

The Effect of Assistive Technology Measurement on Late Life Disability Rates

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Introduction

Tracking late-life disability trends has become an increasingly important topic of interest to demographers (e.g. Freedman, Martin, Schoeni, 2002; Schoeni, Freedman and Wallace, 2001; Manton and Gu, 2001; Waidman and Liu, 2000; Freedman and Martin, 1998; Crimmins, Saito and Reynolds, 1997; Manton, Corder and Stallard, 1997). Even more than other measures of health, disability is socially defined, representing the intersection of an individual's abilities, their social and physical environment, and the demands of daily tasks (Agree 1999). Conceptually, a person experiences a disability when the demands of a given context (environment and task) do not match his or her physical, cognitive, and sensory capabilities. Verbrugge and Jette (1994) and others (Agree 1999) make the additional important distinction between underlying disability (without help or assistive technology) and residual disability (with help or assistive technology, if used).

Given these complexities, the lack of agreement about optimal measures of disability is not surprising (Altman 2001). Yet, demographers rely almost exclusively upon self-reported measures of disability in national surveys for estimates of disability and trends in functional health. It is therefore critical to evaluate the ways in which these data are collected and the potential sources of bias in responses (e.g. Agree, 1999; Freedman, 2000).

In practice, at least three general approaches have been adopted by national health and demographic surveys to measuring disability. The first approach asks about difficulty with daily tasks in the absence of accommodations. The second approach asks directly about the use of help and classifies those needing or getting help as having a disability. The third approach, classifies as having a disability people who use any accommodations—either help or assistive technology—in daily activities. All three measurement approaches are influenced by the use of assistive technology, since individuals who use devices without help are less likely to report having difficulty or needing assistance (Madans and Altman, 2002).

At the same time, the relative importance of assistive technology in meeting the needs of the older population has increased in the last few decades. Manton et al. (1993), for example, showed increases in the use of assistive technology were offset by declines in human help during the 1980s, a trend that has continued through the 1990s for some activities (Freedman et al. 2003). Freedman et al. (2003) also show that rates of assistive technology use among older Americans vary widely across national surveys, and that for walking and bathing assistive technology is equally or more likely than human assistance to be used. Hence, a systematic analysis of the various approaches to measuring assistive technology use and their influence on disability rates is warranted.

In this paper we examine six national health and demographic surveys in order to 1) identify salient features in the measurement of assistive technology; 2) compare estimates of the use of assistive technology; 3) examine how differences in question wording and structure affect estimates of assistive technology use; and 4) demonstrate the implications of the various measurement approaches for estimates of late-life disability rates.

Data

We compare estimates of assistive technology use among noninstitutionalized adults age 65 + across six national surveys: National Health Interview Survey (NHIS), Health and Retirement Survey (HRS), National Long Term Care Survey (NLTC), Medical Expenditure Panel Survey (MEPS), Survey of Income and Program Participation (SIPP), and Medicare Current Beneficiary Survey (MCBS). We use the latest available data from each survey; years range from 1996 to 2001, depending on the survey.

Methods

For each survey, we present the weighted percent of those age 65+ and those age 85+ who use: any aid, mobility aids, bathing aids, toileting aids, transferring aids, eating aids, dressing aids, as well as a list of individual items such as wheelchair, walker, cane, railings, ramps, shower stools, and the like. For the HRS and SIPP, we also present rates of use by difficulty with certain tasks. As will be discussed below, this allows us to assess the potential effects of using a disability screen to skip people around questions about assistive technology use. A final analysis will demonstrate the influence of the various measurement approaches on disability rates.

