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The Next Big Mortality Improvement

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Acknowledgements and Disclaimer

I am grateful for input from Khurram Khan and Prof Brendan Delaney. All views expressed are mine alone, as are any errors or omission. These do not necessarily represent the views of my employer, Deloitte, nor of the Institute and Faculty of Actuaries.

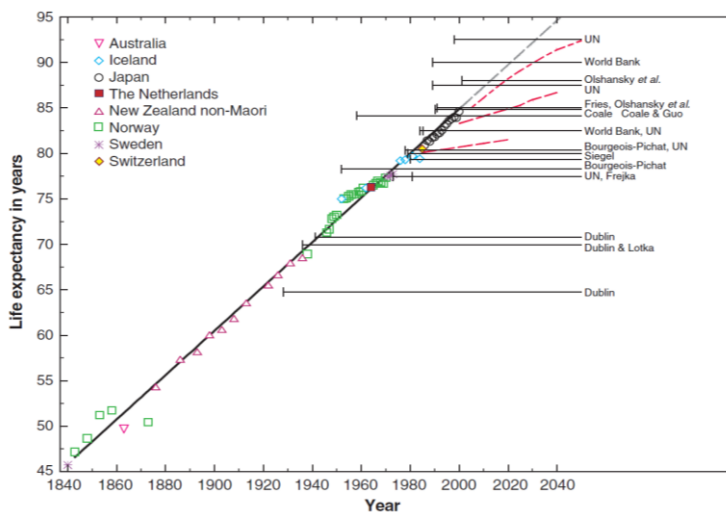


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2

Longevity Improvements in the 20th Century



Source: Oeppen
and Vaupel
(2002)



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3

What Lies behind the Patterns?

- Although there is a general increasing trend in life expectancy, we know that some historic causes have had particularly large impact:
 - Discovery of penicillin and other antibiotics
 - Reduction in smoking
- It is difficult to argue these can be repeated; smoking in the UK has fallen from 50% to 20% in the last 40 years and it cannot feasibly fall to -10% over the next 40 years
- Feasible forecasts should look behind the causes of death.

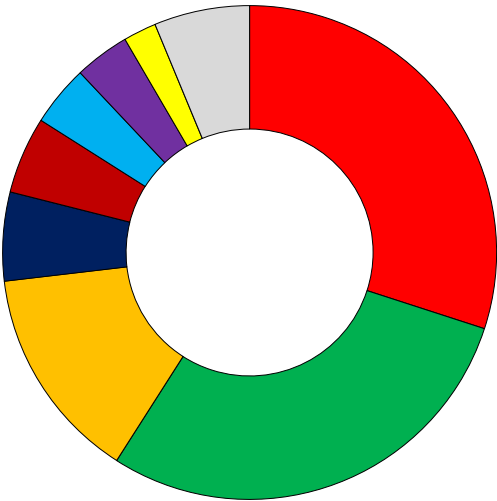


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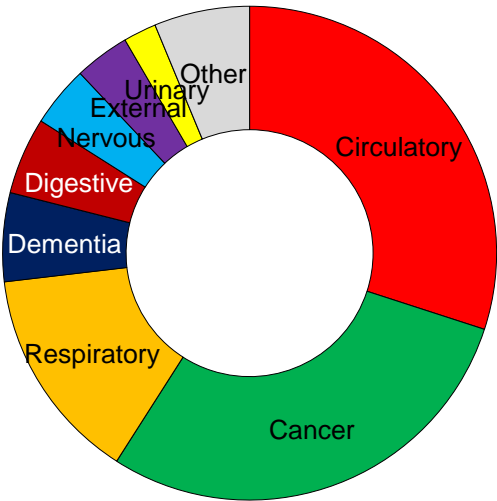
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4

Do You Know the Biggest Cases of Deaths?

