9 (1.6)	50 (6.7)	78 (10.5)

^aReasons for referral were taken directly from the LTC Screening Assessment document from the index assessment, which is the first assessment in which services were recommended and the individual was eligible. Reassessment, in this case, may reflect prior assessments generated from a variety of processes, before services were recommended or the individual was eligible to receive them.

Table 4.8 shows the frequencies of the variables represented by the professional conclusions section of the LTC Screening Assessment document. As noted previously, this section allows the assessor to record conclusions summarizing the overall assessment. Within those EW clients newly enrolled in 2019, the frequency of assessors recording people having a complicated condition was low overall, but highest among the clients in high need clusters including those living with others (24.1%) in congregate living (22.2%).

Other frequencies of recorded professional conclusions followed patterns similar to those found within the aggregate information of need that was created based on case mix and ADL/IADL assistance, as previously described. For example, although the frequency of impaired cognition had a sizable range across clusters, it was lowest among the clients in the cluster lives alone / low need (30.3%) and highest among the cluster congregate living / high need (74.9%). Concerns for individuals' care, hygiene, nutrition, or safety did not vary much across clusters, with the lowest frequency being 78.6% in the lives with others / low need cluster and the highest 85.4% in the congregate living / high need cluster. Other professional conclusions followed similar, and predictable, patterns as shown.

Table 4.8. Professional conclusions by clusters of newly enrolled Elderly Waiver clients

	Lives Alone Low Need (n=1,679)	Lives Alone High Need (n=458)	Lives with Others Moderate Need (n=1,075)	Lives with Others High Need (n=582)	Congregate Living Moderate Need (n=750)	Congregate Living High Need (n=740)
Has a complicated condition	239 (14.2)	80 (17.5)	147 (13.7)	140 (24.1)	139 (18.5)	164 (22.2)
Impaired cognition	508 (30.3)	293 (64.0)	383 (35.5)	296 (50.9)	423 (56.4)	554 (74.9)
Frequent behavior symptoms	684 (40.7)	314 (68.6)	456 (42.4)	293 (50.3)	463 (61.7)	565 (76.4)
Concerns: care, hygiene, nutrition or safety	1,322 (78.7)	374 (81.7)	845 (78.6)	496 (85.2)	619 (82.5)	632 (85.4)
Concerns: neglect, abuse or exploitation	894 (53.3)	250 (54.6)	524 (48.7)	320 (55.0)	419 (55.9)	502 (67.8)
Person is frail	379 (22.6)	206 (45.0)	263 (24.5)	264 (45.4)	231 (30.8)	322 (43.5)
Frequent institutional stays	420 (25.0)	183 (40.0)	270 (25.1)	208 (35.7)	352 (46.9)	438 (59.2)
Hearing impairment causing functional limitations	120 (7.2)	58 (12.7)	70 (6.5)	58 (10.0)	57 (7.6)	83 (11.2)
Needs restorative or rehabilitative treatments	208 (12.4)	65 (14.2)	123 (11.4)	101 (17.4)	138 (18.4)	161 (21.8)
Health is unstable	326 (19.4)	114 (24.9)	187 (17.4)	129 (22.2)	192 (25.6)	228 (30.8)
Needs special treatment during evenings/nights	92 (5.5)	52 (11.4)	55 (5.1)	55 (9.5)	98 (13.1)	134 (18.1)
Requires complex health care management	105 (6.3)	51 (11.1)	67 (6.2)	78 (13.4)	83 (11.1)	92 (12.4)
Visual impairment not corrected by contacts or glasses	165 (9.8)	77 (16.8)	120 (11.2)	83 (14.3)	80 (10.7)	86 (11.6)
Needs constant supervision or physical assistance during toileting	-	458 (100)	-	582 (100)	-	740 (100)
Eligible for 12+ hours of personal care assistant services per day	-	3 (0.7)	2 (0.2)	8 (1.4)	-	7 (1.0)

Table 4.9 provides details regarding prior Minnesota health care program enrollment, including Medical Assistance and MinnesotaCare, as well as which state-administered managed care products (e.g. MSHO, MSC+, etc.), and eligibility because of disability. All enrollment presented here is based on least 90 days prior and up to 6 years prior to EW enrollment. Notably, Alternative Care enrollment was also considered, but none of the newly enrolled EW clients were observed to have previously been enrolled in that program and thus are not shown.

Clients with prior Medical Assistance eligibility varied by cluster, but overall 56% of newly enrolled clients had some coverage prior to EW enrollment. In general, high need clusters had lower prior Medical Assistance enrollment compared to the low and moderate need clusters.

It was most common among the lives alone / low need cluster with 70.4% of people enrolled in Medical Assistance at least 90 days prior to EW enrollment and less common among the congregate living / high need clients (26.8%).

