Risk factor change and disability.

A multistate approach of the US Health and Retirement Survey

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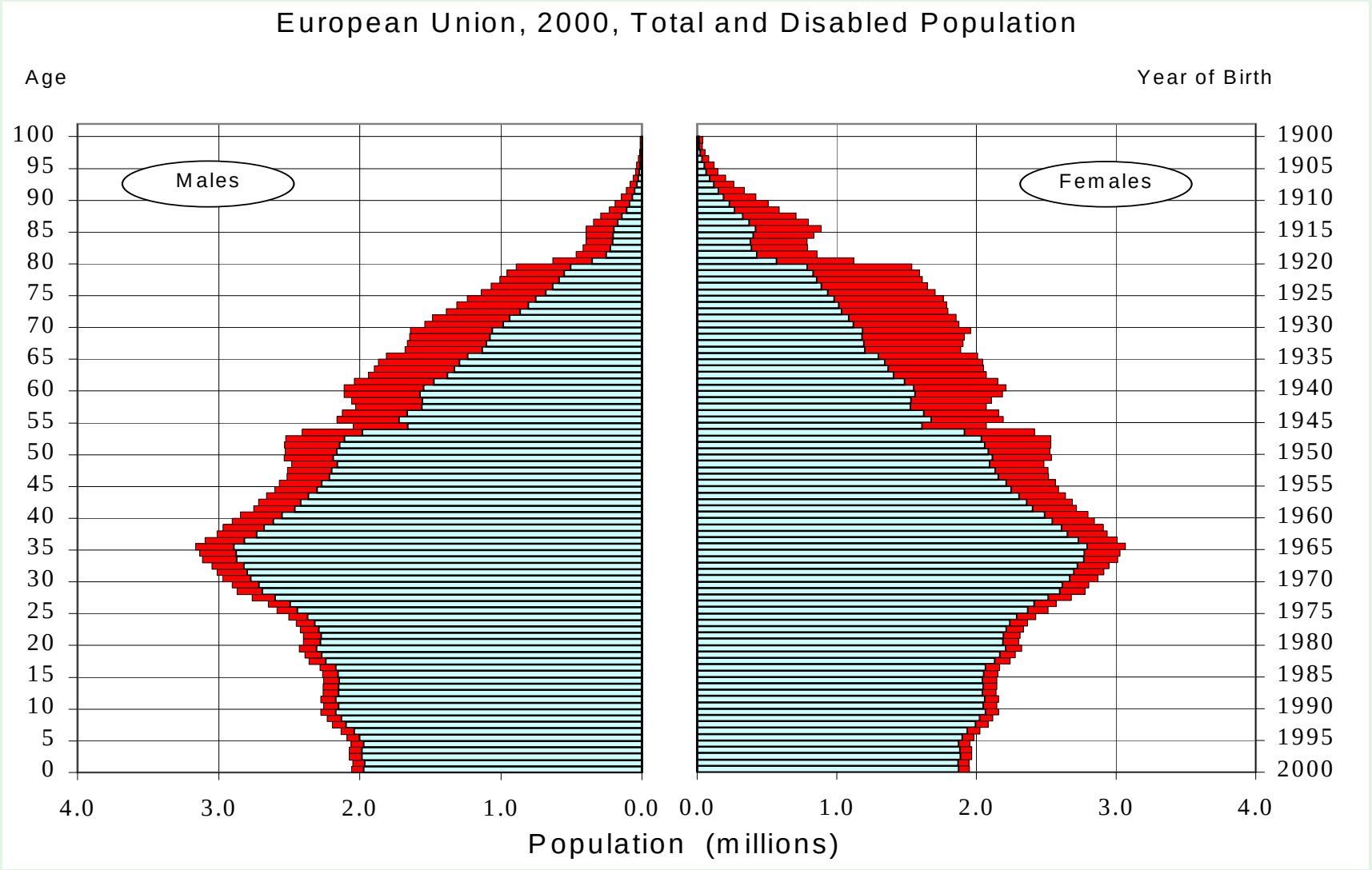
sciences


