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Estimates of the Incidence, Prevalence, Duration, Intensity and Cost of Chronic Disability Among the U.S. Elderly*

by Eric Stallard

The objective of the study was to estimate the burden of chronic disability on the U.S. elderly population using unisex and sex-specific measures of Long-Term Care (LTC) service use, intensity and costs. This was done using multi-state life-table analysis of the 1984, 1989 and 1994 National Long-Term Care Survey (NLTCs).

The disability classifications were based on “Triggers” defined in the Health Insurance Portability and Accountability Act (HIPAA) of 1996. The disabled population was stratified according to four levels of disability, one mild/moderate and three levels of severe disability. The three levels of severe disability qualify for benefits under Tax Qualified LTC Insurance, and were identified according to whether

the disability was due to limitations in activities of daily living (ADL) alone, cognitive impairment (CI) alone or a combination of the two (ADL limitations and CI).

CLASSIFICATION OF DISABILITIES ACCORDING TO HIPAA ADL TRIGGER REQUIREMENTS

The HIPAA ADL Trigger requires that the individual be unable to perform at least two out of six ADLs (bathing, dressing, toileting, transferring, continence and eating) without “substantial assistance” from another individual, for at least 90 days due to a loss of functional capacity.

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To simulate the HIPAA ADL Trigger using the NLTCS, the questionnaire responses for each of the six ADLs were classified according to the highest value indicated in the following hierarchy:

0. Performs ADL.
1. Needs help with ADL, but does not receive it.
2. Performs ADL with special equipment.
3. Performs ADL with standby help or oral cues, without special equipment.
4. Performs ADL with standby help or oral cues, with special equipment.
5. Performs ADL with active or hands-on help, without special equipment.
6. Performs ADL with active or hands-on help, with special equipment.
7. Unable to perform ADL.

An individual ADL was coded as “severely impaired” when the selected value for that individual ADL was 3 or higher.

When two or more ADLs were coded as “severely impaired,” then the HIPAA ADL Trigger was assumed to be met.

CLASSIFICATION OF MILD OR MODERATE ADL DISABILITY

If the HIPAA ADL Trigger was not met, but at least one of the ADLs had a hierarchy code of 2 (used special equipment), the respondent was classified as having a “mild/moderate” ADL disability.

Furthermore, if at least one of nine Instrumental Activities of Daily Living (IADLs) or if inside mobility was coded as impaired, then the respondent was also classified as having “mild/moderate” ADL disability.

CLASSIFICATION OF DISABILITIES ACCORDING TO HIPAA CI TRIGGER REQUIREMENTS

The HIPAA CI Trigger requires that the individual requires “substantial supervision” to protect him/herself from threats to health and safety due to “severe cognitive impairment,” defined as “a loss or deterioration in intellectual capacity that is comparable to (and includes) Alzheimer’s disease and similar forms of irreversible dementia.”

To simulate the HIPAA CI Trigger using the NLTCS, the responses to the 10-item Short Portable Mental Status Questionnaire (SPMSQ) were coded according to the following hierarchy:

0–2 errors	=	unimpaired
3–4 errors	=	mild/moderate CI
5–10 errors	=	severe CI

Respondents with a proxy interview due to senility or Alzheimer’s Disease were also coded as having severe CI.

When the respondent was coded as having severe CI, then the HIPAA CI Trigger was assumed to be met.

CLASSIFICATION OF MILD OR MODERATE DISABILITY

Respondents with mild/moderate CI or mild/moderate ADL disability were coded as having “mild/moderate disability.” Respondents who did not have mild/moderate disability and did not meet either of the two HIPAA triggers were classified as nondisabled.

IDENTIFICATION OF DISABILITY STATUS LEVELS

These procedures yielded five mutually exclusive and exhaustive categories (one without disability and four with some level of disability) which were used to classify each respondent at each time of observation:

- I. Non-disabled.
- II. Mild/moderate disability, satisfies neither ADL nor CI trigger.
- III. Severely disabled, satisfies ADL trigger, but not CI trigger.
- IV. Severely disabled, satisfies CI trigger, but not ADL trigger.
- V. Severely disabled, satisfies both ADL and CI triggers.

