# What can past trends in health expectancy tell us about the future?

Carol Jagger

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*Newcastle University*

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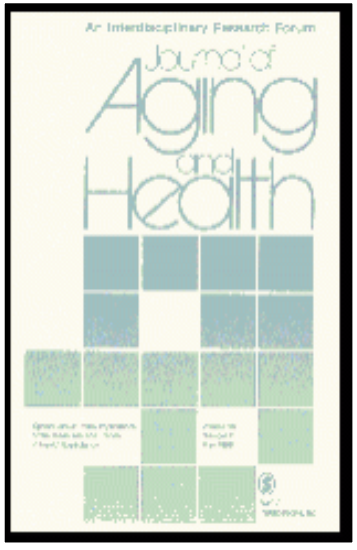
**REVES@30 May 30-June 1, 2018**

**George Myers Lecture**

# George Myers

- REVES 8 Chicago (1995)

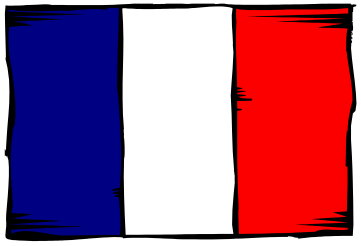




Jagger C, Raymond N, Morgan K. Planning for the future: p. the effect of changing mortality, incidence, and recovery rates on life expectancy with visual disability: p.154-170.

# Individual or population health?

**LLI**

**SRH**



**GALI**

**SRH**

**IADL/ADL**

It is better to measure **inaccurately** something which is **important** than to measure **accurately** something which is **unimportant.**

*Professor Stephen Evans*

Newcastle University

Institute for Ageing

# Plan

- Why do we need  monitor health expectancy trends?
- What are/have been the barriers/challenges?
- What does the evidence on past trends tell us?
- Will these trends continue in the future and if not why not?
- What is the future for REVES?

# Why do we need  monitor HE trends?

- To answer question ‘We are living longer – are the years good ones?’
- To inform future policy to improve and plan resources
- REVES network set up to do this
  - Trends papers even in the earliest REVES!
- Increasing number of countries over time (Canada, UK, US, Netherlands, France, Belgium, Spain, Italy, China, …..)
- Tended to feel like there should be one trend we were all following – but all at different points in population ageing
- Now more sophisticated and looking at trends within subgroups – could we do more?
- Why compare countries
  - to learn from others
  - natural experiments for differences in health systems, economic shocks, etc

# Trends - primary phase

- Wilkins R, Adams O. Health expectancy trends in **Canada, 1951-1986**. (REVES 1 1989)
- Crimmins EM, Saito Y, Ingegneri D. Trends in disability-free life expectancy in the **United States, 1970-90**. Popul Dev Rev 1997;23:555-572. (REVES 1 1989)
- Deeg DJH, Kriegsman DMW, van Zonneveld RJ. Trends in fatal chronic diseases and disability in the **Netherlands 1956-1993** and projections 1993-1998. (REVES 7 1994)
- Robine JM. Disability-free life expectancy trends in **France 1981-1991**, international comparison. (REVES 7 1994)
- Mathers C, Jain S. Trends in Health Expectancies in **Australia 1981-1998** and Preliminary Results From the Australian Burden of Disease Study. (REVES 11 1999)
- Kelly S, Baker A. Healthy life expectancy in **Great Britain, 1980-96**, and its use as an indicator in UK Government strategies. (REVES 12 2000)

# Trends – secondary phase

- Van Oyen, H., et al. Trends in health expectancy indicators in the older adult population in **Belgium between 1997 and 2004**. European Journal of Ageing 2008;5(2):137-146. (REVES 18 2006)
- Jeune, B. and Bronnum-Hansen, H. Trends in health expectancy at age 65 for various health indicators, **1987-2005, Denmark**. European Journal of Ageing 2008;5(4):279-285 (REVES 19 2007)
- Yong, V. and Saito, Y. Trends in healthy life expectancy in **Japan: 1986-2004**. Demographic Research [Online] 2009;20(19):467-494. (REVES 20 2008)
- Cheung, SLK, Yip, SFP. Are we heading to the compression of disability? The case of **Hong Kong SAR, 1984-2008**. (REVES 21 2009)
- Jeune, B, et al. Increasing disability-free life expectancy among older adults in **Palestine from 2006 to 2010**. (REVES 26 2014)

- Robine, J.-M., Romieu, I. and Michel, J.-P. Trends in health expectancies. In: J.-M. Robine, C. Jagger, C. D. Mathers, E. M. Crimmins and R. M. Suzman, editors. Determining Health Expectancies. Chichester (U.K): John Wiley § Sons; 2003. p. 75-104.

# Differential trends between subgroups

- Petterson H. Trends in health expectancy for **socio-economic groups** in Sweden (REVES 8 1995)
- Crimmins EM, Saito Y. Trends in healthy life expectancy in the United States, 1970-1990: **gender, racial and educational differences**. Soc Sci Med 2001;52:1629-1641. (REVES 10 1997)
- Bajekal, M. Healthy life expectancy **by area deprivation**: magnitude and trends in England, 1994-1999. Health Statistics Quarterly 2005;25(Spring):18-27. (REVES 13 2001)
- Wilkins R, Ng E, Berthelot JM. Trends in health expectancy by **neighbourhood income and education** in Canada from 1986-1996. (REVES 15 2003)
- Van Oyen, H, et al. **Socioeconomic** inequalities in Disability Free Life Years at age 25 in Belgium: The evolution between 1997 and 2004 (REVES 20 2008)
- Martin, L, Zimmer, Z , Hurng, B-S. Trends in Late-life disability in Taiwan by **education and Mainlander status**, 1993-2007 (REVES 22 2010)

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- REVES set up to do this
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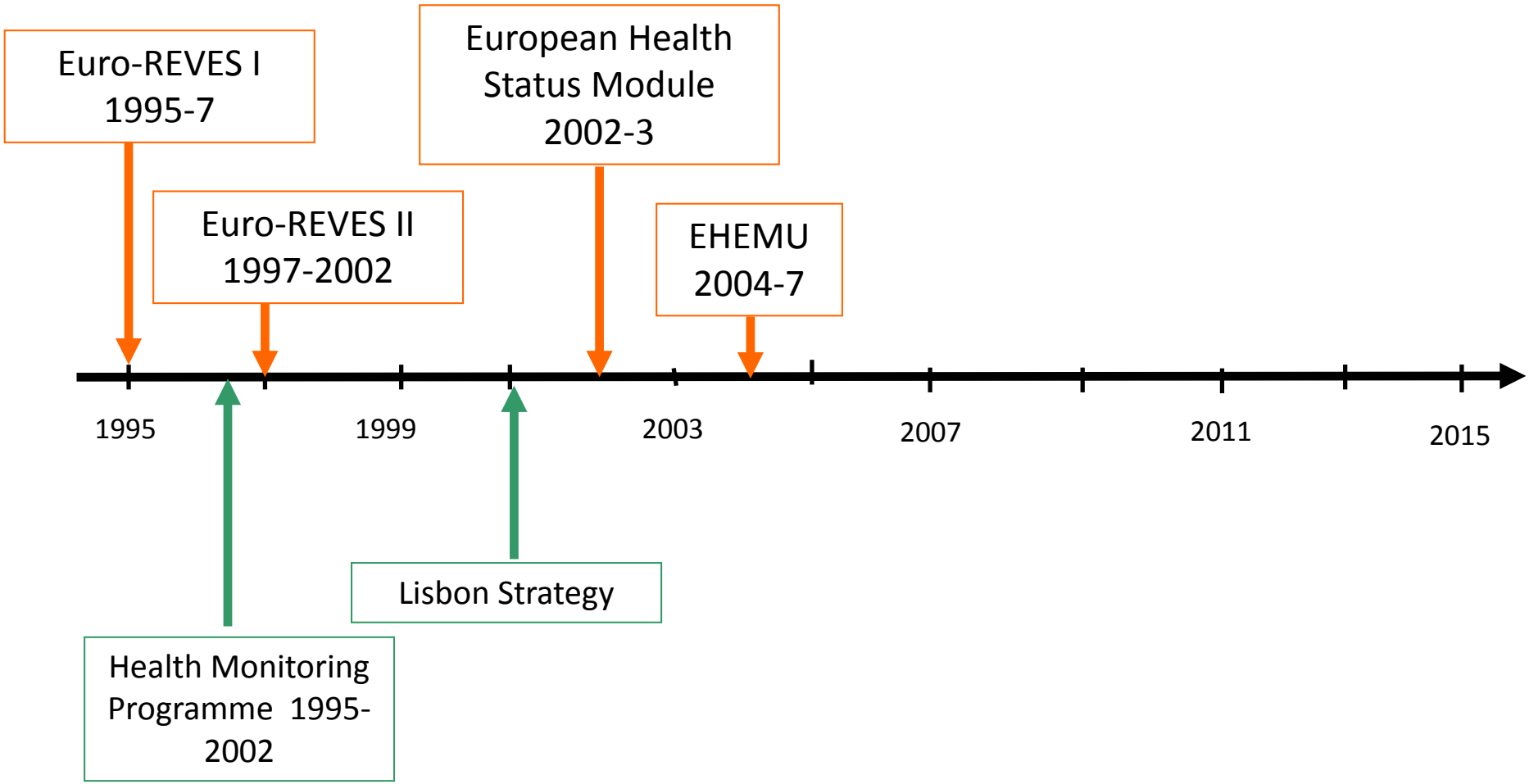
# Plan

- Why do we need  monitor trends?
- What are/have been the barriers/challenges?
  - Data availability
  - Data consistency
  - Case study – European Union
- What does the evidence on past trends tell us?
- Will these trends continue in the future and if not why not?
- What is the future for REVES?