European Union, 2000, Total and Disabled Population
Age
Year of Birth
Males
Females
100
95
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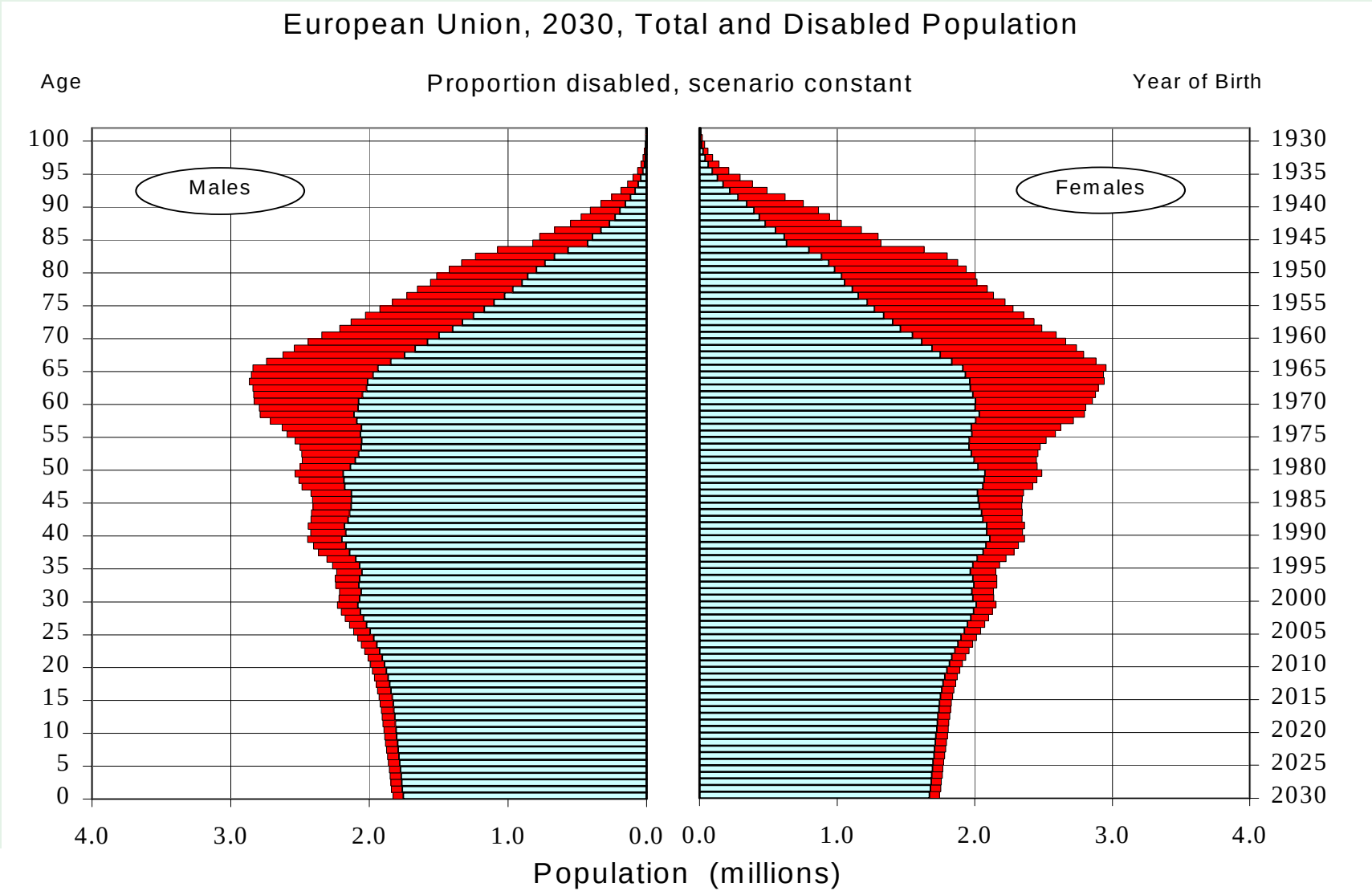
Population (millions)