MULTI-STATE LIFE CALCULATIONS

The multi-state life table calculations were based on weighted sex- and age-specific tabulations of the NLTCS sample where the rows were the five disability status levels at the start of each 5-year observation interval and the columns were the five



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disability status levels at the end of each 5-year observation interval with an additional category added to account for persons who died during the interval. The tabulations from the two intervals, 1984–1989 and 1989–1994, were pooled to increase the sample sizes.

FINDINGS AND CONCLUSIONS

The findings were as follows (with numbers rounded):

- Chronic disability represented 20 percent of the remaining life expectancy for age 65 males and 30 percent for females (see table below).
- For both sexes, the years of chronic disability above age 65 were split evenly between mild/moderate and severe disability.
- The expected lifetime cost beyond age 65 of purchased LTC services was \$59,000 (including home health care and facility care using constant year 2000 dollars), with substantial differences by sex: \$29,000 for males vs. \$82,000 for females.
- For both sexes, the overwhelming majority (92 percent) of the lifetime costs were incurred during episodes of severe disability.
- The remaining lifetime costs (8 percent) were incurred during episodes of mild/moderate disability.
- The unpaid residual lifetime hours of informal home or community care averaged 3,200 for males and 4,000 for females.
- Approximately one-third of these unpaid hours were incurred during episodes of mild/moderate disability.

The findings supported the following conclusions:

- The HIPAA ADL and CI Triggering criteria effectively targeted the high-cost disabled subpopulation.
- The disabled subpopulation that met the HIPAA triggers accounted for the overwhelming majority of purchased LTC services, and a large majority of unpaid LTC services, for individuals over the age of 65.
- The sex differences in expected per capita lifetime costs were substantial: females outspent males 2.8 to 1.

The remaining lifetime costs (8 percent) were incurred during episodes of mild/moderate disability.

LTCI PROFESSIONALS MAY WISH TO CONSIDER CERTAIN LIMITATIONS OF THE STUDY

- The NLTCs is representative of the general U.S. elderly population, for which only a small fraction was covered by private LTCI during the study period. The LTC experience of insured elderly may be substantially different from that of non-insured elderly.
- The multi-state life table model is a Markov model in which transitions from one disability category to another are assumed to be independent of duration in the current category. Violations of this assumption can induce biases in estimates of incidence and continuance rates derived from such analyses, especially for nursing home care. Sex- and age-specific disability and mortality rates have been declining over time for the U.S. elderly. The estimates in this study are based on the assumption that the pooled

Age-Specific Residual Life Expectancy at Age 65 Years by Disability Group and Sex

Item and Sex	Disability Group							Total
	I. Non-disabled	II. Mild/moderate disability	III. HIPAA ADL only	IV. HIPAA CI only	V. HIPAA ADL + CI	III-V. Severe disability	II-V. Any disability	
Years								
Males	12.34	1.50	0.72	0.24	0.54	1.50	3.00	15.33
Females	13.65	2.97	1.30	0.35	1.18	2.83	5.80	19.44
Unisex	13.06	2.31	1.03	0.30	0.90	2.24	4.55	17.61
Percentages								
Males	80.46%	9.76%	4.72%	1.53%	3.52%	9.78%	19.54%	100.0%
Females	70.18%	15.29%	6.68%	1.78%	6.06%	14.53%	29.82%	100.0%
Unisex:	74.17%	13.12%	5.87%	1.71%	5.13%	12.71%	25.83%	100.0%

Source: Abstracted from Table 4 in Stallard's paper.

transition rates for 1984–1989 and 1989–1994 remain constant from age 65 onward. To the extent that disability continues to decline faster than mortality, the current estimates of lifetime disability will be upwardly biased.

News. *Since that issue went to press, the paper was selected as the 1st place winner of the Society's Ed Lew Award.*

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View Stallard's paper and other papers presented at the Living to 100 Symposium at <http://www.soa.org/livingto100monographs>. ■

Editor's Note: *This is a summary of the presentation made at the Society of Actuaries' Living to 100: Survival to Advanced Ages International Symposium held on Jan. 7–9, 2008 in Orlando, Florida. An abstract of the paper was presented in the September 2008 issue of Long-Term Care*

LIVING TO 100 MONOGRAPH ONLINE

The SOA 2008 Living to 100 Symposium monograph, with research papers and discussions from the event, is now posted online.



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