Notably, prior enrollment in the managed care products were not mutually exclusive, meaning the same individual could have enrolled in multiple products over time. Prior enrollment in MSC+ was the most common among the managed care products, and most common among the lives with others / moderate need cluster (39.2%). Prior enrollment in MinnesotaCare, the health care program for people with incomes too high for Medical Assistance, was low overall among newly enrolled clients. MinnesotaCare enrollment followed a similar pattern as prior Medical Assistance enrollment—it was more frequently observed among those with low or moderate needs. Likewise, qualifying for Medical Assistance because of a disability was observed most frequently among the lives alone / low need cluster (24.6%) and followed a similar pattern.

The average length of time of prior Medical Assistance enrollment, from 90 days prior to EW enrollment up to six years, indicates that on average, clients in the lives alone / low need group had enrolled over 4.7 years prior to EW. This cluster contrasts with the congregate living / high need cluster, where the average prior enrollment per client was 2.3 years prior to EW.

Table 4.9. Health care program enrollment including Medical Assistance and MinnesotaCare, by clusters of newly enrolled Elderly Waiver clients at least 90 days prior to Elderly Waiver enrollment

	Lives Alone Low Need (n=1,679)	Lives Alone High Need (n=458)	Lives with Others Moderate Need (n=1,075)	Lives with Others High Need (n=582)	Congregate Living Moderate Need (n=750)	Congregate Living High Need (n=740)
Medical Assistance Enrollment >90 days prior to EW Enrollment	1,182 (70.4)	162 (35.4)	739 (68.7)	366 (62.9)	289 (38.5)	198 (26.8)
Medical Assistance Managed Care >90 days prior to EW Enrollment						
MSC+	565 (33.7)	78 (17.0)	421 (39.2)	196 (33.7)	83 (11.1)	52 (7.0)
MSHO	536 (31.9)	40 (8.7)	285 (26.5)	93 (16.0)	95 (12.7)	46 (6.2)
Families and Children	230 (13.7)	21 (4.6)	125 (11.6)	38 (6.5)	32 (4.3)	13 (1.8)
Special Needs Basic Care	237 (14.1)	33 (7.2)	129 (12.0)	41 (7.0)	16 (2.1)	5 (0.7)
MinnesotaCare >90 days prior to EW Enrollment	149 (8.9)	20 (4.4)	107 (10.0)	44 (7.6)	20 (2.7)	17 (2.3)
Eligible because of disability >90 days prior to EW Enrollment	413 (24.6)	53 (11.6)	219 (20.4)	88 (15.1)	48 (6.4)	18 (2.4)

	Lives Alone Low Need (n=1,679)	Lives Alone High Need (n=458)	Lives with Others Moderate Need (n=1,075)	Lives with Others High Need (n=582)	Congregate Living Moderate Need (n=750)	Congregate Living High Need (n=740)
Average years since earliest Medical Assistance enrollment (standard deviation)	4.7 (2.4)	3.8 (2.7)	4.3 (2.5)	3.8 (2.6)	2.9 (2.6)	2.3 (2.4)

Table 4.10 represents data related to health care utilization from MDS assessments, self-reported hospital, ED and NF stays and falls indicated on LTC Screening Assessments, and claims paid via MN health care program for new enrollees.¹⁹

Prior NF Stays

Based on data from MDS assessments for up to 6 years before EW enrollment, having any prior SNF stay was relatively common across all clusters. However, it was most common in both moderate and high need congregate living clusters. More than half of clients in these two clusters had a SNF stay at any point prior to EW enrollment. These two clusters were also more frequently observed to have multiple stays and long stays (more than 100 days) in a nursing facility than other clusters. Furthermore, over 40% in each cluster had a SNF stay in the year prior to EW enrollment and 35% within 90 days. Thus, consistent with the cluster label, those in congregate living had a high likelihood of a recent SNF stay just before EW enrollment. A high frequency of recent SNF stays was also observed in the lives alone / high need cluster, with over 25% having a recent stay within 90 days of EW enrollment. Data collected from the LTC Screening Assessment, which asks about nursing facility stays in the previous three years, was consistent with these patterns observed from the MDS data.

Emergency Department and Hospital Admissions

According to the LTC Screening Assessments, ED and hospitalizations in the prior three years were fairly common, with over 50% of clients in every cluster having had an ED visit during that time and nearly 25% in each cluster had multiple EDs. Between 40-60% of clients had a hospitalization in the previous three years and over 15% in each cluster had multiple hospitalizations. Although there were typically more frequent ED and hospitalizations among clusters noted as high need, regardless of living arrangement, differences by cluster were fairly minor for these services.

