



U.S. Department of Health and Human Services  
Assistant Secretary for Planning and Evaluation  
Office of Disability, Aging and Long-Term Care Policy

# **INTERNATIONAL EVIDENCE ON DISABILITY TRENDS AMONG THE ELDERLY**

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# EXECUTIVE SUMMARY

Life expectancy continues to increase in the United States and much of the industrialized world as death rates at older ages decline. But are today's elderly healthier than previous generations or does increased longevity come with increased risk of disability and reduced quality of life? This question is not only of personal and intellectual interest. It is of crucial policy importance, because it affects the public costs of the income, health, and long-term care needs of the elderly population. In aging societies like those of the United States and much of the industrialized world, these costs could have critical implications for the future financial stability of national budgets. Unfortunately for the public debate, it is a complex question to answer and has stimulated substantial controversy among the analytic community--with some evidence pointing to increasing disability rates as mortality rates fall and other evidence pointing in the opposite direction.

In the ongoing search for a definitive answer, this report provides a comprehensive review of the evidence, both for the United States and internationally. The most defensible conclusion is that disability rates are falling in most industrialized countries.

In the United States, where several surveys have been used to estimate disability trends, a growing body of evidence points toward declines in disability rates among the elderly. Some studies show smaller declines than others, but in a variety of disability research employing different surveys and analytic methods, no sustained increase in disability rates has been observed. To the contrary, several sources of survey data, which in earlier years appeared to show either increasing disability or no pattern over time, now show statistically significant declines in elderly disability rates.

Similarly, in much of the industrialized world outside of the United States, available survey data point to an increase in the amount of time the elderly can expect to live without disability. The countries where disability among the elderly appears to be declining include France, Belgium, Taiwan, Italy, Netherlands and Switzerland. In countries where no substantial decline is apparent there is no consistent evidence that disability rates are rising. These include Australia, Canada, and Britain.

How fast disability rates are falling is still unclear, however, because wide disparities in the disability measures, field procedures, and sample designs prevent comparability across data sources. After reviewing and assessing the quality of the evidence, the paper ends with recommendations for future data collection and analysis to increase comparability and narrow the range of the estimates. Such measures are recommended to improve national estimates of disability trends and enhance the opportunities for international comparisons.

# 1. INTRODUCTION

Life expectancy continues to increase in the United States and much of the industrialized world as death rates at older ages decline (e.g., Manton and Vaupel, 1995; Vaupel and Jeune, 1994). But are today's elderly healthier than previous generations or does increased longevity come with increased risk of disability and reduced quality of life? This question is not only of personal and intellectual interest. It is of crucial policy importance, because it affects the public costs of the income, health, and long-term care needs of the elderly population. In aging societies like those of the United States and much of the industrialized world, these costs can have critical implications for the financial stability of national budgets. Unfortunately for the public debate, it is a complex question to answer and has stimulated substantial controversy among the analytic community--with some evidence pointing to increasing disability rates as mortality rates fall and other evidence pointing in the opposite direction.

In the ongoing search for a definitive answer, this paper provides a comprehensive review of the evidence, both for the United States and internationally. The basic conclusion is that disability rates are falling in most industrialized countries. For the countries where no decline is apparent, there is no consistent evidence that disability rates are rising. How fast they are falling, and what this may mean for national budgets are still unclear, however, because wide disparities in the disability measures, field procedures, and sample designs prevent comparability across data sources. After reviewing and assessing the quality of the evidence, this report ends with recommendations for future data collection and analysis to increase comparability and narrow the range of the estimates.

## 1.1. Policy Significance

The policy debate hinges on the implications of health and functioning among the elderly for retirement income support and health care needs. Labor force participation rates among the non-elderly have been falling drastically, increasing the number of years the average person depends on public or private pension income. In the early 1960s, for example, in 11 industrialized countries (Belgium, Canada, France, Germany, Italy, Japan, Sweden, the Netherlands, Spain, Britain, and the United States), labor force participation rates were over 70% in all but one and over 80% in several. By the 1990s, although the rate in Japan had only dropped to 75%, it had dropped to 53% in the United States and to between 20% and 40% in Europe (Gruber and Wise, 1998). These reductions are plausibly attributable, at least in part, to the work disincentives embodied in the implicit tax that public pensions (like Social Security in the United States) typically levy on the labor earnings of persons who work after reaching retirement age.

If increasing longevity is accompanied by increasing disability rates, these labor force participation rates can be expected to continue to drop. But if disability rates are

falling, public policy can be designed to promote labor force participation into older ages, reducing the length of time the average person spends in retirement (Tolley and Manton, 1998).

The latter possibility, combined with the fiscal pressures of supporting a longer-lived population and the prospect of the baby boomers' retirement, led the U.S. Congress to pass legislation in 1983 gradually raising the normal Social Security retirement age from 65 to 67 years by the year 2024. There have even been extensive discussions of accelerating this legislated increase, on the basis of recent research findings that disability rates among the elderly in the United States may, indeed, be falling (Tolley and Manton, 1996). In a number of other countries similar increases in the retirement age are being debated, though the data available on which such discussions are based is typically much less developed.

The policy impact of changing rates of chronic disease and disability among the elderly on health policy (including the provision of long-term care) may be even more direct than on retirement policy. However, the possibility of reduced disability has so far been virtually ignored in projecting the acute and long-term care needs of elderly Medicare and Medicaid recipients in the United States, as has the potential benefit of public health and medical research strategies to promote such a trend. Discussions in other countries have been characterized by similar neglect of the issue.

## **1.2. Background to the Debate about Trends**

The theory that increasing longevity might actually be linked to increasing prevalence of disability was initially postulated as a response to three phenomena. First, medical interventions (such as cardiac surgery) in the management of children with chronic disorders (such as Down's syndrome) began enabling such children to survive into childbearing ages (Gruenberg, 1977). Second, models were developed suggesting that industrial societies were altering lifestyles in ways that raised the risk of chronic diseases among the elderly (Dubos, 1965; Antonovsky, 1968; Omran, 1971). Third, there was speculation that increases in medical expenditures were concentrated largely on very intensive and expensive medical care to preserve life in elderly, very ill, disabled persons to gain only small amounts of additional, relatively poor quality life.

The theory that increased longevity is inherently linked to increased disability has not withstood empirical examination. The theories about the links between industrial society and chronic disease risk were based largely on what turns out to have been an isolated phenomenon (increased risk of male coronary heart disease in the United States and Britain) in the 1950s and 1960s (Kaplan and Keil, 1993). The average person surviving past age 80 is now documented to be in better health and incurs lower health care costs than the average person dying in his 60s (e.g., Vita et al., 1998; Perls et al., 1997; Lubitz and Riley, 1993; Lubitz et al., 1995). And much new evidence suggests that health at late ages has been improving for a long time (Lanska and Mi,

1993)--probably beginning, at least in the United States and Britain, for the generation born in the 1840s (Fogel, 1994; Perutz, 1998).