European Union, 2030, Total and Disabled Population
Age
Proportion disabled, scenario constant
Year of Birth
Males
Females
100
95
90
85
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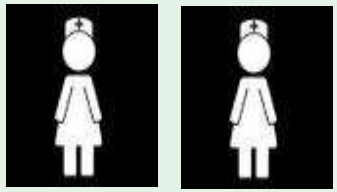
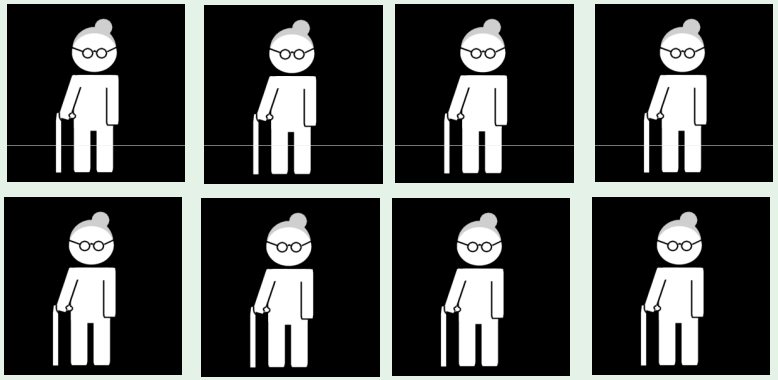
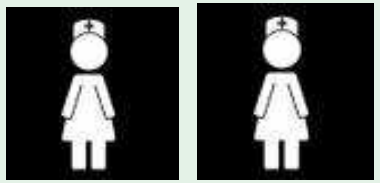
1.0
2.0
3.0
4.0
Population (millions)

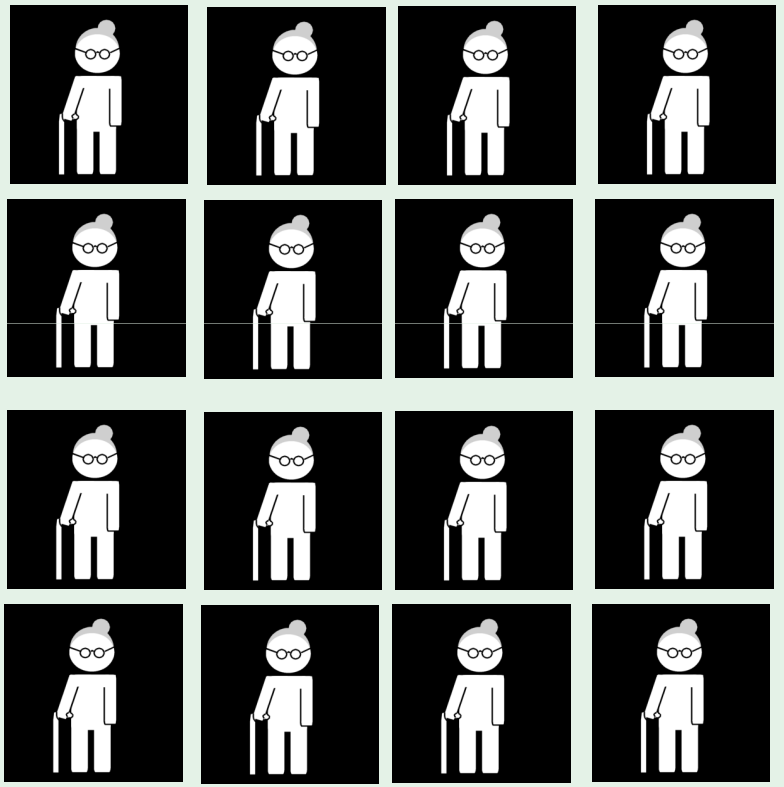
2008





2040





Source: Netherlands Bureau for economic policy analysis (CPB)

