PASSPORT consumer eligibility

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PASSPORT
Consumer Eligibility

Do PASSPORT Consumers Meet Eligibility Requirements for Participation in the Medicaid Home and Community-Based Waiver Program?

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ACKNOWLEDGMENTS

CONSUMER ELIGIBILITY

In this segment of the PASSPORT evaluation we will address whether waiver consumers meet the Medicaid Home and Community-Based Long-Term Care Waiver program's eligibility criteria. We will also explore what factors impact the PASSPORT consumers' length of stay and what factors lead to disenrollment from the program to enter a nursing facility.

Most applicants to Ohio's long-term care system must have a health and functional review which is accomplished through the PASSPORT pre-admission assessment function. In addition, those needing Medicaid to pay for their care must have an asset and income assessment prior to receiving long-term care services. Applicants to the long-term care system receive a Pre-admission screening (PAS) to ensure that applicants with mental illness or mental retardation and developmental disability receive needed services. The PASSPORT assessment evaluates the functional capabilities of the applicants and provides an opportunity to present home and community-based options as an alternative to nursing facility placement. PASSPORT is also an important gateway function for other programs managed by the Ohio Department of Aging — it serves to match consumers to the programs that best suit the applicant. Information regarding the applicant's health, disability, care needs, living environment, and the presence or absence of informal caregivers are collected and recorded on an ongoing basis by the PASSPORT Administrative Agencies (PAAs), a division of the Area Agencies on Aging, in the software application known as the PASSPORT Information Management System (PIMS). Each prospective consumer is assessed once initially and then reassessed annually. In addition, PASSPORT consumers are reassessed when their health and functional status changes and when they leave the program. The assessment is not completed in one visit; rather it is completed over

a period of time. For the purpose of examining PASSPORT *eligibility* we will rely on an analysis

of PIMS data at a single point in time to answer the following two questions.

1. **DO PASSPORT CONSUMERS MEET THE ELIGIBILITY REQUIREMENTS FOR PARTICIPATION IN THE MEDICAID WAIVER PROGRAM? SPECIFICALLY, ARE THEY FINANCIALLY ELIGIBLE AND DO THEY MEET THE REQUIREMENT THAT CONSUMERS HAVE A NURSING FACILITY LEVEL OF CARE?**

To examine whether currently enrolled PASSPORT consumers meet the *eligibility*

requirements for enrollment in PASSPORT (OAC Rule: 5101:3-31-03) each consumer's

assessment results will be evaluated against two criteria: the Medicaid financial eligibility

determined by the County Department of Job and Family Services (CDJFS) and the intermediate

or skilled level of care determined by the PAA. Consumers' demographics, living arrangement,

and health and functional status are collected by PAA assessors and entered into PIMS at the

time of their visits to both new applicants and currently enrolled consumers. This software

allows the assessors, case managers, and Ohio Department of Aging (ODA) staff immediate

access to consumers' data for review and examination.

Methodology

In order to have consistent data from all 13 PAAs, this study selected all PASSPORT

consumers who were enrolled and had an active service plan for any length of time between

October 1, 2004 and September 30, 2005. This is the first 12 month period in which all PAAs

were using PIMS for data recording. This selection criterion allowed us to use uniform data from

all PAAs and to study the current PASSPORT population and their status at their most recent

assessment. Figure 1 displays a sample of the specific assessments that were used for this study.

The X's denote the timing of each assessment, and a continuous line across several years shows

that the consumer has been an active PASSPORT client during that time. The X's surrounded by a box indicate the beginning of an assessment.

There were 26,536 complete assessments during the study period, from which 295 were excluded because: the consumers or their physicians did not agree to the care plan and consequently were not enrolled; they enrolled in the Choices program and they were excluded from this study; or they had a diagnosis of MR/DD and potentially were receiving services from MR/DD county boards.

Figure 1

PASSPORT Sample for Evaluation

	2002	2003	Oct. 2004	Sept. 2005
Mrs. B.				
Mr. C.				
Mr. D.				
Mrs. K.				
Mrs. H.				
Mrs. F.				
Mr. X.				

To determine financial eligibility access to consumers' financial data is required. Although the PASSPORT assessors make an initial evaluation of the financial status of

applicants based on the documents provided by the consumers, the final eligibility determination takes place at the County Department of Job and Family Services and the information collected is verified and stored in an automated client eligibility, enrollment, and case management system known as CRIS-E (Client Registry Information System – Enhanced). Initially, we had proposed and planned to acquire the financial data for all of the 26,079 active PASSPORT consumers by accessing CRIS-E data. ODJFS informed us, after many efforts on both sides, that the CRIS-E system could not create a database for all PASSPORT consumers, and that the only way to assess eligibility would be to look up each record, one consumer at a time. Since this strategy was beyond the scope of this project, we selected a stratified random sample based on the regional case load of 1,044 consumers distributed across the 13 PAAs for the determination of financial eligibility. We obtained clearance to access the CRIS-E system and were trained on all the steps that Medicaid technicians take to determine financial eligibility. In assessing financial eligibility each PASSPORT consumer was examined for marital status (for determination of spousal impoverishment assets, identical to those applied to nursing home residents). In addition, each consumer's finances were examined by way of a monthly income test of up to 300% of SSI ($1,692 in 2004 to 2005, after accounting for all health insurance premiums) and given an asset test of no more than $1,500 in liquid assets.

Profile of PASSPORT consumers

The PASSPORT program was designed to serve Ohio's population age 60 or older. In order to confirm that PASSPORT consumers meet the age eligibility criteria and to build a demographic profile of PASSPORT enrollees, we calculated the age of consumers in terms of the number of days between their date of birth and the date of their most recent service plan, and

then annualized the days to obtain age. The average age of PASSPORT consumers was 76.6 while 18.5% were 85 years or older. Figure 2 displays the age distribution of this population. A small number of consumers (19) were assessed and enrolled just prior to (less than 10 days) turning 60.

Figure 2
Age Distribution of PASSPORT Consumers
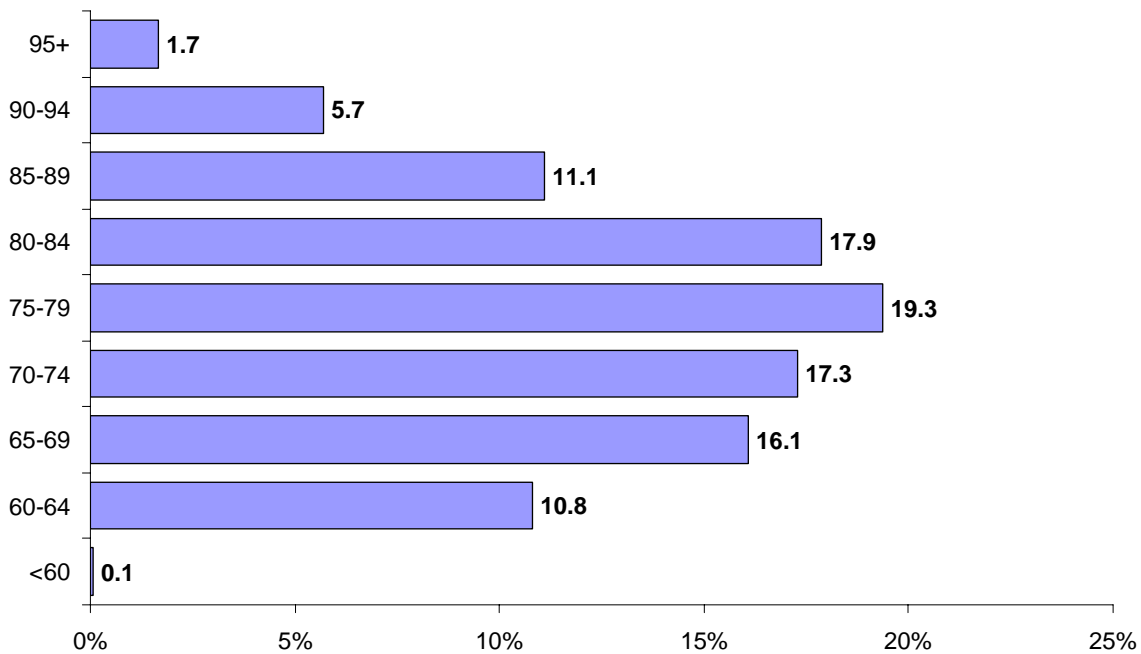
Age	Percentage
95+	1.7
90-94	5.7
85-89	11.1
80-84	17.9
75-79	19.3
70-74	17.3
65-69	16.1
60-64	10.8
<60	0.1

Source: PASSPORT consumers with an active service plan during October 1, 2004 to September 30, 2005. PASSPORT Information Management System (PIMS).

More than three quarters of PASSPORT consumers are female; Figure 3 displays the PASSPORT consumers' distribution by gender.

As Figure 4 shows, more than one quarter of PASSPORT consumers were minorities, much higher than the proportion of minorities among the 60+ population of Ohio (10.3 %). More than one percent of PASSPORT consumers identified their ethnicity as Hispanic, again, this is

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Figure 3
Distribution of PASSPORT Consumers by Gender
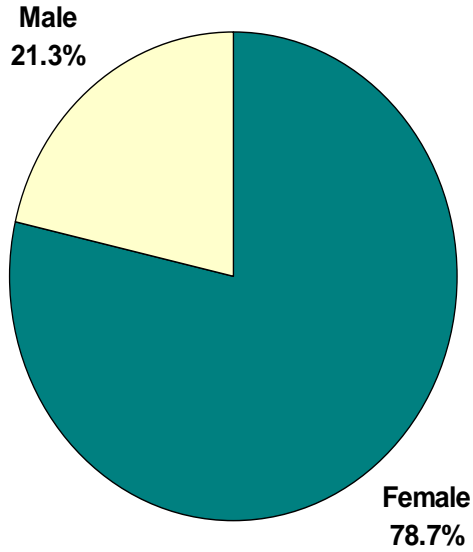
Male
21.3%

Female
78.7%

Figure 4

Distribution of PASSPORT Consumers by Race

Race	Percentage
Hispanic	1.2%
Other Races	1.6%
Black	24.3%
White	74.1%

0% 10% 20% 30% 40% 50% 60% 70% 80%

more than the proportion of older Hispanic Ohioans (0.7%)[1]. This may reflect the

disproportionate number of minority elders who qualify for Medicaid because of poverty or,

perhaps, a preference of minorities for alternatives to nursing home care because of cultural

values.

More than four out of every five PASSPORT consumers are unmarried, almost one half

are widowed, and nearly one third are divorced, separated, or never married (Figure 5).

