Longevity risk – applying insight

- Business context – Why do we care about longevity?
- Longevity drivers - What affect longevity? When? And so what?
- Consideration for future trends: Socio-economic, sciences, health care system

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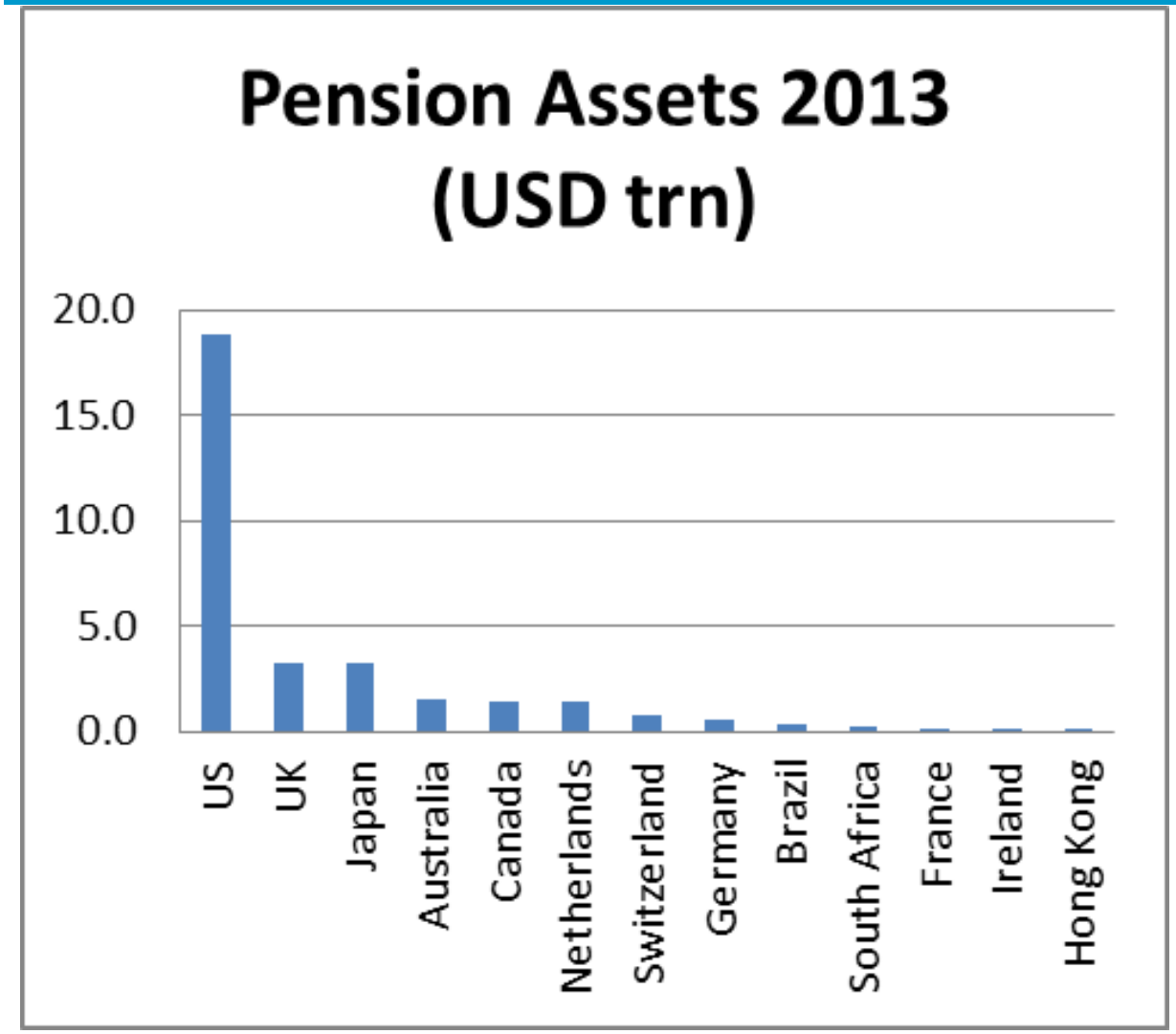
September 2014, Birmingham

EVERY DAY MATTERS.

Legal & General

Global Pension Assets is Large



Pension Assets in 2013

13 Largest Pension Market

Asset USD 32 trn

83% of GDP

http://www.towerswatson.com/en-GB/Insights/IC-Types/Survey-Research-Results/2014/02/Global-Pensions-Asset-Study-2014

Longevity Market Size

US

- Corporate pension liabilities ~ $2.5 trn
- Up to 2012
  - Average USD$1-2bn p.a. corporate pension buyout
- 2012+
  - Regulatory & accounting changes
  - GM's USD$26bn & Verizon USD$7bn large pension buyouts in 2012
  - 50% CFO said they're likely or very likely to consider pension buyout.
  - About $3.8bn pension scheme buyouts announced in 2013
  - Expected more to come.