The question

- What is the effect of risk factor change on disability status in the life course?
  - Smoking (never, quit, continuing)
  - BMI (self report)
  - Levels of education
  - (Age)

Data: Health and Retirement Survey (HRS and AHEAD)

- United States
- Period: 1992-2004, 7 waves
- Ages: 55+
- Selection (16,167 individuals):
  - White, Non-Hispanics
  - Excluding underweight =>BMI > 18.5
  - Survey participation >= 3 year

Outcomes

- **Mortality**

- **ADL Disability**
  - defined by Katz basic activities of daily living (ADL)
    - Walking (from bed to chair)
    - Bathing
    - Dressing
    - Toileting
    - Feeding
  - ADL disabled if person answers ‘with difficulty’ on at least 1 or 2 of ADL (only 1 presented)

Methods

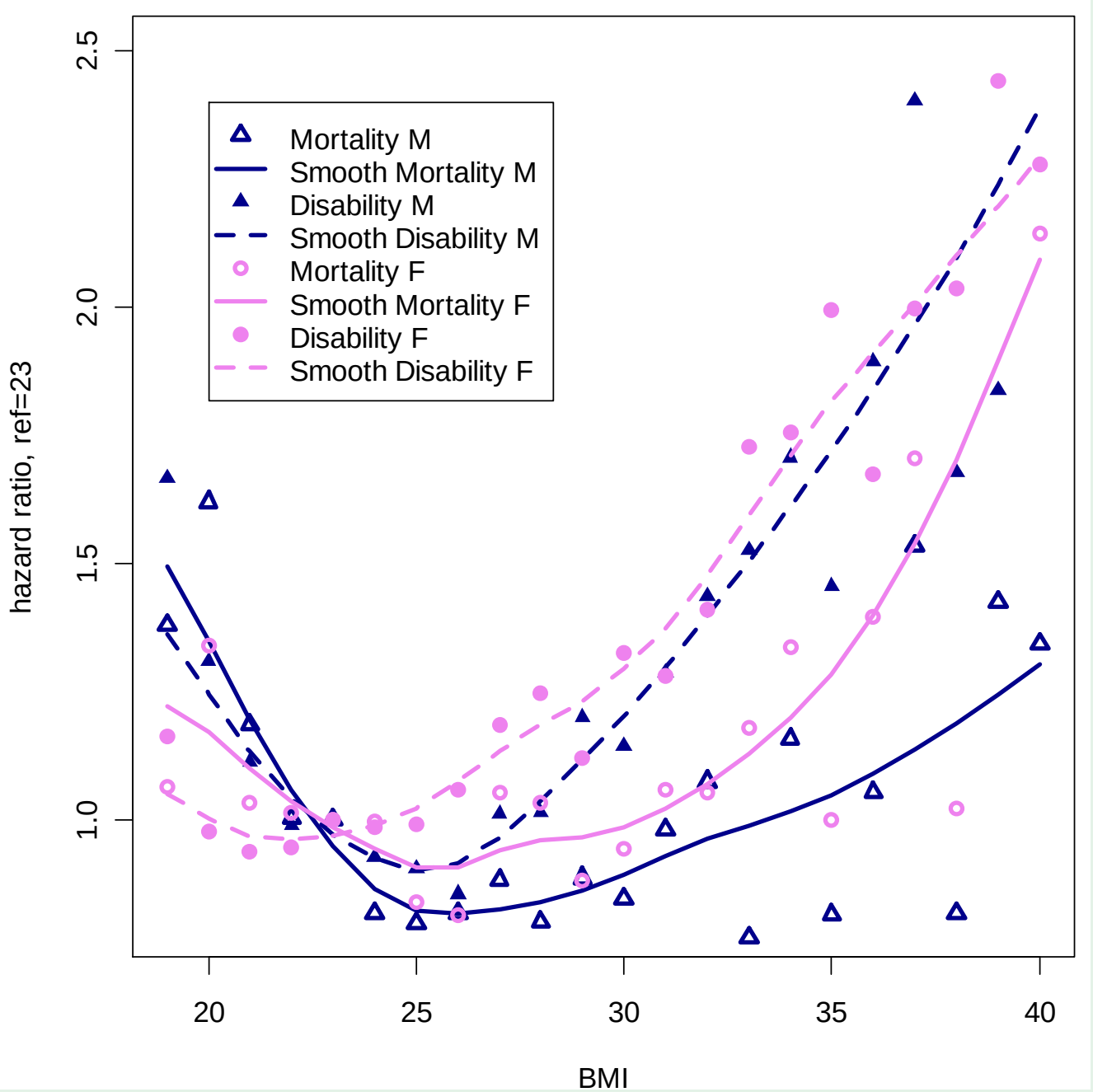
1. Statistical models estimate hazard rates from observed transitions to inactive life and death
2. Multi state life tables (MSLT) translate these hazards in average durations of active and inactive life
3. Continuous time microsimulation estimates the distributions of event biographies that make up these averages
4. All steps are conditioned by risk factor status, gender and age