Preliminary results

- Table 1 outlines the salient features of questions about assistive technology use. There are three primary ways in which surveys differ in their approach to the collection of information about the use of assistive technology: 1) whether a screen for disability is used to skip respondents who do not report difficulty with ADLs around the questions about assistive technology; 2) whether the questions ask about equipment used for specific tasks, about lists of equipment (regardless of the task for which they are used), or about a combination of tasks and devices, generally in a single question; and 3) whether and which specific devices are included in the lists of assistive technology. There also are some question wording differences, including: a reference to equipment being used for a health reason; a reference to a time period for use (e.g. last week); and the terminology used to refer to assistive technology (e.g. special equipment, aids, technology, equipment etc.)
- Table 2 shows that, despite the differences in measurement, estimates of the use of “any assistive technology device” are remarkably similar. Between 15 and 18 percent of those age 65 and over and between 41 and 46 percent of adults age 85+ use one or more pieces of assistive technology. However, in the one survey (MEPS) for which we can estimate use two different ways, the estimate derived by summing across devices (9.6 % of those age 65+) is quite a bit lower than the estimate from the global question (15.7 %).

- Estimates of the use of specific devices, vary greatly across surveys. For example, the use of aids for mobility among the 65+ population ranges from 8.1 % in the NLTCS to 16.8 % in the SIPP. Similarly, for the population age 85 and over, the use of mobility aids ranges from 24.9 % in the NLTCS to 45.6 % in the SIPP. Looking at specific aids used, estimates of the use of a walker, cane or crutches among the 65+ population ranges from a low of 7.1 % in the MEPS to a high of 15.8 % in the SIPP.
- In general, estimates of the use of specific devices from surveys that use a disability screen to skip respondents around the questions about assistive technology use are lower than estimates from surveys that do not use a screen.
- The top half of table 3 shows that in the HRS, which does not use a disability screen, 18 % of those age 65 and over who report having no difficulty walking across a room also report using mobility related equipment. If these respondents were excluded from the use questions (as they would be if a disability screen were used), the HRS estimates of use for walking would be cut in half. That is, only 6.4% would be identified as using mobility related devices with a screen whereas 14.6% would be identified without a screen. The majority of those who would be excluded use canes.
- Similarly, in the HRS 22% of those who report no difficulty with getting in and out of bed also report using transferring devices (bottom half of Table 3). The use of a screen would result in an estimate of assistive technology use that is 20% lower -- 4.2% would be identified as using assistive technology with a screen versus 5.1% with no screen. The majority of those who would be excluded use canes.
- Data from the SIPP (Table 4) show a pattern similar to the HRS. The SIPP data also suggest that the task used in the disability screen affects the number of respondents who get skipped around the questions about the use of assistive technology. Screening on easier tasks (such as walking across the room) would exclude more people than screening on harder tasks (such as walking a quarter mile). Consequently, the rate of assistive technology use, which is 16.8% when no screen is used, would be two-thirds lower if the SIPP screened on walking across a room (5.3%) but only one-fifth lower if the SIPP screened on walking one quarter mile (13.5%).
- A final table will demonstrate how these various approaches to measuring assistive technology affect estimates of late-life disability rates.

Discussion

The discussion will include recommendations to survey designers regarding the measurement of assistive technology use and implications for potential bias in disability rates.

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Table 1: Comparison of Salient Differences in Measurement of AT Use across Surveys

SURVEY	SCREEN		FOCUS		DETAILS ABOUT LISTS				QUESTION WORDING:		
	Is there a screen, if so, what?	AT use asked for specific ADL activities (TASK)	AT use asked for specific devices used (DEVICE)	AT use asked for all tasks and/or devices combined (GLOBAL)	List of devices read aloud	Grouped device list	Individual device list	Any device used	Includes reference to equipment being used because of a health problem	Includes reference to a time period for use (e.g. last week)	AT is referred to as _____.
2001 National Health Interview Survey (NHIS)	No screen	No	No	Yes	n/a	No	No	Yes	Yes	No	special equipment
2000 Health and Retirement Survey (HRS)	At least one functional limitation	Yes	No	No	No	No	Yes	No	No	No	equipment or devices
1999 National Long Term Care Survey (NLTCS)	A chronic (90 + days) problem with one or more ADLs or IADLs	Yes	No	No	Yes	Yes	Yes	No	No	Yes, last week	special equipment
1997 Medical Expenditure Panel Survey (MEPS)	Difficulty with one or more ADL tasks	No	Yes	Yes	No	Yes	Yes	Yes	Yes	No	special equipment or technology
2001 Survey of Income and Program Participation (SIPP)	No screen	No	Yes	No	No	Yes	Yes	No	No	No	aids
2000 Medicare Current Beneficiary Survey (MCBS)	Difficulty with specific ADL tasks	Yes	No	No	n/a	n/a	n/a	Yes	No	No	special equipment or aids