Canada

- Pension funds of total C$1.3trn liabilities
- C$2.2bn corporate pension buyouts in 2013

Netherlands

- Business can either be placed with insurers (buy-out) or industry wide schemes
- De-risking activity expected to surge in next 2 - 4 years

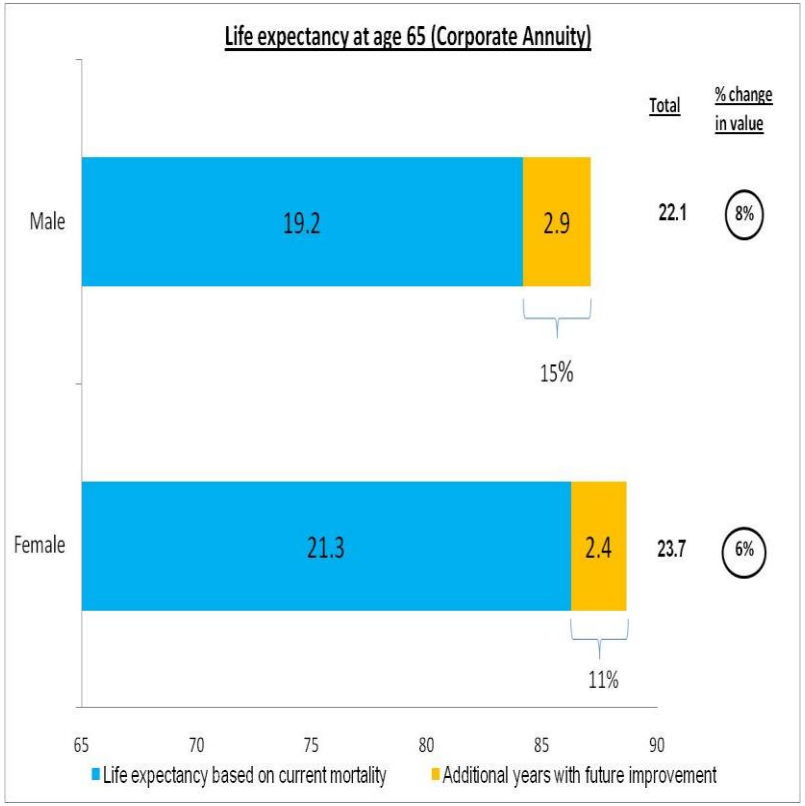
UK longevity market (£bn)

	2012	2013
Individual Annuities	14.0	12.0
Bulk Annuities	4.5	6.5
Longevity Hedging	2.2	8.6
Total	20.7	27.1

Global longevity risk needs management

Actuaries and risk management community must consider:

1. **Current mortality -** Estimates current mortality rates of annuitants based on recent evidence.
2. **Future mortality trend -** Estimates how current mortality rates would change going forward, based on historical trends and future outlook.

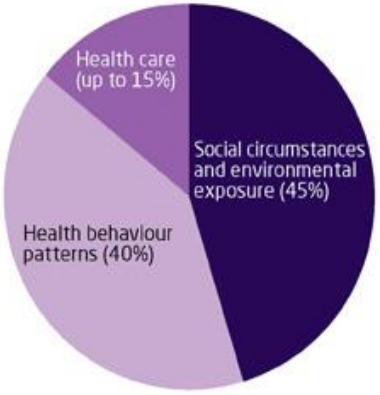


Mortality Assumption

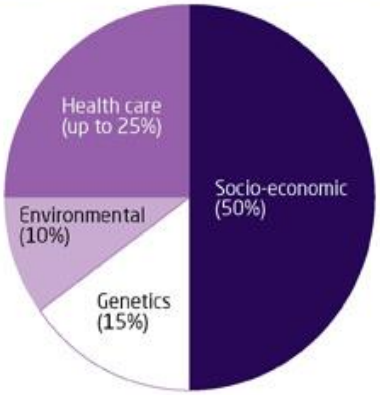
Current		Future
Greater part of life expectancy. More certain. Less capital intensive	Need good and credible data to determine mortality rates: Socio-economic circumstances. Health markers.	Slow to emerge. More uncertain. Drivers can be considered. Needs data and models. Smaller part.

Potential longevity drivers:
What affect Longevity? When? So What?

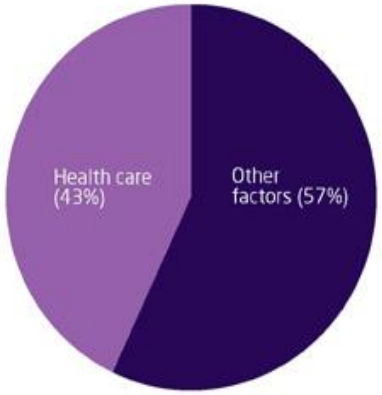
Mc Giniss et al (2002)