Whether the surviving elderly population in any specific country will be more or less healthy on average than the preceding generation is an empirical question. But the physiological potential for health improvements and health maintenance at very advanced ages (e.g., into the 90s) is now well established (Kasch et al., 1993; Fiatarone, 1990, 1993, 1994).

## 2. EVIDENCE ON DISABILITY TRENDS IN THE UNITED STATES

With respect to the United States, the specter of rising disability rates was first raised as an empirical matter during the 1970s, when data from the National Health Interview Survey (NHIS) showed increasing proportions of older adults classifying themselves as limited in their capacity to perform normal activities. Citing a number of methodological and conceptual problems with the survey, researchers at the National Center for Health Statistics, which is responsible for the NHIS, warned against taking these trends at face value (Wilson and Drury, 1984). Even so, various social scientists have interpreted those data to imply that health deteriorated in the 1970s (Verbrugge, 1984, 1989; Colvez and Blanchet, 1981; Chirikos, 1986; Crimmins, 1990; Crimmins and Ingegneri, 1993, 1994; Crimmins, Saito, and Reynolds, 1997).

The NHIS trend in self-reported disability rates changed dramatically during the 1980s, however--at least leveling off and perhaps even declining (Waidmann et al., 1995). Data for the 1984-1990 period from a related source, the Longitudinal Study of Aging (LSOA), also showed modest improvements in rates for certain types of disability. And 1982-1994 findings from the National Long Term Care Survey (NLTCS) showed dramatic declines (by as much as 15%) in the age-adjusted disability and institutionalization rates for the U.S. population over age 65 (Manton, Corder, and Stallard, 1997b; Manton, Stallard, and Corder, 1998b).

What can we responsibly conclude about disability trends in the United States, given these widely different findings? The following discussion of this question owes much to a workshop sponsored by the National Research Council's Committee on National Statistics in 1993 (for the workshop report addressing this very question see Freedman and Soldo, 1994). We begin by reviewing the potential threats to validity. We then discuss each data base in turn.

### 2.1. Potential Threats to Validity

The possible threats to the validity of inferences from statistical data are many, and each of the major data bases is potentially vulnerable in at least one respect.

Survey methodology differences. A review of the wide range of Activities of Daily Living (ADL) disabilities used in U.S. nationally representative surveys found that prevalence estimates are sensitive to differences among surveys (or between survey waves) in the number and wording of questions, sampling strategy, age composition of respondents, and data collection methods. This implies that comparisons over time are less likely to be biased if all these factors are held constant in a given survey series to the maximum degree possible.

*Environmental changes.* Environmental changes over the measurement period can also distort trends. For example, if we use need for human assistance or devices to perform certain activities in our definition of disability, trend measurement will be distorted if access to assistance changes over time.

*Social and economic changes.* Even consistently designed surveys can be affected if public attitudes or the economic climate varies over the measurement period. Changing attitudes toward the acceptability of the disabled role for a particular age group are likely to cause self-reported disability to increase, for example, even if actual prevalence does not. Economic expansion could cause the trend in self-reported disability to go in the opposite direction, as people who used to rationalize their joblessness as due to disability (a socially acceptable reason) are able to find jobs more easily.

*Changes in proxy rates.* If proxy respondents are more likely to report disability than sample members themselves, as Dorevitch et al. (1992) indicate that they are, increases in proxy response rates could dampen estimates of disability declines (or falsely give the appearance of disability increases when there have been none).

*Nonrandom attrition.* If respondents who drop out of a survey between waves are more likely to be disabled than are the respondents who remain in the sample, trend estimates will overstate declines, unless the design of the survey allows for appropriate replenishments to the sample.

How do each of these potential sources of bias affect the major sources of U.S. data on disability trends? We discuss each in turn.

## 2.2. Findings from U.S. Surveys

### 2.2.1. National Long-term Care Survey (NLTCS)

The NLTCS is based on a large list sample drawn from Medicare administrative files. It is designed to measure chronic disability in the Medicare-enrolled population ages 65 and older. It is longitudinal in design (with surveys done in 1982, 1984, 1989, and 1994, following individuals over time and replenishing samples by age group) and adds respondents as new cohorts age into the target population. The questionnaire asks about limitations lasting more than 90 days in the respondent's ability to perform 8 Instrumental Activities of Daily Living (IADL)--more minor disabilities--and 6 Activities of Daily Living (ADLs)--more major disabilities. The NLTCS represents both the population living in the community and the institutionalized population. And the records of all sample respondents (whether chronically disabled or not) are longitudinally linked to Medicare Part A and B files, which are currently available from 1982 to 1995.

Analyses of the NLTCS have consistently shown downward trends in the prevalence of chronic disability. For the 12-year period between 1982 and 1994, for

example, NLTCS data--categorized by age-specific rates of non- disability, chronic IADL disability, and chronic ADL disability/institutionalization--show that the fraction of the 65to 74-year-old population that is not chronically disabled grew by 2.6 percentage points and the fraction of the 75- to 84-year-olds not chronically disabled by 5.4 percentage points (Manton, Corder, and Stallard, 1997b). The fraction of those with only IADL impairments fell by nearly one-quarter for those ages 65 to 84 (from 4.3% to 3.1% for those 65 to 74 and from 7.2% to 5.5% for those 75 to 84). It also fell, but not significantly, for those over 85. The fraction of those who were either ADL impaired or institutionalized fell significantly for all age groups (between 8% to 15% depending on age). These declines were confirmed using multivariate analyses applied to a broader range of disability measures--including a series of physical performance assessments (Manton, Stallard, and Corder, 1998b). The disability measures used also had excellent predictive validity in terms of Medicare expenditures by type (from 1982-1995) and mortality.

Subgroup analyses of the 1982-1989 period showed that the disability declines were larger for better-educated persons (Manton, Stallard, and Corder, 1997b) and that younger cohorts showed less disability than older cohorts at comparable ages (Manton et al., 1997a). Blacks did not share in the reductions to the same degree as whites (for the 1982-1989 period see Clark et al., 1996; for the 1982-1994 period see Manton et al., 1998).

What factors might cause the NLTCS to overstate disability declines? The NLTCS is not vulnerable to sample methodology changes over time, but as with any longitudinal survey nonrandom attrition may be a problem. However, the NLTCS design explicitly addresses this issue by allowing for replenishment. A new sample of 5000 persons who passed age 65 between surveys was gathered in 1984, 1989, and 1994. And older nondisabled persons are automatically rescreened. In any case, attrition rates for reasons other than death are quite small and have been found not to be systematically related to disability (Corder et al., 1996). Attrition analysis is made possible by the linked Medicare records (Manton et al., 1995).

Another factor that might be thought to cause the NLTCS to overstate declines arises from the screening-in to the sample of the most severely disabled persons. If there is regression to the mean (reverting to a more typical level-- high or low), those selected by the screen as chronically disabled are likely to have larger than typical (for themselves) disability at the time of the screen. Conversely, those screened-out as nondisabled are likely to have lower than typical disability at the time of the screen. If, as expected, individuals revert toward their typical level of disability in subsequent waves, the selected individuals would appear to improve while the nonselected ones would appear to deteriorate. In the case of the NLTCS, however, the regression to the mean problem is balanced out by the rescreening of all previously "nondisabled" and the continual follow-up at later waves of all persons who reported either chronic disability or institutional residence at any wave.