Using data from Medical Assistance claims, a sizeable proportion of EW clients were observed to have ED and hospitalizations. However, there were noticeable gaps in these data compared to other sources. For example, the number of hospitalizations overall, and particularly

¹⁹The denominator in this table is the overall number of clients in each cluster. Consequently, the percentages of Medical Assistance claims are attenuated because not all clients were enrolled in Medical Assistance prior to EW.

in the congregate living clusters, is far lower than expected given the high proportion of SNF stays as identified using MDS, which are generally preceded by a hospitalization. However, within the lives alone / low need cluster and both of the lives with other clusters, over 20% had an ED claim and nearly 20% had a hospitalization claim within the year prior to EW enrollment. Given the proportions of prior Medical Assistance enrollment in these clusters (i.e. 60-70%), these attenuated frequencies are still a potentially important indicator of service utilization. Appendix D shows the most frequent primary diagnoses from the Medical Assistance claims data for ED and hospitalizations in the year prior to EW enrollment.

Self-Reported Falls

A high frequency of reported falls was noted, which was between 40-55% of clients by cluster. Among the congregate living clusters, over 17% in each had not experienced a fall, but there was concern expressed regarding falls.

Table 4.10. Health care and nursing facility utilization prior to their Elderly Waiver enrollment by clusters of newly enrolled clients.

	Lives Alone Low Need (n=1,679)	Lives Alone High Need (n=458)	Lives with Others Moderate Need (n=1,075)	Lives with Others High Need (n=582)	Congregate Living Moderate Need (n=750)	Congregate Living High Need (n=740)
MDS Assessments						
Any Skilled Nursing Facility (SNF) stay	464 (27.6)	210 (45.9)	224 (20.8)	177 (30.4)	433 (57.7)	492 (66.5)
Multiple SNF stays	183 (10.9)	106 (23.1)	82 (7.6)	61 (10.5)	175 (23.3)	224 (30.3)
Stay of 100 days or longer	38 (2.3)	13 (2.8)	9 (0.8)	14 (2.4)	94 (12.5)	112 (15.1)
Avg. stay length, days (standard deviation)	39.1 (116.5)	31.3 (39.6)	25.6 (36.8)	36.4 (74.9)	70.8 (190.0)	69.1 (180.7)
Any SNF stay 1 year prior	281 (16.7)	116 (25.3)	142 (13.2)	106 (18.2)	312 (41.6)	336 (45.4)
Multiple SNF stays 1 year prior	53 (3.2)	27 (5.9)	25 (2.3)	28 (4.8)	68 (9.1)	77 (10.4)
Any SNF stay 90 days prior	182 (10.8)	69 (15.1)	88 (8.2)	74 (12.7)	265 (35.3)	256 (34.6)
LTC Screening Utilization (3 years prior)						
Any nursing facility stay	315 (18.8)	121 (26.4)	171 (15.9)	139 (23.9)	350 (46.7)	334 (45.1)
Multiple nursing facility stays	47 (2.8)	25 (5.5)	30 (2.8)	26 (4.5)	42 (5.6)	51 (6.9)
Emergency department	850 (50.6)	262 (57.2)	546 (50.8)	332 (57.0)	437 (58.3)	468 (63.2)
Multiple emergency departments	382 (22.8)	111 (24.2)	232 (21.6)	148 (25.4)	192 (25.6)	227 (30.7)
Hospitalization	718 (42.8)	220 (48.0)	449 (41.8)	291 (50.0)	424 (56.5)	451 (61.0)
Multiple hospitalizations	251 (15.0)	77 (16.8)	164 (15.3)	113 (19.4)	143 (19.1)	162 (21.9)
Had a prior fall	685 (40.8)	224 (48.9)	419 (39.0)	262 (45.0)	310 (41.3)	410 (55.4)

	Lives Alone Low Need (n=1,679)	Lives Alone High Need (n=458)	Lives with Others Moderate Need (n=1,075)	Lives with Others High Need (n=582)	Congregate Living Moderate Need (n=750)	Congregate Living High Need (n=740)
Fall resulted in a fracture	242 (14.4)	52 (11.4)	178 (16.6)	103 (17.7)	83 (11.1)	48 (6.5)
No falls, but concerned	125 (7.4)	63 (13.8)	72 (6.7)	62 (10.7)	103 (17.7)	129 (17.4)
Medical Assistance Claims Utilization 1 year prior to EW Enrollment ^a						
ED	476 (28.4)	59 (12.9)	277 (25.8)	125 (21.5)	110 (14.7)	74 (10.0)
Hospitalization	366 (21.8)	51 (11.1)	199 (18.5)	121 (20.8)	127 (16.9)	95 (12.8)
Multiple hospitalizations	107 (6.4)	12 (2.6)	67 (6.2)	38 (6.5)	40 (5.3)	21 (2.8)
Avg hospital stay in days (standard deviation)	5.8 (7.6)	8.1 (16.1)	5.4 (7.4)	6.6 (16.6)	7.6 (10.6)	9.6 (19.8)
Medical Assistance Claims Utilization 90 days prior to EW Enrollment ^b						
ED	279 (16.6)	39 (8.5)	152 (14.1)	66 (11.3)	73 (9.7)	51 (6.9)
Hospitalization	231 (13.8)	25 (5.5)	132 (12.3)	72 (12.4)	85 (11.3)	61(8.2)