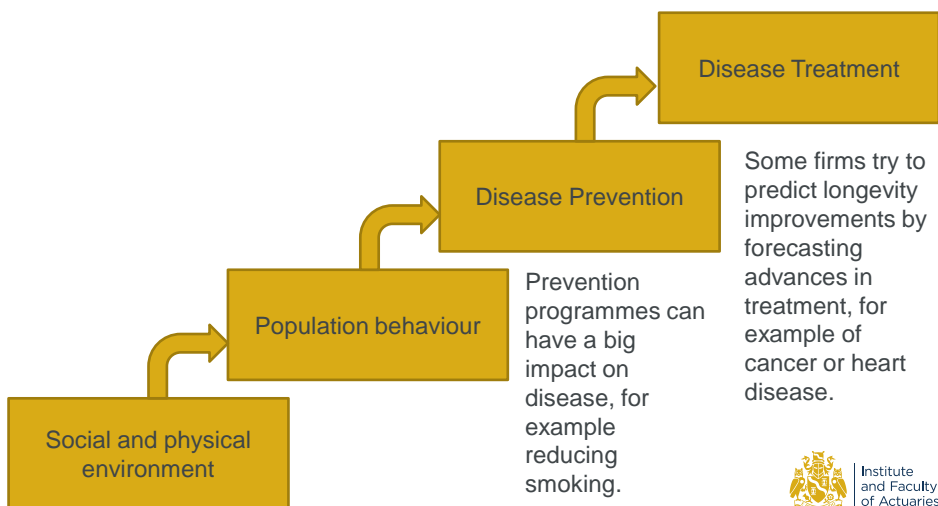


Death Causes (England and Wales, 2009-13)



This is based on the international
classification of diseases.
Total deaths (M+F) = 2,464,479
Source: ONS

Lifetime Influences on Disease



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7

Longevity Catalysts: Underlying Causes

- “What future events are we aware of today whose occurrence is likely to be coupled with a significant impact on UK longevity?”
 - Introduction of plain cigarette packaging in the UK
 - Use of novel diagnostic biomarkers
 - KRAS targeted cancer treatment
 - Genetic screening
 - NHS Bowel Cancer Screening Programme
 - Stem cell therapy and Parkinson's disease
 - Polypill scenario
 - Development of a universal influenza vaccine
- Source: Longevity Catalysts working party

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8

Social Trends

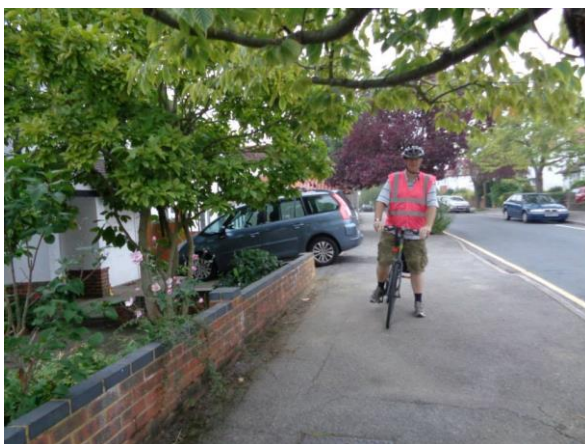
- To understand the range of possible longevity outcomes we should consider what clusters of diseases are affected by common social trends.
- We may not be able to forecast the social trends, but we can monitor them and hold capital against losses from adverse trends.
- In this session, I will look at the impact of transport policy.



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9

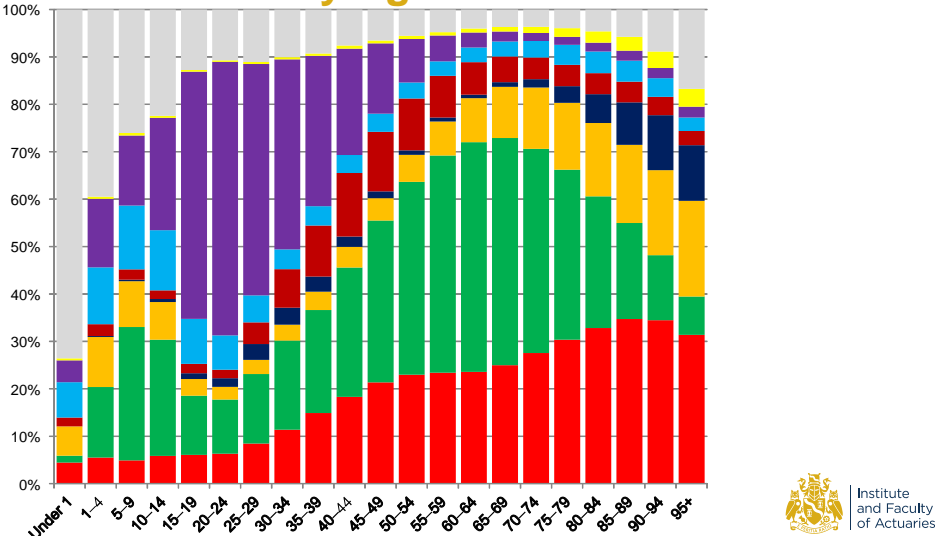
Thinking about Transport Deaths: This Affects me Personally