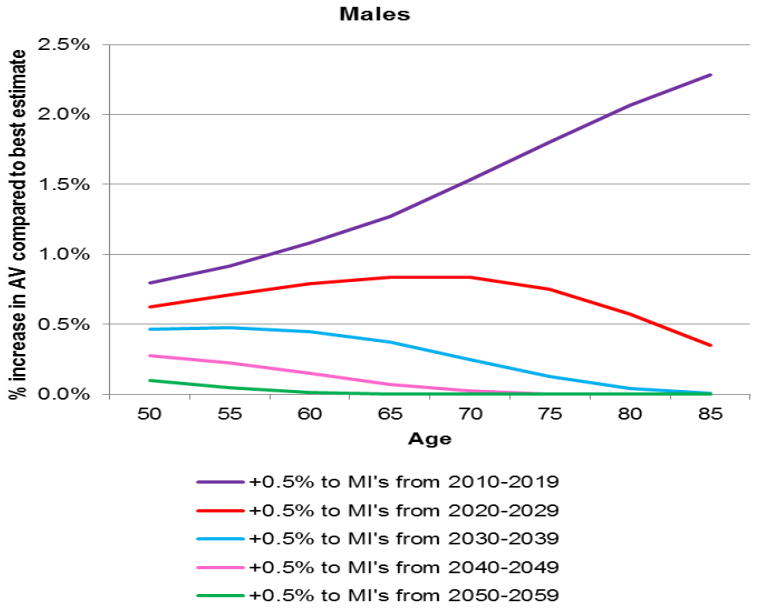
Canadian Institute of Advanced Research (2012)

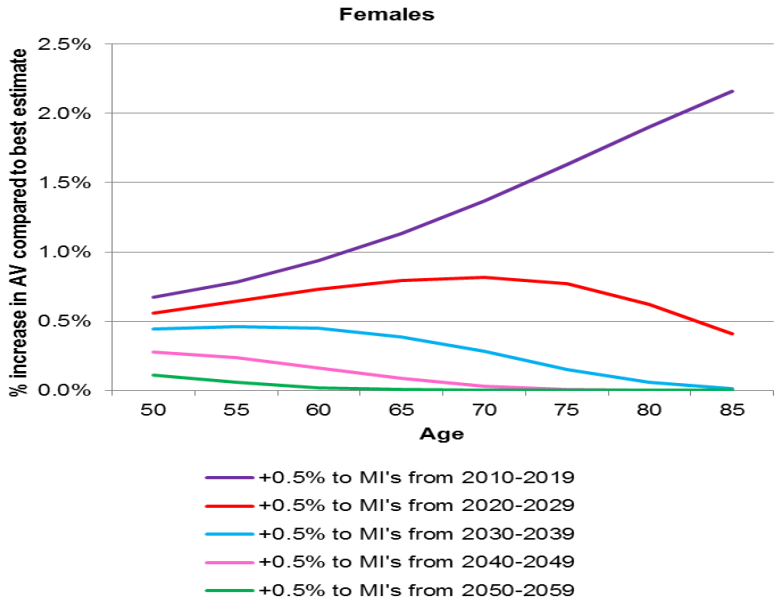


Bunker et al (1995)