Thus, if at wave 1 a person reports no chronic disability and is screened-out, that person when rescreened is more likely, by chance, to report a higher level of disability than is accurate. The regression to the mean effect is further mitigated by the requirement that the disability had to exist at least 90 days, since regression to the mean is less likely for a persistent trait than for an event. The NLTCS screened-in sample contains a wide distribution of disability levels, making it possible to examine the traits of screened-out and screened-in persons for systematic differences over the complete follow-up interval (again from Medicare records). A study of such persons in the 1982, 1984, and 1989 NLTCS showed no significant differences in mortality or Medicare service use (Manton et al., 1995).

A final factor that might be a potential problem in the NLTCS is the fact that proxy response rates fell from 1982 to 1989, which might have had the effect of overstating disability declines other things equal. In fact, this is unlikely to be a major problem for this survey, because the reason for proxy interviews in this case is primarily severe physical or cognitive disability. In fact, the decline in proxy rates over the 1982-1989 period itself represents a decline in the community-resident population with severe chronic disabilities.

### ***2.2.2. National Health Interview Survey (NHIS)***

The NHIS is the longest-running survey collecting health data on the population of the United States. It is an annual cross-section survey designed to be representative of the civilian non-institutionalized population residing in United States that has been collected continuously since 1957. The multi-stage probability sample consists of approximately 50,000 households (representing over 100,000 individuals) per year. It is conducted by the US Census Bureau under specifications established by the National Center for Health Statistics.

For the 1970s, NHIS data were restricted to self-reports of limitations in capacity to perform normal activities and of suffering from a number of potentially disabling chronic conditions. In 1982, the NHIS added two questions on the annual core questionnaire pertaining specifically to disabilities in the population over age 70. One question asks about the need for help in performing "routine needs," which it defines in such a way that it overlaps with some IADLs, and one asks about the need for help in performing "personal care"--which includes references to several ADLs. However, there is no requirement that these limitations be chronic.

As noted, the NHIS showed increased disability rates over the decade of the 1970s. In the 1980s, however, as also already noted, the NHIS self-reported data changed dramatically--at least leveling off and perhaps even declining (Waidmann et al., 1995). It showed statistically significant declines in the prevalence of disabilities related to routine needs, but no significant change in "personal care" limitations for specific age groups between 1983 and 1993.

The NHIS is vulnerable in at least three respects, all of which tend in the direction of underestimating any real decline in disability rates. First, it does not cover the most severely disabled members of the population (because it excludes persons who are institutionalized) and includes people who may not be disabled in any durable sense (since it has no chronicity requirement). Second, its self-report data make it vulnerable to the distorting impacts of secular social change. An examination of the NHIS disability data for the 1970s and 1980s in the context of social changes, for example, argues that the observed deterioration in self-reported health during the 1970s reflects changes in the ways in which individuals respond to existing health problems and earlier diagnoses of existing chronic conditions (Waidmann et al., 1995). Finally, cross-section surveys like the NHIS are vulnerable to distortions from the dramatic fall in the institutionalization rate over the 1970s, 1980s and 1990s. If newly deinstitutionalized persons are more likely to be disabled than the random noninstitutionalized individual, these surveys will underestimate declines in disability for the population as a whole.

### ***2.2.3. Longitudinal Study of Aging (LSOA)***

The LSOA began (in its LSOA-I incarnation) as a Supplement on Aging (SOA) to the 1984 NHIS--which was administered by personal interview to noninstitutionalized individuals over age 70 in 1984. It asked about difficulty in performing ADLs without assistance of persons or devices. These original sample members were followed and interviewed again in 1986, 1988, and 1990. A new Supplement on Aging (SOA-II) was administered in 1994, with the intention of starting a new Longitudinal Study on Aging (LSOA-II). For LSOA-II, interviewing is done in two stages, taking up to 29 months to administer, and major efforts are made to reduce proxy reporting (which affects reported disability rates as discussed further below). LSOA-II data will not yield trend estimates for several years. Like the NHIS, the LSOA does not have any chronicity requirement.

Initial studies using the LSOA found no evidence of significant declines in ADL disability. However, a recent analysis of NHIS and LSOA data that controls for changes in the age and sex composition of the noninstitutionalized population finds that the disability prevalence rate fell by 2 percentage points over the 11-year period 1982-1993 (Crimmins, Saito, and Reynolds, 1997).

Using NHIS data, analysts found significant declines in both personal care and routine needs disability. Using LSOA-I data, their models found that, while the rates in 1986 and 1988 were higher than in 1984, rates for 1990 were lower than in 1988 and not significantly different from the 1984 rates. When ADL and IADL disabilities were analyzed, 1986-1990 declines were found for both. These results confirm the general downward trend indicated by the NLTCS analyses. However, for the LSOA analyses the overall fit of the multinomial logit model was not good, the samples of very elderly persons were small, and analysts were not able to strongly reject the hypothesis that all the coefficients in the model are zero ( $p=.13$ ). Thus, more years of data are needed to confirm the persistence of any trend.

The LSOA has three weaknesses that cast doubt on comparisons between the 1984 wave and more recent years. The first is that the mode of questioning changed during that period from in-person interviewing to telephone interviewing. The second is that the rate of proxy interviewing increased dramatically (and was not restricted to respondents with major disabilities). The third is that there was no sampling of institutional persons in 1984. The accounting for institutionalized persons in the later surveys is also questionable. In the 1986, 1988, and 1990 LSOA1, the transitions to institutions were counted to the extent that a household respondent was available to report such a change in the telephone interview (or a person entered or left an institution during the interval between surveys). Since the "accumulation" of institutionalized persons was incomplete, and the sample kept getting older (the youngest person in 1990 was 76), the effects on current disability prevalence rates are complex. This is because the institutionalization rate (which is now known to have declined) was miscalculated due to the incomplete assessment of such transfers. The effects of institutionalization also vary strongly over age and by gender and race (Manton, 1997).

#### ***2.2.4. National Nursing Home Survey (NNHS)***

The National Center for Health Statistics relies on the NNHS to provide statistics on the institutionalized elderly population, which is not represented in the NHIS. The NNHS is a survey of persons residing in nursing homes and similar facilities, which was fielded in 1973-74, 1977, 1985, and 1995 (National Center for Health Statistics, 1989; Strahan, 1997).

According to the NNHS, the nursing home use rate for persons age 65 and over declined from 47.1/1000 in 1977 (a year by which the deinstitutionalization of elderly person from state mental hospitals was already relatively complete) to 41.3/1000 in 1995. The 1995 rate is lower than the rate yielded by the NLTCS, which was 51.1/1000 in 1994. This discrepancy is accounted for by the more comprehensive definition of institutionalization in the NLTCS and its more comprehensive individual-based (rather than place-based) sample frame.