^aPercentages calculated based on 5,284 newly enrolled EW clients to compare with other rows despite not all had prior Medical Assistance enrollment

Table 4.11 highlights the proportion of clients by cluster who matched with SLL data modules, by cluster. Although there was an overall high match rate with any SLL data for most EW clients (58-95%), it was notably lower for the clients in the lives with others clusters (58% and 64%). Although it is not possible to completely conclude whether the low match is the result of the inability to link data or the lack of calls made by (or on behalf of) the individual, it is a reasonable hypothesis that because these individuals live with others they may be less likely to have placed a call to the SLL.

In considering specific modules of SLL, the percentages in Table 4.11 are based on the entire cluster denominator, not just those who matched with the SLL. Notable patterns were present in the types of data across clusters. For example, Options Counseling calls were most frequently observed among the congregate living clusters, with 58.2% having been identified in the high need and 54.9% in the moderate need clusters. The lives alone / high need cluster was also high, with a comparable 49.8% with Options Counseling call data. Other clusters were all below 20%. Calls for the Return to Community Initiative, which helps individuals move out of nursing facilities, was predictably most common among the congregate living clusters, where the frequency was 20% and 26% of the moderate and high need clusters, respectively.

Table 4.11. Overall matches of newly enrolled Elderly Waiver clients with different Senior Linkage Line data modules by cluster

	Lives Alone Low Need (n=1,679)	Lives Alone High Need (n=458)	Lives with Others Moderate Need (n=1,075)	Lives with Others High Need (n=582)	Congregate Living Moderate Need (n=750)	Congregate Living High Need (n=740)
Matched with SLL	1,192 (71.0)	380 (83.0)	618 (57.5)	370 (63.6)	711 (94.8)	697 (94.2)
Any call for Options Counseling	295 (17.6)	228 (49.8)	114 (10.6)	54 (9.3)	412 (54.9)	431 (58.2)
Any call for Return to Community Initiative	123 (7.3)	63 (13.8)	48 (4.5)	50 (8.6)	150 (20.0)	192 (26.0)
Any call for Pre-Admission Screening	592 (35.3)	243 (53.1)	303 (28.2)	226 (38.8)	475 (63.3)	521 (70.4)

Table 4.12 shows more detailed information regarding the 1,534 newly enrolled EW clients with SLL calls for Housing Options Counseling. These calls were among those newly enrolled EW clients who had evidence of placing calls or being offered Options Counseling as part of a call to the SLL for another reason. As described above, it is important to interpret the frequencies within this table in light of the number of clients for whom data was available. Notably, among those with records of calls for Options Counseling, these calls typically took place prior to EW enrollment; more than 80% in each cluster was over 1 month prior to enrollment. Also notable, nearly half of clients with call data declined Options Counseling. Among clients who called and were in the lives alone and congregate living clusters, the average call relative to EW enrollment was on average approximately 20-25 months prior; those in the living with others cluster, who infrequently had spoken to the SLL regarding Options Counseling, called approximately 12 months prior. Across all clusters, the majority of clients had planned a move within a month of speaking with SLL. The need for services and safety concerns were the most common reasons for planning a move.

Table 4.12. Detailed information among 1,534 newly enrolled Elderly Waiver clients with calls to SLL for Housing Options Counseling, by cluster

	Lives Alone Low Need (n=295)	Lives Alone High Need (n=228)	Lives with Others Moderate Need (n=114)	Lives with Others High Need (n=54)	Congregate Living Moderate Need (n=412)	Congregate Living High Need (n=431)
Called prior to or same month as EW enrollment	273 (92.5)	221 (96.9)	95 (83.3)	51 (94.4)	403 (97.8)	423 (98.1)
Called same month as EW enrollment	39 (13.2)	18 (7.9)	35 (30.7)	14 (25.9)	50 (12.1)	54 (12.5)
Average time of call before EW enrollment, months (standard deviation)	20.4 (21.4)	24.4 (21.8)	10.1 (16.5)	11.7 (16.5)	18.7 (19.9)	22.5 (21.8)
Declined Options Counseling	156 (52.5)	123 (54.0)	44 (38.6)	24 (44.4)	229 (55.6)	248 (57.5)
Planned move date <1 month	192 (65.1)	156 (68.4)	63 (55.3)	32 (59.3)	266 (64.6)	304 (70.5)
Planned move date 1 – 6 months	28 (9.5)	17 (7.5)	20 (17.5)	7 (13.0)	35 (8.5)	15 (3.5)
Planned move date unknown/not recorded	69 (23.4)	53 (23.3)	28 (24.6)	14 (25.9)	107 (24.8)	105 (25.5)
Reasons for move						
Need for services	184 (62.4)	140 (61.4)	62 (54.4)	36 (66.7)	238 (57.8)	265 (61.5)
Safety concerns	87 (29.5)	74 (32.5)	32 (28.1)	18 (33.3)	142 (34.5)	132 (30.6)
Family decision	48 (16.3)	37 (16.2)	21 (18.4)	10 (18.5)	75 (18.2)	68 (15.8)
Recommended by Family	25 (8.5)	25 (11.0)	11 (9.7)	9 (16.7)	38 (9.2)	49 (11.4)
Socialization	20 (6.8)	13 (5.7)	2 (1.8)	-	30 (7.3)	18 (4.2)
Nursing home discharge	15 (5.1)	7 (3.1)	1 (0.9)	2 (3.7)	24 (5.8)	39 (9.1)
Relieve burden on family/caregiver	19 (6.4)	12 (5.3)	11 (9.7)	1 (1.9)	17 (4.1)	23 (5.3)
Other	86 (29.2)	73 (32.0)	27 (23.5)	9 (16.7)	112 (27.2)	121 (28.1)