Figure 5

Marital Status of PASSPORT Consumers

More than 80% of PASSPORT consumers lived in their own home or apartment. Another

16% lived in the home of a friend or relative. A few consumers stated their usual place of

residence as a congregate housing (65) and fewer still an adult family home or group

[1] Mehdizadeh, et. al (2004). Profile & Projections of the 60+ Population: Ohio & Counties. Page 17.

home (24). A total of 83 consumers lived in one of the following settings: nursing facility, residential care facility, acute care hospital, an Ohio Department of Health licensed alternative community living setting, or other locations at the time of assessment. Ohio Administrative Code 5101:3-31-03 specifies that a PASSPORT consumer, must not be a resident of a "Keys Amendment" facility; these are medical facilities that are not certified by either Medicaid or Medicare or non-medical facilities where a significant number of SSI recipients reside (examples include adult foster homes, adult family homes and group homes, and residential care facilities) as defined by 5101:3-31-02. PASSPORT consumers also must not reside in a hospital or nursing facility. It appears that about 0.5% of PASSPORT consumers lived in a setting defined as inappropriate by OAC at the time of assessment. Medicaid Management Information System (MMIS) verifies the living arrangement for waiver consumers prior to issuing a payment. Although the assessments that we received suggest inappropriate living arrangements, it is reasonable to assume, given the built-in mechanism in MMIS that these consumers moved following the assessment. Figure 6 displays the living arrangements (settings) of PASSPORT consumers.

Did PASSPORT consumers meet the requirement of needing a nursing facility level of care?

To investigate whether PASSPORT consumers meet the nursing home level of care, their functional, physical, and mental health will be used to determine whether each individual meets the intermediate or skilled level of care as defined by OAC 5101:3-3-05 and OAC 5101:3-3-06. Specifically, PASSPORT consumers, in addition to meeting financial eligibility standards, must meet the nursing facility level of care. The nursing facility level of care could be met by meeting either intermediate level of care (ILOC) or skilled level of care (SLOC). To meet ILOC one must meet at least one of the following four criteria:

Figure 6
Distribution of Living Arrangement Settings Among
PASSPORT Consumers
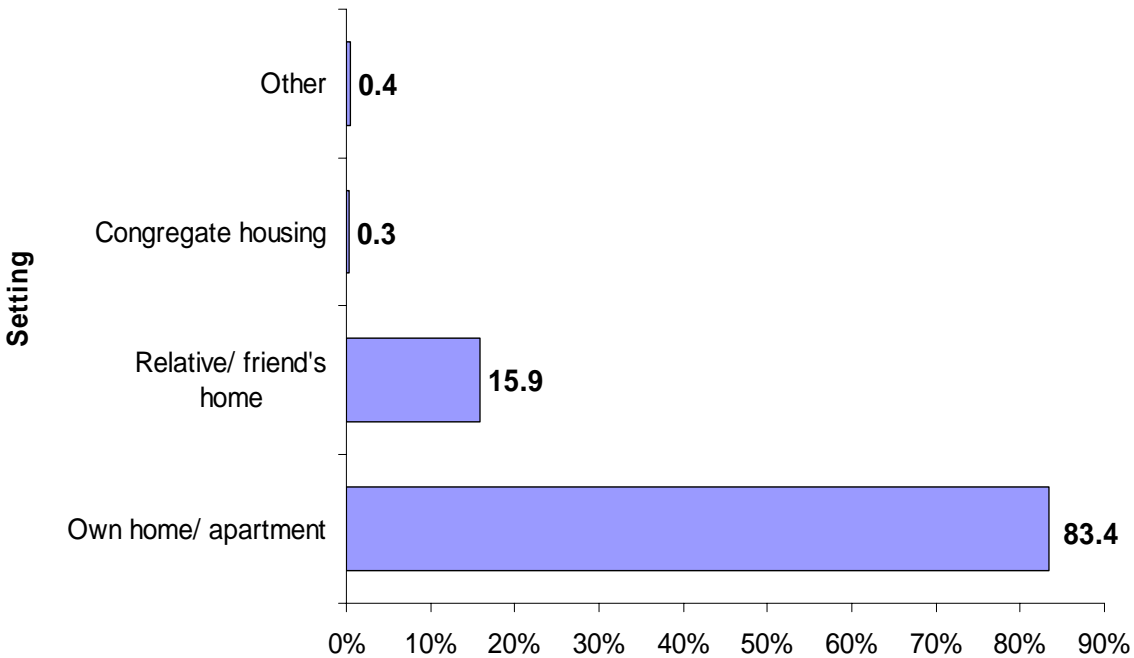
(1) Require *hands-on* assistance with at least two activities of daily living (ADL), (2) Need *hands-on* assistance with at least one ADL and also require the help of another person to administer medication, (3) Need 24-hour-per-day supervision from another person to prevent harm to self or others because of cognitive impairment including, but not limited to dementia, and (4*)* Have an unstable medical condition and require at least one skilled nursing service at less than 7 days per week, and/or a skilled rehabilitation service at less than 5 days per week (at a lower level of care than skilled level of care (SLOC), see the next section on SLOC)[2].

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[2] Anderson Online Documents. (2007). Ohio Administrative Code 5101:1-39-24. Retrieved March 13, 2007 fromhttp://onlinedocs.andersonpublishing.com/oh/lpExt.dll?f=templates&fn=main-h.htm

Although almost all PASSPORT consumers meet intermediate level of care, a very small number of them are suffering from such complicated health conditions that they are assessed for SLOC. An applicant meets skilled level of care when she/he needs assistance beyond intermediate nursing home level of care or needs an intermediate level of care in a facility designed for persons with MR/DD. To qualify for SLOC the applicant must meet both of the following conditions: (1) the applicant's medical condition is unstable, and (2) the applicant's physician has ordered at least one skilled nursing service seven days or more frequently per week, and/or one skilled rehabilitation service five days or more frequently per week.

Prior to examining whether PASSPORT consumers meet nursing home level of care, the functional and cognitive status of consumers will be presented to provide insight into the extent of impairment and the dependency of this population. More than 95% of these consumers needed the assistance of another person for bathing (Figure 7).

Figure 7

Proportion of PASSPORT Consumers Needing Hands on Assistance With the Following ADL Impairments

ADL Category	Percentage
Eating	11.3
Toileting	20.1
Grooming	32.4
Dressing	60.8
Mobility*	77.9
Bathing	95.6

*Note: The 'mobility' category combines 'locomotion', 'transfer', and 'bed mobility'.

Source: PASSPORT consumers with an active service plan during October 1, 2004 to September 30, 2005. PASSPORT Information Management System (PIMS).
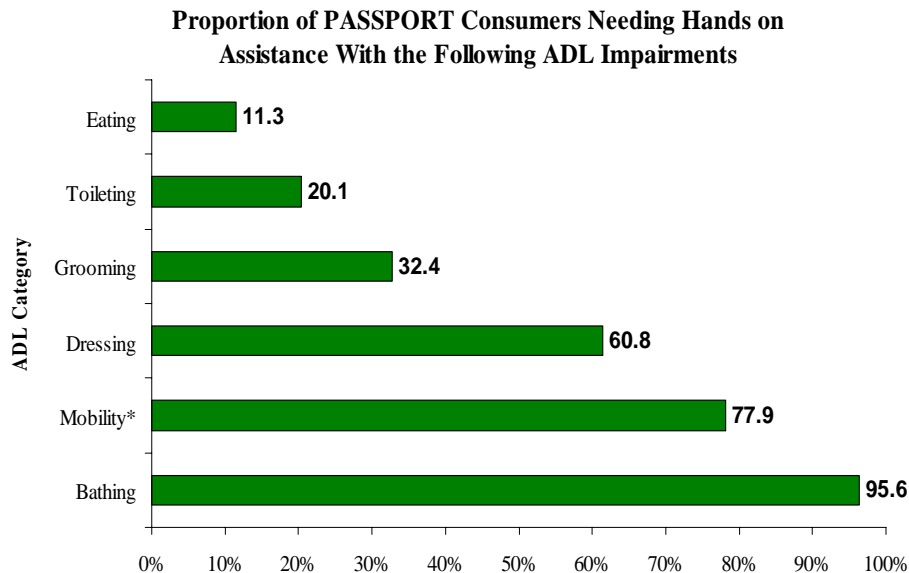
On the other hand only slightly more than 11% of consumers needed assistance with eating. Overall, more than 95% were impaired in at least two activities of daily living (Figure 8).

Next, we will examine the extent to which consumers could function independently. Instrumental activities of daily living (IADL), such as shopping, meal preparation, performing heavy household chores, yard work, handling legal and financial matters, and laundry together

Figure 8
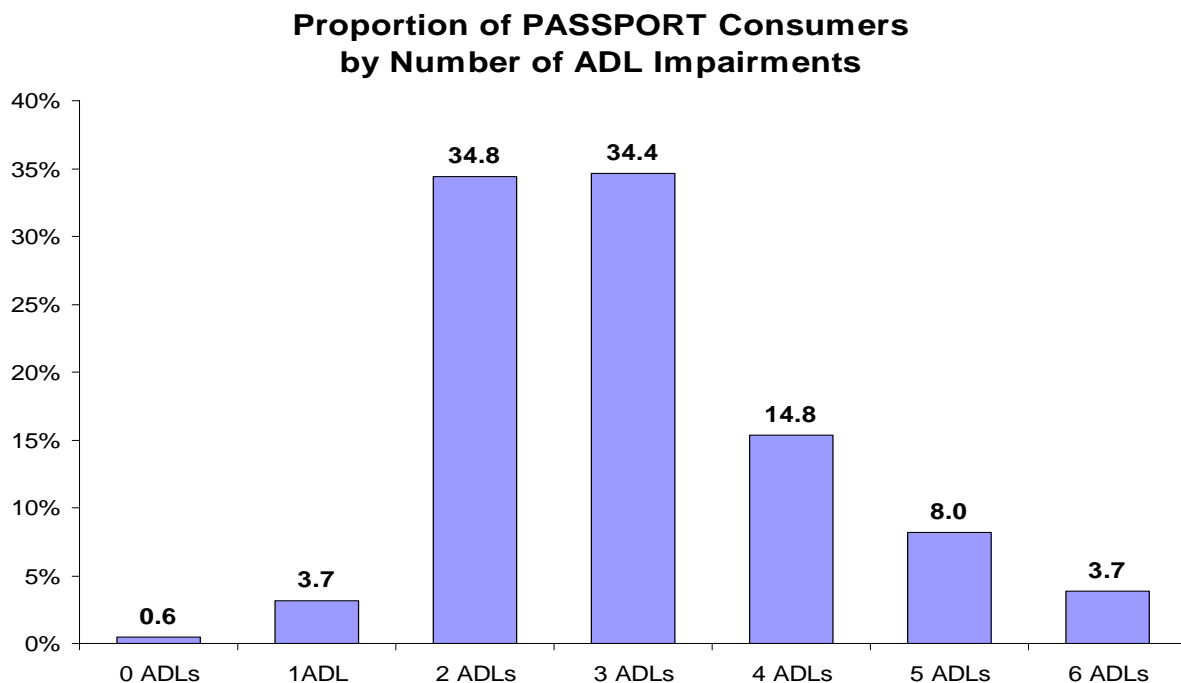
**Proportion of PASSPORT Consumers
by Number of ADL Impairments**

determine the extent of independence. As Figure 9 shows, almost 96% of PASSPORT consumers needed assistance with laundry and 88% needed help with using the telephone, transportation, or handling legal or financial matters (community access).