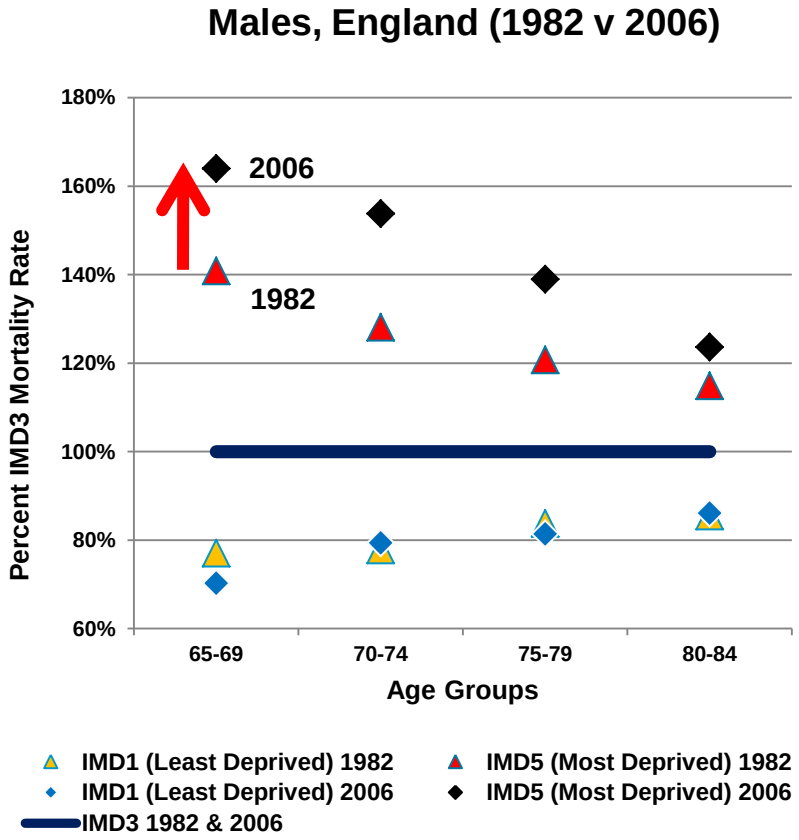
Kings Fund

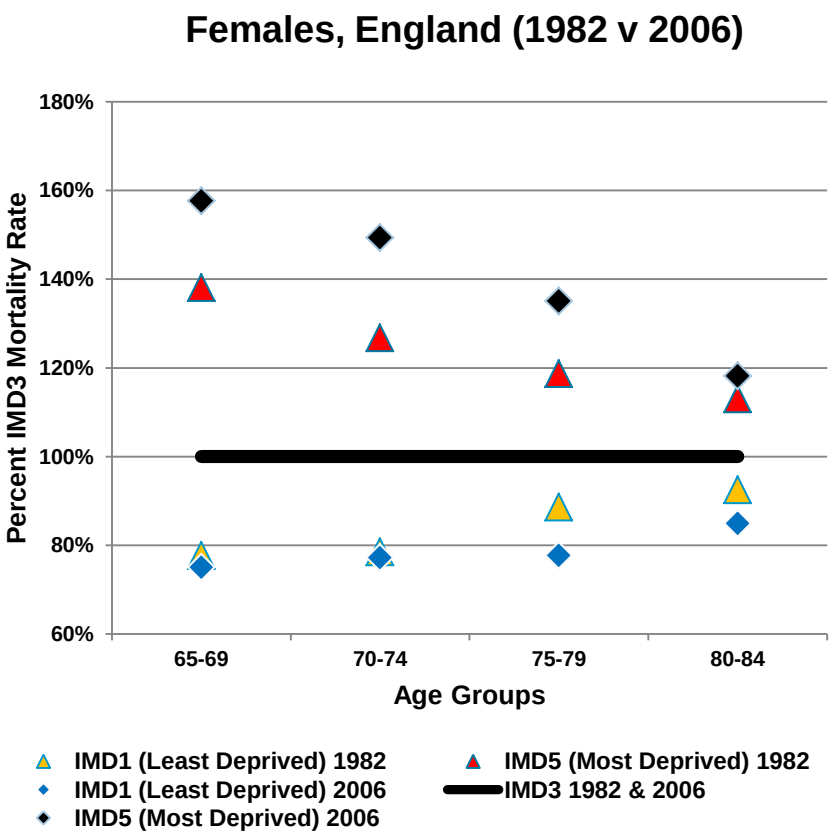




Socio-economic:
Future outlook: Will the gap widen, persist or converge?

Comparison of mortality rates of people in different socio-economic circumstances (England 1982 vs 2006)