# Timeline


Euro-REVES I
1995-7
European Health
Status Module
2002-3
Euro-REVES II
1997-2002
EHEMU
2004-7
1995
1999
2003
2007
2011
2015
Lisbon Strategy
Health Monitoring
Programme 1995-
2002

# Euro-REVES II – the solution

Proposals for nine instruments dealing with:

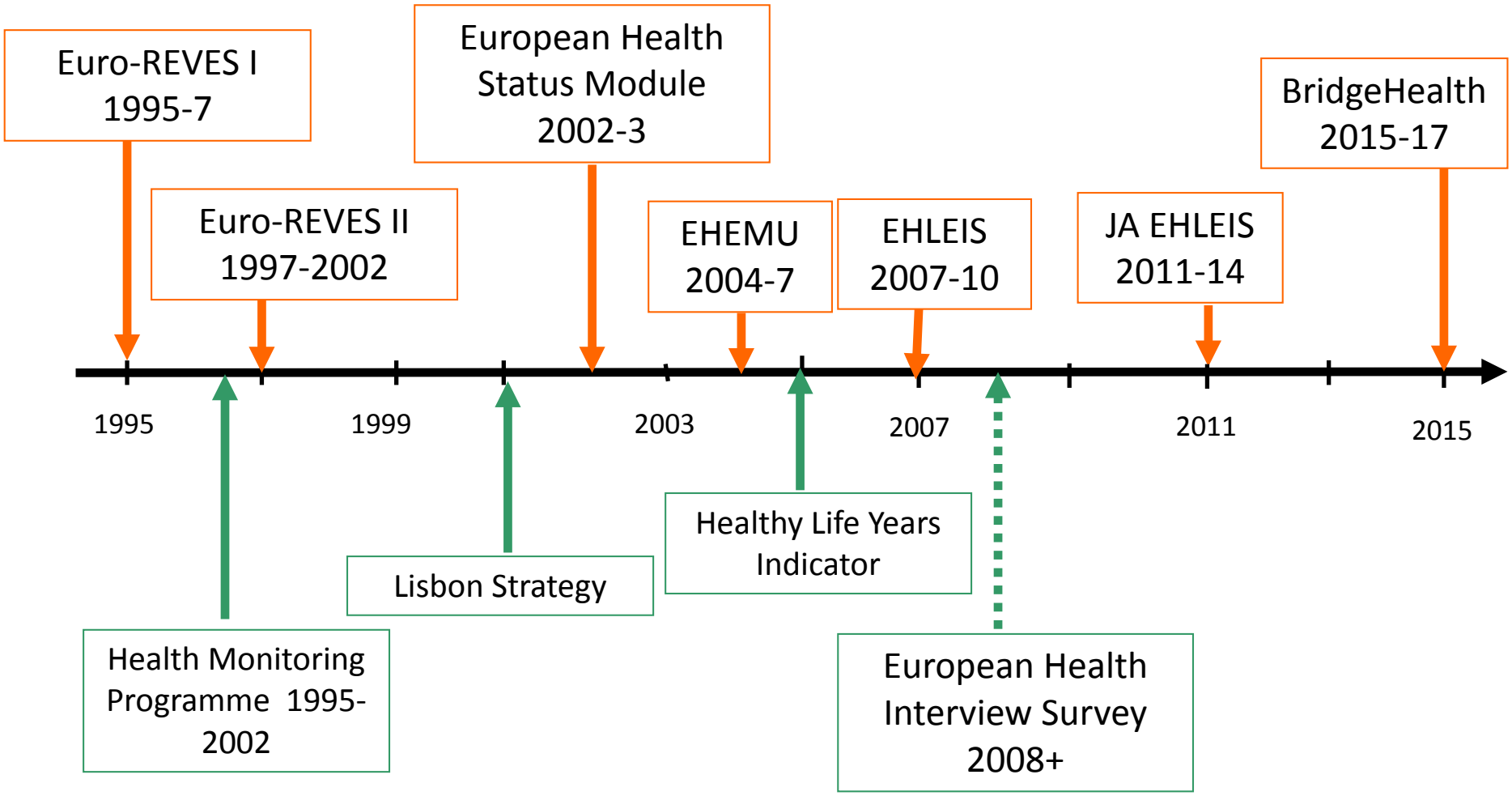
- Chronic morbidity
  - Global
  - Detailed
- Functional limitation
  - Detailed (physical and sensory)
- Activity restriction
  - Global (GALI)
  - Detailed (personal care, household care, other activities)
- Perceived health
  - Global
- Mental health

MEHM*

*__Minimum European Health Module__ (Module 2000) for inclusion in all the European health and social surveys and included in Health Surveys (Eurobarometer, SILC)

In EU-SILC since 2004/2005

# Timeline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JA EHLEIS
2011-14
BridgeHealth
2015-17
1995
1999
2003
2007
2011
2015
Health Monitoring
Programme 1995-
2002
Lisbon Strategy
Healthy Life Years
Indicator
European Health
Interview Survey
2008+

EUROPEAN HEALTH & LIFE EXPECTANCY
JA:EHLEIS
INFORMATION SYSTEM

# Key outputs

# Plan

- Why do we need  monitor trends?
- What are/have been the barriers/challenges?
  - Data availability
  - Data consistency
  - Case study EU
- What does the evidence on past trends tell us?
- Will these trends continue in the future and if not why not?
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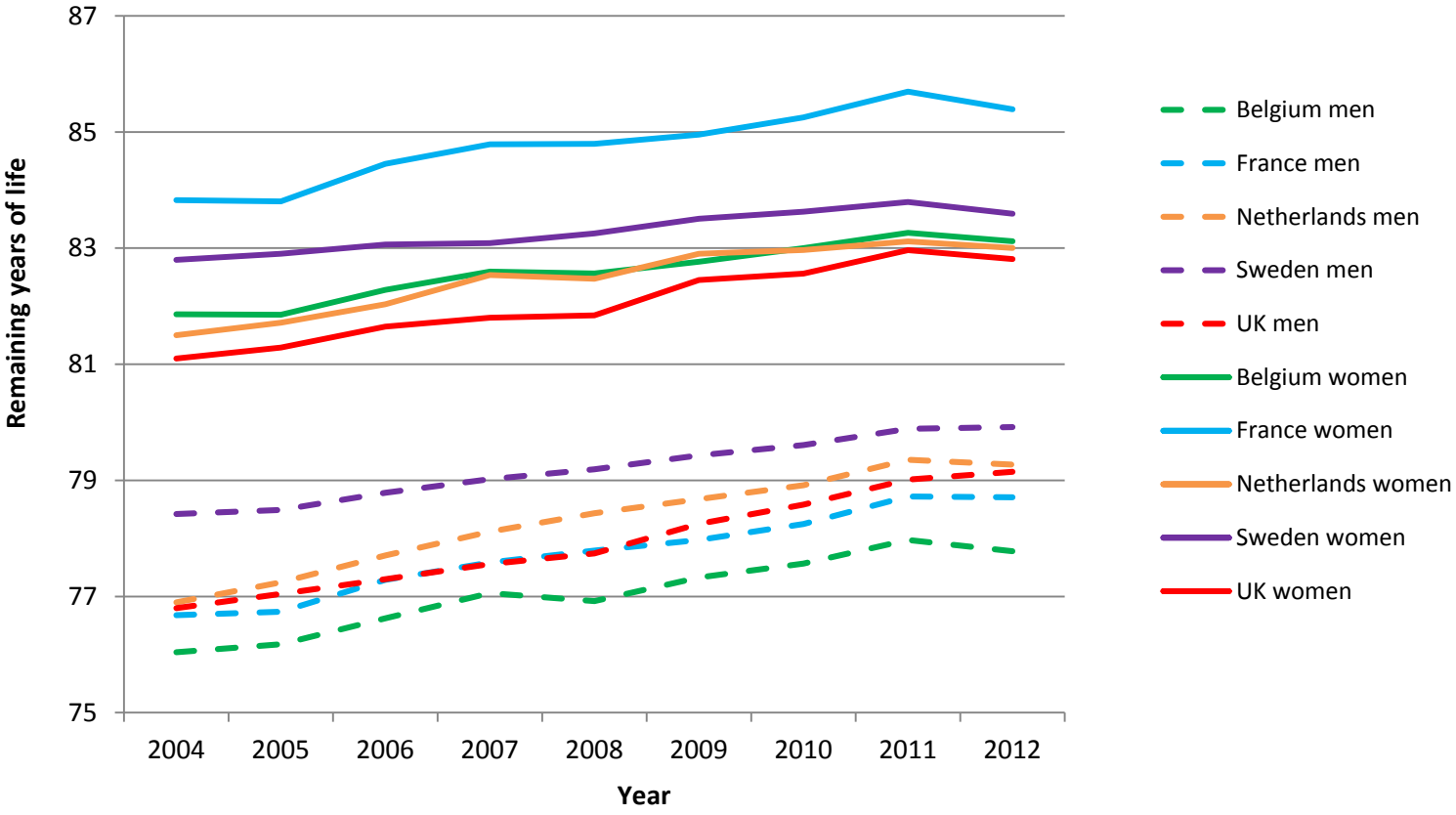
# LE at birth: selected EU countries