The ability to prepare and self-administer any medication irrespective of whether it is over-the-counter or prescribed affects ones health and well being. Needing assistance with the

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administration of medication **and** having impairment in one of the six ADLs (bathing, mobility, dressing, grooming, using the toilet, and eating) is another criterion for meeting nursing home level of care. Four out of 10 consumers needed assistance with the administration of their medication.

Figure 9

Proportion of PASSPORT Consumers Who Need Hands on Assistance With the Following IADLs

Note: Impairment in any or all of the following activities - house cleaning, yard work, or house chores constitutes 'environmental impairment'. Needing hands on assistance in any or all of the following activites- using the telephone, transportation, and legal and financial work constitutes 'community access' impairment.

Source: PASSPORT consumers with an active service plan during October 1, 2004 to September 30, 2005. PASSPORT Information Management System (PIMS).

When consumers need assistance with IADLs there is an additive effect that impacts the extent to which consumers are dependent on other people. Figure 10 shows that more than 95% of consumers relied on others for at least four of the instrumental activities of daily living.

The next criterion for meeting intermediate nursing home level of care is needing 24-hour supervision. As mentioned earlier, the need for supervision is tied to varying levels of cognitive disability or dementia. An investigation of the cognitive status of PASSPORT consumers and

Figure 10
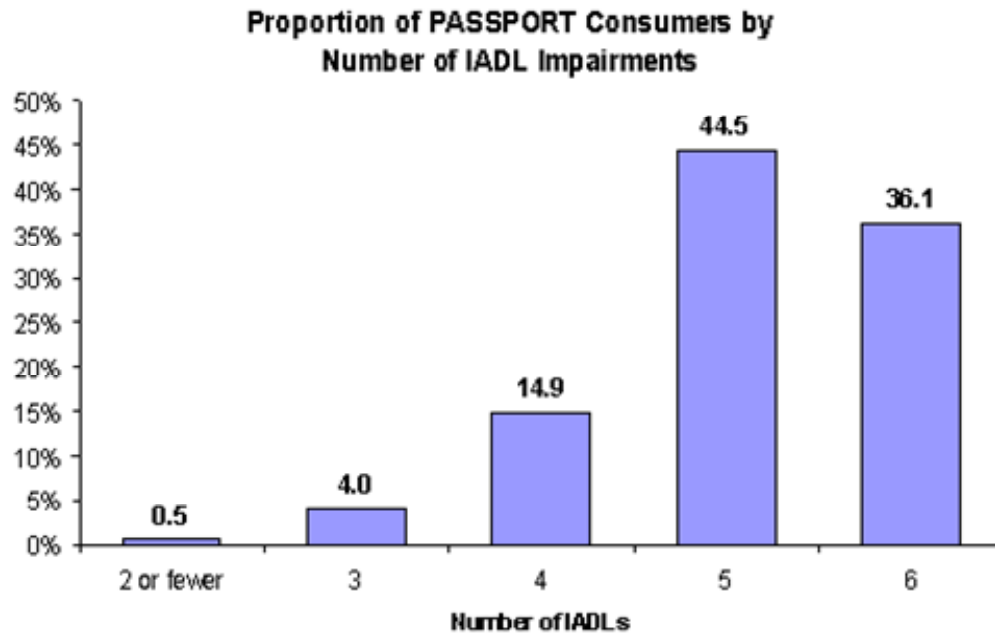
Proportion of PASSPORT Consumers by
Number of IADL Impairments

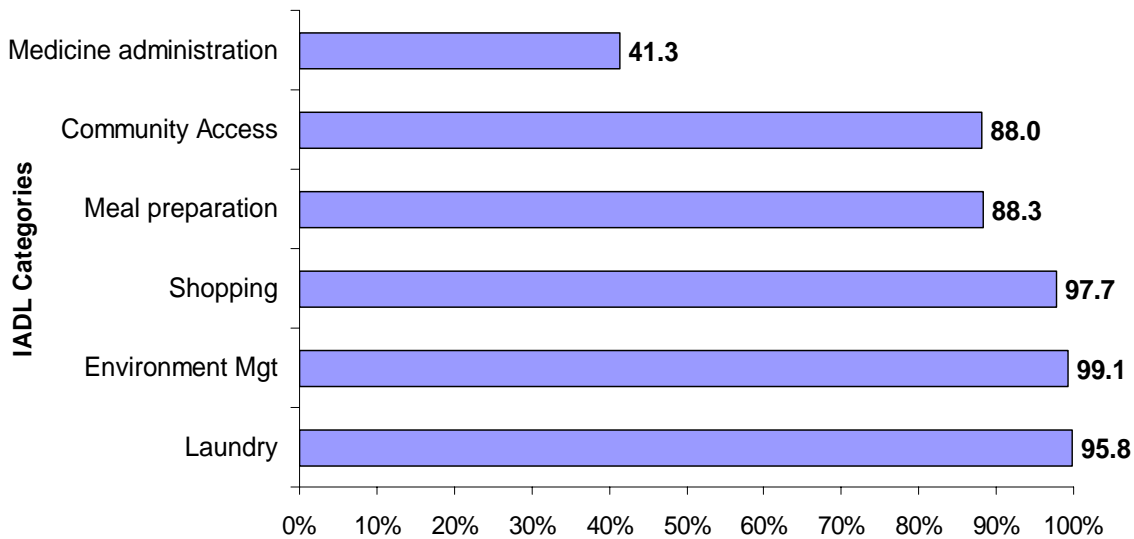Source: PASSPORT consumers with an active service plan during October 1, 2004 to September 30, 2005.
PASSPORT Information Management System (PMS).

their need for supervision revealed that 8.6% needed 24-hour supervision; another 10% needed

partial supervision (Figure 11).

The final criterion for meeting intermediate level of care is the presence of unstable

medical conditions along with a physician's order for some skilled nursing or skilled

rehabilitation services. Only 1.1% (266) of consumers were identified as having unstable medical

conditions, often in addition to having met one of the other three criteria for ILOC. We evaluated

these consumers one by one to examine the extent of their need for skilled nursing care or skilled

rehabilitation services. A total of 99 were in need of skilled nursing service (less than seven days

a week) or skilled rehabilitation services (less than five days a week) and met ILOC; another 15

had more serious medical conditions and required skilled nursing service (seven days a week or

more often) and/or skilled rehabilitation services (five days a week or more often) and met

SLOC.

Figure 11

Level of Supervision Needed by PASSPORT Consumers
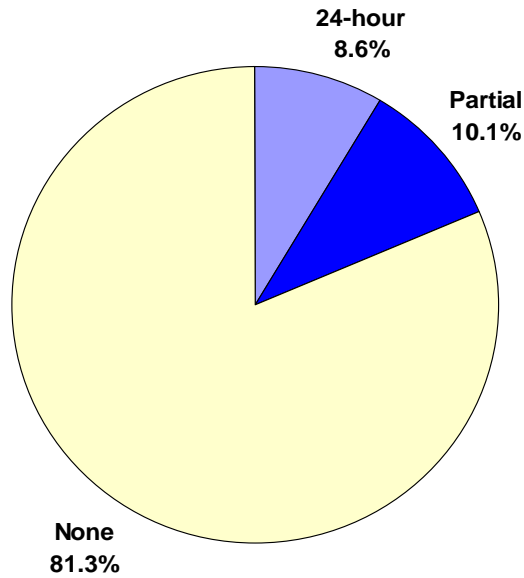
24-hour
8.6%

Partial
10.1%

None
81.3%

To meet the nursing home level of care, a consumer must meet at least one of the four criteria for ILOC or meet SLOC as described on page 9. Our investigation showed that often the consumers met more than one criterion. However, the intent of this evaluation is to determine: 1) Whether the PASSPORT consumers met at least one of the four criteria for ILOC or the criterion for SLOC; and 2) Whether our assignment of ILOC or SLOC matches that of the PASSPORT assessors and case managers. Figure 12 presents the distribution of newly enrolled and continuing PASSPORT consumers and their LOC as assigned by the PAA assessors or case managers. The overwhelming majority of PASSPORT consumers 25,701 (98.6%) out of 26,079 met ILOC by PAAs' designation; another 49 consumers (0.2%) met SLOC; and five had the intermediate MR/DD LOC. Among the new and re-assessed consumers there were a total of 324