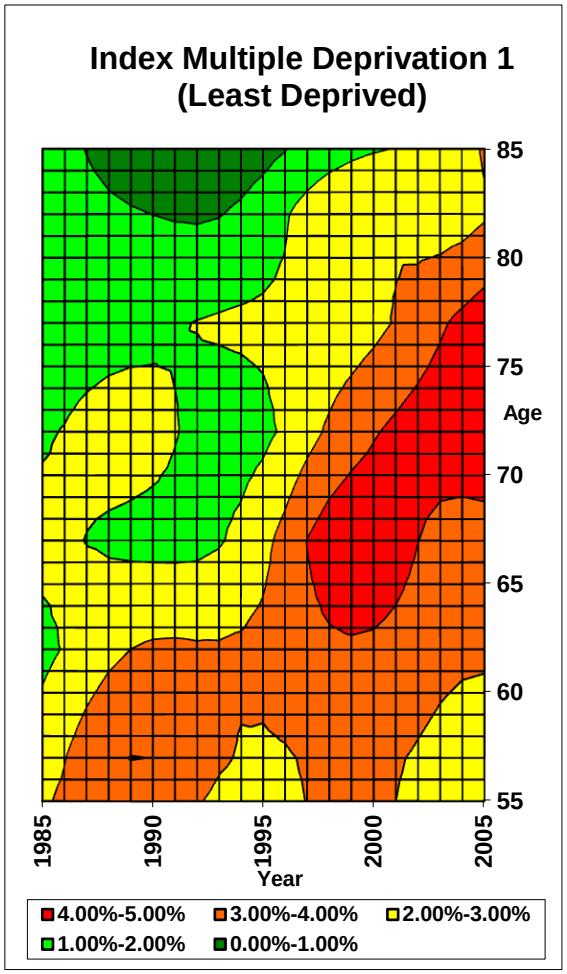
IMD = Index of Multiple Deprivation

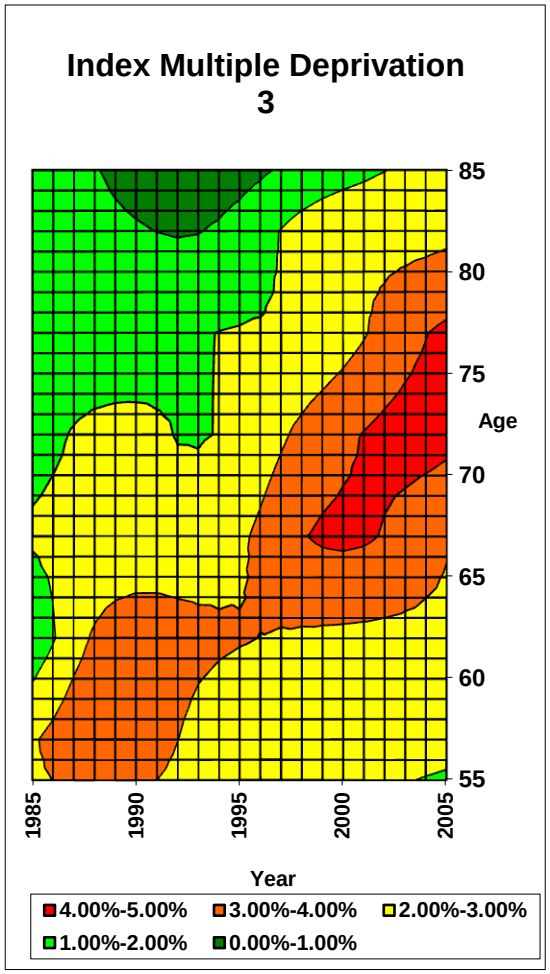
IMD1 = Least deprived fifth

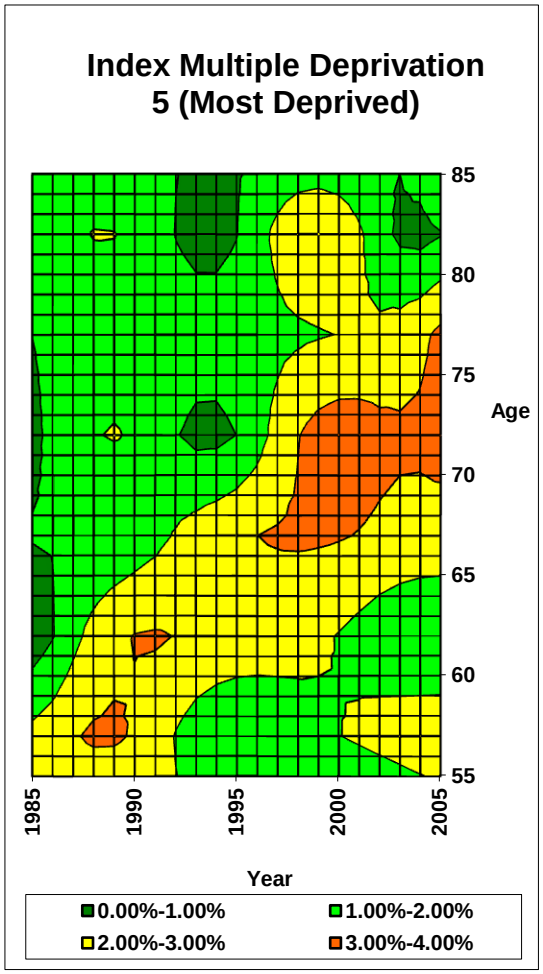
IMD 5 = Most deprived fifth

Historical evidence in England. Future?

