

Living to 100 Symposium  
January 7-9, 2008  
Featured Papers

**IS THE COMPRESSION OF MORBIDITY A UNIVERSAL PHENOMENON?**

**Jean-Marie Robine   Siu Lan K. Cheung   Shiro Horiuchi   A. Roger Thatcher**

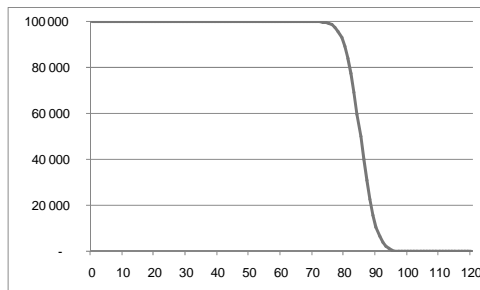
ABSTRACT

Recent reviews of national health trends show conflicting results. It is clear today that the various health dimensions follow different trends over time. For instance an expansion of morbidity may accompany a compression of disability. What do we measure when we observe a decline in disability? Is the elderly population healthier or are individuals more independent and less helped by children, using more technical devices in a more favorable environment? The recent OECD study, reviewing trends in ADL disability at age 65 and over in 12 OECD countries during the 1990s, demonstrates that there is clear evidence of a decline in disability among elderly people in only five of the twelve countries studied: Denmark, Finland, Italy, the Netherlands, and the United States. Three countries (Belgium, Japan and Sweden) report an increasing rate and two countries (Australia, Canada) a stable rate. In France and the United Kingdom, different surveys show different trends in ADL disability (OECD, 2007). These results suggest that a decline in ADL disability may be less universal than expected. More importantly, the OECD study shows that ADL disability at age 65 and over ranges from a low 7.1% in the Netherlands (HIS) to a high of 18% in the United Kingdom (GHS survey). This paper reviews the available evidences about the compression of morbidity and the disability decline and discusses the context in which they occur: initial level of disability, initial value of life expectancy and trend in life expectancy.

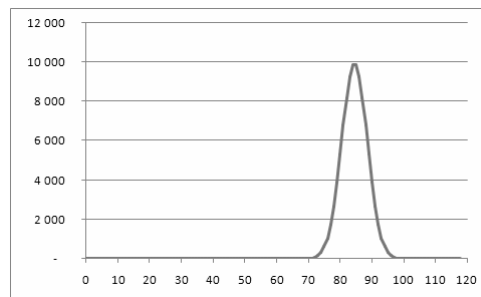
Living to 100 Symposium January 7-9, 2008

# Is the Compression of Morbidity a Universal Phenomenon?

Jean-Marie Robine  
INSERM, CRLC, University of Montpellier, France



The ideal survival curve and the natural deaths



Fries, 1980

# M-Project

with

Siu Lan K Cheung, China

Shiro Horiuchi, Japan

Roger Thatcher, UK

## Health trends: conflicting results

- Considering the dimensions of population health proposed by Crimmins (i.e. risk factors, diseases/conditions/impairments, functioning loss, disability and death), **only disability and death clearly decreased during the 1990s in the United States and self reported morbidity clearly increases** (Crimmins, 2004).
- It is more clear today that the various health dimensions follow different trends over time (Ahacic et al, 2007)
- HRS results: “Overall, the raw evidence indicates that Boomers on the verge of retirement are in poorer health than their counterparts 12 years ago” (Soldo et al, 2006)

## **Compression of morbidity: has it been achieved?**

Possibly but we have not been able to demonstrate  
such a compression

Our findings reveal that although disability measures often show improvement, there is a simultaneous increase in chronic disease and functional impairments – health components that require care resources. That is, an expansion of other health problems may accompany a compression of disability (Parker and Thorslund, 2007)

## **Compression of disability**

## Observations from the US

- Consistent declines in instrumental activities of daily living (IADLs -2.7% to -0.4% per year),
- Consistent declines of 1%-2.5% per year in difficulty with daily activities (ADLs) and help with daily activities among the population aged 70+ during the mid- and late 1990s (Freedman et al, 2004)
- Generally, more improvement in less-severe disability (Crimmins, 2004)
- Decline in disability at younger ages (70-74) was 2.8% annually while the decline at older age (85+) was 1.1% (Schoeni et al, 2004)
- Decline in chronic disability over the last 22 years (1982-2004) at a rate of 1.5% per year (Manton et al, 2006)

## Observations from Australia

- In Australia, the age-standardized prevalence rate of disability increased from 1981 to 1998. Much of the increase took place between 1981 and 1988 (AIHW, 2003)