The rates of decline yielded by the two surveys are similar, however--12.3% between 1977 and 1995 in the NLTCS versus 10.2% between 1982 and 1994 in the NNHS. Both these may underestimate the actual reduction in the risk of institutionalization, because they are not adjusted for the rapid growth of the U.S. population age 85 and older. In the NLTCS, the 85+ institutional rate declined from 258.5 per 1000 in 1982 to 235.7 per 1000 in 1994, an 8.8% decline. The decline reflected in the NNHS was much more precipitous, going from 225.0 per 1000 in 1977 to 152.6 per 1000 in 1995--a 32.4% decline. The NLTCS-NNHS disparity here is accounted for, at least in part, by a more restricted definition of nursing home in the 1995 NNHS than in the previous wave.

### ***2.2.5. Survey of Income and Program Participation (SIPP)***

SIPP is a longitudinal survey with 36-month long panels interviewed every four months. In each set of nine surveys, one specifically collects information on chronic disabilities. A comparison of data for the 1984 and 1993 panels (Freedman and Martin, 1997a) used several measures of physical function--reading a newspaper, lifting and carrying a package weighing 10 pounds, climbing a flight of stairs, walking three blocks--that are thought to be less susceptible to environmental and socio-cultural influences and more closely related to the actual process of physical disablement than ADL and IADL disability measures (Nagi, 1965; Pope and Tarlov, 1991). In hierarchical models of disability, these measures are often thought of as precursors to IADL and ADL disability. That analysis, which controlled for population composition change, found statistically significant declines in functional limitation for several measures over the nine-year period.

### ***2.2.6. Medicare Current Beneficiary Survey (MCBS)***

The MCBS is administered by Westat, Inc. under the supervision of the Health Care Financing Administration. The sample is designed to represent the beneficiary population of the Medicare program. Survey respondents are interviewed three times a year over a 4-year period. The sample is replenished every year to account for attrition and newly enrolled persons. The MCBS collects information on chronic condition prevalence, ADL limitations, IADL limitations, and functional limitations. Preliminary analysis of the MCBS, which controlled for demographic shifts in age, race/ethnicity, education, marital status, and gender, found significant declines in ADL and IADL disability and in measures of functional limitation (Waidmann and Liu, 1998).

## **2.3. Summing Up**

The 1993 National Research Council's workshop review reached a consensus that there had been declines in less severe (IADL) disability in the United States over the decade of the 1980s, although there was no agreement on the cause of the change. They noted the statistically significant declines in the prevalence of disabilities related to routine needs in both the NLTS and the NHIS, even though the populations, nature of questions, and prevalence estimates differed. They interpreted the LSOA findings on IADL disability--an increase between 1984 and 1986, a fall between 1986 and 1988, and virtually no change between 1988 and 1990--as showing no pattern. Given the discontinuities between the 1984 and 1986 LSOA noted above, we feel that a more defensible approach is to exclude the 1984 data from the comparison. If this is done, the LSOA trend is suggestive of declining IADL disability. The workshop did not have the benefit of the SIPP and MCBS findings.

With respect to more serious (ADL) disability, the workshop failed to reach agreement. Before adjusting for changes in age composition, the NLTS data on chronic ADL disabilities for 1982-1986 showed a shift from the fraction of the population

with 5 or 6 limitations, to the fraction having 3 or 4 limitations, and a decline in the fraction with 1 or 2 limitations. Adjusting for changes in the age composition of the elderly population yields significant declines in the 5 or 6 and 1 or 2 limitations category. The NHIS, however, showed no significant change in "personal care" limitation for specific age groups between 1983 and 1992. The LSOA-1 showed large increases in disability between 1984 and 1986 and essentially no change thereafter, with increasing prevalence rates for men and falling prevalence rates for women. Here again, the workshop did not have the benefit of the SIPP or MCBS findings.

Since 1993, the observed difference between the trend for IADL disability and the trend for ADL disability has been further discussed. Crimmins and colleagues (1997) suggest that the difference is due to the environmental factors that lead to IADL disability (e.g., the presence of helpers). However, Freedman and Martin's (1997a) analysis of SIPP data on physical functioning suggests that it is not solely changes in environmental factors, but also real improvements in health, that have caused declines in disability rates. This is consistent with declines in chronic morbidity, and in disability and physical performance measures in the 1982-1994 NLTCs (Manton et al., 1998b).

### **3. EVIDENCE ON HEALTH TRENDS IN OTHER INDUSTRIALIZED COUNTRIES**

#### **3.1. Existing Data Collection Efforts**

There have been a number of efforts to assess the prevalence of chronic disability in elderly populations cross-nationally. Professor G. Andrews of Flinders University in Australia, under World Health Organization (WHO) auspices, has conducted a series of similarly constituted surveys of the population aged 60+ in roughly 25 countries in the Pacific and Middle Eastern regions of WHO. The United Nations maintains an international database (DISTAT) of disability statistics derived primarily from census sources (Chamie, 1990). A number of individual countries (Canada, France, and Britain) have conducted local area and cross-sectional national surveys of disability. The national surveys (many of them of labor force activity) have often been used in cross-national comparisons of chronic disabilities and handicaps. Relatively rare, however, are longitudinal surveys of chronic disability conducted using a consistent survey design and instrumentation, and methodologically comparable measures of disability impact on elderly populations.

An organization explicitly created to promote the generation of such measures for cross-national studies, the International Healthy Life Expectancy Network (REVES), held its first meeting in Quebec in 1989. Involved in that meeting were researchers from Canada, the United States, and four European countries (France, Britain, the Netherlands, and Switzerland). Since then, roughly 10 meetings have been held, the most recent in Tokyo, Japan in 1997. REVES membership has been growing rapidly since the first meeting. And its work has now received official recognition by both WHO (e.g., by Nakijima, then WHO Director-General) and the Organization for Economic Cooperation and Development (OECD) as well as by the governments of a number of countries (including Canada, Britain, and France).

The early work of the REVES group was stimulated by efforts to calculate population prevalence measures of disease and disability-free life expectancy (DFLE)--using procedures due to Sullivan (1966; 1971), the results of a WHO consultation held on the epidemiology of aging (WHO TRS 706), and early studies of chronic disability by Colvez and Blanchet (1983), Katz et al. (1983), Wilkins and Adams (1983), Robine et al. (1989), Bebbington (1988), Manton (1988), and Harris (1989), among others.

The advantage of relating life expectancy measures to the level of disability is that such "active" life expectancy measures integrate the population effects of disability at all ages past some index age. This tends to make the measures statistically more stable by utilizing data across multiple age categories - rather than examining rates within individual age categories. Also, by summarizing disability experience with a life-expectancy-based measure, the number of statistics that have to be examined to make cross-population comparisons is greatly reduced. Additionally, the integration of life

expectancy and disability measures combines quantitative and qualitative measures of health and life span. The initial studies of DFLE had the limitation, however, that the Sullivan index was constructed from prevalence estimates of disability from sample surveys and the estimates of life expectancy from period life tables. As such, the classic Sullivan measures did not reflect the effects on population estimates of disability related to cohorts, returns to functioning, or selective mortality (Manton and Land, 1998).