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10

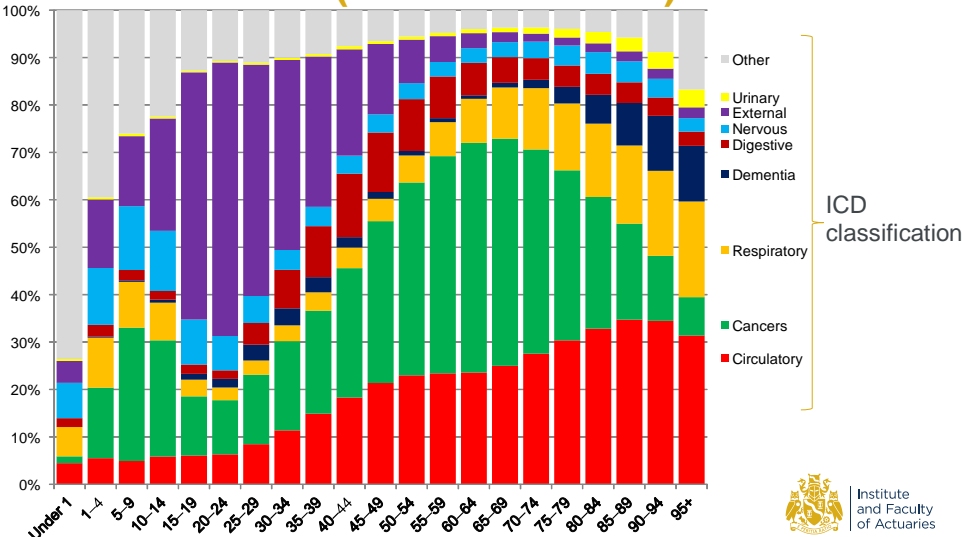
Death Causes by Age: Which is Which?



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11

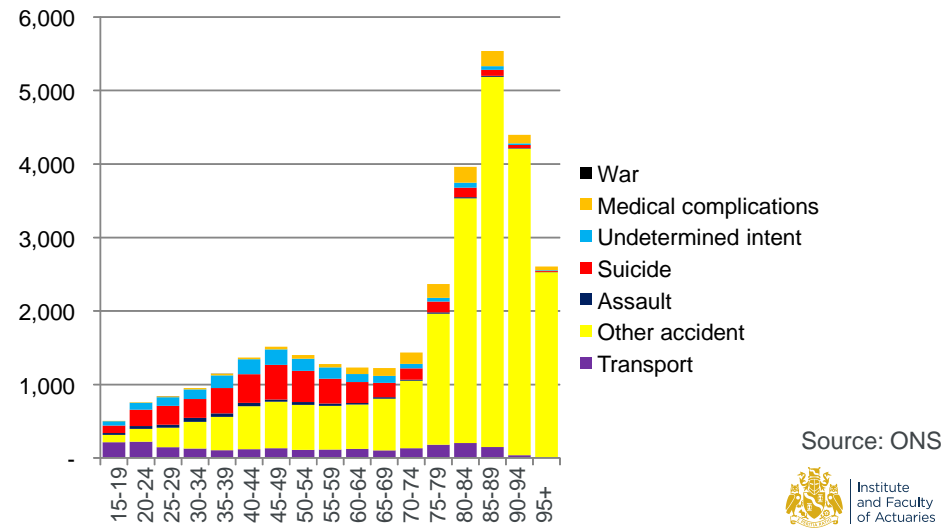
ONS Death data (E&W 2009-2014)