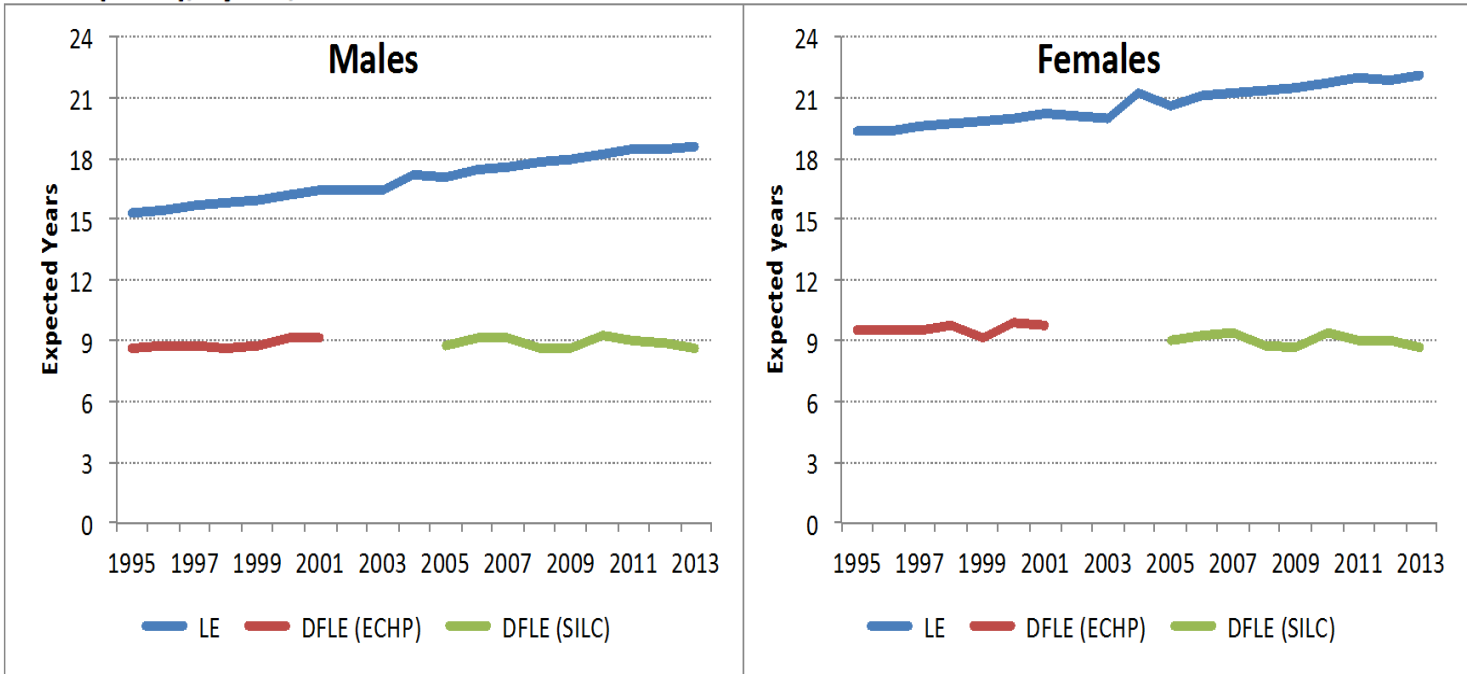



*Source: Jagger Foresight evidence review*

EUROPEAN HEALTH & LIFE EXPECTANCY
EHLEIS
INFORMATION SYSTEM

# LE and DFLE at age 65, EU15, 1995-2013

**Life expectancy (LE) and disability-free life expectancy (DFLE) at age 65 in 15 members of the European Union (EU15), by sex, from 1995 to 2012**




Note: Data on disability come the European Community Household Panel (ECHP) from 1995 to 2001 and from the European Statistics on Income and Living Conditions (EU-SILC) since 2005. No data are available for 2002-2004; Calculation: www.eurohex.eu

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# Trends selected EU countries (men)

| | Change in years between 2005 and 2010 | | | | | |
|---|---|---|---|---|---|---|
| | Birth | | Age 65 | | Age 85 | |
| | LE | HLY | LE | HLY | LE | HLY |
| **MEN** | | | | | | |
| Belgium | **1.4** | **1.7** | 1.0 | 0.9 | 0.8 | 0.7 |
| France | 1.5 | -0.4 | 1.2 | 0.5 | 0.9 | 0.1 |
| Netherlands | 1.7 | -4.4 | 1.3 | -1.1 | 0.6 | -1.2 |
| Sweden | **1.1** | **7.0** | **0.9** | **3.4** | **0.3** | **1.3** |
| UK | 1.5 | 0.9 | 1.2 | 0.4 | 0.5 | -0.1 |
| EU25 | 1.6 | 1.1 | 1.1 | 0.3 | 0.7 | 0.0 |

- Compression of activity limitation (disability) for men in Belgium (birth) and Sweden (all ages)
- Compression of activity limitation (disability) for women in Sweden (all ages)

*Source: Jagger Foresight evidence review*

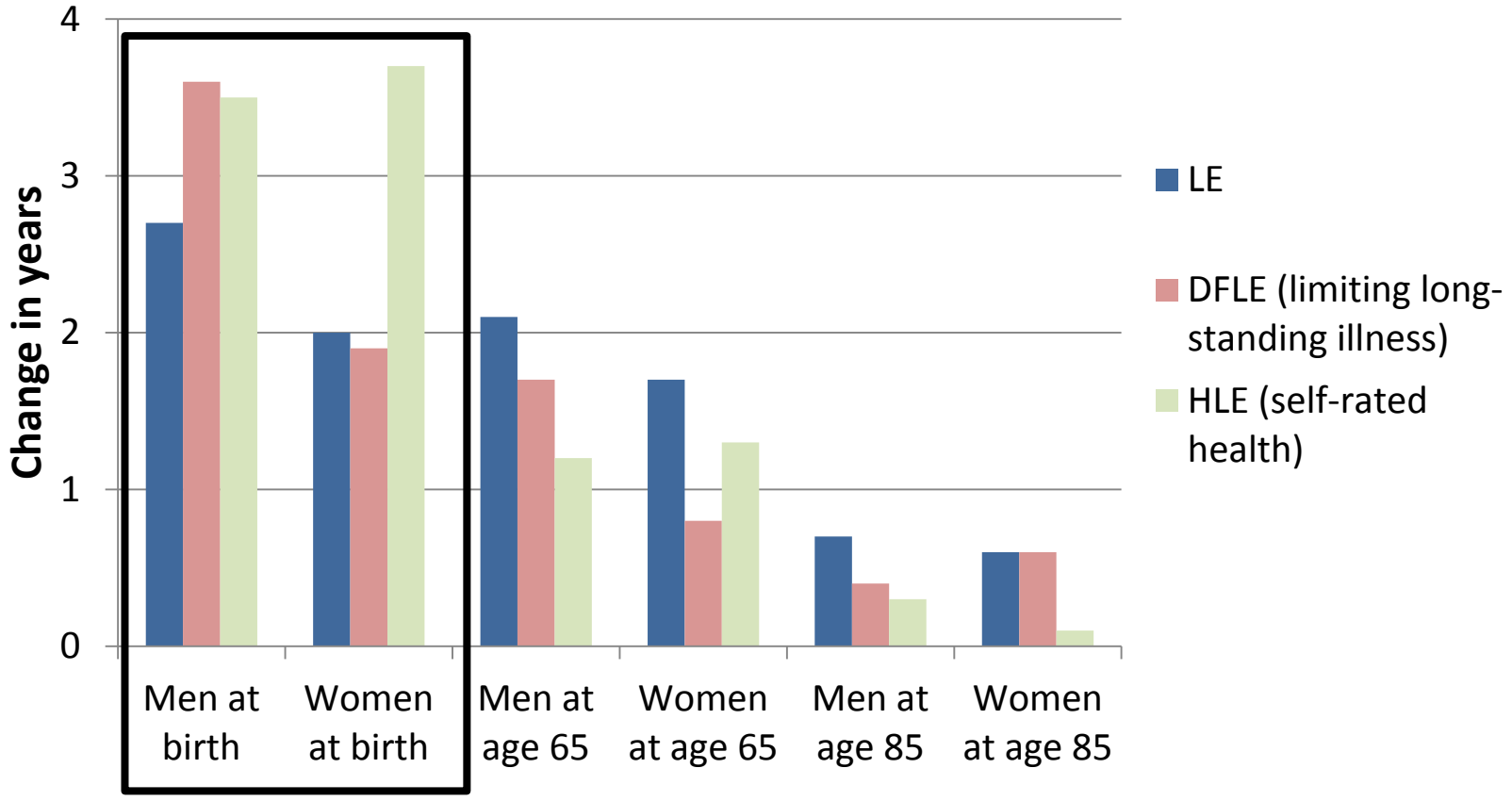
# Trends selected EU countries (women)

| | Change in years between 2005 and 2010 | | | | | |
|---|---|---|---|---|---|---|
| | Birth | | Age 65 | | Age 85 | |
| | LE | HLY | LE | HLY | LE | HLY |
| **WOMEN** | | | | | | |
| Belgium | 1.1 | 0.5 | 1.1 | -0.1 | 1.1 | 0.1 |
| France | 1.4 | -1.2 | 1.4 | 0.2 | 1.4 | 0.7 |
| Netherlands | 1.3 | -2.9 | 0.9 | -1.6 | 0.6 | -0.2 |
| Sweden | **0.7** | **7.7** | **0.4** | **4.4** | **0.1** | **2.1** |
| UK | 1.3 | 0.1 | 1.1 | 0.4 | 0.6 | -0.1 |
| EU25 | 1.3 | 0.5 | 1.1 | 0.2 | 0.9 | 0.1 |