More deprived males have experienced lower mortality improvement

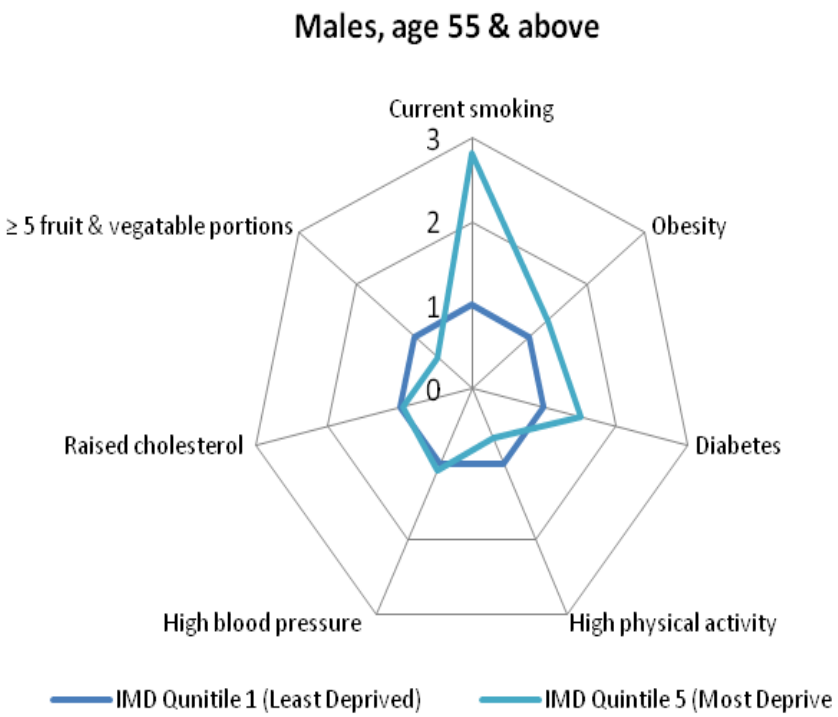


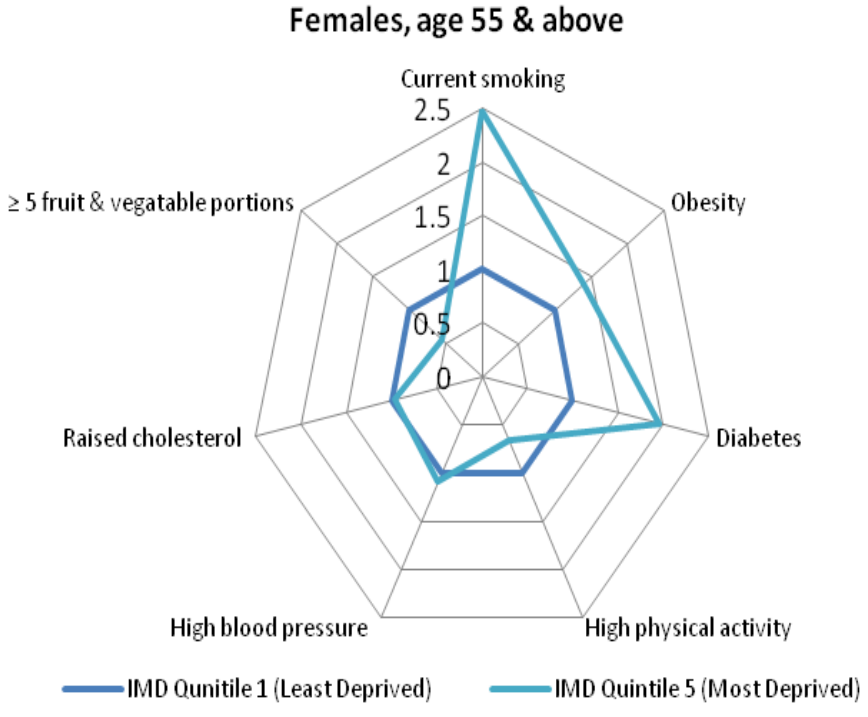




Mortality improvement of people in IMD quintiles in England & Wales

Relative inequalities in cardiovascular risk factors for males and females (England, age 55 and above)
Potential for future convergence?



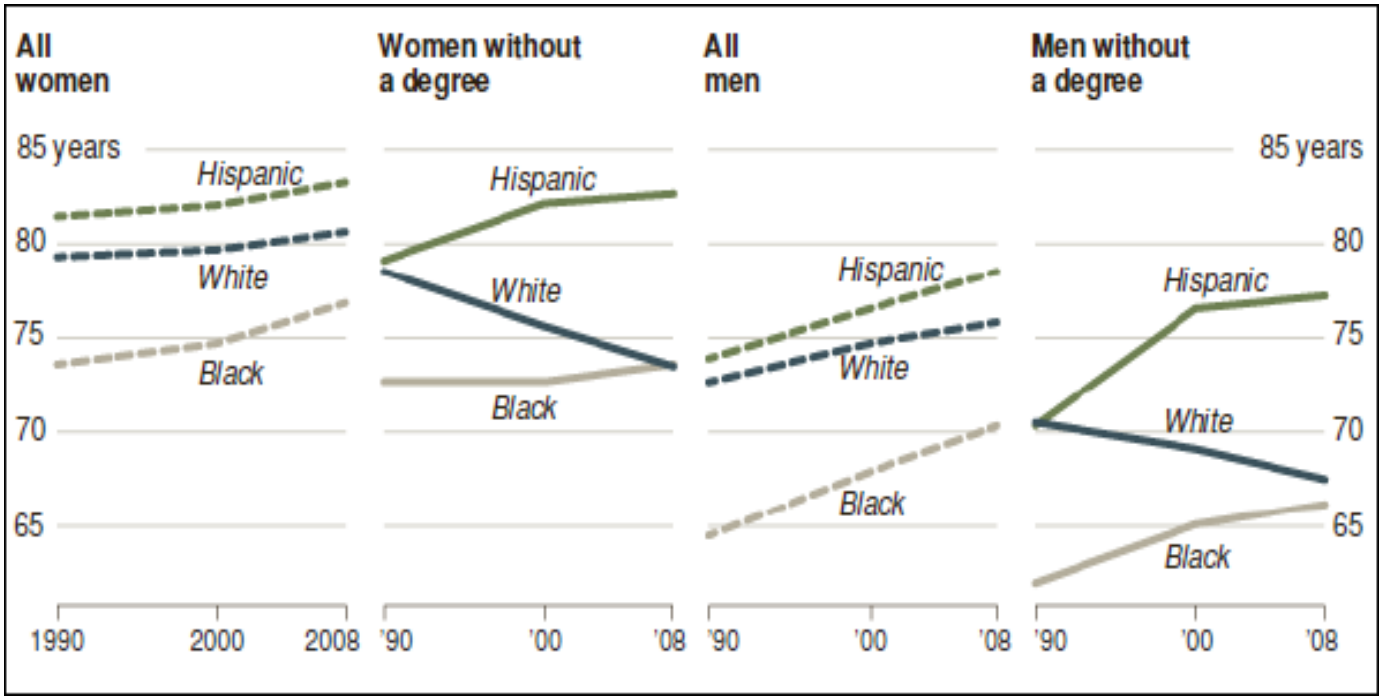


•Adapted from: Shaun Scholes[1*], Madhavi Bajekal[1], Hande Love[2], Nathaniel Hawkins[3], Rosalind Raine[1], Martin O'Flaherty[3] and Simon Capewell[3]

•Persistent socioeconomic inequalities in cardiovascular risk factors in England over 1994-2008: A time-trend analysis of repeated cross-sectional data (2012)

•BMC Public Health

Sub-population differences, including socio-economic differences are relevant internationally



Life expectancy differences between races in the US

Source: The New York Times. 20 Sept. 2012.

Socio-economic circumstances (SEC): Applying insight

Potential use for actuarial work

- **Stressed test scenarios**
  - What if mortality rates of all socio-economic quintiles converge or narrow to the least deprived, in the next 10, 20 or 30 years?
- **Understand differences in current mortality rates**
- **Study differences in causes of death to gain insight**

Discussion:

- **How would SEC risk factors gap such as smoking, obesity and diabetes change going forward?**
- **What's likely to happen to the life expectancy gap?**
- **Important because health strategies exist (e.g. stop smoking, exercise, drugs) and could be used in short term.**

Biology of ageing:
Anti-ageing intervention to dramatically change life expectancy and max lifespan

Anti-ageing intervention unlikely:

Ageing process is complex and not a single pathway.