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12

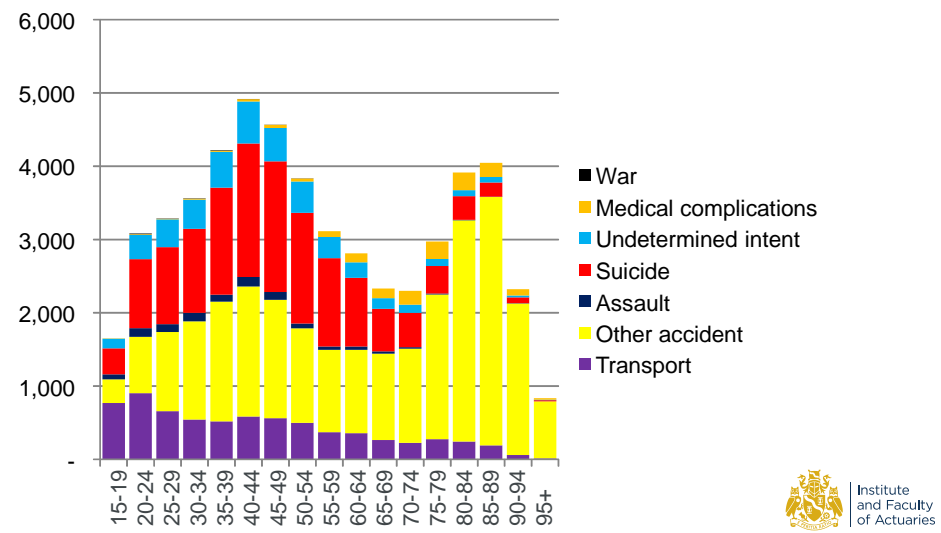
Female External Deaths: E&W 2009-214



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13

Male External Deaths: E&W 2009-2014



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14

Total Transport Deaths E&W 2009-2014

	All ages	Aged 15-19	Aged 20-24
Male deaths all causes	1 196 461	3 032	5011
Male deaths transport	7 214	770	903
% transport deaths	0.60%	25.40%	18.02%
Female deaths all causes	1 278 617	1 422	2022
Female deaths transport	2 341	216	221
% transport deaths	0.18%	15.19%	10.93%

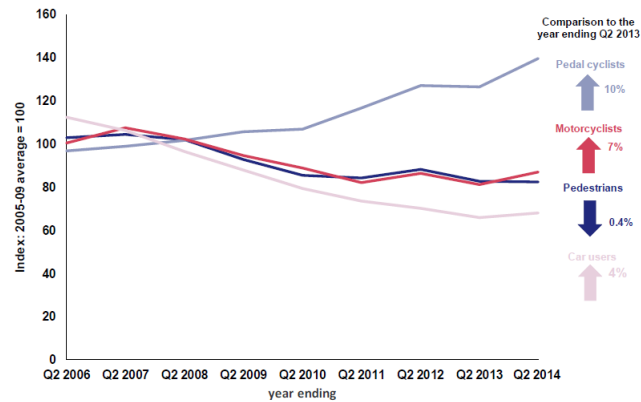
The vast majority of transport deaths relate to road collisions.
More than 1900 road deaths per year in England and Wales.
Male victims outnumber female victims by more than 3-to-1
Think about the insurance implications of a reduction in road deaths.



Road Deaths: Killed and Seriously Injured

Source: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/370826/quarterly-estimates-apr-to-jun-2014.pdf

Chart 3: Reported killed or seriously injured (KSI) road casualties by road user type, rolling years ending Q2: GB, 2006 – 2014



Pollution Impact of Transport Policy

- Particulate matter from UK combustion emissions causes approximately 13,000 premature deaths a year (lung disease, cancers, circulatory)
- Transport emissions (from road and other transport) are the biggest cause of pollution death, causing approximately 7,500 premature deaths a year.
- Road transport alone is estimated to cause 4,900 deaths.
- Power generation caused approximately 2,500 and industrial emissions approximately 830 premature deaths a year. A further 6,000 deaths are caused by non-UK emissions produced in the European Union.
- Source: Yim SHL and Barrett SRH. Public Health Impacts of Combustion Emissions in the United Kingdom. Environmental Science and Technology, 2012, 46 (8), pp 4291–4296