- Compression of disability for women in Sweden (all ages)

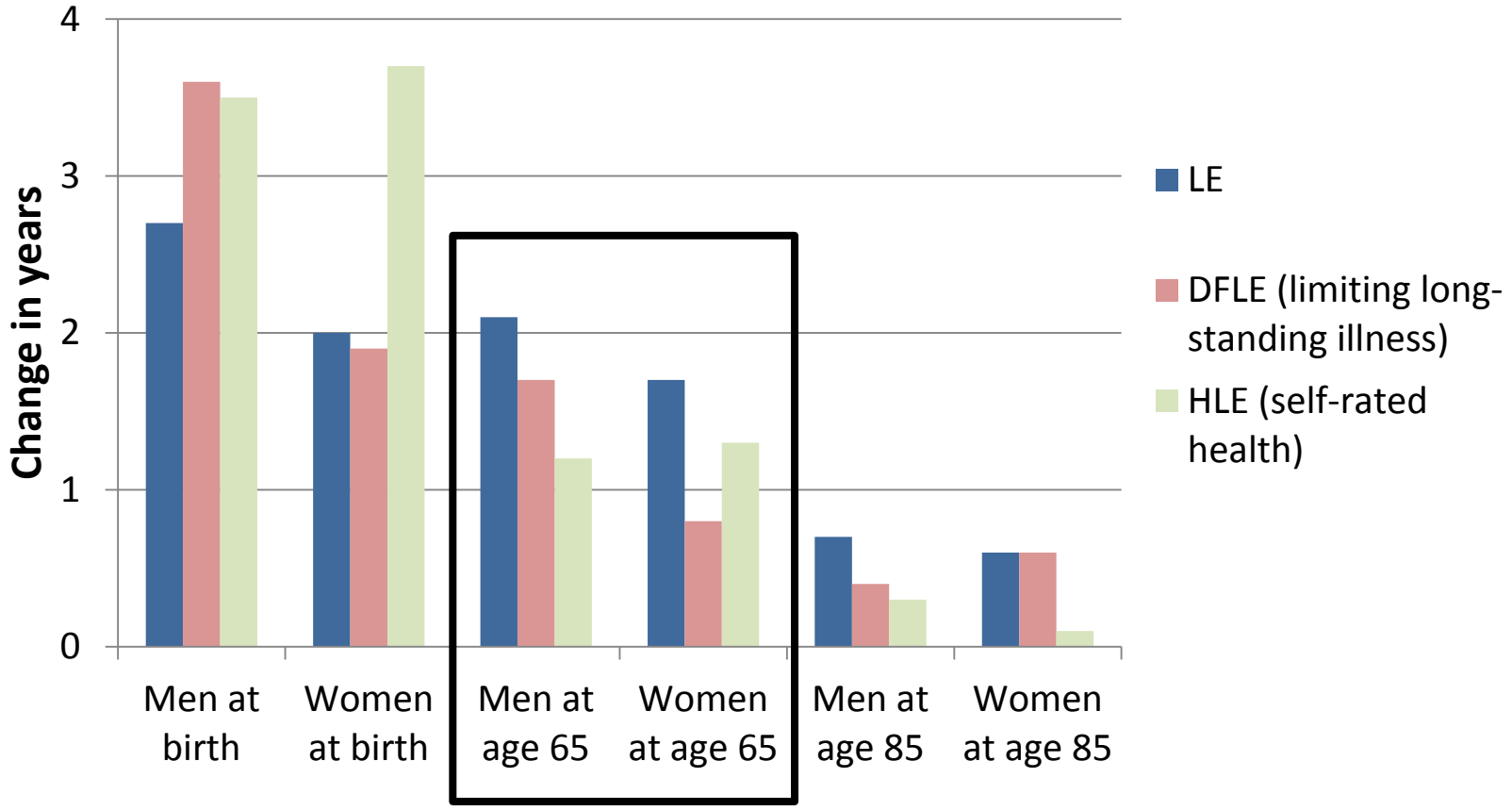
*Source: Jagger Foresight evidence review*