Although the overall number of clients with calls to SLL regarding the Return to Community Initiative was low, given the focus of this service, more detailed information about these calls is shown in Table 4.13.

Table 4.13. Information among 626 newly enrolled Elderly Waiver clients with calls to SLL for the Return to Community Initiative, by cluster

	Lives Alone Low Need (n=123)	Lives Alone High Need (n=63)	Lives with Others Moderate Need (n=47)	Lives with Others High Need (n=50)	Congregate Living Moderate Need (n=150)	Congregate Living High Need (n=192)
Called prior to or same month as EW enrollment	122 (99.2)	63 (100)	47 (97.9)	50 (100)	150 (100)	192 (100)
Average time of call before EW enrollment (standard deviation)	18.1 (18.0)	24.6 (24.6)	17.6 (18.6)	12.9 (15.3)	14.2 (17.4)	19.6 (21.5)
Discharge Location						
Assisted living	33 (27.1)	19 (30.2)	0 -	3 (6.0)	53 (35.3)	72 (37.5)
Private residence lives alone	35 (28.7)	9 (14.3)	8 (17.0)	4 (8.0)	18 (12.0)	37 (19.3)
Private residence with spouse/partner	4 (3.3)	5 (7.9)	14 (29.8)	22 (44.0)	4 (2.7)	11 (5.7)
Other	14 (11.5)	5 (7.9)	8 (17.0)	7 (14.0)	16 (10.7)	19 (9.9)
Unknown/not recorded	36 (29.5)	25 (39.7)	17 (36.2)	14 (28.0)	59 (39.3)	53 (27.6)

Data from SLL Pre-Admission Screening calls are shown in Table 4.14. Data from these calls was limited to time, frequency, and primary payer. Of note, these data show that very few clients had a private payer at the time of the assessment.

Table 4.14. Information among 2,360 newly enrolled Elderly Waiver clients with calls to SLL for Pre-Admission Screening, by cluster

	Lives Alone Low Need (n=592)	Lives Alone High Need (n=243)	Lives with Others Moderate Need (n=303)	Lives with Others High Need (n=226)	Congregate Living Moderate Need (n=475)	Congregate Living High Need (n=521)
Called prior to EW enrollment	442 (74.7)	193 (79.4)	207 (69.2)	158 (69.9)	387 (81.5)	425 (81.6)
Called same month as EW enrollment	28 (4.7)	9 (3.7)	17 (5.6)	9 (3.7)	20 (4.2)	25 (4.8)
Average time of call prior to EW enrollment (standard deviation)	15.8 (16.7)	16.6 (16.5)	15.7 (17.8)	14.7 (17.1)	12.6 (14.7)	15.1 (17.1)
Multiple PAS from SLL prior to EW enrollment	179 (30.2)	104 (42.8)	96 (31.7)	71 (31.6)	188 (39.6)	220 (42.2)
Payer						
Private payer	24 (5.4)	21 (10.9)	8 (3.9)	10 (6.3)	25 (6.5)	41 (9.7)

	Lives Alone Low Need (n=592)	Lives Alone High Need (n=243)	Lives with Others Moderate Need (n=303)	Lives with Others High Need (n=226)	Congregate Living Moderate Need (n=475)	Congregate Living High Need (n=521)
Medical Assistance (only)	69 (15.6)	7 (3.6)	31 (15.0)	18 (11.4)	37 (9.6)	25 (5.9)
Medicare (only)	217 (49.1)	109 (56.5)	102 (49.3)	86 (54.4)	201 (51.9)	231 (54.4)

5. Conclusions

Analyses of four secondary datasets have provided information to better understand patterns and trajectories of participants prior to enrollment on EW.