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17

Exercise Impact of Transport Policy

- Effect of 2.5 hours / week of moderate physical activity include reductions in
 - Circulatory disease: - 23%
 - Breast cancer: -11%
 - Diabetes: -19%
 - Colon cancer: -8%
 - Depression: -7%
- Compare statins (cholesterol, blood pressure lowering) –0.1%
- Exercise does not benefit from pharma lobbying
- Source: Prescription cost analysis, 2013, ONS



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18

UK Contributions to DALYs Loss

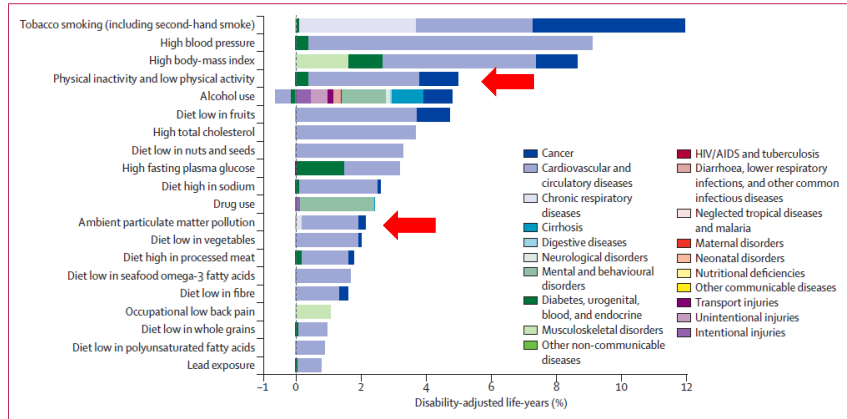


Figure 7: Burden of disease attributable to 20 leading risk factors for both sexes in 2010, expressed as a percentage of UK disability-adjusted life-years. The negative percentage for alcohol is the protective effect of mild alcohol use on ischaemic heart disease and diabetes.

Source: UK Health Performance: findings of the global Burden of Disease Study. Murray *et al*, The Lancet, March 2013.



Key Motor Transport Mortality Impacts



Collisions

+ Emissions

++ Exercise



Increasing Awareness of Traffic Deaths



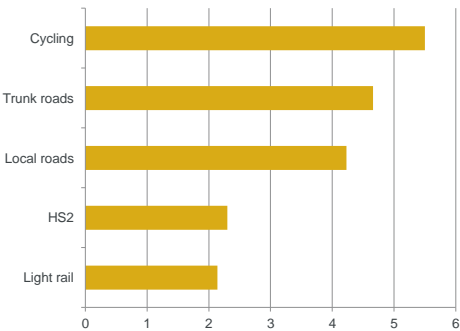
National Funeral for the Unknown Victim of Traffic Violence. 15 Nov 2014
Photo: Frederique Bellec.

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21

Benefit / Cost Ratio for Infrastructure



Source: <http://web.archive.org/web/20080324002356/http://www.dft.gov.uk/about/strategy/transportstrategy/eddingtonstudy/>
Cycling BCR: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/348943/vfm-assessment-of-cycling-grants.pdf
HS2 BCR: <https://www.gov.uk/government/news/hs2-crucial-to-meet-uk-transport-needs>

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22

Employers Supporting Cycle Superhighways



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23

Concluding Remarks

- A good mortality forecast is more than just a statistical extrapolation of past trends.
- Many insurers already analyse improvements by cause of death, with particular regard to medical treatment advances.
- Incidence of diseases are related to environmental and social trends, which we can also attempt to forecast, or at least understand the range of possibilities.
- Trends in transport can affect mortality in three major ways: road collisions, air pollution and exercise. Government and businesses increasingly factor the benefits of active transport into decision-making.

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24

Questions

Comments

Expressions of individual views by members of the Institute and Faculty of Actuaries and its staff are encouraged.

The views expressed in this presentation are those of the presenters.



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25



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10 December 2014