Cox proportional hazard ratios

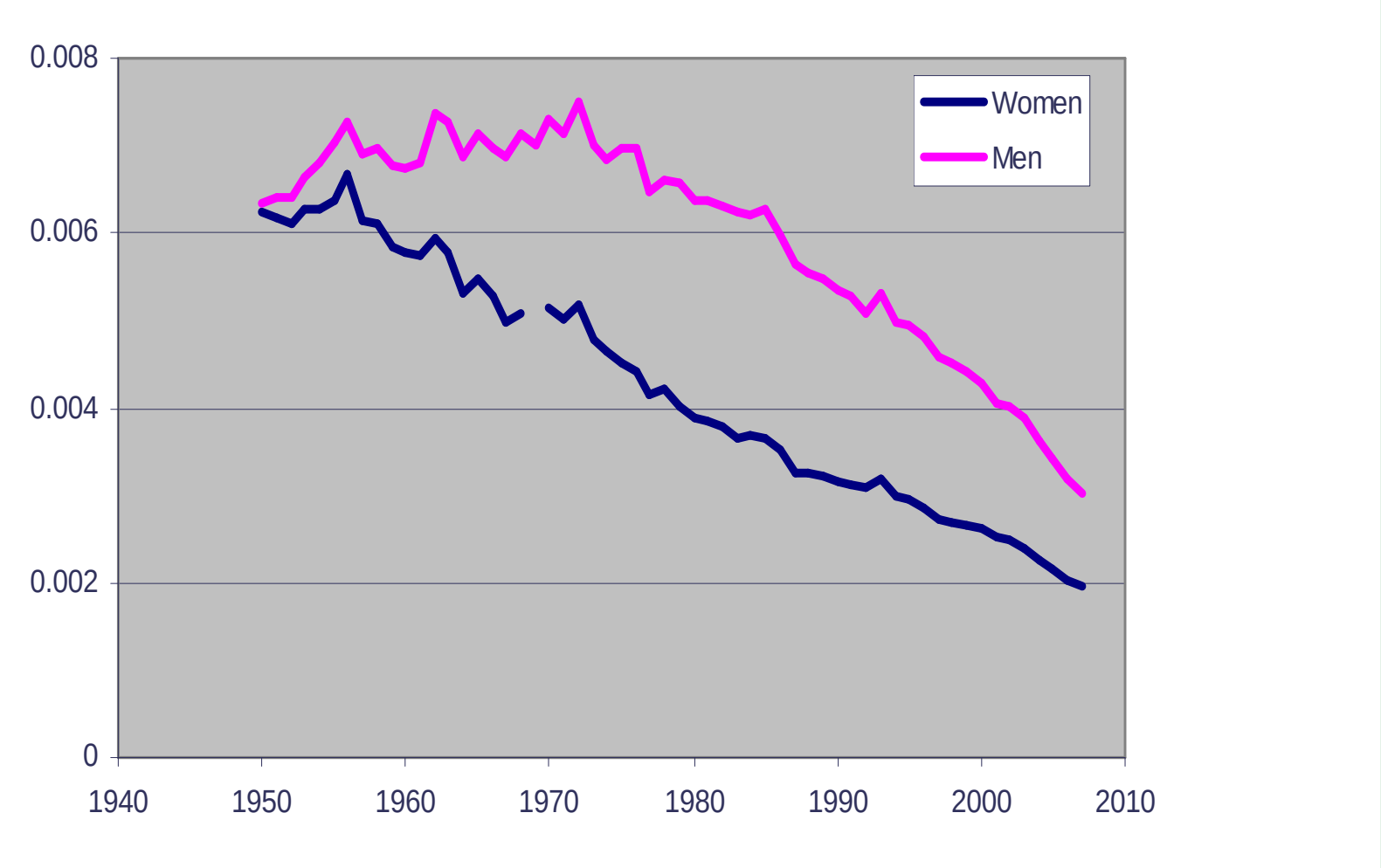
	Men		Women	
	Healthy to ADL disabled	ADL disabled to death	Healthy to ADL disabled	ADL disabled to death
BMI 18.5-22.9	1.11	**1.42**	0.98	1.13
BMI 23-24.9 *	Ref	Ref	Ref	Ref
BMI 25-29.9	1.04	0.98	**1.25**	**0.75**
BMI 30-34.9	**1.69**	1.01	**1.66**	**0.79**
BMI 35+	**2.54**	0.91	**2.81**	1.07
Never smoked *	Ref	Ref	Ref	Ref
Stopped smoking	1.06	1.12	1.01	1.13
Currently smoking	**1.43**	**1.34**	**1.60**	**1.69**
Low education	**1.69**	1.18	**1.49**	**1.31**
Medium education	**1.32**	1.09	1.04	1.11
High education *	Ref	Ref	Ref	Ref