## OECD Study

- The OECD study (Lafortune et al, 2007), reviewing trends in ADL disability at age 65 and over in 12 OECD countries during the 1990s, demonstrates that **there is clear evidence of a decline in disability among elderly people in only five of the twelve countries studied:** Denmark, Finland, Italy, the Netherlands, and the United States. Three countries (Belgium, Japan and Sweden) report an increasing rate and two countries (Australia, Canada) a stable rate. In France and the United Kingdom, different surveys show different trends in ADL disability (OECD, 2007). **These results suggest that a decline in ADL disability may be less universal than expected.** More importantly, the OECD study shows that **ADL disability at age 65 and over ranges from a low 7.1% in the Netherlands (HIS) to a high of 18% in the United Kingdom (GHS survey).**

## Disability decline: what do we measure?

- Is the elderly population healthier (Cutler 2001) **or are individuals more independent and less helped by children**
- **using more technical devices in a more favorable environment?**

## **Significant increase in independence**

- In Japan
  - significant decline between 1950 and 2000 in the proportion of young mothers who, when elderly, expect to depend on children (from about 65% to less than 10%)
  - significant decline in the proportion of those considering it is the custom or natural duty to care for the elderly (from 80% in 1965 to less than 50% in 2000) (Ogawa et al, 2004)
  
- Similar observations in the US (Spillman and Pezzin, 2000)

## **Significant decline in the proportion of elderly receiving help**

- In Sweden between 1980 and 1995
  - significant decline in the proportion of elderly people who receive help, 5% per year for the 65-79 and 2.5% for the 80+
  
  - but decline in the proportion with 'severe ill-health' from 2% to 1.2% per year, suggesting that the receipt of help declines faster than the need for help (Lagergren and Batljan, 2000)

## **Significant improvement in the built and technical environment**

- IADLs (shopping, managing money, doing laundry, preparing meal or using the telephone) are easier to perform today than 10 or 20 years ago (Spillman, 2004)

## **Disability decline: what do we measure?**

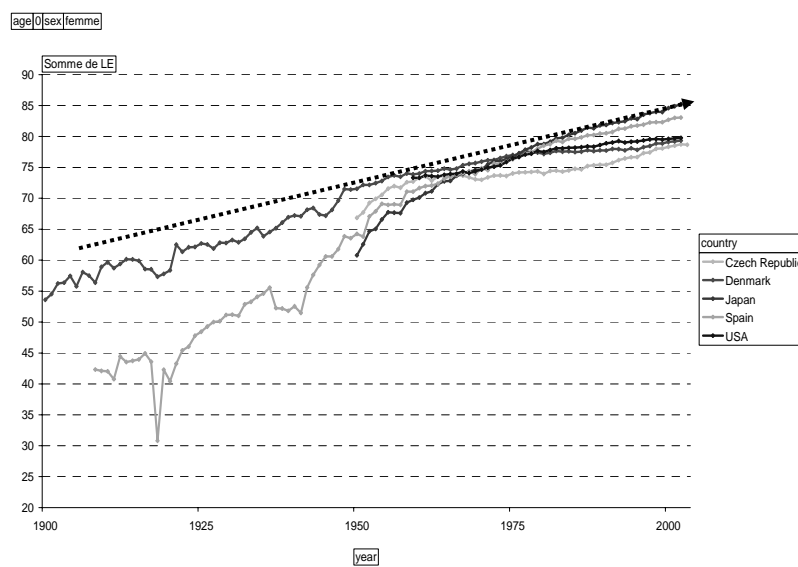
- Need to better distinguish the numerous concepts of disability (functional limitations, activity restriction, difficulty to do, use of technical device, need and receipt of help)

## Analysing disability trends

Need to consider:

- Initial level of disability
- Initial value of life expectancy
- Trend in life expectancy

## Life expectancy at birth, various countries, females – Human Mortality Database (HMD)



## Health trends in centenarians

- Interestingly, in Japan where the number of centenarians is increasing quickly, their health status seem to worsen as shown by the strong increase overtime in the prevalence of bedridden centenarians (Gondo, personal communication, 2007) whereas in Denmark, where the increase in the number of centenarians is very slow, centenarians perform significantly better in 2005 than their counterparts of 1995 (Engberg et al, 2007).

## Active life expectancy

- To know whether decline in ADL disability is large enough to compensate for the lengthening of life, it is necessary to simultaneously take into account survival and disability. This is done through the estimation of the life expectancy without disability.