Table 2: Estimates of AT Use across 5 National Surveys by Age - Ages 65+ and age 85+ (Weighted Percents)

	Age 65 +					Age 85 +				
	2001 NHIS	2000 HRS	1997 MEPS	1996 SIPP	1999 NLTCS	2001 NHIS	2000 HRS	1997 MEPS	1996 SIPP	1999 NLTCS
Respondent uses.....										
Any AT (global question)	17.74	--	15.66	--	--	45.81	--	42.74	--	--
Any AT (summing across devices)	--	14.99	9.63	16.82	17.67	--	41.11	26.72	45.58	42.85
Uses AT for the following ADL tasks										
Mobility	--	14.58	--	16.82	8.11	--	40.32	--	45.58	24.85
Outdoor mobility	--	--	--	--	9.26	--	--	--	--	26.78
Bathing	--	--	3.47	--	8.53	--	--	9.81	--	24.43
Toileting	--	--	3.44	--	4.92	--	--	9.97	--	14.65
Transferring	--	5.11	--	--	5.92	--	13.89	--	--	19.50
Eating	--	--	--	--	0.29	--	--	--	--	0.62
Dressing	--	--	0.25	--	0.43	--	--	0.50	--	1.01
Specific AT devices										
Wheelchair	--	--	--	--	3.40	--	--	--	--	10.78
Wheelchair/Scooter	--	--	2.77	3.79	--	--	--	6.62	10.09	--
Wheelchair/Cart	--	2.27	--	--	--	--	6.08	--	--	--
Walkers	--	6.18	--	--	--	--	20.48	--	--	--
Canes	--	10.41	--	--	--	--	26.63	--	--	--
Crutches	--	0.27	--	--	0.29	--	0.13	--	--	0.23
Walker/Cane	--	13.85	--	--	10.81	--	38.35	--	--	32.29
Walker/Cane/Crutches	--	13.99	7.14	15.80	10.91	--	38.42	22.40	42.98	32.37
Orthopedic shoes	--	0.01	0.38	--	0.19	--	0.00	0.77	--	0.44
Brace	--	0.07	0.51	--	0.25	--	0.15	0.49	--	0.41
Prosthesis	--	0.08	0.11	--	0.12	--	0.10	0.11	--	0.11
Railing	--	0.78	--	--	6.54	--	1.98	--	--	19.00
Ramp	--	--	--	--	0.22	--	--	--	--	0.66
Railings/Ramps	--	--	1.85	--	6.59	--	--	4.71	--	19.17
Elevator or Escalator	--	--	--	--	0.22	--	--	--	--	0.72
Lift	--	--	0.43	--	0.18	--	--	0.63	--	0.33
Chairlift	--	--	--	--	0.08	--	--	--	--	0.24
Furniture/Walls	--	0.56	--	--	0.60	--	1.13	--	--	1.92

Table 2 continued

	Age 65 +				Age 85 +					
	2001 NHIS	2000 HRS	1997 MEPS	1996 SIPP	1999 NLTCS	2001 NHIS	2000 HRS	1997 MEPS	1996 SIPP	1999 NLTCS
Specific aids (continued)										
Reacher	--	--	0.76	--	--	--	--	0.75	--	--
Guide dog	--	--	0.00	--	0.01	--	--	0.00	--	0.06
Oxygen—respirator	--	0.07	0.89	--	0.38	--	0.00	0.65	--	0.44
Special telephone	--	--	--	--	4.90	--	--	--	--	8.75
Communication Equipment	--	--	0.23	--	--	--	--	1.17	--	17.86
Showersat or Tubstool	--	--	--	--	6.18	--	--	--	--	6.24
Handheld shower	--	--	--	--	2.19	--	--	--	--	8.89
Rubber mat in shower/bath	--	--	--	--	3.12	--	--	--	--	8.91
Raised toilet	--	--	--	--	2.99	--	--	--	--	4.74
Portable toiled or commode	--	--	--	--	1.63	--	--	--	--	1.41
Bedpan or urinal	--	--	--	--	0.64	--	--	--	--	3.62
Special underwear or diapers	--	--	--	--	0.96	--	--	--	--	0.11
Catheter or colostomy bag	--	--	--	--	0.05	--	0.67	1.73	--	3.68
Total Noninstitutionalized Population										
Unweighted <i>n</i>	6,152	10,713	3,833	10,215	16,597	665	1,341	390	721	1,980
Weighted <i>n</i> (in thousands)	32,864	32,609	32,452	32,063	33,774	3,231	3,170	2,986	2,263	3,437