# UK trends 2000-2 to 2009-11




- Some evidence of compression of disability and morbidity at younger ages

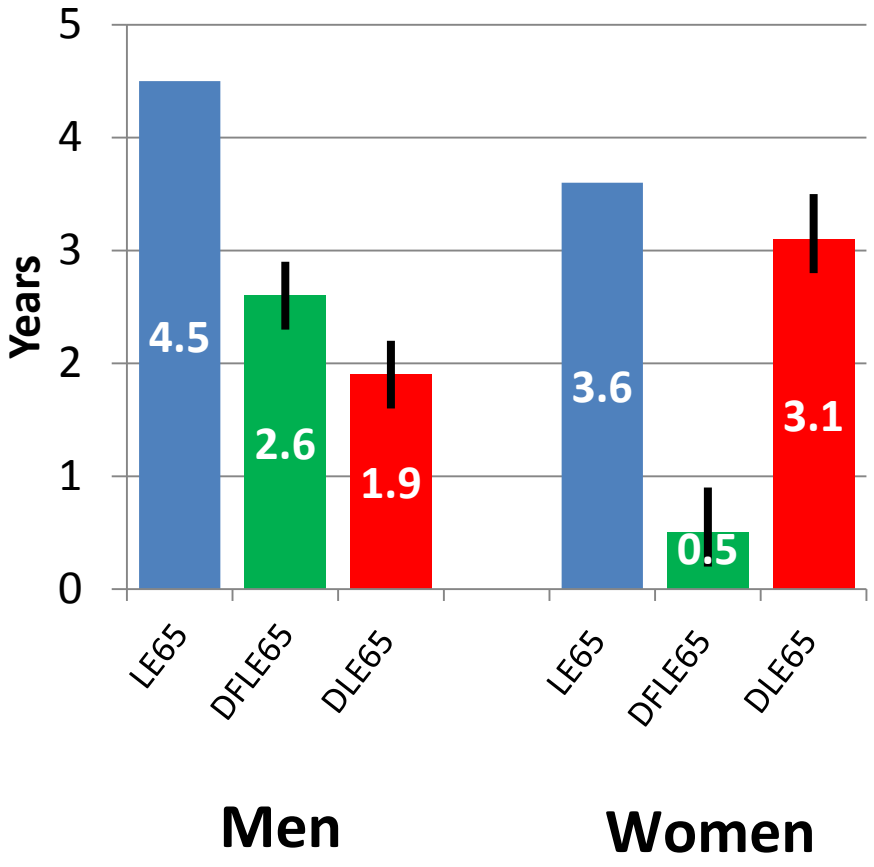
# UK trends 2000-2 to 2009-11



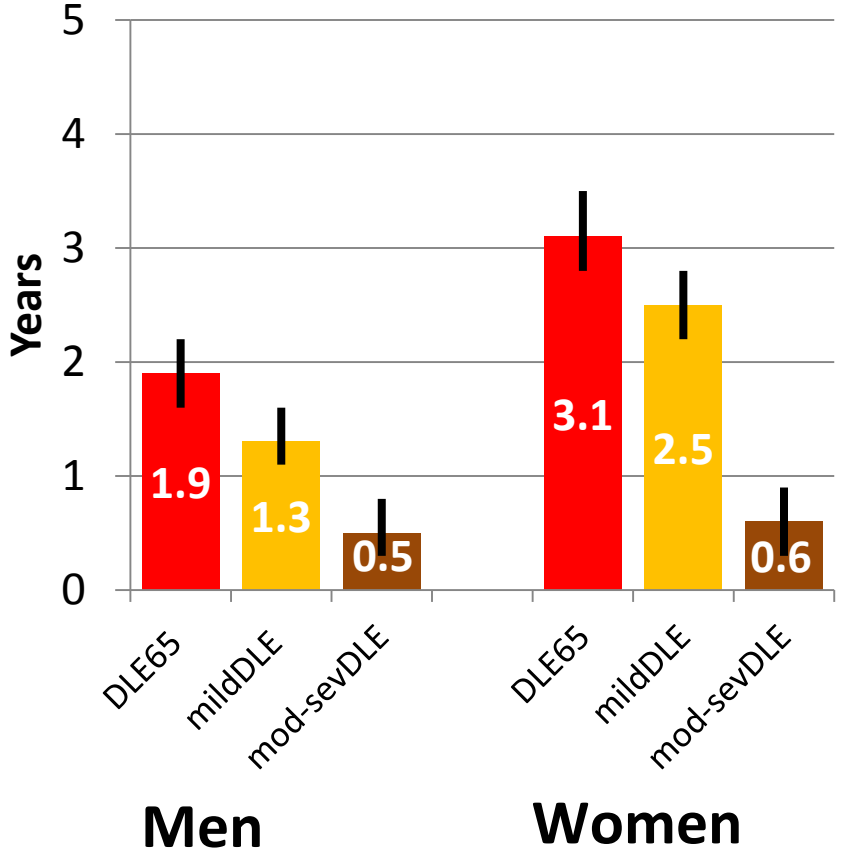

- Some evidence of compression of disability and morbidity at younger ages

# Change in HE at age 65:1991 to 2011

## Disability Free Life Expectancy



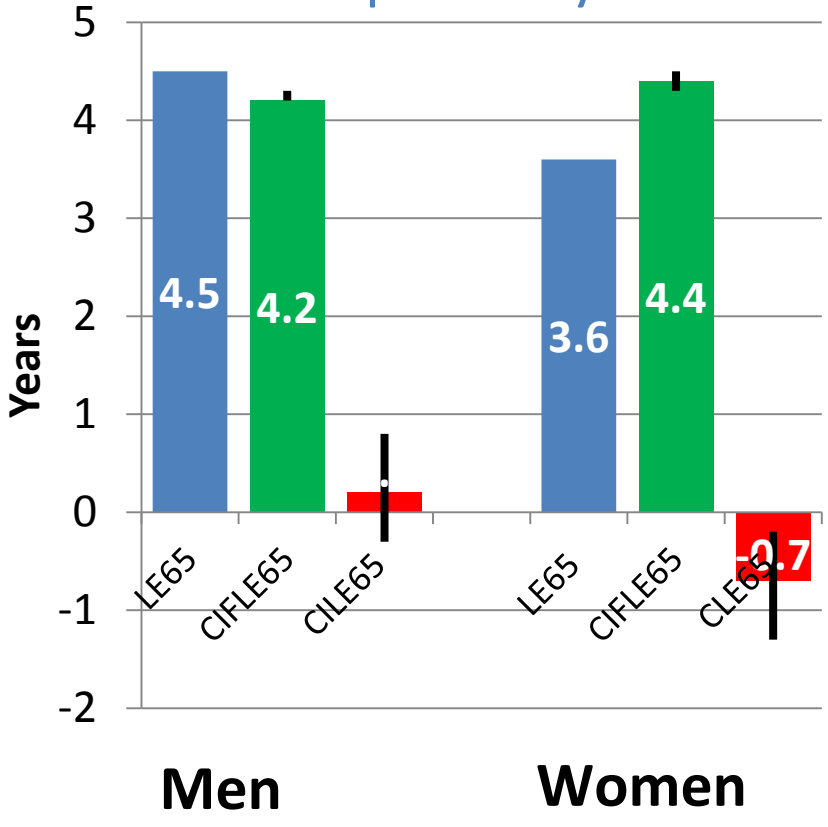

## Severity of disability



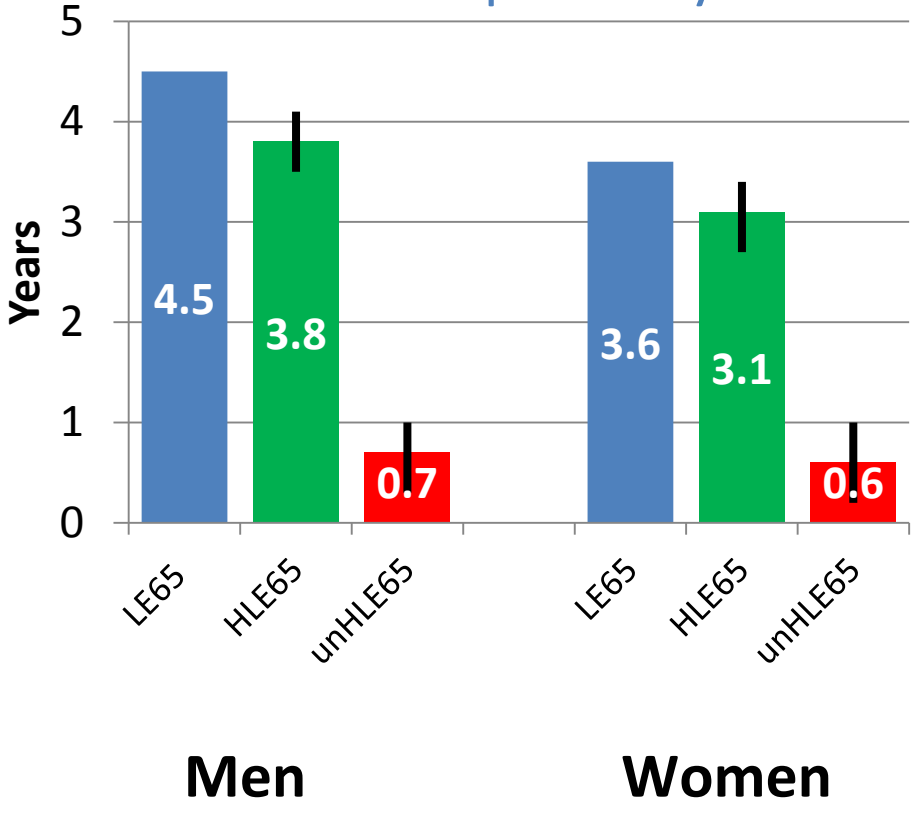

*Source: Jagger et al Lancet 2015*

# Change in HE at age 65:1991 to 2011

## Cognitive Impairment Free Life Expectancy




## Healthy Life Expectancy




*Source: Jagger et al Lancet 2015*

# DFLE USA 1982-2011

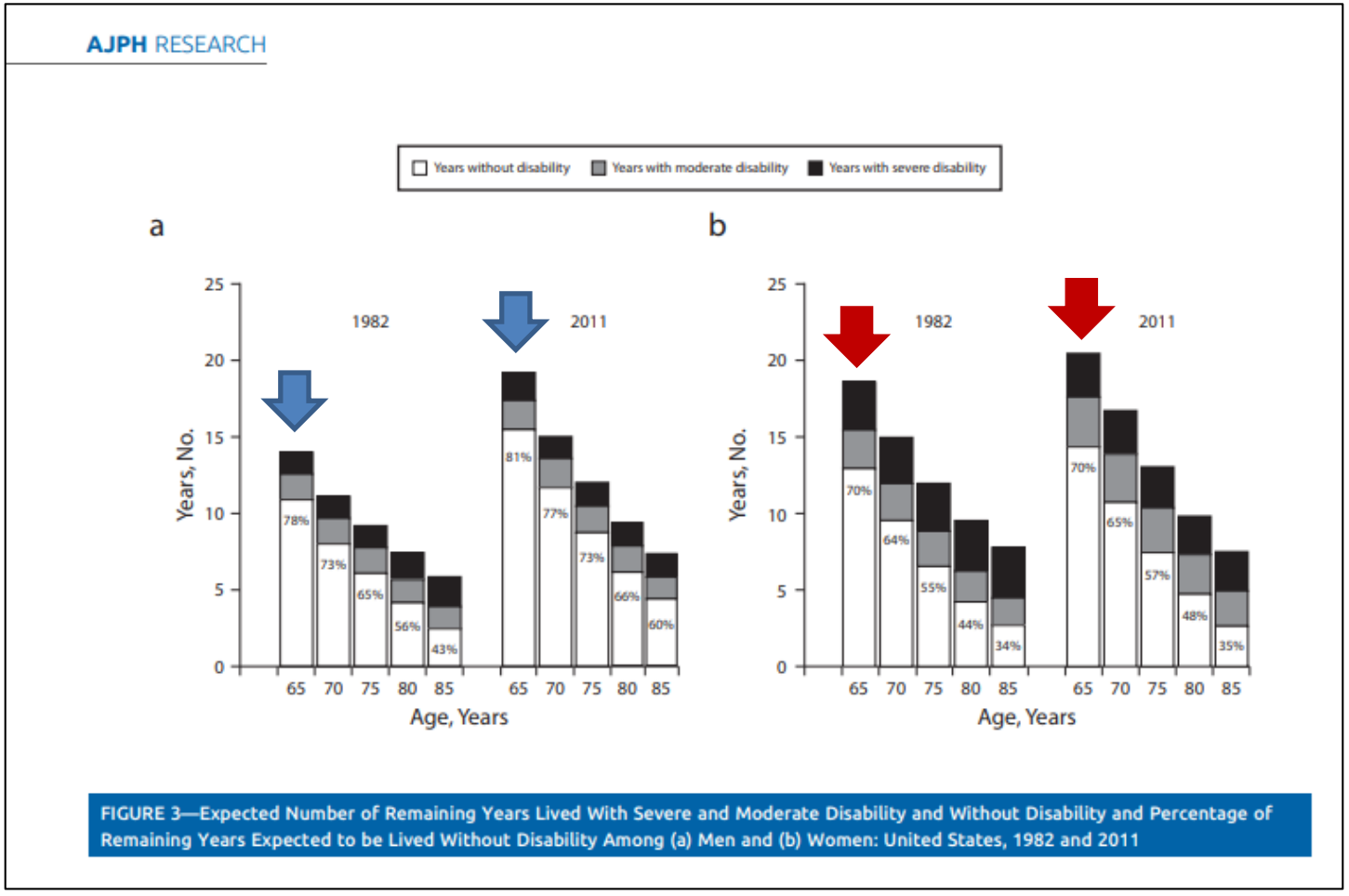



FIGURE 3—Expected Number of Remaining Years Lived With Severe and Moderate Disability and Without Disability and Percentage of Remaining Years Expected to be Lived Without Disability Among (a) Men and (b) Women: United States, 1982 and 2011