Figure 12

Level of Care Assignment by PAA
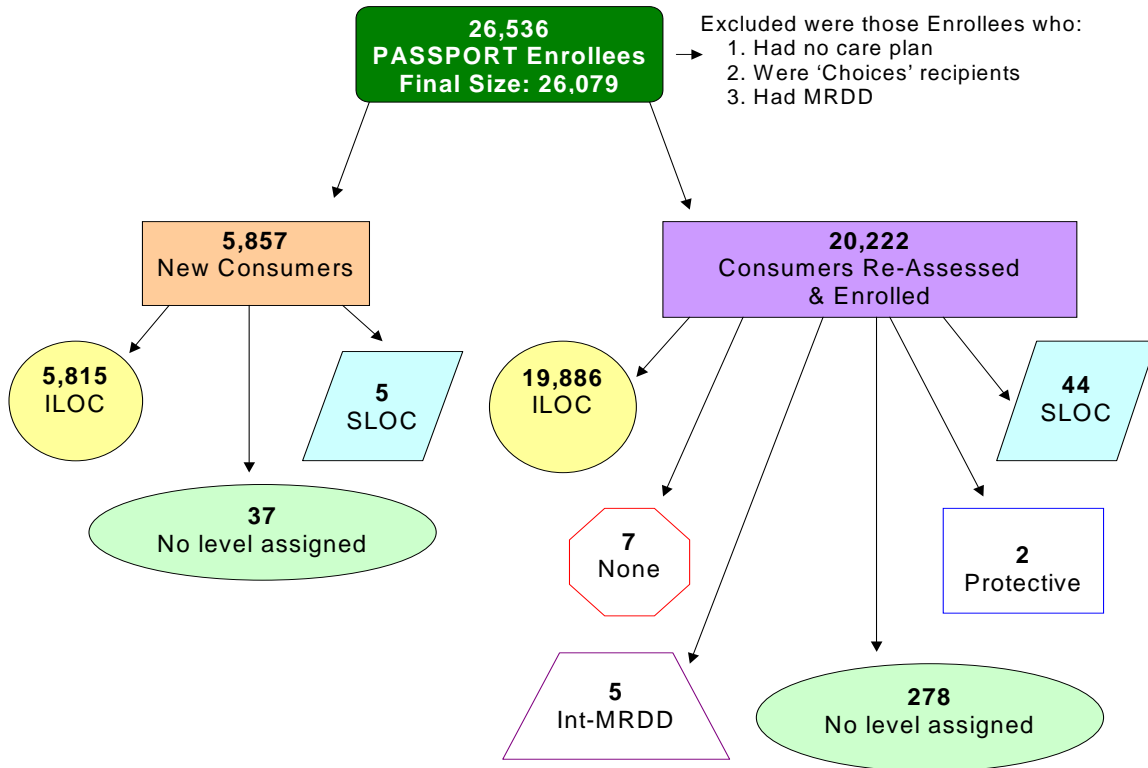
consumers (1.2%) where either no level of care was assigned (315) or their level of care was defined as none (7). Two consumers had been assigned protective level of care which ranks at a level lower than the ILOC. Next, we evaluated each consumer using the information extracted from PIMS and compared our level of care assignment with that of the PAAs.

In examining all of the 26,079 consumer's health and functional status based on OAC 5101:3-3-05 and OAC 5101:3-3-06, we learned that almost 98.7% (same as PAAs designation) of consumers met intermediate or skilled level of care (Figure 13), 39 of those who did not meet nursing home level of care were disenrolled and were evaluated based on their disenrollment assessment which might have not been complete. The remaining 311 consumers

required more in-depth study. For these consumers we reviewed the assessors' assessment notes

case-by-case looking for some information that would suggest how the level of care was

assigned. The overwhelming majority of these 311 consumers had multiple, complicated health

conditions that overshadowed all other conditions or impairments. The case notes typically

defined these consumers as:

> "The client has significant chronic health issues that require periodic evaluation; she does not drive, she has limited finances, limited family support…"

> "The client has significant arthritis pain, joint swelling, stiffness, limited standing, cane dependent, tremors."

Here are a few chronological excerpts from assessment notes for another consumer:

> has lung cancer-uses O2-2l prn. States she wears it for about all but 2hrs. Activity is somewhat limited. Cl has learned to take her time to complete tasks. Able to bathe and dress self in about 15 min. each. Takes time and uses a shower chair to rest. Limited with IADLS such as shopping and cleaning. Does a little at a time and gets exhausted easily.

> Has recently had esophagus stretched d/t dysphagia r/t chemo and radiation tx. Is now able to swallow soft foods. Left side of throat is paralyzed causing swallowing difficulty. States only has 3 teeth left.

> Able to prepare meals but is having trouble maintain wt. RN is monitoring and supervising cl's nutritional status and wt control. On clear liquid diet temporarily. On feeding machine. Granddtr does shopping.

> Consumer is hooked up to a feeding machine and has hospital bed in living room. Only bathroom is up stairs. Consumer has difficulty getting upstairs on some days. ERS has been tested and received a good response.

The notes often identified an inability to perform multiple ADLs, in fact 189 (61%) of the

311 had two or more ADL deficiencies, eight had cognitive impairment or dementia. Only for a

small number of consumers (114), although having serious debilitating conditions, there was no

specific mention of ADL or cognitive impairment or need for skilled nursing or therapy, and we

were unable to find a clear explanation that would clarify their LOC assignment.

Figure 13

Evaluating Every PASSPORT Consumer for ILOC or SLOC
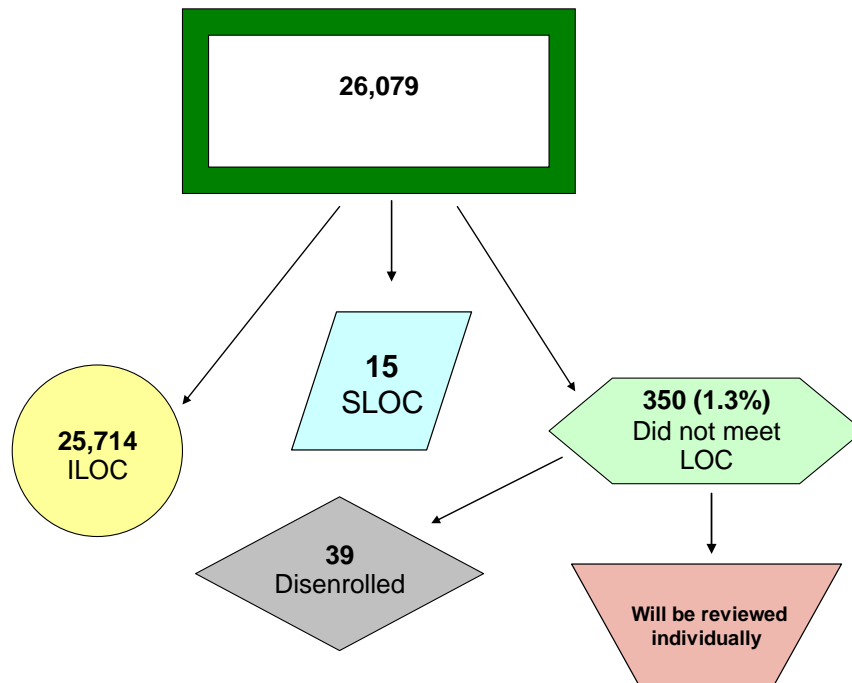
Out of curiosity we examined those consumers who had "No LOC Assigned" by PAAs to see how they compared with the group for which we could not assign a LOC based on the snapshot of PIMS. Figure 14 summarizes those results. From the 324 consumers with no LOC assignment by PAAs, 266 (82 %) met the criteria for ILOC or SLOC by our analysis and 58 (17%) did not, eight of the 58 were disenrolled and we were examining their disenrollment assessment.

Figure 14

Assessing Those with No LOC Assignment
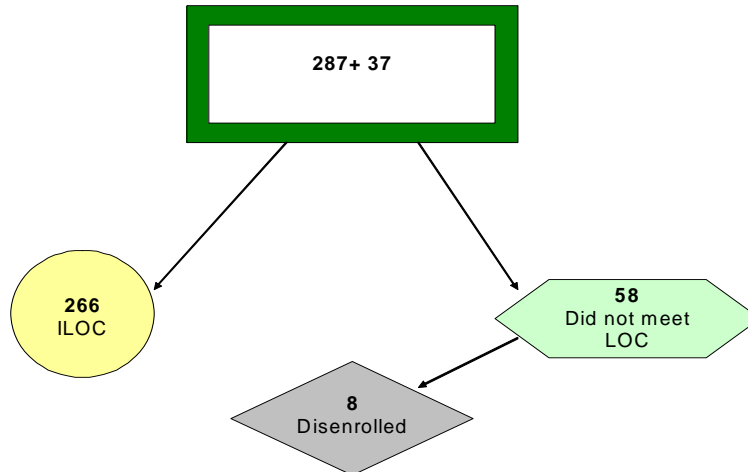
Did the consumers' 12 month service plan stay within the Cost Cap?

Cost effectiveness and neutrality is a federal requirement for all HCBS waiver programs

and the PASSPORT program is no exception to this rule. The PASSPORT waiver legislation

emphasizes that the average annual service plan cost for PASSPORT consumers cannot exceed

60% of the average annual Medicaid nursing home cost.

A service plan is the combination of the types of services (such as homemaker, chore,

transportation, adult day service, medication administration, bathing, and dressing) and the

frequency and amount of those services that a case manager determines the consumer needs to

remain in the community. This service plan is created with the consultation and input from both

the consumer and her/his caregivers to complement the services that the informal caregivers

provide. The service plan is a blueprint of what services will be provided, but the actual services

rendered often deviate, even from week to week, from this plan based on the consumer's evolving circumstances. Our findings suggest that in general fewer services are received than are prescribed in the service plan.

PIMS records the number of units of each type of service received and the accepted Medicaid unit cost of that service for each consumer while the consumer is receiving services. As stated in the methodology section for determining eligibility, we examined the assessment and accompanying records of current PASSPORT consumers for a one year window of time (October 1, 2004 to September 30, 2005). During this window, some new consumers were added to the pool of PASSPORT recipients and some were disenrolled, therefore not everyone in the study received services for 365 days. We first determined the number of days each consumer had an active service plan, and then calculated the daily cost of services provided during that period of time by dividing the cost by the number of service days. We then annualized the daily home care expenditures (by multiplying by 365) to obtain the12-month cost of PASSPORT services per consumer. Figure 15 displays the PASSPORT consumers' annual home care expenditures distribution. The average annual PASSPORT consumer's home care expenditures, based on PIMS, were $13,310 for the services rendered and $1,194 for case management ($99.50 per consumer per month) according to Ohio Department of Aging for an annual total of $14,504. The annual service plan expenditure for more than one half (54.1%) of the PASSPORT consumers in our sample is $10,000 or less. Only 5.9% of the consumers have a service plan costing more than $25,000.

In comparison, in 2005 the average annual Medicaid expenditures for a nursing home resident age 60 or older was $48,906. Table 1 presents the Medicaid average nursing home expenditures by day, month, and year.