Over time, the annual meetings held by the REVES group (often with the input and coordination of J.M. Robine of France's INSERM) have placed increasing emphasis on comparable data collection strategies, methods to measure disability in a comparable fashion across countries, and on methods to make dynamic calculations of active life expectancy from nationally representative longitudinal data.

TABLE 1: Comparison of Active Life Expectancy Estimates for Countries Selected in a WHO Analysis			
Selected Countries and Date of Data Collection	Life Expectancy ( $e_{65}$ )	Years Free of Disability	% of $e_{65}$ Free of Disability
Canada, 1986			
Male	14.9	8.1	54.4
Female	19.2	9.4	49.0
Finland, 1986			
Male	13.4	2.5	18.7
Female	17.4	2.4	13.8
Indonesia, 1989			
Male	11.5	11.4	99.1
Female	12.8	12.4	96.9
Myanmar, 1989			
Male	12.0	11.1	92.5
Female	13.5	12.8	94.8
Netherlands, 1990			
Male	14.4	9.3	64.6
Female	19.0	9.1	47.9
Thailand, 1989			
Male	12.6	12.4	98.4
Female	14.2	13.6	95.8
United Kingdom, 1991			
Male	14.3	13.6	95.1
Female	18.1	16.9	93.4
<b>SOURCE:</b> WHO, 1997.			

An alternative effort to make cross-national estimates of the burden of disease and disability on populations has been conducted by the Global Burden of Disease (GBD) Group - a joint Harvard, WHO and World Bank effort (e.g., Murray and Lopez, 1996). The GBD effort differs from REVES in focusing more attention on the use of vital statistics data, and the use of demographic modeling techniques, to make comprehensive global and regional analyses of the burden of disease and disability. The burden of disease in these studies was defined by disability-adjusted life years (DALY). The DALYs were created using a subjective expert panel elicitation procedure to develop weights indicating the degree of dysfunction associated with specific

diseases (van Ginneken, 1994). The prevalence of these diseases was then estimated for all the countries of the world and the global and regional burden associated with specific diseases calculated. However, concern has been raised by the WHO Medical Advisory Council as well as other researchers about the subjective nature of the DALY. (Similar concerns have been raised about the quality-adjusted life year (QALY) concepts.)

A final, ongoing effort is housed at WHO headquarters in Geneva, Switzerland where micro-data from a number of countries is being used to analyze the use of home health services to deal with the functional limitations of elderly persons. In that study (directed by J.E. Dowd) use is made of multivariate procedures to deal with some of the disability measurement problems.

Of these three efforts, the REVES initiative is furthest along. But even REVES is a considerable way from being able to produce estimates that are even plausibly comparable across countries. The problem is illustrated in Table 1, which shows estimates of independent or active life expectancy at age 65 for a select set of developed and developing countries (WHO, 1997).

TABLE 2: Disability Free Life Expectancy for Males and Females at Age 65 in Eight Selected Western Countries and Japan			
Country and Date of Estimate	Life Expectancy	Years Free of Disability	% of $e_{65}$ Free of Disability
United States, 1985			
Male	14.6	10.5	71.9
Female	18.6	13.4	72.0
Japan, 1985			
Male	15.5	14.1	91.0
Female	18.9	17.1	90.5
Canada, 1986			
Male	14.9	8.1	54.4
Female	19.2	9.4	49.0
Spain, 1986			
Male	15.0	6.8	45.3
Female	18.4	6.5	35.3
United Kingdom, 1988			
Male	13.7	7.6	55.5
Female	17.6	8.8	50.0
Australia, 1988			
Male	14.8	6.7	45.3
Female	18.7	8.6	46.0
Switzerland, 1988-89			
Male	15.4	12.2	79.2
Female	19.6	14.9	76.0
Netherlands, 1990			
Male	14.0	9.0	64.3
Female	19.0	8.0	42.1
France, 1991			
Male	15.7	10.1	64.3
Female	20.1	12.1	60.2

Clearly, very different measures and methods were used to define disability status in these different countries. For example, the 12.4 years expected to be active of the 12.6 years of total life expectancy (98.4%) for males aged 65 in Thailand in 1989 is not likely comparable to the 2.5 years expected to be active of the 13.4 years (18.7%) expected to be lived at age 65 in Finland in 1986. Thus, unless one is extremely careful in selecting countries and reviewing data collection methods, and the variety of definitions of chronic disability used, the cross-national comparison of disability levels is of little analytic or policy value.

Even when comparisons are restricted to those developed countries with relatively good data, comparing chronic disability prevalence rates across countries is still hazardous due to construct differences, as illustrated by Table 2.

Clearly, the cross-national variation in the proportion of male and female disability free life expectancy (e.g., for females 90.5% in Japan in 1985 to 35.3% in Spain in 1986) is still too extreme to allow us to be confident about their comparability and content validity.

An examination of the surveys in the different countries confirms that the calculations are based on disability measures that are often substantially different. For example, many countries used the International Classification of Impairments, Disabilities, and Handicaps (i.e., the ICIDH; WHO, 1980) publication to define disability concepts and measures. However, in the ICIDH classification system there are actually three concepts used, impairments (which are the physical problems generating activity limitations, e.g., blindness), disability, and handicaps (which tend to be social in nature, e.g., inability to go to church). Different countries have made different choices among these concepts in their disability, health, and labor force surveys to define "disability" in their elderly populations. Likewise, the concept measured in surveys is often healthy life expectancy (i.e., free of morbidity) rather than active life expectancy. And there are very different periods of time during which the impairment or disability must last (if chronicity is used at all in defining the disability measure). Until these fundamental definitional issues are addressed, it is not much use to examine other analytic issues that affect the accuracy of reporting survey mode (e.g., in person vs. telephone administration) or whether specific types of institutions were included in the survey sample frame.

### **3.2. Selected Country Findings**

Since cross-national comparisons of disability prevalence rate levels do not seem feasible except in a very few cases, it may be worth examining changes within a country to determine at least the direction and rate of change in a common culture with an internally comparable set of data. We do this for a select group of studies where there is some longitudinal perspective available in a developed country, where data quality is relatively good, and where the data collection methods are reasonably well defined. Consistency within a country sometimes requires focusing only on the most recent data, in order for the disability time series to be internally consistent. Canadian data, for

example, which is not in any case directly comparable with U.S. data, is only methodologically and measurement consistent beginning with the HALS of 1986.