*Source: Freedman et al AJPH 2016*

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# CIFLE USA 2000-2010

Table 2. Life Expectancy 2000 and 2010: total, with good cognition, with CIND, with dementia: Health and Retirement Study.

| | Males | | | Females | | |
|---|---|---|---|---|---|---|
| **Expectation of life in years** | **2000** | **2010** | **Change 2010–2000** | **2000** | **2010** | **Change 2010–2000** |
| **At age 65** | | | | | | |
| Total | 16.1 | 17.7 | 1.6 | 19.1 | 20.3 | 1.2 |
| With good cognition | 10.7 (10.4–10.9) | 12.5 (12.3–12.7) | 1.8* | 12.5 (12.3–12.7) | 14.1 (13.9–14.4) | 1.6* |

*Source: Crimmins et al SSM Popn Health 2016*

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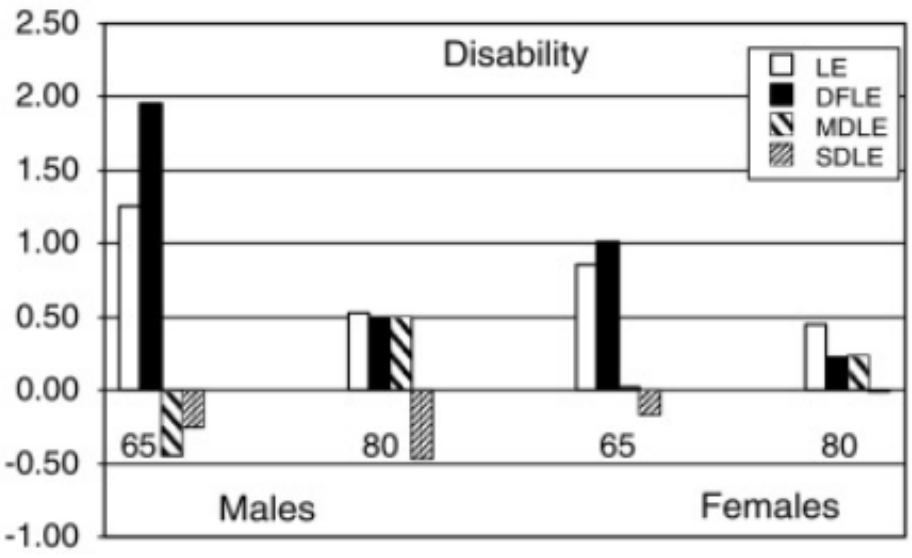
DFLE Belgium 1997-2004




DFLE Denmark 1987-2005

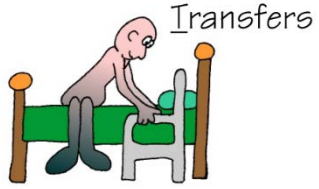
**Table 3** Life expectancy, expected lifetime with and without *mobility limitations* and proportion of ex restrictions at age 65 in Denmark in 1987, 1994, 2000, and 2005

| Calendar year | Life expectancy | Expected lifetime without mobility restrictions | | Expected lifetime with mobility restrictions | |
|---|---|---|---|---|---|
| | Years | Years | 95% CI | Years | 95% CI |
| Men | | | | | |
| 1987 | 14.1 | 10.2 | 9.6–10.8 | 3.9 | 3.2–4.5 |
| 1994 | 14.1 | 10.7 | 10.1–11.4 | 3.4 | 2.8–4.0 |
| 2000 | 15.0 | 12.4 | 12.1–12.7 | 2.6 | 2.4–2.9 |
| 2005 | 16.0 | 13.3 | 12.9–13.6 | 2.7 | 2.4–3.0 |
| Women | | | | | |
| 1987 | 17.9 | 11.0 | 10.2–11.7 | 7.0 | 6.2–7.7 |
| 1994 | 17.6 | 10.5 | 9.8–11.3 | 7.1 | 6.3–7.9 |
| 2000 | 18.1 | 11.9 | 11.5–12.3 | 6.2 | 5.8–6.6 |
| 2005 | 19.0 | 13.1 | 12.7–13.5 | 5.8 | 5.4–6.3 |

# Years with dependency

- Disability does not give real indication of care needs

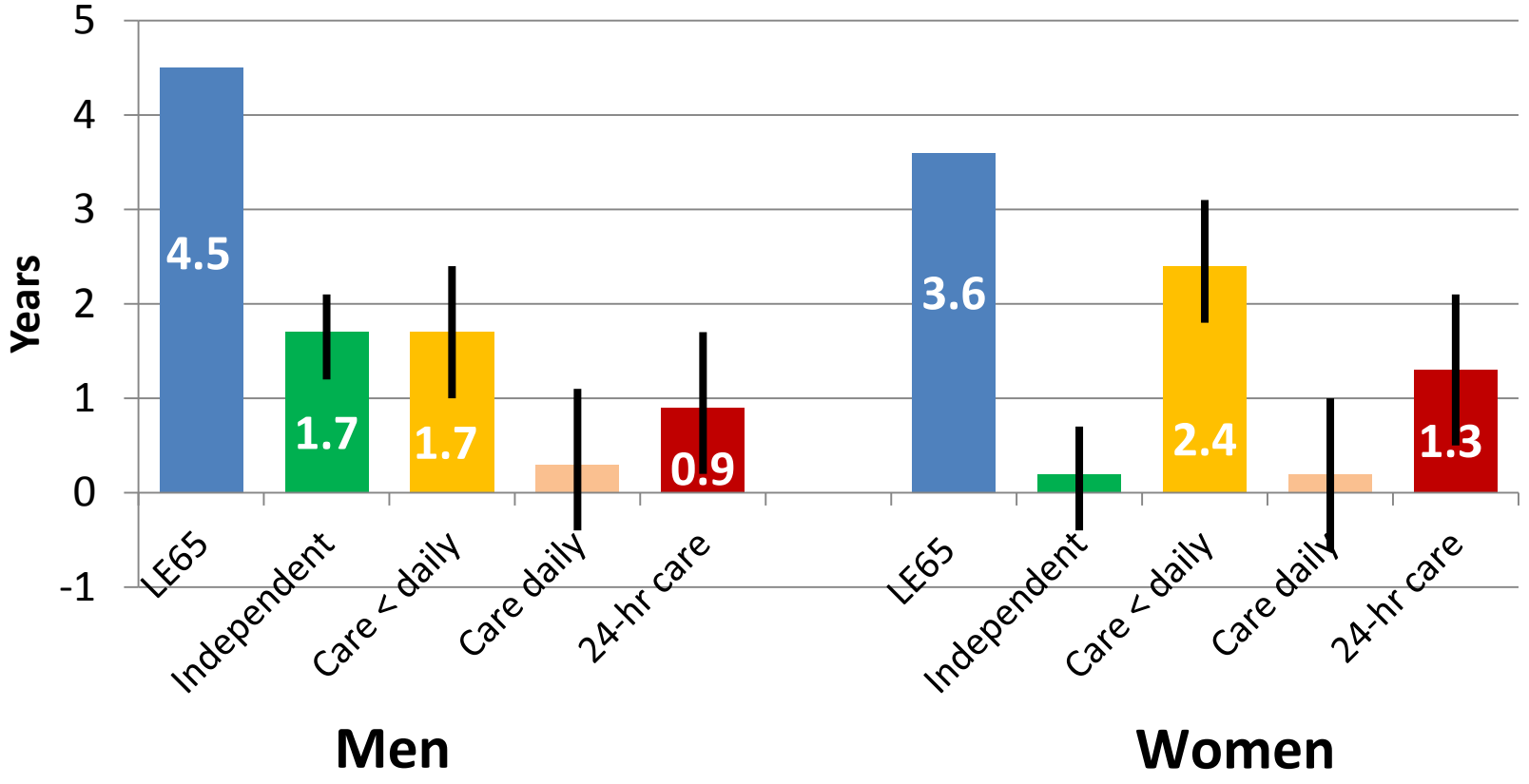
- Interval of need (Isaacs and Neville, 1975):
  - **High (requires 24-hour care)**
    - bedbound or chairbound, or unable to get to or use the toilet without help, or need help feeding, or be often incontinent and need help dressing, or have severe cognitive impairment (MMSE < 10)
  - **Medium (requires help at regular times daily)**
    - need help preparing a meal, or dressing
  - **Low (requires help less than daily)**
    - need help to wash all over or bath, or cut toenails, or shop, or do light or heavy housework
  - **Independent**




# Change in HE at age 65:1991 to 2011

## Years with different care needs




*Source: Kingston et al Lancet 2017*

# Explaining the trends

- Are the increases in years with disability due to:
  - Increases in incidence
  - Living longer with disability/reductions in mortality from disabled state
- Have the increases in years with disability been experienced by all social groups?
- How much has education contributed to the reductions in years with cognitive impairment?