Figure 15

Distribution of 12 Month Service Plan Cost (Annualized)

$ Spent	Percent
46,001 +	1.8
40,001 - 46,000	0.5
35,001 - 40,000	0.6
30,001 - 35,000	1.0
25,001 - 30,000	2.0
20,001 - 25,000	6.6
15,001 - 20,000	14.0
10,001 - 15,000	19.4
5,001 - 10,000	29.2
1,001 - 5,000	21.6
< 1000	3.3%
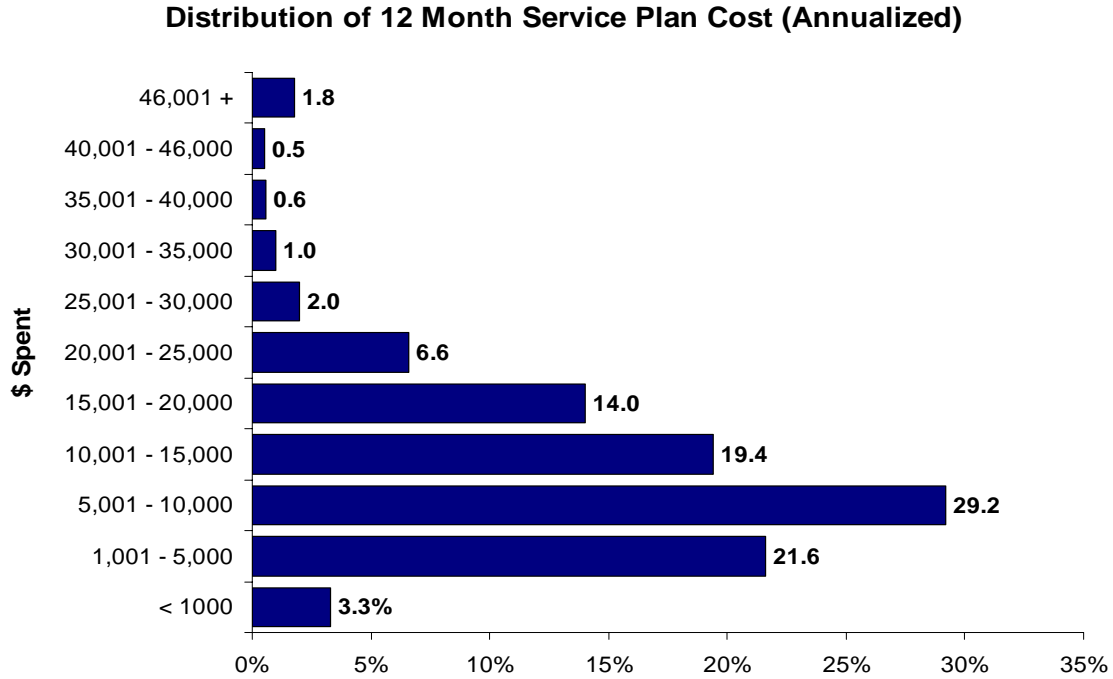
Table 1

**Average Nursing Facility Expenditures
Per Day, Per Month, and Per Year by Age Group**

Age Group	Number NF Patients	Days Medicaid NF	NF Expenditures	Avg. NF Expenditures Per Day	Annual Cost	Monthly Average	60% of monthly avg.
21 and Older	86,775	19,518,098	$2,660,076,701	$136.29	$49,745.01	$4,145.42	$2,487.25
60 and Older	71,676	16,698,716	$2,237,457,814	$133.99	$48,906.28	$4,075.52	$2,445.31

Source: Ohio Department of Job and Family Services: DSS, based on 2005 Medicaid Administrative Claims Data. Prepared by Ohio Health Plan Office. Report Date: 8-1-06

The OAC: 5101:3-31-03 requires that the PASSPORT average annual expenditure is not to exceed 60% of the average Medicaid nursing home cost during the same time span. Clearly, $14,504 is well under $29,345 (60% of $48,906).

Discussion

Nearly all of the PASSPORT consumers in the study met more than one of the criteria for nursing home level of care. Exceptions include 2.4% (614 consumers) that met ILOC based on having one ADL impairment and need for hands-on assistance with the administration of medication, 1% (287 consumers) that met ILOC based on having cognitive impairment or dementia, and 11 consumers that either met skilled level of care, or intermediate level of care based on their unstable health condition and need for skilled nursing care or skilled therapy. One half of the consumers met PASSPORT eligibility criteria based on having at least two ADL impairments alone. The remaining consumers had at least two ADL impairments and had met one or more of the other criteria for nursing home level of care. Figure 16 displays the number of consumers that met different criteria for nursing home level of care.

Only 114 out of 26,079 (0.4%) consumers reviewed in this study had neither an intermediate nor a skilled level of care. Except for a very small number (19), everyone in the study was 60 years or older at the time of enrollment. PASSPORT consumers' average annual home care expenditures were well below 60% of the average annual Medicaid nursing home costs. We determined that in many of the cases where the consumers appeared to not meet the program's eligibility requirements that was the result of incomplete data gathering and data entry rather than violations of regulations.

The consumers' living arrangement was not always updated in PIMS following enrollment in PASSPORT, as a result, in a small number of consumers, the living arrangement

Figure 16

Meeting Intermediate or
Skilled Level of Care By Criterion

614

Had at least one ADL and needed assistance with medication administration.
Total consumers: 10,491

287

Cognitive impairment or dementia.
Total consumers: 2,246

Had at least two ADL Impairments
Total consumers: 24,818

1

Skilled level of care.
Total consumers: 15

10

Met intermediate level of care based on skilled nursing or therapy needs.
Total consumers: 114

This figure is for conceptual purposes only- its components are not drawn to scale.

Excluded from this analysis were 349 consumers who were examined for incomplete assessment.

recorded was not consistent with the program's requirements. To clarify the few unclear issues

we participated in a focus group comprised of PAA directors or their designees, mostly designed

to explore agency policy, procedure, and practice questions that emerged during investigations

for other components of this evaluation.

We learned that assessment is an ongoing process, thus, it is not completed in the first

visit. Rather, the assessor attempts to determine the consumer's functional capabilities, review

the financial circumstances, and survey the care needs (given the availability of informal

caregivers) in that first visit. In subsequent conversations with the caregiver(s), physician, and

the consumer the assessor and the case manager complete more sections of the assessment. My

colleagues (McGrew & Brothers-McPhail, 2007) that evaluated *PASSPORT Assessment and*

Services defined the assessment process in the following way:

We maintain that effective assessment is **shared** (uses multiple sources of input), **ongoing** (reflects changes over time), and **developmental** (builds upon itself to broaden and deepen knowledge over time). All three elements of effective assessment were found in our evaluation of the PASSPORT program. In fact, the ongoing aspect of assessment is an explicit ODA expectation. "[T]he assessment process is ongoing to ensure continual awareness and updating of the individual's situation so that needs may be met in the most appropriate manner" (Section Two: Assessment. PAA Operational Manual, p. 1 of 3).

As Figure 1 showed, we reviewed every consumer during a fixed time period. During that window of time clients were at different stages of their PASSPORT career, some had just started, while others had received services for years. For those new enrollees the assessment process perhaps was not yet complete at the time in which we extracted our data, therefore we may not have had a complete and accurate picture of their care needs. However, a review of the case notes taken in October 2006 (a full year after the initial data extraction) shows that 63% of the consumers who we were not able to determine their LOC based on the original data extraction met this requirement by having the required ADL deficiencies, cognitive impairment, or because they needed assistance with medication.

Limitations

Caregivers play a major role in assisting consumers in the PASSPORT program, however, because some caregivers are concerned about disclosing detailed personal information, the data screens related to caregivers are not always completed. It would have been a complement to this report if we were able to present a complete picture of the role that caregivers play in providing care to PASSPORT consumers.

As we learned from the focus group, and the seemingly uncompleted assessments, the *assessment* is a process not a fixed determination and the main efforts are concentrated on determining whether the consumer is disabled enough to meet ILOC or in rare cases SLOC. Useful and telling information, such as whether the consumer has a certain health condition that

does not influence his/her functional abilities, is not always posted to PIMS. This prevented us from completely profiling the PASSPORT consumers.

FINANCIAL ELIGIBILITY

The Medicaid financial eligibility for PASSPORT examines both "countable resources and income." The countable resources (checking accounts, savings accounts, stocks and bonds) for a single person can not exceed $1,500; the consumers' home, a vehicle, and an irrevocable burial contract and cemetery plot are not considered countable resources. For a married couple with a spouse in the community who is not in need of long-term care, they can retain resources valued up to $95,100[3]. This excludes the consumers' $1,500 allowable resources and does not include their home, a vehicle, and their prepaid irrevocable burial plot and expenses.

The countable income is the total amount of gross earned income, if there is any, such as wages, earnings from self-employment, certain royalties and honoraria, as well as sheltered workshop payments; and total gross unearned income such as Social Security benefits, pensions, state disability payments, Supplemental Security Income (SSI), Railroad Retirement benefits, VA benefits, interest income, and dividends. The income ceiling for PASSPORT applicants known as the "Special income level" during 2004-2005, the study period, was $1,692 (after accounting for all insurance premiums) or three times the state average SSI at the time.

As mentioned in the methodology section on page 4, we were not able to obtain financial data for the entire PASSPORT consumer population under review. Therefore, we selected a stratified sample of 1,044 consumers distributed among all 13 PAAs. The financial data used for their Medicaid eligibility determination is collected, verified, and stored by County Department of Job and Family Services Medicaid technicians in an automated client eligibility, enrollment, and case management system (Client Registry Information System – Enhanced (CRIS-E).

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[3] Pro-Seniors, 2007. PASSPORT & Other Home Care Alternatives Retrieved on January 2007 from http://www.proseniors.org/PDFDocs/Medicaid/PASSPORT.pdf

Because ODJFS was unable to provide us with a database of CRIS-E information for the entire

PASSPORT population under review, we followed the steps that their Medicaid eligibility

technicians take to verify eligibility and we recorded the incomes and assets for the 1,044

selected consumers.

The most common source of income for the consumers in the sample was Social Security

income (83%); the monthly amount ranged from $50 to $1,619; the average amount of Social

Security income for the sample was $683 a month.

Two other sources of income were observed: SSI and private pensions. A few consumers

in the sample were Ohio Public employees and they had a pension only and no Social Security

income. One in every seven (14.5%) PASSPORT consumers had Supplemental Security Income

(SSI) as their only source of income. The average monthly income for these consumers was

$492. Rarely did anyone have substantial interest income or dividends. The average gross

monthly income of the PASSPORT consumers in the sample was $719, compared to the

allowable income of $1,692. A few consumers in our sample were married (18%). In the case of

married couples, their income and assets are considered individually, not jointly, when financial

eligibility is determined. The most common asset holding among the sample was a savings

and/or a checking account. Only 69% of the consumers had any assets. The average PASSPORT

consumers' assets were valued at $434. Overall, all the consumers in the sample met the

financial eligibility standards by having less than the threshold income level of $1,692 and asset

holdings of $1,500. Ten consumers had their checking and/or saving accounts listed as joint

accounts and the total balance was more than $1,500. Married consumers have a certain amount

of time (one year) to separate their liquid assets. For these consumers we used 50% of the

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balance of the checking and/or saving as theirs and based on that they met resource eligibility criteria.