Existing health interventions would not dramatically increase max lifespan.

Future interventions such as regenerative medicine might aim to treat diseases and not change human species.

Optimists might have over-estimated current scientific anti-ageing knowledge, ease of intervention and impact on life expectancy.

Anti-ageing intervention:

Single intervention likely to be available?

Common pathway for ageing process?

Animal studies show promises.

Some pathways identified, with interventions leading to longer-living animals.

Regenerative medicine promising.

Strategies proposed (E.g. Aubrey De Grey).

More to be added from this conference (Prof Richard Faragher)

Biology: Potential scenario testing

Dieting Canto (age 27, left) looks younger and healthier than non-dieting Owen (age 29, right).

2014
- Health care 'highly engaged scenario'. UK to experience higher mortality improvement than current best estimate. Assume CMI Model with 0.5% higher long-term rates.

2029
- The drug is available for clinical trials for age-related diseases such as diabetes.
- Pet food companies sell it as supplement to extend animals' lives.
- Some people take the pet supplement.

2034
- Clinical trials show that the drugs are safe for diabetics or other age-related disease.
- News that drug prolong pets' lives.
- More people take the drug next 15 years.

2049
- 80% of UK population take the drug.
- 20% of population will not use it or for some reasons won't benefit from the drug.
- This 80% peak would be consistent with the use of other medicine such as hypertension drug .

Anti-ageing breakthrough

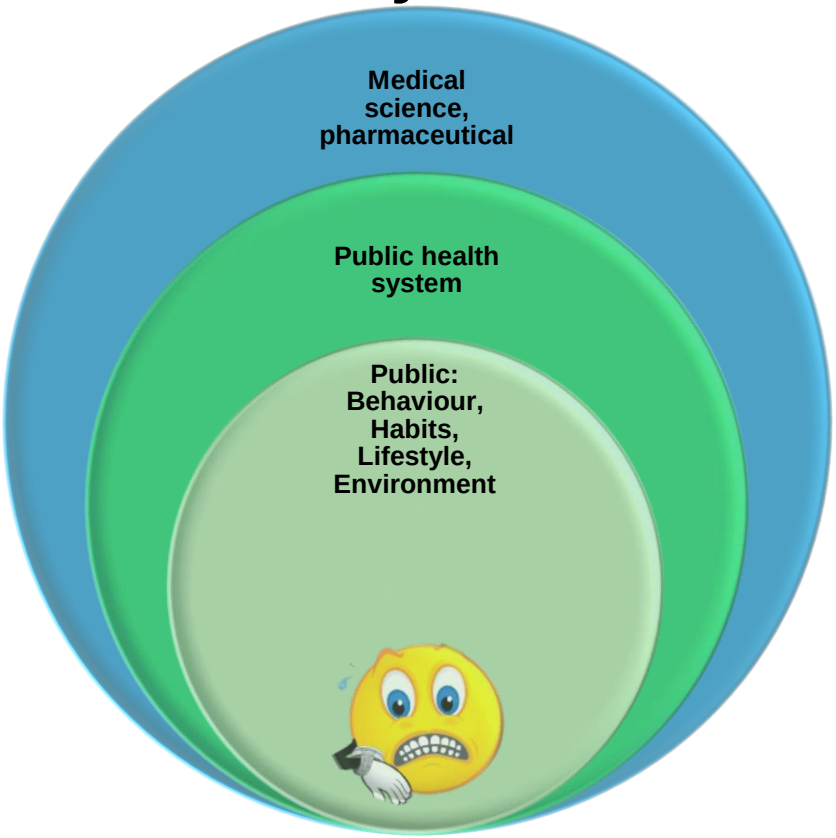
- GSK purchased of a company ($720m) to develop a compound with potential anti-ageing properties (resveraterol) in 2008. Project shut down in 2013.
- Stressed scenario: Drug available to reduce death rates by 65% as shown in a 2009 caloric-restriction monkey study. (The result of this study was refuted in another study on primates in 2012).

Health care system: From creating to delivering health solutions

Wide coverage

- Academic & Industry – Research institutions. Pharmaceutical and biotech companies
- Public health - Policies, health messages, health care system uptake of new technology
- Public - Environmental policies, social care

Health care system



Academic, Industry, NHS & Public

(The Academy of Medical Sciences 2014 - Horizon scanning: looking ahead to 2025)

Falling number of approved drugs per unit investment.

Industry moving away from blockbuster drugs.

Moving into more targeted medicines.

Each treatment may deal with smaller number of people.

Overall, it might need longer time horizon to cover larger scope of diseases.

NHS funding freeze since 2011, despite rising demand with new problems presented by ageing population and co-morbidity.

NHS funding gap expected to be £30bn by 2020.

Social care cost is rising with ageing population.

Academics urged to be multi-disciplinary, improving innovation.