Loss or gains in life years	Mannen			Vrouwen		
	Total	Active	ADL disab	Total	Active	ADL disab
BMI 18.5-22.9	**-1.8**	-1.1	-0.7	0.4	0.1	-0.5
BMI 23-24.9 *	**24.5**	**19.5**	**5.1**	**28.7**	**21.8**	**6.9**
BMI 25-29.9	0.6	0.2	0.4	0.6	**-1.5**	**+2.1**
BMI 30-34.9	-0.6	**-2.7**	**+2.0**	-0.4	**-3.6**	**+3.2**
Never smoked *	**27.6**	**21.4**	**6.2**	**30.4**	**22.0**	**8.4**
Stopped smoking	**-2.8**	**-1.9**	-0.9	**-1.6**	-0.7	-0.9
Currently smoking	**-7.7**	**-6.4**	**-1.3**	**-6.6**	**-5.2**	**-1.4**
Low education	**-2.8**	**-3.6**	0.7	**-3.2**	**-3.3**	0.0
Medium education	**-1.7**	**-2.1**	0.4	-1.0	-0.4	-0.6
High education *	**26.2**	**21.1**	**5.1**	**30.1**	**21.9**	**8.2**
All (excl. severely obese)	**24.6**	**19.1**	**5.5**	**28.7**	**20.8**	**7.9**