Occasionally, circumstances arise where a consumer's income in a given time period exceeds the maximum income eligibility level. In such situations CRIS-E calculates the consumer's *liability* for that time period, which is usually a month. The liability is the amount that the consumer must pay toward the cost of her PASSPORT services. PASSPORT Area Agencies (PAAs) are responsible for collecting the consumers' liabilities and applying them toward their services. There was no one in the sample with liability.

Recommendations

For a variety of reasons including caregivers' concern about disclosing detailed personal information, the data screens related to caregivers in PIMS are not always complete. We recommend that ODA devise a way to assure caregivers their privacy and the confidentiality of their personal information and then make completing the screens related to caregivers a required part of the assessment.

Although the assessors and case managers must concentrate on determining LOC during the assessment process, other useful information is not always posted to PIMS, such as whether the consumer has a health condition that does not influence his /her functional abilities. In the analysis, beyond determining level of care, we were limited by incomplete screens. We recommend that ODA require the assessors to complete all screens within a certain time period. We also recognize that assessment is an ongoing process, and, as such, requiring that screens be completed within a time limit might not always be feasible.

2. **WHAT FACTORS IMPACT THE LENGTH OF STAY ON THE PASSPORT PROGRAM BY CONSUMERS AND WHAT FACTORS LEAD TO DISENROLLMENT FROM PASSPORT TO ENTER A NURSING FACILITY?**

Nationwide, consumers of home and community-based waiver programs leave for a variety of reasons such as nursing home placement, health improvement, or death. Ohio's PASSPORT program is no exception.

To gain insight into the stay patterns of the consumers in PASSPORT, we first present the distribution of length of stay and reasons for disenrollment, followed by a brief review of the literature addressing both length of stay and disenrollment for nursing homes, which is one of the major reasons, besides mortality, that people leave PASSPORT program. Next, we describe the methodology and the characteristics of the study population; finally, we present the findings and discuss the results.

Length of stay is the number of days, or months, that a consumer receives services. Normally, length of stay for a program participant is measured by calculating the number of days between the consumer's enrollment into the program and when she/he disenrolled. Because in this study we used a snapshot of the PIMS data that covers a one-year window of time, we had consumers at different stages. Some had just begun the program, others started years ago and are continuing in the program, yet some had left during this window of time. In order to calculate length of stay we took October 1, 2005 as the end date for those still receiving services and calculated the number of days each consumer received services beginning with their enrollment date. During the one-year study period, 8,155 consumers received services for less than one year, indicating that there is a large number of new consumers in PASSPORT at any given time. This is brought about by continuous expansion in the PASSPORT program and replacement of those who leave the program. Although there are 152 consumers who have been receiving services

more than 11 years the average length of stay in PASSPORT was 889 days or about 2.4 years.

Perhaps because of data migration to PIMS, the enrollment data for 4,071 consumers were not

available; these consumers will not be included in any length of stay study since we could not

figure out how long they had been in the program. Figure 17 presents the consumers' length of

stay in PASSPORT.

Figure 17
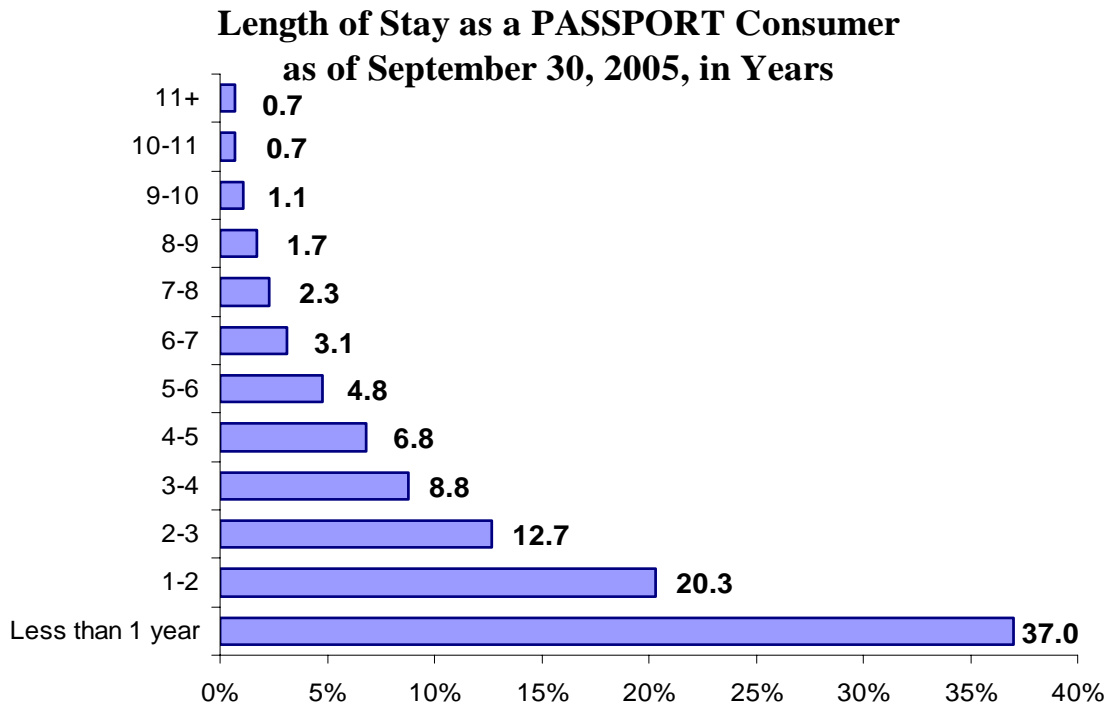
**Length of Stay as a PASSPORT Consumer
as of September 30, 2005, in Years**

Length of Stay	Percent
11+	0.7
10-11	0.7
9-10	1.1
8-9	1.7
7-8	2.3
6-7	3.1
5-6	4.8
4-5	6.8
3-4	8.8
2-3	12.7
1-2	20.3
Less than 1 year	37.0

Source: PASSPORT consumers with an active service plan during October 1, 2004
to September 30, 2005. PASSPORT Information Management System (PIMS).

Consumers leave PASSPORT for a variety of reasons including getting better and not

needing long-term care services. During the study period 2,889 consumers left the program.

Figure 18 presents reasons and the proportion of the consumers that disenrolled. Almost one half

(47.7%) of those who disenrolled did so because of death; another 30 percent (29.7%) were

disenrolled because they went to a nursing home or needed hospice care. Over 8% no longer met

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Medicaid financial eligibility requirements and about one half of one percent disenrolled because

they no longer met intermediate or skilled level of care.

When studying why consumers disenroll from a Home and Community-Based Care

Service (HCBS) program, two important questions arise. The first is, are there particular

characteristics of some PASSPORT participants that cause them to remain in the program longer

than others? The second question is, are there strategies to postpone nursing home admissions by

identifying which participants are most likely to leave for a nursing home?

Figure 18

Reasons for Disenrollment from the PASSPORT Program
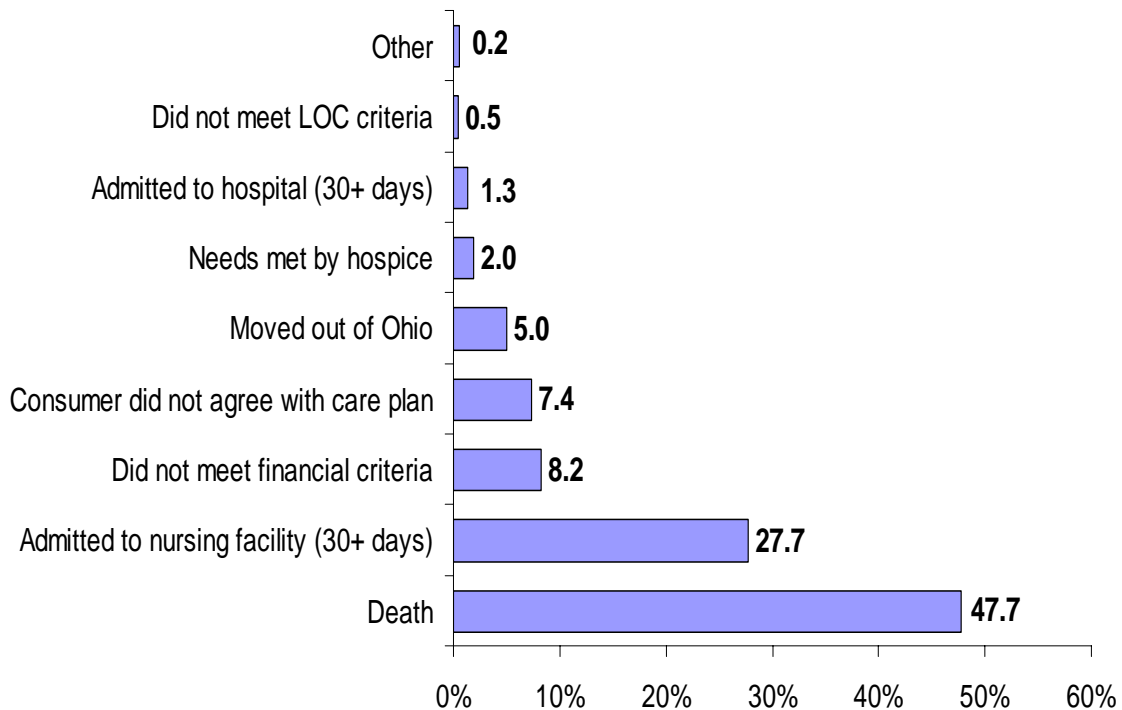
In regard to the question of what factors impact the length of stay in HCBS programs, there is limited literature. Instead, there is a tendency for HCBS research to focus on statewide average length of stays per enrollee. While any further investigation into the characteristics of the short-term and long-term enrollees is lacking in the literature; other research compares aggregate length of stay within and across service setting such as nursing homes, adult day care, and hospitals.

The studies that do investigate length of stay identify risks or predictors by choosing baseline data for newly enrolled participants and following them forward or prospectively for several years. The amount of time in the program is then related to their baseline characteristics to identify factors that increase or decrease risks of staying or leaving the program. Due to implementation of a new PASSPORT Information Management System that occurred between 2001 and 2004, our ability to utilize this methodology was limited (see the Appendix for more detail).