First, 16% of clients in EW during 2019 had enrolled in the program for the first time that year. These new enrollees, on average, were younger, slightly more likely to be male relative to the proportion of males in the overall cohort, and more likely to have an informal caregiver than the full client population.

Second, linkages across other datasets within MN, namely the SLL, MN Health Care Programs, and MDS data, provided evidence that, by and large, enrollees have some level of engagement with MN programs prior to EW. For example, nearly two-thirds of newly enrolled EW clients from 2019 had some record of contact with the SLL, 36% had a SNF stay, and 56% had Medical Assistance enrollment at least 1 month prior to EW.

Third, a cluster analysis using data-driven techniques to provide unbiased phenotypes of newly enrolled EW clients addressed several important research questions regarding the trajectory of clients prior to enrollment. The magnitude of the differences between the clusters highlights the constellation of factors which may have led to these older adults enrolling into the EW program for HCBS services.

More specifically, a key finding from the cluster analysis is that new enrollees form distinct groups based on their current living arrangement and need for assistance as measured by the composite of case mix, ADL and IADL need for assistance. Notably, assistance or supervision with toileting was an important ADL need that defined some clusters.

Taken collectively, these first three conclusions may be useful in understanding the trajectories of clients and allow for identification of points of contact for early identification of older adults who may be likely to need services in the future.

Low Need EW Enrollees

From the cluster analysis, the largest proportion of new clients enrolling in EW during 2019 were those who lived alone and were noted as having relatively low needs compared to other clusters. Several key features of this cluster are worth considering.

- First, this cluster of clients was recorded as having low case mix and limited assistance needed on ADL or IADLs. However, it was the conclusion of the professional administering the screening that nearly 80% of these clients had concerns regarding their care, hygiene, nutrition, and/or safety. Furthermore, over 60% of this cluster lacked an informal caregiver. Despite having relatively few ADL/IADL limitations, it is possible that lacking an informal caregiver may have exacerbated the need for formal EW services for many of these clients.
- Second, this cluster was observed to have a high prior enrollment in Medical Assistance programs (90 days before EW) with 70% having had coverage. This cluster also had the highest average length of prior Medical Assistance enrollment of 4.0 years before EW enrollment. This suggests this cluster has persistently low income/assets for several years prior to EW enrollment.

- Third, because this cluster was noted to live in their own home on the index assessment, and had relatively low care needs and low frequency of SNF stays compared to other clusters (28%), it is likely that most of this cluster did not have a recent medical event triggering a move to a nursing facility or assisted living facility and subsequent spenddown of assets to qualify for EW. However, data from the LTC Screening Assessment noted ED and hospitalizations among this cluster were common, so it cannot be ruled out completely.
- With a better understanding of how the clients in the lives alone / low need cluster came to EW and their characteristics at the time of enrollment gleaned from this secondary analysis, future research can examine additional details about this cluster. For example, service utilization while on the program could distinguish people who could receive more early targeted services or supports, perhaps using a more limited package, to provide services while balancing the full slate of resources.

Assisted Living

It was not clear which clients had previously or were currently living in an assisted living facility. The congregate living clusters included primarily clients in board and lodge residences,²⁰ with a smaller proportion in a nursing facility/SNF and returning to another community setting. However, the likelihood that clients would move from assisted living back to their own home is low, and thus it is more likely that clients with prior assisted living stays were concentrated in the congregate living clusters. However, it is notable that that 52 clients in the lives alone clusters (both low and high needs combined) did at one time reside in assisted living based on Return to Community Initiative data.

In addition to the living arrangement and housing, clients in the congregate living clusters are distinct from others in several ways. Generally, both of the congregate living clusters had substantial care needs, have a high frequency of SNF stays, including 10% with multiple stays within the prior year as noted from MDS data, and a high prevalence of cognitive impairment. Furthermore, the congregate living clusters have a lower frequency of prior Medical Assistance participation. Thus, it is possible that a proportion of this cluster, and perhaps a sizable number, have been in the process of spending down assets in assisted living, SNF, or other facilities. Data from the SLL Return to Community Initiative calls identified a limited number of clients with some indication of a history of assisted living or other facilities. Although the frequency was highest in the congregate living clusters, it was low overall, but suggests some movement from institutions and the community within this cluster. Therefore, understanding the patterns and trajectories of this cluster may provide insights into the characteristics of EW clients who enter the program following a spenddown of assets.

Findings from the National Scan conducted by the research team highlighted the importance of a state having robust Options Counseling programs, and Minnesota has one of the most robust among all states. However, among new EW enrollees, Housing Options Counseling use as recorded in the SLL was relatively low for many clusters (e.g. 18% in the lives alone / low need). Furthermore, among those with SLL Housing Options data, the percentage of clients who were offered and declined was high (40-60%). This could be because clients had already made a decision on housing, for example a planned move to assisted living. Alternatively, clients may have believed they did not have any options given their functional status or assets. The timing and delivery of Housing Options Counseling could be further explored to better understand the impact this service has on planning for long-term care among Minnesotans.