Table 3: Number and Percent Using Special Equipment by Difficulty with Tasks: 2000 HRS

	Difficulty walking across a room				Percent using device	
	Has difficulty/can't do		No difficulty		Without Screen	With Screen
	<i>Percent (weighted)</i>	<i>Number (weighted)</i>	<i>Percent (weighted)</i>	<i>Number (weighted)</i>	<i>Percent using (weighted)</i>	<i>Percent using (weighted)</i>
Any mobility device	79.22	2,073,121	18.15	2,813,524	14.6	6.4
Specific equipment						
Wheelchair	21.7	566,154	1.1	175,279	2.3	1.7
Walker	42.5	1,117,537	5.8	897,223	6.2	3.4
Cane	43.8	1,150,796	14.5	2,243,113	10.4	3.5
Crutches	1.3	34,837	0.4	53,629	0.3	0.1
Orthopedic shoes	0.0	0	0.03	4,829	0.01	0.0
Brace	0.6	14,341	0.06	8,663	0.07	0.04
	Difficulty getting in or out of bed				Percent using device	
	Has difficulty/can't do		No difficulty		Without Screen	With Screen
	<i>Percent (weighted)</i>	<i>Number (weighted)</i>	<i>Percent (weighted)</i>	<i>Number (weighted)</i>	<i>Percent using (weighted)</i>	<i>Percent using (weighted)</i>
Any transferring device	67.21	1,360,509	21.91	3,526,136	5.1	4.2
Specific equipment						
Wheelchair	20.1	409,080	2.1	332,353	2.3	1.3
Walker	32.7	664,500	8.4	1,350,260	6.2	2.0
Cane	36.4	739,412	16.5	2,654,497	10.4	2.3
Crutches	1.1	22,039	0.4	66,427	0.3	0.1
Orthopedic shoes	0.0	0	0.03	4,829	0.01	0.0
Brace	0.6	12,742	0.06	10,262	0.07	0.03

Table 4: Number and Percent Using Special Equipment by Difficulty with Tasks: 1996 SIPP

	Difficulty getting around inside				Percent using device	
	Has difficulty/can't do		No difficulty		Without Screen	With Screen
	<i>Percent (weighted)</i>	<i>Number (weighted)</i>	<i>Percent (weighted)</i>	<i>Number (weighted)</i>	<i>Percent using (weighted)</i>	<i>Percent using (weighted)</i>
Wheelchair or walker/cane/crutch	77.6	1,685,866	12.4	3,706,755	16.8	5.3
Specific equipment						
Wheelchair	32.7	709,860	1.7	506,631	3.8	2.2
Walker/cane/crutch	67.9	1,473,860	12.0	3,593,039	15.8	4.6

	Difficulty walking a quarter mile				Percent using device	
	Has difficulty/can't do		No difficulty		Without Screen	With Screen
	<i>Percent (weighted)</i>	<i>Number (weighted)</i>	<i>Percent (weighted)</i>	<i>Number (weighted)</i>	<i>Percent using (weighted)</i>	<i>Percent using (weighted)</i>
Wheelchair or walker/cane/crutch	43.1	4,342,794	4.8	1,049,827	16.8	13.5
Specific equipment						
Wheelchair	10.9	1,094,335	0.6	122,157	3.8	3.4
Walker/cane/crutch	40.3	4,060,629	4.6	1,006,325	15.8	12.7