Many of the studies on length of stay in HCBS programs are in relationship to nursing home placement or mortality. Since nursing home placement from PASSPORT can be as high as 30% of those leaving the program in a year, it is not surprising that planners and policymakers would want to know the most important factors contributing to nursing home placement. Much of the earlier work on risk of nursing home admission used nationally representative samples of community residents and often had access to longitudinal data. One critique of many of these studies is that they did not use specific populations of older adults enrolled in formal home and community-based programs such as Medicaid HCBS. The type of services received and duration of services were rarely addressed, even if they were addressed they were defined by a 'yes' or 'no' response to a question about the receipt of formal care.

Different financing structures, care settings, and methods of data collection and analysis have led to a lack of consensus on what factors predict nursing home placement. Yet, a variety of factors have consistently impacted disenrollment to nursing homes. Age has often contributed to nursing home placement; the older the participant, the more likely the nursing home placement. Physical functioning has also been a steady predictor, with some studies showing impairments in ADL as a contributing factor while others showing that impairment in IADL having an impact. Inability of a caregiver to continue his/her role also tends to contribute to nursing home placement; participants whose caregivers are experiencing increased burden have a greater likelihood of nursing home placement. Participants who have dementia also tend to leave the community for nursing homes. Finally, studies have shown that the total number of medications and medication cost can contribute to nursing home placement.

Factors that Impact Length of Stay in PASSPORT

Each PASSPORT consumer is assessed at the time of enrollment and at least annually thereafter. In addition, consumers are assessed if their health condition or financial status changes or if they leave the program. The PASSPORT population under review consisted of 26,079 consumers, from which 11% (2,889) disenrolled during the one-year study period (October 1, 2004 to September 30, 2005). We relied on snapshot data for all consumers who had an active service plan during Oct 1, 2004 to September 30, 2005 and were determined to be PASSPORT or presumptively eligible (excluding 4,071 consumers with no enrollment date).

Utilizing a backwards stepwise regression approach (for more information about this statistical analysis see the Appendix), we included 30 variables in the original model (see Table 2). The final model, Table 3, took into account most of the variables selected, based on the literature, yet it only established a weak relationship between the set of variables and length of

Table 2
Variables Entered into Regression

Client Demographics
    Age greater than or equal to 75
    Client is female
    Client is White
    Client is married
    Client lives with family or friends

Client Medical Diagnosis:
    Parkinson's disease
    Diabetes
    Stroke
    Emphysema
    Dementia
    Cardio pulmonary obstructive disease (COPD)
    Cancer

Client Physical Functioning
    Impairment in:
        Mobility
        Bathing
        Dressing
        Eating
        Grooming
        Laundry
        Environmental management
        Shopping
        Meal preparations
        Toileting
        Accessing community
    Participant needs partial or 24-hour supervision
    Assistance with medication administration
    Total number of medications

Caregiver Characteristics
    Primary care present
    Caregiver reports less ability to care

Service Usage
    Past year nursing home admissions
    Past year hospital admissions

stay (R-squared=.1), signifying that this group of variables only explain 10% of the reasons that the consumers disenrolled.

Table 3 shows the 18 variables that have a significant relationship to length of stay. These variables have an impact by increasing or decreasing length of stay when all other variables are held constant. A negative sign connotes a decrease in length of stay, while a positive sign signifies an increase. Presence of caregiver and certain medical conditions appear to play a larger role in lowering length of stay for PASSPORT clients. For one, the presence of a primary caregiver equates to 26% fewer days in PASSPORT than those who do not have a primary caregiver. Those PASSPORT consumers whose friends or family members say that their ability to provide care has decreased, had a 46% decline in their length of stay in the program. A PASSPORT consumer who is in need of partial or 24-hour supervision experiences 31% fewer days in the program than a client who is not in need of 24-hour supervision.

Certain consumer health conditions also contribute to decreases in length of stay. The presence of cancer decreases the length of stay for consumer by 38% and the presence of COPD also contributes to a 20% decline in length of stay. Finally, those consumers needing help with toileting have a 19% shorter length of stay than those who do not.

In contrast, there are factors that increase length of stay. Individuals who experienced a stroke are likely to have 24% more days in the program than those who did not. Women tended to have 14% longer stays in the program than did men, while Whites have 17% fewer days. Impairments in bathing (+25%), grooming (+22%), dressing (+16%), and laundry (+35%) also contributed to longer lengths of stay. Surprisingly, increased age and the number of medications taken also contributed to a longer length of stay.

Table 3
Regression Results

Independent Variables	Coefficients	1 unit increase in X associated with percent change in Y	Significance Level
Caregiver reports less ability to care	-.46	-46%	.0001
Presence of cancer	-.38	-38%	.0001
Impairment in laundry	.35	+35%	.0001
Partial or 24-Hour supervision needed	-.31	-31%	.0001
Age greater than or equal to 75	.26	+26%	.0001
Primary caregiver present	-.25	-25%	.0001
Impairment in bathing	.25	+25%	.0001
Has had a stroke	.24	+24%	.0001
Impairment in grooming	.20	+20%	.0001
Presence of cardio pulmonary obstruction disease (COPD)	-.19	-19%	.0001
Impairment in toileting assistance	-.19	-19%	.0001
White	-.17	-.17%	.0001
Past year nf admissions	-.17	-17%	.0001
Impairment in dressing	+.16	+.16%	.0001
Participant needs assistance with medication administration	-.16	-16%	.0001
Female	.14	+14%	.0001
Impairment in accessing community	.13	+13%	.0001
Number of medications	.04	+4%	.0001

Based on our analysis there are factors that do significantly increase or decrease current length of stay. However, only a small portion of variation (10%) in length of stay was explained by these variations. Our findings appear, however, to suggest that the presence of a primary caregiver and acute illnesses tend to contribute more to a shorter stay whereas instances of stroke and impairments in bathing, grooming, and laundry contribute to longer lengths of stay.

These longer lengths of stay may be attributable to the services that are provided by the PASSPORT program that help participants meet their needs in the community. Also, the services provided may be more of a benefit to caregivers, unburdening them from having to perform all the assistance on their own. Impairment in using the toilet, on the other hand, might increase caregiver's burden leading, to shorter stays.

On the other hand, it is not clear why the presence of stroke and older age would contribute to longer lengths of stay. Future analyses that follow a specific cohort for longer periods of time may help to clarify or explain why some variables have an unexpected impact on length of stay.

Factors that Lead to Nursing Home Placement

For determining nursing home level of care we used the latest assessment for each consumer, however, for the following analysis the most recent assessment may not provide adequate information, particularly because 2,889 of the consumers were disenrolled and their most recent assessment, selected for the evaluation, was completed at the time of their disenrollment.

In order to investigate what leads to nursing home placement we limited the size of the study group to those PAAs that had already converted to the new PASSPORT Information System by September 30, 2003 (PSA 1, PSA 3, PSA 13, PSA 5, PSA 2) and to the consumers in

those PAAs who had received PASSPORT services for at least one year. Using the assessment data from the year prior to their disenrollment we were able to access more complete assessments with detailed caregiver and medication information. Therefore, the study population for determining factors influencing nursing home admission is limited to the 5,035 consumers in the selected PAAs who had been PASSPORT consumers at least for one year on October 1, 2005.

Since this restricted population was roughly 20% of the overall population, we compared this group's characteristics to the statewide PASSPORT population on the following variables: age distribution, gender, race, marital status, living arrangements, supervision needed, and number of ADL and IADL impairments. On most of these variables the two populations compared favorably. Differences were noted, however, in the percentage of consumers living in a relative's or friend's home (18.3% in our sample compared to 15.9% in the overall population). Tables 4 and 5 have more detailed information about this sample.

We utilized a method called classification tree analysis that allowed us to identify the variables that contributed to nursing home placement, it was sensitive to the differences in the size of the two components in this group (those who remained [93%] and those who left for nursing homes [7%]), and it accommodated the large number of fields with missing information.

The results, presented as a classification tree, are shown in Figure 19. The model begins with the entire group of 4,654 PASSPORT clients at the top of the tree. This number is lower than the 5,035 consumers because this analysis only includes the individuals who either remained in PASSPORT or disenrolled for nursing home placement. All other disenrollment reasons (e.g. death, move to hospice care) are excluded from this analysis. Of this sample, 325 consumers (7.0%) disenrolled for nursing facility placement during the study period.

Table 4
Demographic Characteristics of the PASSPORT Participants
from Selected PAAs for Nursing Home Admission Analysis

	(Percentages)[*]
Age	
60-64	11.1
65-69	17.4
70-74	17.1
75-79	19.2
80-84	18.1
85-90	10.1
91-94	5.4
95+	1.6
Gender	
Female	80.2
Race	
White	73.2
Black	24.8
Other	1.8
Marital Status	
Never Married	6.0
Widowed	50.0
Divorced/Separated	22.2
Married	19.4
Current Living Arrangement	
Own home/apartment	78.6
Relative or friend's home or apartment	18.3
Number of Participants	5,035

[*]Percentages are adjusted to reflect only those consumers for whom information was available on each variable.

Source: PASSPORT Information Management System (PIMS)

Table 5
Functional Characteristics of PASSPORT Participants from
Selected PAAs for Nursing Home Admission Analysis

	(Percentages)*
Percentage with Impairment/Needing Hands-On	
Assistance, Activities of Daily Living (ADL)[b]	
Bathing	94.2
Dressing	59.2
Toileting	18.7
Eating	18.9
Grooming	20.8
Mobility[c]	84.3
Number of Impairments[d]	
0	.8
1	5.2
2	34.2
3	32.9
4 or more	27.0
Percentage with Impairments in Instrumental	
Activities of Daily Living (IADL)	
Community access[e]	88.9
Environment management[f]	99.9
Shopping	97.7
Meal preparation	90.3
Laundry	95.2
Medication administration	47.6
Number of IADL Impairments[g]	
0	0
1	.1
2	.4
3	4.0
4 or more	95.5
Supervision Needed	
24-hour	7.9
Partial	10.6
Incontinence[h]	25.2
Number of Participants	5,035