### **France**

The country with perhaps the highest quality longitudinal data on chronic disability in the elderly population other than the United States is France. There are two major French longitudinal disability surveys of relevance. The first French longitudinal study was composed of three regional pilot surveys started in 1978 and followed up after 3.5 and 6.2 years. The three French regions represented Upper Normandy, Lille and Ile-de-France - areas with very distinct social and economic characteristics. These data were used to make estimates of DFLE for which longitudinal changes in the functional status of individuals could be explicitly represented in life table calculations (Brouard and Robine, 1992). The second French study was of changes in chronic disability from 1981 to 1991 using nationally representative longitudinal disability surveys. A summary of results taken from Robine (1994) is presented in Table 3. DFLE increased significantly at birth for both males and females in France from 1981 to 1991. For the French elderly population (i.e., persons aged 65+), we see sizable increases in DFLE, both absolutely and relatively, for both males and females.

<b>TABLE 3: Male and Female Changes in Disability Free Life Expectancy Above Age 65 in France from 1981 to 1991</b>						
	1981		1991		Change 1981-1991	
	Years	%	Years	%	Years	%
<b>Males</b>						
Life expectancy ( $e_{65}$ )	14.1	100.0	15.7	100.0	+1.6	
with severe disability	1.0		0.9		-0.1	
$e_{65}$ free of severe disability	13.1	92.9	14.8	94.6	+1.7	
with moderate disability	4.3		4.7		+0.4	
$e_{65}$ free of any disability	8.8	62.4	10.1	64.3	+1.3	+2.0
<b>Females</b>						
Life expectancy ( $e_{65}$ )	18.3	100.0	20.1	100.0	+1.8	
with severe disability	1.8		2.0		+0.2	
$e_{65}$ free of severe disability	16.5	90.2	18.1	90.0	+1.6	
with moderate disability	6.7		6.0		-0.7	
$e_{65}$ free of any disability	9.8	53.6	12.1	60.2	+2.3	+6.6
<b>SOURCE:</b> Robine & Mormiche, 1994.						

Heathcote and McDermid (1994) used the 1981 and 1991 French Health Surveys to fit cohort models to the data for males. The age specific results from that analysis are presented in Table 4. For the model fit to the 1981 to 1991 French male data, that there is a progression of DFLE both for cohorts--and within cohorts over time. This progression occurs not only for ages 65 to 84 but also for age 85+. The presence

of declines in disability above age 85 is consistent with results showing disability declines at late ages (e.g., age 95+) in the 1982 to 1994 NLTCS (Manton et al., 1997b).

TABLE 4: Results of Using Cohort Models to Analyze French Disability Changes for Males Aged 65-84 and 85+ from 1981 to 1991							
Year of Birth	Year Age 65	Expected Years Lived 65-84	DFLE, 65-84		Expected Years Lived 85	DFLE, 85+	
			1981	1991		1981	1991
1905	1970	12.57	8.21	8.67	4.99	1.63	1.69
1910	1975	13.04	8.48	8.96	5.22	1.68	1.75
1915	1980	13.58	8.80	9.30	5.45	1.73	1.81
1920	1985	13.64	8.84	9.34	5.70	1.78	1.88
1925	1990	13.76	8.90	9.40	5.95	1.83	1.93
1930	1995*	14.01	9.05	9.55	6.21	1.88	2.00
1935	2000*	14.26	9.19	9.69	6.48	1.93	2.07
1940	2005*	14.49	9.32	9.84	6.76	1.98	2.13
1945	2010*	14.72	9.46	9.97	7.05	2.03	2.19
1950	2015*	15.36	9.58	10.11	7.34	2.08	2.26

**SOURCE:** Heathcote and McDermid, 1994.

\* Projections

Robine et al. (1998) have recently estimated models of disability and morbidity to assess whether declines in disability are due to delayed onset of morbidity or improved management of potentially disabling conditions once they exist. They find that the prevalence of potentially disabling conditions rose significantly between 1980 and 1991, but that the propensity of those with the conditions to report themselves disabled fell. Combined with their previous findings of falling disability prevalence between 1980 and 1991, these findings suggest the possibility that the treatment or management of diseases has improved, or that rates of rehabilitation have increased. However, it is also possible that observed trends in condition prevalence reflect only increasing awareness of morbidity rather than real increases in morbidity and that these increased self-reports are concentrated among the less-severely impaired.

### ***Belgium (Van Oyen and Roelands, 1994)***

Three disability surveys were done in Belgium: in 1980 (the KUL Survey), 1984 (the CBGS Survey), and in 1989 (the RUG Survey). Only the 1980 and 1989 surveys have comparable disability measures in that a person was classified as disabled only if they could not do an activity without help. The 1984 CBGS Survey produced very different prevalence estimates (much higher) since a person was classified as disabled if the person had "trouble" doing the specific activity.

In Table 5 we present life expectancy, disability-free life expectancy (DFLE), and life expectancy with disability at age 65 by sex for the Flemish region of Belgium for their 1980 and 1989 disability surveys.

In Belgium, there is an absolute and relative increase in DFLE for both males and females from 1980 to 1989. The relative increase for males was modest (i.e., +1.0%;

but an absolute increase in DFLE of 1.8 years). The increases in DFLE for Belgian females were larger than those in France 1981-1991 (i.e., 9% vs. 6.6%).

<b>TABLE 5: A Comparison of Disability Free Life Expectancy (DFLE) for the Elderly Populations in Two Belgium Surveys</b>				
<b>Survey and Date</b>	<b>e<sub>65</sub></b>	<b>DFLE<sub>65</sub></b>	<b>e<sub>65</sub> - DFLE<sub>65</sub></b>	<b>%</b>
Males				
KUL (1980)	13.0	11.3	1.7	90.0
RUG (1989)	14.0	13.1	1.3	91.0
Females				
KUL (1980)	16.9	13.6	3.3	80.0
FUG (1989)	18.5	16.4	2.1	89.0

### **Taiwan (*Tu and Chen, 1994*)**

The 1986 and 1991 Supplements on Elderly Living Conditions to the Monthly Surveys of Human Resources in Taiwan were two large (N ~ 55,000 persons in each) surveys used to estimate ALE. In Table 6 we present total life expectancy and DFLE estimates for males and females aged 65 and above.

For Taiwan, from 1986 to 1991, there was a large increase, both relatively, and absolutely, in disability-free life expectancy for both males (+4.1 years) and females (+3.8 years). These relative increases were larger than for Belgium or France for both males (+15.6%) and females (+10.9%). The increases in Taiwan were larger than for either Belgium or France.

<b>TABLE 6: Estimates of Change in DFLE for Elderly Males and Females in Taiwan, 1986-1991</b>				
<b>Survey and Date</b>	<b>e<sub>65</sub></b>	<b>DFLE<sub>65</sub></b>	<b>e<sub>65</sub> - DFLE<sub>65</sub></b>	<b>%</b>
Males				
1986	12.9	7.6	5.2	58.9
1991	15.5	11.7	3.9	75.5
Change in %				+16.6
Females				
1986	14.5	9.1	5.4	62.8
1991	17.5	12.9	4.6	73.7
Change in %				+10.9

### **Australia (*Mathers, 1994*)**

Three surveys were done of disability and aging in Australia in 1981, 1988, and 1993. Disability was defined to be a physical impairment in 1981 and 1988 lasting for at least 6 months. The list of disability items used to screen the population was expanded in 1993. In addition, handicaps were identified in the five areas of self care, mobility, verbal communication, school, and work. Comparisons of the 1988 and 1993 Australian surveys are shown in Table 7.