**Needs longitudinal data!**

# Plan

- Why do we need  monitor trends?
- What are/have been the barriers/challenges?
  - Data availability
  - Data consistency
  - Case study EU
- What does the evidence on past trends tell us?
- Will these trends continue in the future and if not why not?
- What is the future for REVES?

# Future HE (1)

*European Journal of Public Health*, Vol. 23, No. 5, 829–833

doi:10.1093/eurpub/ckt030 Advance Access published on 13 March 2013

**Mind the gap—reaching the European target of a 2-year increase in healthy life years in the next decade**

Carol Jagger[1], Martin McKee[2], Kaare Christensen[3], Karolina Lagiewka[4], Wilma Nusselder[5], Herman Van Oyen[6], Emmanuelle Cambois[7], Bernard Jeune[8], Jean-Marie Robine[9]

- European and individual country level
- Projections from 2010 to 2020
- Various scenarios explored:
  - HLY/LE constant
  - Variety of reductions in inequalities between countries
- Conclusions:
  - EIP-AHA target unlikely to be reached by EU as a whole though some countries would
  - Reaching target for EU would not reduce inequalities

# Future HE (2)

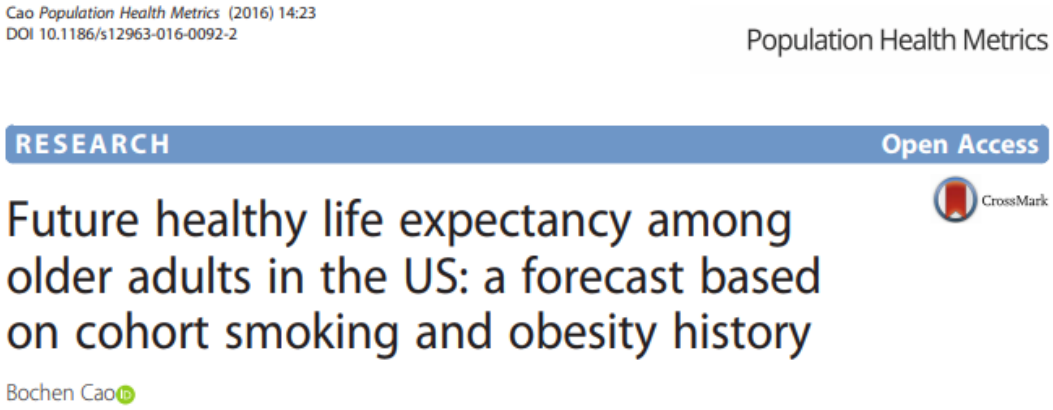
Demography (2013) 50:673–697
DOI 10.1007/s13524-012-0156-2

**Modeling and Forecasting Health Expectancy: Theoretical Framework and Application**

**Istvan M. Majer · Ralph Stevens · Wilma J. Nusselder · Johan P. Mackenbach · Pieter H. M. van Baal**

- Dutch population
- Projections to 2030
- Future health expectancy from projecting transition probabilities (by age and calendar time)

# Future HE (3)



Cao *Population Health Metrics* (2016) 14:23
DOI 10.1186/s12963-016-0092-2

Population Health Metrics

RESEARCH Open Access

Future healthy life expectancy among older adults in the US: a forecast based on cohort smoking and obesity history

Bochen Cao

- US population
- Projections from 1982 to 2040
- Future health expectancy from projecting transition rates incorporating cohort smoking and obesity

# Future HE (4)

THE LANCET
Public Health
Volume 2, Issue 7, July 2017, Pages e307-e313
open access

Articles

## Forecasted trends in disability and life expectancy in England and Wales up to 2025: a modelling study

Dr Maria Guzman-Castillo PhD [a], Sara Ahmadi-Abhari PhD [b], Piotr Bandosz PhD [a, c], Prof Simon Capewell DSc [a], Prof Andrew Steptoe DSc [b], Prof Archana Singh-Manoux PhD [b, d], Prof Mika Kivimaki PhD [b], Martin J Shipley MSc [b], Prof Eric J Brunner PhD [b, †], Prof Martin O'Flaherty PhD [a, †]

- England population
- Projections to 2025
- Future DFLE from projecting transition probabilities conditional on dementia, cardiovascular disease, age and sex calculated from the English Longitudinal Study of Ageing
- Assumes declines in dementia and CVD will continue

# Population Ageing & Care Simulation (PACSim)

- Dynamic microsimulation model
- England population
- Base population formed from 3 longitudinal studies (Understanding Society, ELSA, CFAS)
- 'Ages' individuals aged 35+ from 2014 to 2042 wrt range of characteristics:
  - Survival (qx from ONS population projections)
  - Sociodemography (education, marital status, occupation)
  - Lifestyle factors (smoking, physical activity, BMI)
  - Morbidity (cognitive impairment, CVD, hypertension, diabetes, arthritis, stroke, dementia, visual impairment, hearing impairment, respiratory disease, cancer, depression)
  - Dependency

MODEM modelling outcome and cost impacts of interventions for dementia

Improving Dementia Care ESRC·NIHR

*http://www.modem-dementia.org.uk*

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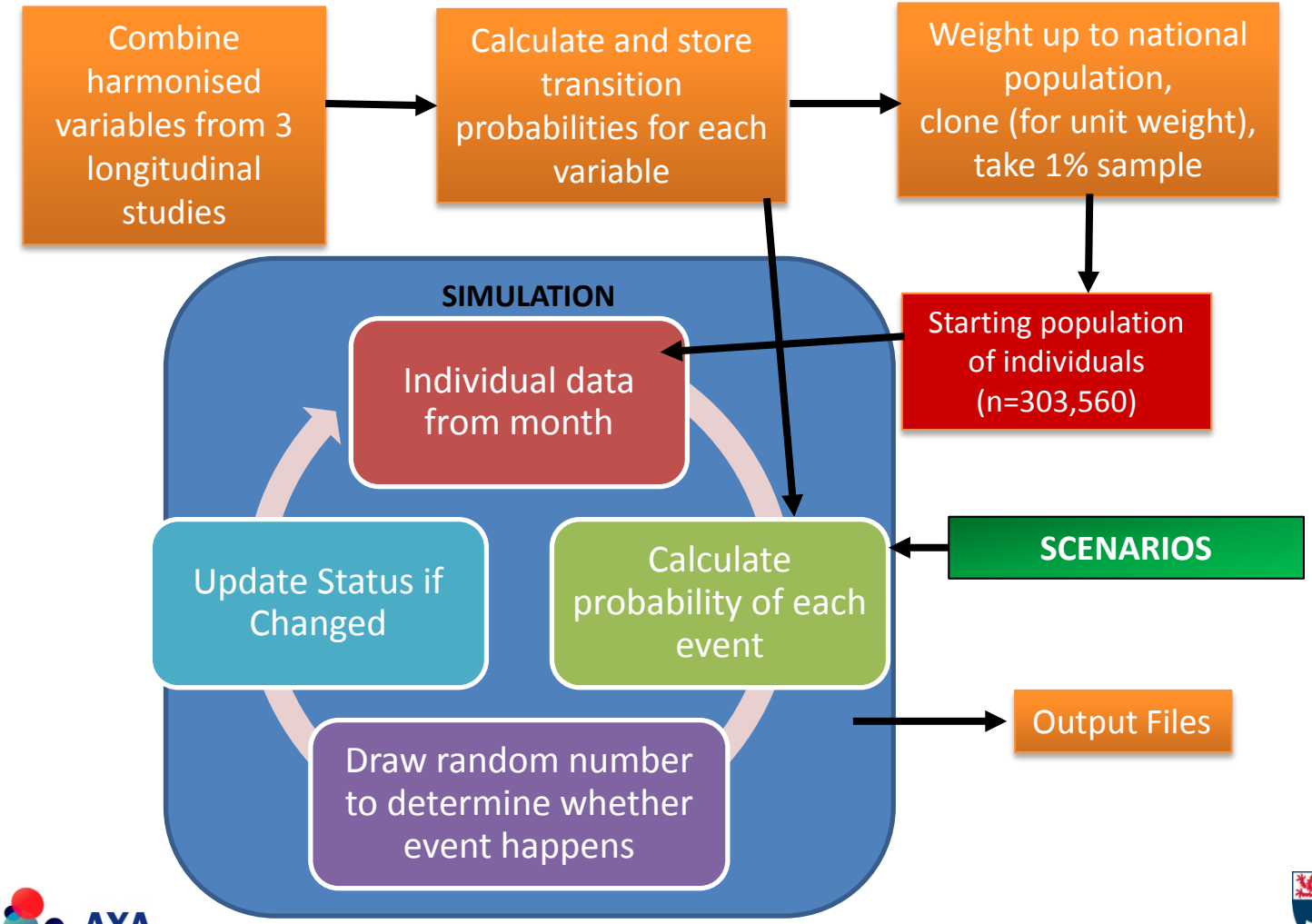
# PACSim: Simulation step