*Percentages are adjusted to reflect only those consumers for whom information was available on each variable.
[b]Impairment includes all who could not perform the activity by themselves or could with mechanical aid only.
[c]Needs hands-on assistance with at least one of the following three activities: "bed mobility", "transfer", or "locomotion".
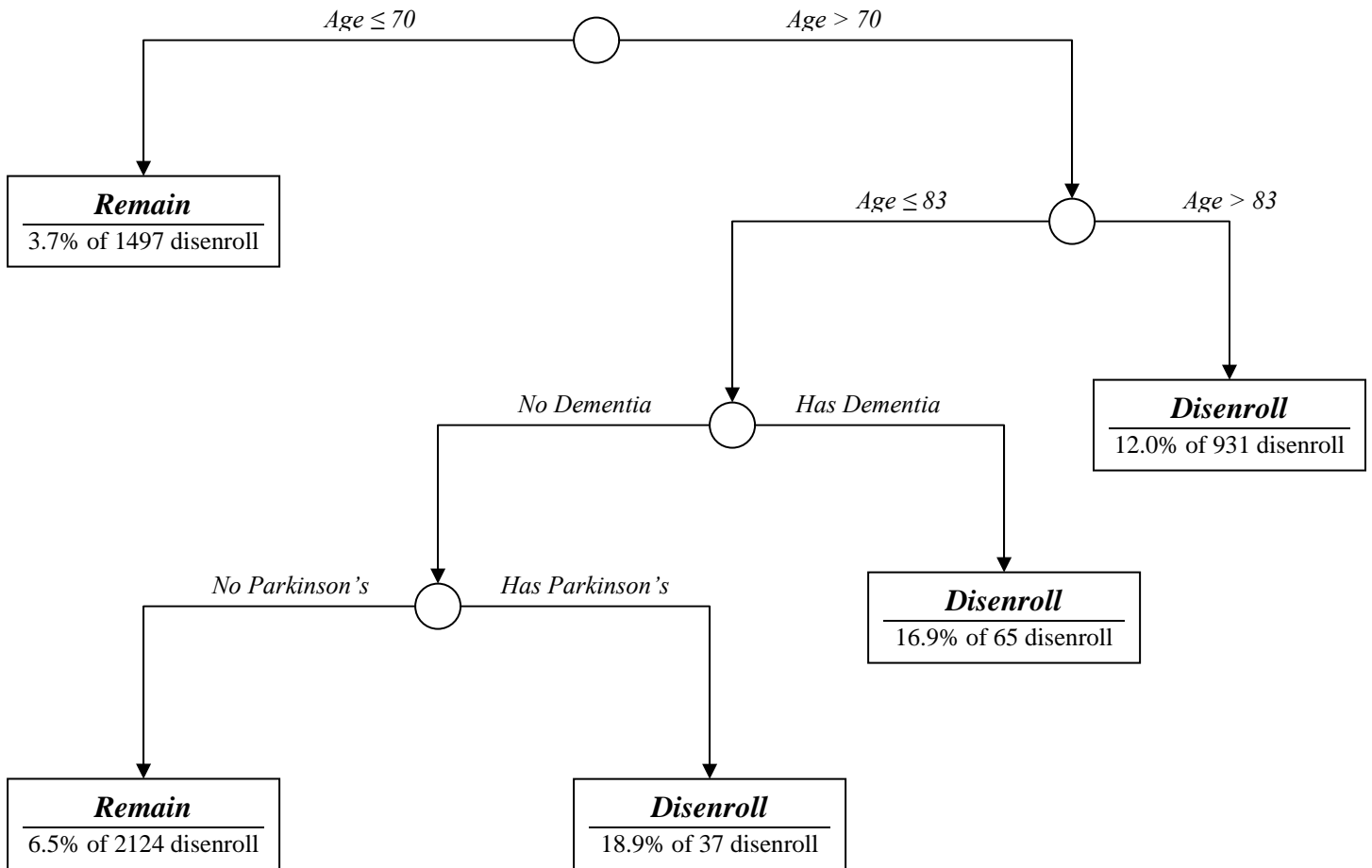[d]From the list above.
[e]Needing hands-on assistance with using a "telephone", using "transportation", or handling "legal or financial matters".
[f]Needing hand-on assistance with "house cleaning", "yard work", or "heavy chores".
[g]From the list above.
[h]Dribbling urgency, dribbling frequently, or chronic bladder incontinence or fecal incontinence.

Figure 19
Classification Tree for Predicting PASSPORT Disenrollment

Age ≤ 70   ○   *Age > 70*

Age ≤ 83   ○   *Age > 83*

Remain
3.7% of 1497 disenroll

No Dementia   ○   *Has Dementia*

Disenroll
12.0% of 931 disenroll

No Parkinson's   ○   *Has Parkinson's*

Disenroll
16.9% of 65 disenroll

Remain
6.5% of 2124 disenroll

Disenroll
18.9% of 37 disenroll

The model first splits the client population according to age. Only 3.7% of clients aged 70 and under disenroll from PASSPORT, so the model predicts that people in this "younger" age group remain in the program. The over-70 age group splits again based on their age, resulting in an "older" group (over 83) and a "middle" group (71 to 83). Because 12.0% of individuals in the older group left the program the model declares that individuals over 83 have a higher tendency to disenroll.

The middle age group (71 to 83) is split further based on the incidence of dementia and Parkinson's disease. Those with dementia are identified as more likely to disenroll from the program as 16.9% of these individuals disenrolled during the study period.

Looking further, of those consumers without dementia, 6.5% of those who didn't have Parkinson's disease disenrolled versus 18.9% of those with Parkinson's disease. In summary, the following groups are identified as "having a high-probability of disenrollment":

- Age over 83

- Age 71-83 with either dementia or Parkinson's disease

These groups are identified as "having a low-probability of disenrollment":

- Age 70 or younger

- Age 71-83 with neither dementia nor Parkinson's disease

The model correctly identifies 40.0% of those who disenrolled as belonging to high-probability of disenrollment groups and as likely candidates for nursing home admission, while correctly classifying 79.1% of those remaining in PASSPORT as belonging to low-probability of disenrollment groups. The resulting overall classification rate is 76.4%.

Our findings suggest that there are factors that do contribute to nursing home placement from PASSPORT. Increased age and specific consumer health conditions such as dementia and Parkinson's disease play a significant role in nursing home placement after one year.

Investigating a longer period of time such as two or three years would help to improve the accuracy of our model as it would balance the number of participants remaining in the PASSPORT program to the number of participants leaving for nursing homes.

It is surprising that caregiver's ability to provide same level of care did not play a larger role in determining the high disenrollment group. Two reasons may have contributed to this. For

one, we did not have consistent caregiver data for all consumers and much of the caregiver data beyond whether a caregiver was present was limited, therefore, caregiver and related variables did not play a role in the model. Second, the combination of dementia and Parkinson's disease might be correlated with the caregiver data, but we did not have the opportunity to examine that.

APPENDIX

Limitations

      The staff of the 13 PASSPORT Administrative Agencies' were trained and assisted to convert to the new PASSPORT Information Management System between 2001 and 2004. At the time of conversion, a decision was made to bring forward information for currently enrolled consumers in addition to consumers who had left the program within the last two years. Lack of historical enrollment and disenrollment data prevented us from being able to follow a particular cohort from enrollment to disenrollment. For instance, if we wanted to follow a sample from 2001 through 2005, we would have only been able to gather baseline data on those who remained in the program until after the conversion in 2004, missing those who disenrolled more than two years prior to their PAA conversion. In addition, since the conversion took place over a three-year period, each PAA brought forward data for their disenrolled clients for only the two years prior to their conversion. For some PAAs it was the 1999-2001 time span, while for others it was 2002-2004.

      Consistent, detailed information about caregivers, who play such an important role in maintaining the consumers in the community, are not uniformly available for all consumers. Because of these data limitations we found it more appropriate to use the most recent data to obtain as much uniform information as possible across the state. Similarly, baseline data for the 7% of individuals enrolled for more than six years was limited to what was electronically available through the previous PASSPORT management system. For example, in addition to ADL and IADL, data on sex, age, living arrangement, and marital status has been gathered since the program's inception. Currently, other information such as the extent of medication utilization and consumers' physical health and mental conditions are also available electronically. This had created a richer data set for current consumers.

Variables in the Models

Independent variables were recoded for the length of stay and the nursing home

placement analysis in the following manner:

Sex was coded as 1 = 'Female' and 0 = 'Male'.

Living arrangement was coded as 1 = 'Living with family or friends' and 0 = 'Not living with

family and friends'.

Ability to provide care was transformed into 1 = 'Less' and 0 = 'Same/More'.

Marital Status was coded into 1 = 'Married' and 0 = 'Not Married'.

Race was coded as 1 = 'White' and 0 = 'Non-White'.

For supervision need type 1 = 'Partial/24 hour' and 0 = 'None'.

All ADL and IADL are coded as 1 = 'Impaired' and 0 = 'Not impaired'.

Diseases or disorders were coded 1 = 'Present' and 0 = 'Not Present'.

Age for the length of stay analysis was 1 = '75 or above' and 0 = 'below 75 years'.

For the nursing home enrollment analysis age was not recoded. Total number of

medications, number of nursing home stays, and number of hospital stays for the prior year were

also not recoded. Length of stay is measured as the number of days between enrollment and

disenrollment. If the consumer was still enrolled in PASSPORT, October 1, 2005 was used to

calculate length of stay as of that date.

Models:

It is clear from Figure 17 on page 28, that the variable "current length of stay in program"

is not normally distributed, with more individuals having stayed for a shorter period of time than

a longer period of time. In an attempt to correct the dependent variable's distribution, we took

the natural log of length of stay. The equation that represents the model has the following form:

$$\text{Log } y_i = B_0 + B_1x_{i1} + B_2x_{i2} + \ldots + B_kx_{iK} + e$$

The results are presented in pages 33 through 35.

Nursing Home Placement

A common approach to classification modeling for a variable that only assumes two values (i.e., went to nursing home, stayed in PASSPORT) is logistic regression (Agresti, 1996). Using this approach, the probability of disenrollment is modeled as a specific nonlinear function of the predictor variables. Here, the log odds of disenrolling from PASSPORT would be modeled as a function of age, number of medications, ADLs and other factors. Classification decisions for new observations are then based on estimated probabilities of disenrollment.

As an alternative, we opted to use a tree-structured classification algorithm called CRUISE (Classification Rule with Unbiased Interaction Selection and Estimation) (Kim H. and Loh W-Y, 2001), which is freely available from CRUISE Classification Tree, Hyun Joong Kim web site. Tree-structured models are less rigid than the logistic model because a specific functional relationship between the predictor variables and response variable is not required. Moreover, the CRUISE algorithm offers multiple strategies for handling missing data during both model estimation and prediction. In these models a decision tree is constructed to predict disenrollment from PASSPORT. At each level of the tree a "split" is determined on the variable that best predicts disenrollment at a particular stage/level in the tree. For example, suppose "age" were identified as an important variable, with participants older than 70 more likely to disenroll than participants younger than 70. The split of the tree would be at this age. The tree would then have a branch of 70-year-olds and younger and a second branch with 71+ year-olds. Variables would then be examined to see if predictions of disenrollment could be improved at each branch. The resulting tree and explanations are presented on pages 39 - 40.

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