From 1988 to 1992 there is a small decrease in DFLE at age 65 for males--and a small increase at age 65 for females. There were declines in handicaps for Australian females and increases in handicaps for males. Thus, the Australian data show no consistent trend in disability prevalence rates.

<b>TABLE 7: Comparisons of Disability and Handicapped Life Expectancy Changes for Elderly Males and Females in Australia</b>			
<b>Selected</b>	<b>1988</b>	<b>1992</b>	<b>Change in Years</b>
Males			
Life Expectancy ( $e_{65}$ )	14.8	15.4	0.6
With Severe Handicap	2.2	2.3	0.1
With Handicap	6.7	7.1	0.4
With Disability	8.1	9.0	0.9
DFLE	6.7	6.4	-0.3
% Free from Disability	45.3%	41.5%	
Females			
Life Expectancy ( $e_{65}$ )	18.7	19.2	0.5
With Severe Handicap	5.0	4.5	-0.5
With Handicap	9.1	9.0	-0.1
With Disability	10.1	10.2	0.1
DFLE	8.6	9.0	0.4
% Free from Disability	45.9%	46.9%	

### **Canada (Wilkins, Chen, and Ng, 1994)**

The 1986 Canadian HALS survey was felt to be so dissimilar to prior Canadian disability surveys (e.g., those used to compare disability changes from 1950 to 1978; Wilkins and Adams, 1983) that no meaningful longitudinal changes of chronic disability could be assessed over the prior period. Comparisons could be made for 1986 and 1991 using the first and second HALS. The results for elderly males and females are in Table 8.

<b>TABLE 8: Changes in Elderly Male and Female Disability Free Life Expectancy in Canada from 1986 to 1991</b>						
	Life Expectancy ( $e_{65}$ )		Free of Severe Disability		Free of Any Disability	
	1991	Change from 1986	1991	Change from 1986	1991	Change from 1986
Males	15.6	+0.7	13.3	+0.5	8.3	-0.2
Females	19.7	+0.5	15.4	+0.5	9.2	-0.2

There was a significant increase at age 65 in life expectancy free of severe disability for both Canadian males and females. The life expectancy value for being free of any disability declined, but insignificantly so, for both genders.

### ***Britain (Bebbington, 1988)***

Analyses were done of three General Household Surveys in Britain to determine the expectation of life without disability at age x, (ELWD<sub>x</sub>). The results for the 1976, 1981, and 1985 British GHS are in Table 9.

There is an improvement in ELWD at both ages 65 and 75 that is generally consistent with the trends over the three survey years. The change is modest for females and moderate for males.

<b>TABLE 9: Comparison of Expected Life Without Disability (ELWD<sub>x</sub>) Changes at Ages 65 and 75 for Britain in 1976, 1981, and 1985</b>						
	$e_{65}$	ELWD <sub>65</sub>	%	$e_{75}$	ELWD <sub>75</sub>	%
Males						
1976	12.5	6.9	55	7.4	3.4	46
1981	13.1	7.7	59	7.8	4.0	51
1985	13.4	7.7	58	8.0	4.2	52
% Change 1976-85			3%			6%
Females						
1976	16.6	8.2	50	9.8	3.8	39
1981	17.1	8.1	47	10.4	3.7	36
1985	17.5	8.9	51	10.7	4.3	41
% Change 1976-85			1%			2%

### ***Italy, Japan, the Netherlands, and Switzerland***

The OECD presented a set of tables (from REVES sources) on disability free life expectancy. These are presented in Table 10 for four developed countries--Italy, Japan, the Netherlands, and Switzerland--for which we had no data from national sources.

For Italy, Netherlands and for females in Switzerland, there were relative increases in DFLE over the respective time periods. In all cases there were absolute increases in DFLE. The relative levels of DFLE in these countries are higher than in France but similar to those seen in Belgium and Taiwan.

**TABLE 10: A Comparison of Changes in DFLE at Age 65 for Males and Females  
in Italy, Japan, Netherlands, and Switzerland**

	Males	Both Sexes	Females
<b>Italy</b>			
1980			
$e_0$	70.6		77.4
DFLE	60.6		63.9
% DFLE	85.8		72.6
1983			
$e_0$	71.6		78.2
DFLE	64.3		68.3
% DFLE	89.8		87.3
Change 1980-1983 %	+4.0		+4.7
<b>Japan (both sexes)</b>			
1966			
$e_0$		70.9	
DFLE		68.1	
% DFLE		96.1	
1970			
$e_0$		71.9	
DFLE		68.8	
% DFLE		95.6	
Change 1966-1970 %		-0.5	
<b>Netherlands</b>			
1981			
$e_0$	72.7		79.3
DFLE	56.9		58.0
% DFLE	79.3		73.1
1990			
$e_0$	73.9		80.1
DFLE	60.0		60.2
% DFLE	81.2		75.1
Change 1980-1983 %	+2.9		+2.0
<b>Switzerland</b>			
1981			
$e_0$	72.6		79.3
DFLE	65.9		69.7
% DFLE	90.8		87.9
1988			
$e_0$	74.0		80.9
DFLE	67.1		72.9
% DFLE	90.7		90.1
Change 1980-1983 %	-0.1		+2.2

**SOURCE:** OECD, 1993 (p.62).

## 4. LESSONS AND DIRECTIONS FOR FUTURE

### 4.1. What Analyses of Existing Data can Inform Planning and Policy

The most convincing evidence about trends in disability will come as more measures from more surveys are analyzed to yield independent replications that are robust to method differences. As many have argued, disability is a multi-dimensional concept that no single measure will capture completely. Different dimensions will be important for answering different policy questions (e.g. Manton et al., 1994; 1998). Thus there is value in continuing to conduct statistical analyses of existing data sets to get a more complete view of trends in health and disability status to aid policy development. Several areas of work are relevant.

**Replications with additional data sources.** Further cross-survey checks using comparable populations can be used to validate existing findings and address areas of remaining disagreement in the field. For example, the Medicare Current Beneficiary Survey contains basic measures of disability (IADL, ADL, Institutionalization) as well as physical functional limitation. Data are available for the 1991- 1996 rounds of the MCBS.

As more waves of the AHEAD data become available, we will have further evidence for the late 1990s. Unfortunately, however, the form of the ADL and IADL questions changed between the baseline survey (1993) and the first follow-up (1995). In future waves, these disability questions are planned to be consistent with those in the HRS. Thus, it will still be some time until longitudinal estimates are available for the AHEAD survey.