Risk of disability and mortality by BMI



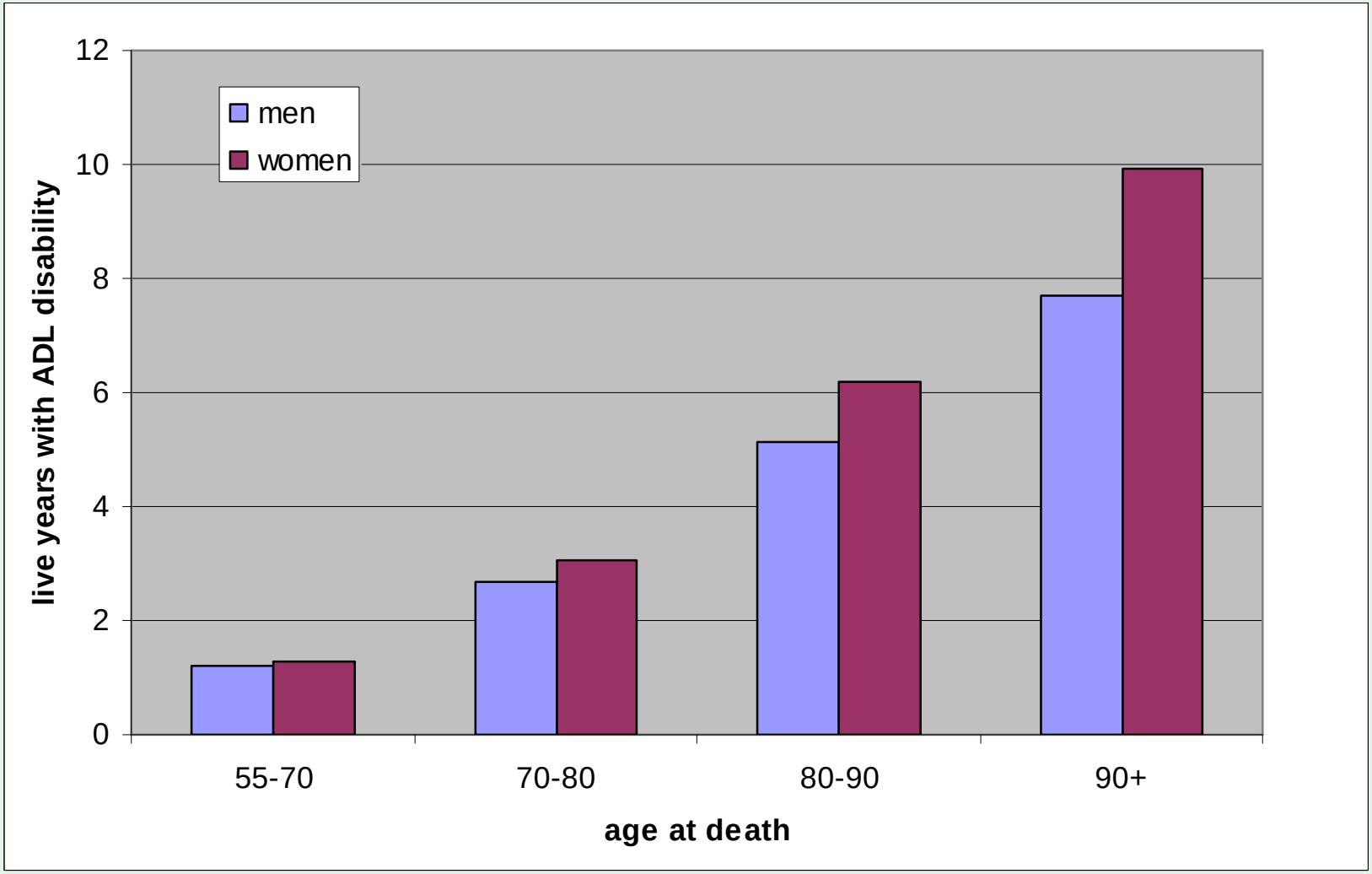
Age standardised cardiovascular mortality rate (Netherlands)