**TABLE 1** Life expectancy (LE) and active life expectancy (ALE) at age 65 and 85, US population, 1935 to 2080, selected years

Year	Age 65				Age 85			
	LE	ALE	Difference (disabled years)	ALE/LE (%)	LE	ALE	Difference (disabled years)	ALE/LE (%)
<b>A. 1935 to 1999<sup>a</sup></b>								
1935	11.9	8.8	3.1	73.9	3.0	0.7	2.3	23.3
1965	15.0	10.9	4.1	72.7	5.4	1.5	3.9	27.8
1982	16.9	12.3	4.6	72.8	6.2	2.1	4.1	33.9
1999	17.7	13.9	3.8	78.5	6.4	3.0	3.4	46.9
<b>B. 2015 to 2080, first projection scenario<sup>b</sup></b>								
2015	18.9	15.6	3.3	82.5	7.0	4.1	2.9	58.6
2022	19.4	16.4	3.0	84.5	7.3	4.6	2.7	63.0
2080	23.6	20.8	2.8	88.1	9.6	7.2	2.4	75.0
<b>C. 2015 to 2080, second projection scenario<sup>c</sup></b>								
2015	18.9	15.1	3.8	79.9	7.0	3.6	3.4	51.4
2022	19.4	15.7	3.7	80.9	7.3	3.9	3.4	53.4
2080	23.6	20.1	3.5	85.2	9.6	6.6	3.0	68.8

<sup>a</sup>Per annum rates of disability decline: 1935 to 1965, 0.6 percent; 1982 to 1999, 1.7 percent.  
<sup>b</sup>Per annum rates of disability decline: 1999 to 2022, 1.7 percent; 2022 to 2080, 0.8 percent.  
<sup>c</sup>Per annum rates of disability decline: 1999 to 2080, 0.8 percent.

Manton et al, 2006

### EHEMU study: Life expectancy (LE) and Healthy Life Years (HLY) at age 50 in the European Union (EU25), in 2005, by gender

EU25	LE (in years)	HLY (in years)	LEwML (in years)	LEwSM (in years)	LE/HLY (in %)
<i>At age 50</i>					
Men	28.6	17.6	7.3	3.7	61.5
Women	33.5	19.1	9.4	5.0	57.0
Difference	4.9	1.5	2.1	1.3	-4.5

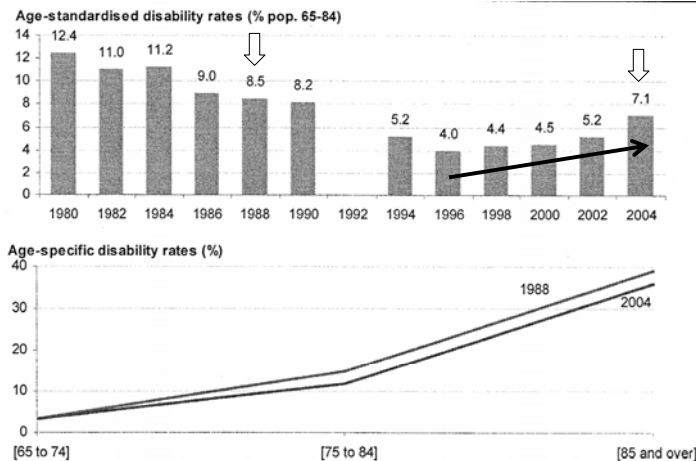
	Men		Women	
	LE	HLY	LE	HLY
<i>At age 50</i>				
Min value	21.3	9.1	29.3	10.4
Max value	30.4	23.6	35.4	24.1
Difference	9.1	14.5	6.1	13.7

European Health Report 2008, forthcoming

## Compression of disability: has it been achieved?

“One of the main policy implications that can be drawn from the finding of this [OECD] study is that it would not be prudent for policy-makers to count on future reductions in the prevalence of severe disability among elderly people to offset completely the rising demand for long-term care that will result from population ageing” (OECD, 2007)

### OECD study: the case of Sweden



Source: *Survey of Living Conditions*.

Note: Data includes people in households and in institutions.

Lafortune et al, 2007

However decrease in ADL or IADL disability increases quality of life of the elderly and the proportion of Americans age 65+ reporting fair or poor health declines (Kramarow et al, 2007)

**Thank you!**

## 2008 Living to 100 Symposium Closing Thoughts



---

**Sam Gutterman**

Chair, SOA Social Security Committee  
Member, Living to 100 Organizing Committee



## Mortality projections

---

- Both understanding the past and figuring out the future
  - Are difficult and complex
  - Benefit from multi-disciplinary discussion and cooperation
- Subject to both predictable forces and black swan (unpredictable) events
- Morbidity and remaining healthy are also important and related



## Mortality modeling

---

- Both statistical and biological approaches have strong advocates
  - Have to use at least a little of both, along with at least a sprinkling of judgment
- Data issues can be significant
  - Effort needed to overcome them can be considerable
- Both adverse and favorable factors involved

3



## Implications

---

- Profound long-term effects
  - Society
    - Security and quality of life
    - Economic growth and allocation of resources
  - Financial and health care services
  - The individual
    - Length and type of work
    - Preparation for retirement
- Affects all actuarial practice areas over the long-term
- Interest in this topic will continue to grow
- Challenges will remain significant

4



## Key takeaways

---

- Will remain a fertile field for future study
  - Both in theory and in practice
- Practitioners need to remain on top of new developments
  - In both their own and other fields
- Field of aging will grow in importance
- The future is uncertain