²⁰ State of Minnesota. (n.d.). Housing Benefits 101. HB101 Minnesota - Board and Lodge. <https://mn.hb101.org/a/2/>.

Need for Further Research

Some of the proposed research questions could not be answered in this analysis. First, more precise data on clients in assisted living was not identified in secondary data sources. In part, this was due to concerns about the validity of addresses where clients currently or previously resided and of assisted living providers' stability over time.

Although data representing Medicare savings program participation were obtained, Medicare claims data were not obtained because of the cost and timeliness of CMS review. Furthermore, the completeness of the dual eligible enrollment was questionable—many clients who were over 65 years old and had a Medical Assistance enrollment did not have a recorded dual eligible savings program recorded (e.g. SLMB, QMB). As an alternative, MN Health Care Programs data provided some information on health care utilization which was useful as a comparison with MDS and LTC Screening data. The lack of Medicare data also precluded using a methodology²¹ to identify individuals in assisted living by address. Finally, the data the SLL could did not contain information on personal resource expenditures.

²¹ Thomas, K. S., Dosa, D., Gozalo, P. L., Grabowski, D. C., Nazareno, J., Makineni, R., & Mor, V. (2018). A Methodology to Identify a Cohort of Medicare Beneficiaries Residing in Large Assisted Living Facilities Using Administrative Data. *Medical care*, 56(2), e10–e15. <https://doi.org/10.1097/MLR.0000000000000659>

6. Appendix A

Matching Criteria

Table 6.1. Matching criteria for linking data across Elderly Waiver clients to Senior LinkAge Line data

Criteria	N (%)
SLL Client IDs	539,225 (100%)
EW Client IDs	34,789 (100%)
SLL Clients matched to EW Clients (% of 2019 EW cohort)	23,868 (68.6%)
No match to SLL	10,921 (31.4%)
PMI, first name, last name, DOB	14,103 (40.5%)
First name, last name, DOB	5,373 (15.4%)
PMI, first name, last name, SSN, DOB	2,173 (6.3%)
First name, last name, birth month, birth day	513 (1.5%)
First name, last name, birth year	429 (1.2%)
PMI, fuzzy name (0.5 Jaccard index)	188 (0.5%)
DoB, fuzzy names (0.2 Jaccard index)	137 (0.4%)
PMI, fuzzy names (0.2 Jaccard index)	135 (0.4%)
DoB, fuzzy names (0.0 Jaccard index)	95 (0.3%)
PMI, first name, last name, birth year	93 (0.3%)
PMI, fuzzy names (0.8 Jaccard index)	92 (0.3%)
DoB, fuzzy names (0.3 Jaccard index)	88 (0.3%)
PMI, fuzzy names (0.0 Jaccard index)	83 (0.2%)
First name, last name, SSN, DOB	72 (0.2%)
EW phone, fuzzy names (0.0 Jaccard index)	70 (0.2%)
EW phone, fuzzy names (0.5 Jaccard index)	60 (0.2%)
PMI, first name, last name, birth month and day	48 (0.1%)
Birth month and day, fuzzy names (0.0 Jaccard index)	30 (0.09%)
Birth year, fuzzy names (0.0 Jaccard index)	24 (0.07%)
EW phone two, fuzzy names (0.5 Jaccard index)	14 (0.04%)
EW phone, fuzzy names (0.2 Jaccard index)	12 (0.03%)
EW phone, fuzzy names (0.5 Jaccard index)	11 (0.03%)
PMI, first name, last name, SSN	11 (0.03%)
EW phone, fuzzy names (0.0 Jaccard index)	7 (0.02%)
EW phone two, SLL cell phone, fuzzy names (0.5 Jaccard index)	3 (0.01%)
SSN, fuzzy names (0.8 Jaccard index)	3 (0.01%)
First name, last name, SSN	1 (0.02%)