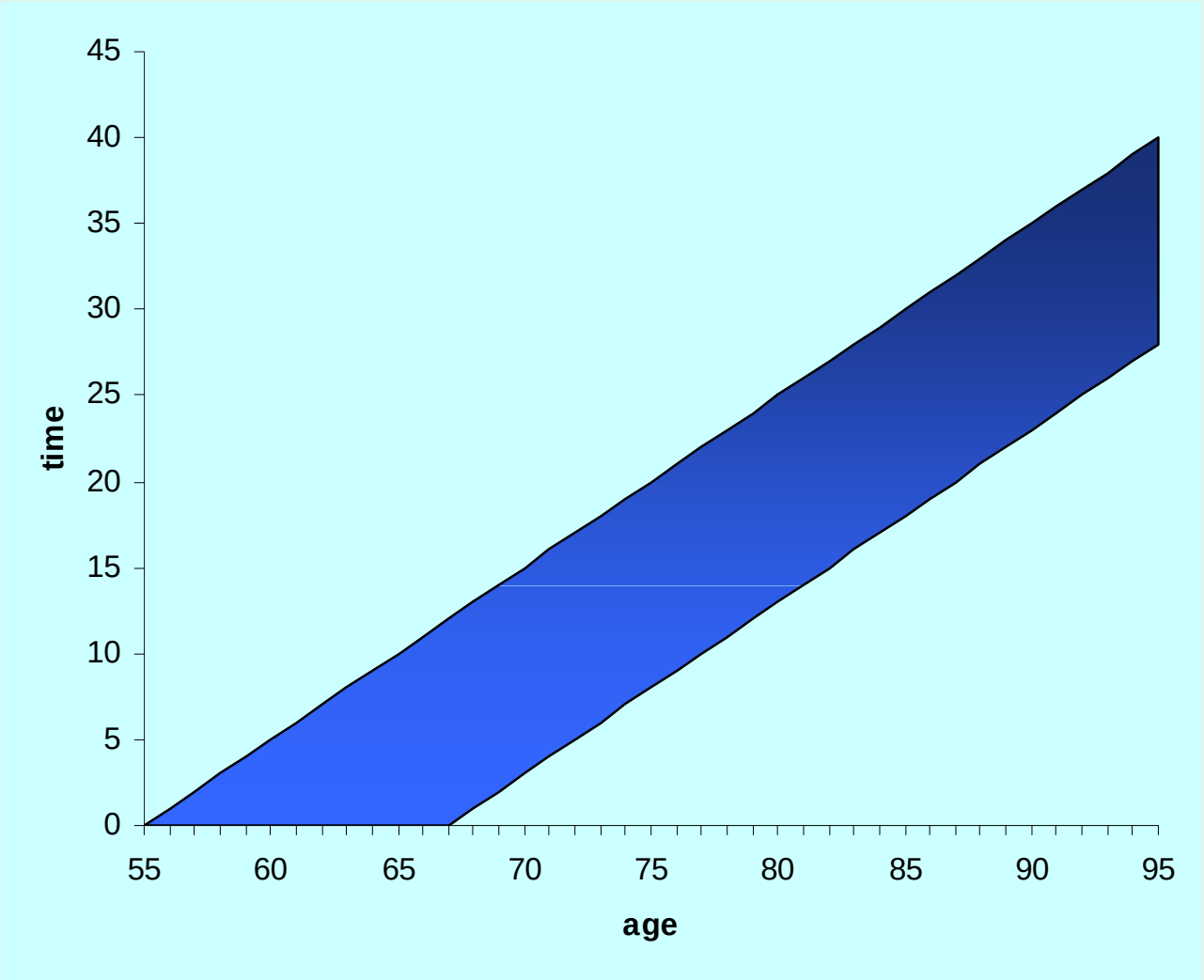
Trajectories

	men		women	
	age at death	probability	age at death	probability
Never disabled	75.5	42.6%	77.9	26.6%
Ever disabled	84.0	57.4%	88.0	73.4%
Ever recovery	86.7	27.6%	90.6	36.7%
Never recovery	81.4	29.8%	85.4	36.8%

Duration of ADL disability by age at death



Age/period of information



Ageing

- Defined as increasing probability of disease, disability and death with increasing age
- Determined by underlying “rate of ageing”
- Slower rate of ageing
  - Longer life
  - Longer life free of disability
  - Longer life with disability
  - Extension of care needs

Conclusion

- Longer life without disability goes together with longer life with disability
- Smoking compresses disability, by killing
- Obesity expands disability, partly by not killing anymore
- A higher education increases active life expectancy, without increasing inactive life expectancy