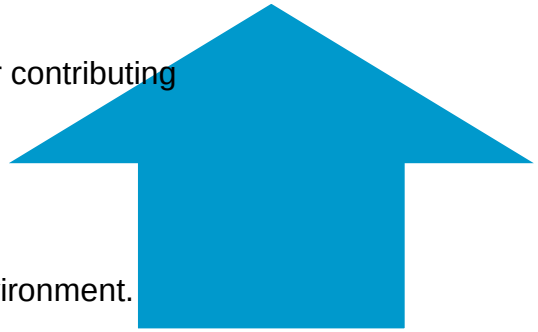
Academic funding for behavioural sciences research, with public behaviour contributing to 50% diseases but attracting only 1% of funding.

Industry move towards individualised diagnoses and treatments.

Technology, e.g. wearable, to monitor health and drug uptake.

Big data to help cost-cutting and treatment effectiveness.

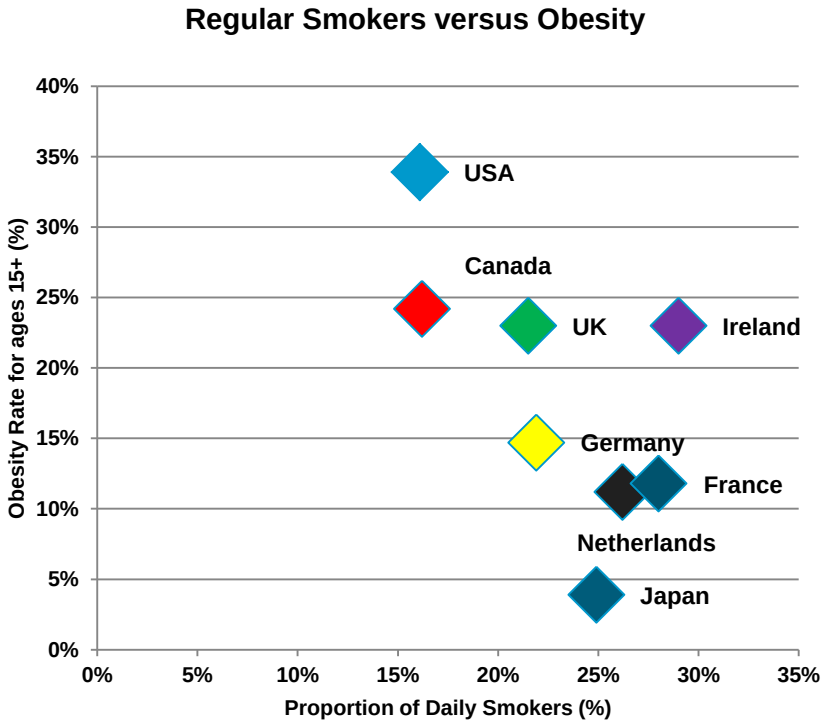
Cheaper drugs following globalisation with manufacturing in lower cost environment.



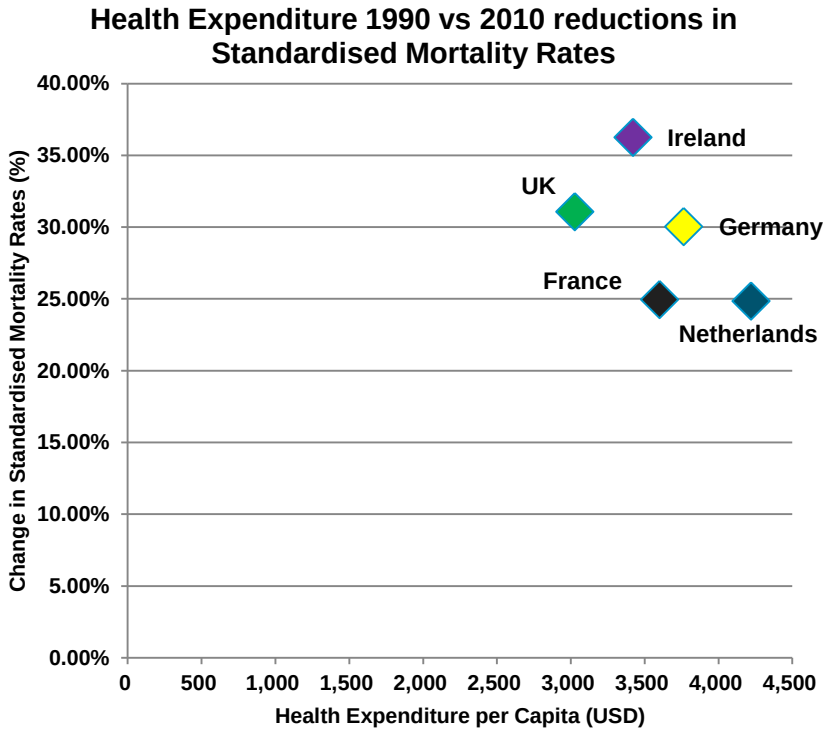
Need models to estimate potential impact on future longevity trend

International differences:
Future trends could benefit from modelling

Risk factors



Expenditure vs. Mortality



Conclusion

- Big commercial interest in longevity risk management.
- Important to understand drivers for longevity to forecast future trends.
- Some insights can be used in the short term.
- But more needs to be done through collaboration with other disciplines and by developing models.
- How do we demonstrate value to stakeholders – insurers, reinsurers, pension funds, governments?
- (Think $32trn asset)