7. Appendix B

Data elements used in cluster analysis

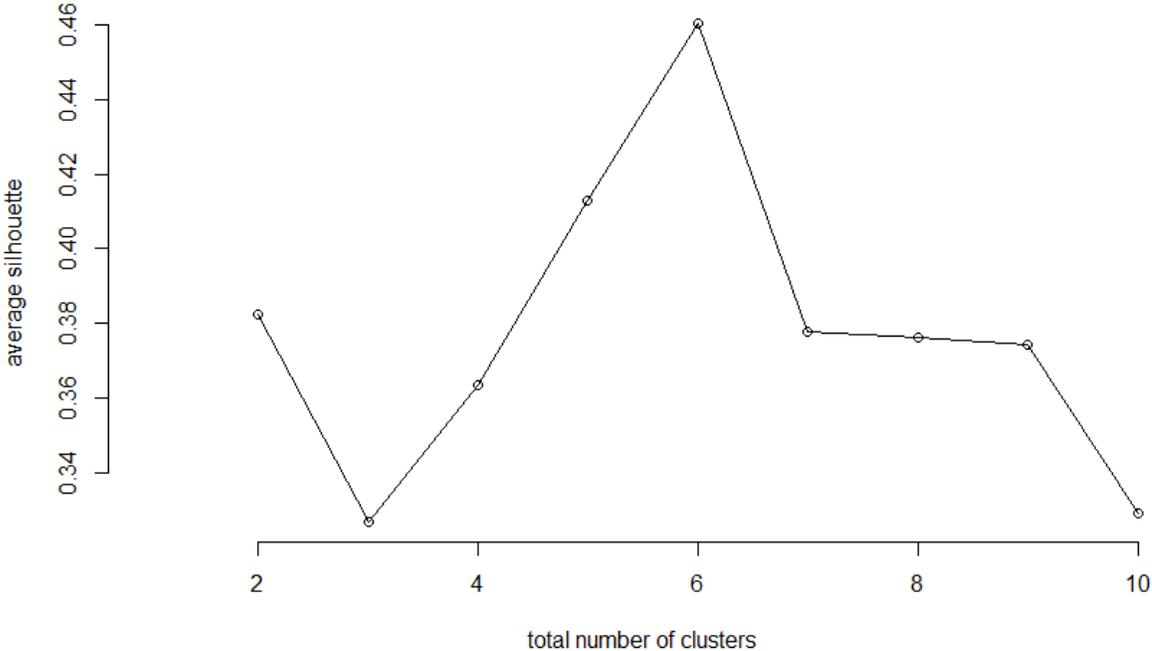
Table 7.1. Data elements used in cluster analysis

Variable description	Type of variable
Number of ADLs needing any level of assistance	Ordinal; range 0 to 8
Aggregated casemix	Binary; 1 = high, 0 = low
Presence of informal caregiver	Binary; 1 = yes, 0 = no
Lives alone	Binary; 1 = yes, 0 = no
Lives with others (spouse/parents/family/friends/significant other)	Binary; 1 = yes, 0 = no
Lives in a congregate setting	Binary; 1 = yes, 0 = no
Requires clinical monitoring	Ordinal; 0 = less than once per day, 1 = at least once per day, 2 = at least once every 8 hours
Has a neurological diagnosis	Binary; 1 = yes, 0 = no
Number of IADLs needing any level of assistance	Ordinal; range 0 to 8
<i>Professional conclusions</i>	
ADL limitation (by professional conclusion)	Binary; 1 = yes, 0 = no
IADL limitation (by professional conclusion)	Binary; 1 = yes, 0 = no
Impaired cognition	Binary; 1 = yes, 0 = no
Frequent behavior symptoms	Binary; 1 = yes, 0 = no
Concerns regarding care, hygiene, nutrition or safety	Binary; 1 = yes, 0 = no
Concerns regarding neglect, abuse or exploitation	Binary; 1 = yes, 0 = no
Person is frail	Binary; 1 = yes, 0 = no
Frequent institutional stays	Binary; 1 = yes, 0 = no
Hearing impairment causing functional limitations	Binary; 1 = yes, 0 = no
Needs restorative or rehabilitative treatments	Binary; 1 = yes, 0 = no
Health is unstable	Binary; 1 = yes, 0 = no
Needs special treatment during evenings / nights	Binary; 1 = yes, 0 = no
Requires complex health care management	Binary; 1 = yes, 0 = no
Visual impairment not corrected by contacts or glasses	Binary; 1 = yes, 0 = no
Needs constant supervision or physical assistance during toileting	Binary; 1 = yes, 0 = no
Eligible for 12+ hours of personal care assistant services per day	Binary; 1 = yes, 0 = no

8. Appendix C

Average silhouette distance

Table 8.1. Average silhouette distance for each potential number of clusters



9. Appendix D

Most Common Diagnoses

Table 9.1. Most common diagnoses for health care utilization in the 1 year prior to Elderly Waiver enrollment, Data Source

Primary Diagnosis	N (%)
Emergency Department encounters	N=2,284 Emergency Department Visits
Other chest pain	57 (2.5)
Chest pain, unspecified	54 (2.4)
Altered mental status, unspecified	52 (2.3)
Urinary tract infection	42 (1.8)
Chronic obstructive pulmonary disease with (acute) exacerbation	42 (1.8)
Hospitalizations	N=1,405 Hospitalizations
Sepsis	81 (5.8)
Hypertensive heart and chronic kidney disease with heart failure	48 (3.4)
Acute kidney failure	33 (2.4)
Chronic obstructive pulmonary disease with (acute) exacerbation	30 (2.1)
Hypertensive heart disease with heart failure	30 (2.1)