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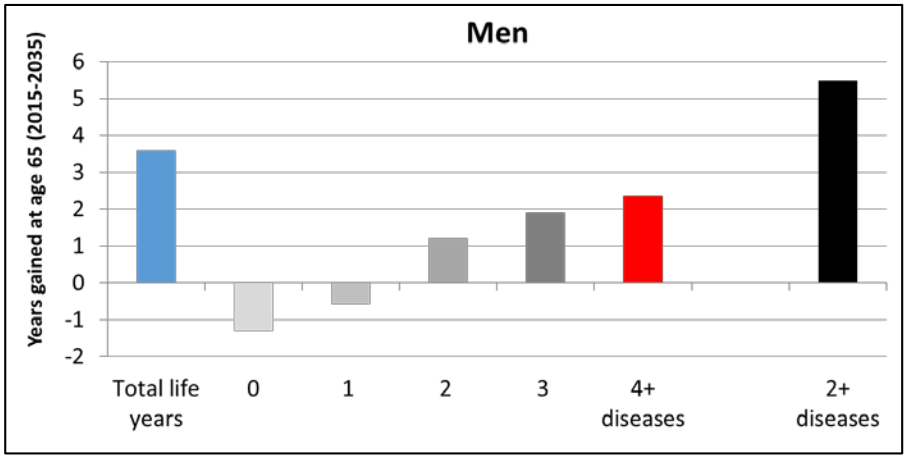
# Multimorbidity

Between 2015 and 2035

- Numbers of older population (aged 65+) with 4+ diseases will double
- Around 1/3 of those with 4+ diseases will have mental ill-health: dementia, depression or cognitive impairment no dementia (CIND)
- Most of gain in LE at age 65 between 2015 and 2035 will be in years with 4+ diseases

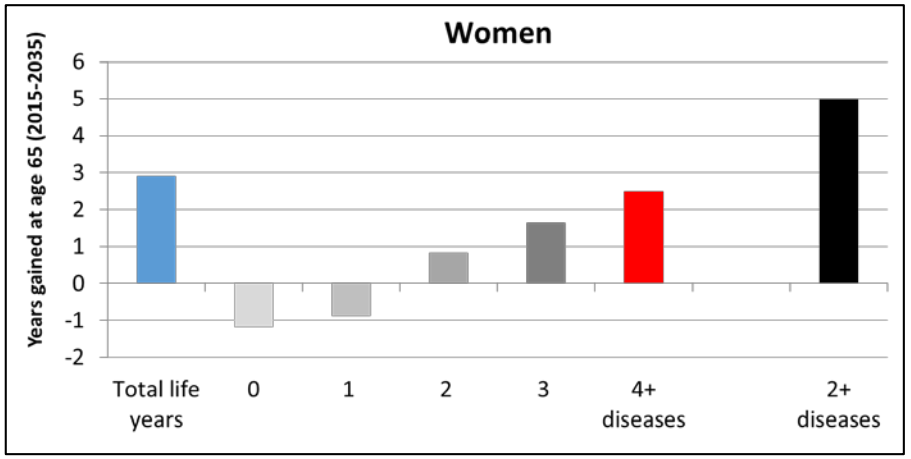
*Source: Kingston et al Age and Ageing 2018*

# PACSim: Years gained with disease 2015-2035




| Life expectancy at age 65 | | Men | % |
|---|---|---|---|
| With 2+ diseases | Total | 5.5 | 100.0 |
| | Survival effect | 2.6 | 47.3 |
| | Multi-morbidity effect | 2.9 | 52.7 |
| | | | |
| With 4+ diseases | Total | 2.4 | 100.0 |
| | Survival effect | 0.8 | 35.8 |
| | Multi-morbidity effect | 1.5 | 64.2 |

| Life expectancy at age 65 | | Women | % |
|---|---|---|---|
| With 2+ diseases | Total | 5.0 | 100.0 |
| | Survival effect | 2.3 | 46.9 |
| | Multi-morbidity effect | 2.6 | 53.1 |
| | | | |
| With 4+ disease | Total | 2.5 | 100.0 |
| | Survival effect | 0.8 | 31.6 |
| | Multi-morbidity effect | 1.7 | 68.4 |




*Source: Kingston et al Age and Ageing 2018*

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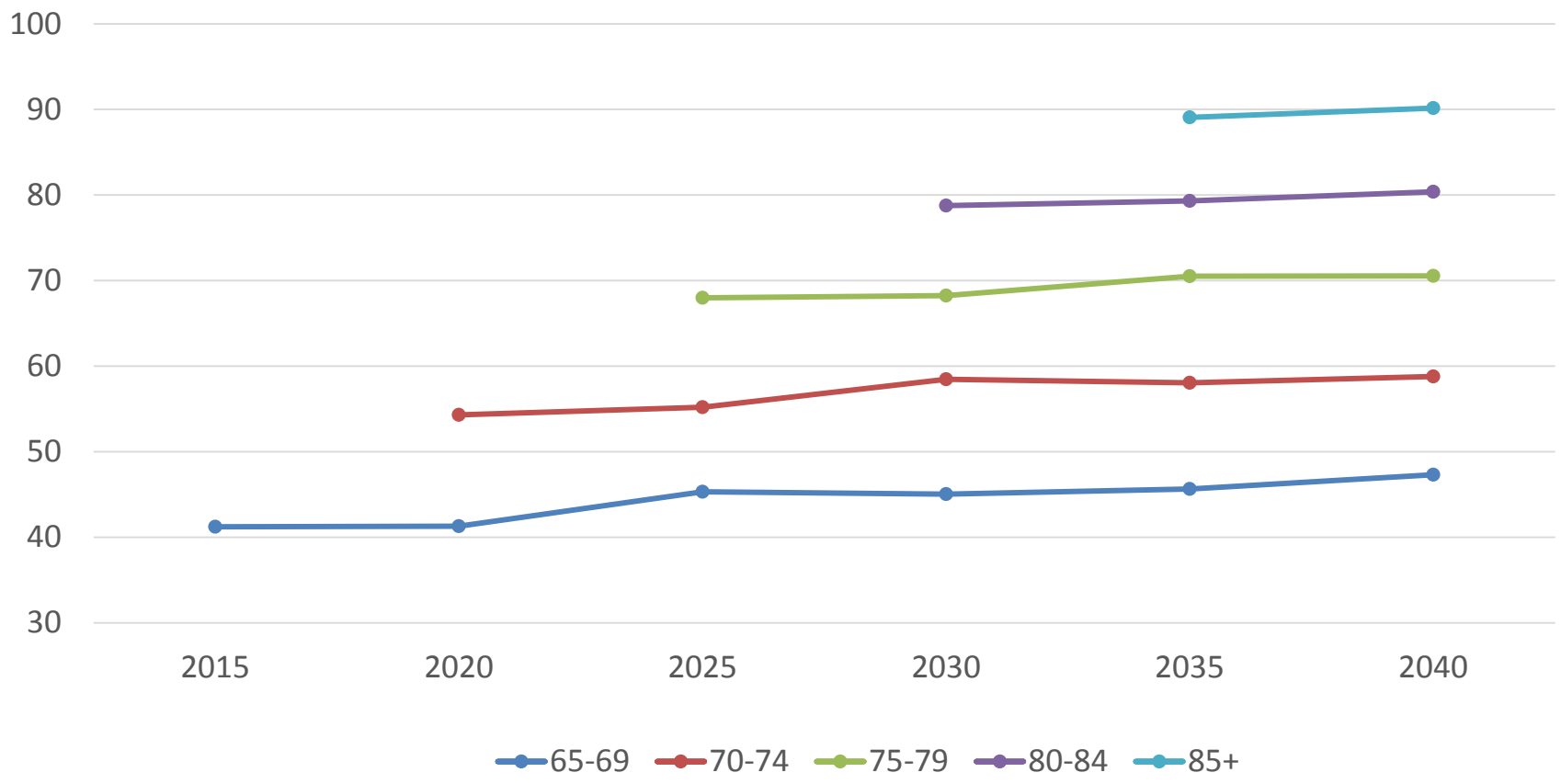
Newcastle University Institute for Ageing

# Prevalence of multi-morbidity (2+ diseases)




*Source: Kingston et al Age and Ageing 2018*

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# Conclusions

**Past trends in health expectancy:**

- Depend on measure of health used
- Vary between countries and within countries over time

**Future trends:**

- Need to take account of health of younger populations ageing in

# Future of REVES – research areas

- Further comparative trends across countries
  - More robust analysis
  - Greater use of partial HE for trends within age groups
  - How do macro-level changes affect trends?
  - How do macro-level factors interact (*Montez et al AJPH 2017*)
- More innovative ways of presenting HE to policy makers – how do we get policy-makers and the public to understand health expectancies
- Estimating costs from times in health states

# Future of REVES – network

- Raising the profile of REVES
- More cross-national collaborative work
- Rebirth of interest groups within the annual meeting:
  - Policy
  - Calculation methods
  - Harmonization
- An update of the book!

# Acknowledgements


**CFAS studies collaboration**


**MODEM**
**modelling outcome and cost impacts of interventions for dementia**


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# And finally ……..


To be old? It's to be young longer than the rest – that's all.

# Thank you

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