**Trends in sub-groups.** It would also be useful to know if trends in disability differ across subgroups of the population. The purpose of subgroup analysis is two-fold. First, similar findings on sub-group trends across surveys would further validate findings for the entire population. Second, since dramatic changes are predicted in the demographic and socioeconomic make-up of the elderly population over the next several decades, knowing how levels and trends differ among those groups is important. For example, one could decompose changes in disability rates between two surveys into changes due to demographic shifts (i.e., education, age, sex, ethnicity) and changes in group-specific rates of disability/limitation. These analyses will be potentially useful in predicting future trends since forecasting demographic composition is one of the most straightforward (i.e., stable) projections that can be made. This would complement similar analyses performed using the SIPP (Freedman and Martin, 1997b) and the NLTCS (Manton, Stallard, and Corder, 1997b; Manton, Stallard, and Corder, 1997a).

**Reconciling findings and identifying differences that remain.** Several analyses can help to reconcile findings across surveys. For example, to compare

findings with those from the NHIS, SOA I & II, and SIPP, we could limit the MCBS and NLTCS to the non-institutional population -- bearing in mind that such sample limitations inevitably limit the usefulness of the estimates. Second, further analyses may also be able to identify the causes of disability trends. Using the MCBS, for example, will permit analysts to relate physical functional limitation items to IADL and ADL disability status. This will promote better understanding of the relationship between these variables and the extent to which disability trends are driven by physical health problems (i.e., limitations in upper body and lower body function) that are relatively independent of environmental factors. The findings of Freedman and Martin (1997a) suggest that disability declines in the late 1980s and early 1990s are not solely related to environmental factors, but the suggested analysis would serve as a more direct test. In addition, these analyses could be compared with multivariate analyses of performance and disability measures on the NLTCS (Manton et al 1998b).

***Analyses of the relationship between health and Medicare costs.*** Analyses that will be of direct use to policy and planning activities are those that relate health and disability status to health care spending, using links to longitudinal Medicare claims data. One approach would model trends in Medicare spending (overall and by type of service) as a function of disability trends and other forces. This could suggest the magnitude of an effect changes in disability status might have on future spending projections for the U.S. Medicare program. Another would use links to Medicare administrative and service use data to examine the potential role of increased health service utilization in lowering rates of disability. One such analysis could link improvements in vision-related disability to the increased utilization of cataract surgery. As of 1991, between 20 and 25 percent of Medicare beneficiaries have had this surgery. The extent to which this intervention delays the onset of disability and prolongs independence is of obvious policy interest for Medicare. The MCBS and NLTCS, which is linked to Medicare claims data, are two obvious sources of information on surgical and medical procedures performed, as well as on medical costs associated with subsequent disability (and, thus, the potential savings a particular intervention might achieve).

***Dynamic structural models of disability.*** If we model disability rates (e.g., IADL or ADL disability) as a function of underlying physical function limitations (e.g., difficulty lifting 10 lbs.), as well as demographic and environmental variables, we can decompose changes in disability into changes in the prevalence of functional limits, changes in the extent to which limitations lead to disability, changes in demographic composition, and changes in group-specific disability rates. Similar to the approach taken by Robine, et al. (1998), multivariate analysis can be used to assess the extent to which changes in limitation rates have led to changes in disability, and the extent to which the link between limitations and disability has changed over time. For example, if disability has declined because of the increased availability of personal care help, or assistive mechanical devices, we would expect to see changes in the relation between limitations and disability (Manton et al., 1993). This would give an indication of the extent to which disability has been reduced (and might be further reduced) by direct interventions after the onset of physical impairment. A related analysis would be to

compare trends using different constructions of disability measures from the same survey (i.e., measures that include the use of help or assistive devices versus measures that do not).

## **4.2. Necessary New Data Collection in the United States**

A reason to continue existing data collection efforts is to develop more stable and precise estimates of trends - and to identify change in those trends. A continuation of existing surveys, with only necessary changes in sample design, instrument content, and field methodology will help minimize the effects of measurement artifact and short term "shocks" on the assessment of disability trends. For example, changes in the design of SOA-I and SOA-II make any inferences about changes in disability using those surveys very complex. While the SOA-II interviews were conducted with the NHIS interviews, the SOA-II interviews were conducted after the NHIS - over a period of up to 29 months.

Future waves of the Health and Retirement Survey/AHEAD will provide rich information on the health, care-giving arrangements and economic status of the population over 50 and will include linked data from the Medicare and Social Security programs. The study is longitudinal in design and will replenish as new cohorts age into the target population and will add cohorts to fill in between the original HRS (ages 51-61 in 1992) and AHEAD (age 70+ in 1993) cohorts. Assuming that disability measures are consistently gathered in the future, this study has the potential to contribute to policy discussions about population aging.

## **4.3. Data Collection Efforts Outside the United States**

Nationally representative longitudinal surveys of disability in elderly populations outside the U.S. are sorely lacking. Conducting such surveys with designs that are broadly similar to one another would allow analysts to gain some real understanding of cross-national differences in disability rates and trends and also to see how disability trends are affected by different socio-economic, cultural and medical conditions.

For such cross-sectional comparisons to be valid, consistency across surveys in design factors is important. For comparisons with US trends derived from the NLTCS, for example, we argue that certain fundamental design factors are essential:

Using samples of individuals from administrative lists of elderly persons. This would ensure that (i) the rate of follow-up of individuals would be high due to the use of a list sample, and (ii) that persons in all types of community and institutional residence would be followed.

Asking about ADL, IADL and physical performance measures separately. All measures should also include a criterion for chronicity (e.g. 90+ days) and an assessment of the modes of acute and LTC services used to address those needs.

Following all persons in the sample over time. This is so that disability improvements as well as documents can be assessed. In certain cases a screening survey will be the most cost-effective design, in which case persons who are disabled and receive a detailed interview must continue to receive that interview and persons who screen out as nondisabled must be rescreened for chronic disability in later surveys.

- Ensuring cross-sectional, as well as longitudinal, national representation. This requires that a replenishment sample of persons "aging in" be drawn from the primary list sample sources.
- Permitting varying periodicity (time between surveys) so long as the period can be collapsed or grouped for cross-national trend comparison. For example, if one is interested in short term individual changes in disability the appropriate sample interval might be one year. If shifts in the population distribution of disability are of greater concern then a longer interval (e.g. five years) is acceptable and more cost effective.
- Linking survey records to administrative data on health services used and mortality.
- Keeping interviews relatively short. Duration should be 15 minutes or less for screens, and 50 minutes or less for detailed interviews of disabled or institutionalized persons. For disabled elderly persons an in-person interview is necessary given the potential effects of disabilities on responses.

## **5. CONCLUSION**

There have recently been moderate to large declines in chronic disability in the elderly in many countries. In countries where no decline has been observed there is little consistent recent evidence of chronic disability increases after adjusting for population age composition and trends in the rate of institutionalization.

With respect to the future, we recommend that national longitudinal surveys of similar sample design and instrumentation be done in a number of developed countries. Such an approach will yield valid cross-national comparisons of change in chronic disability in the elderly population. Such cross-national comparisons can help both in the design of new policies and in monitoring differential effects of disability on the national economics of major developed countries. Such studies could be of particular value in regions where market integration is being implemented, e.g., what effect would these differences have in the European Union; in trade zones in the Americas.

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