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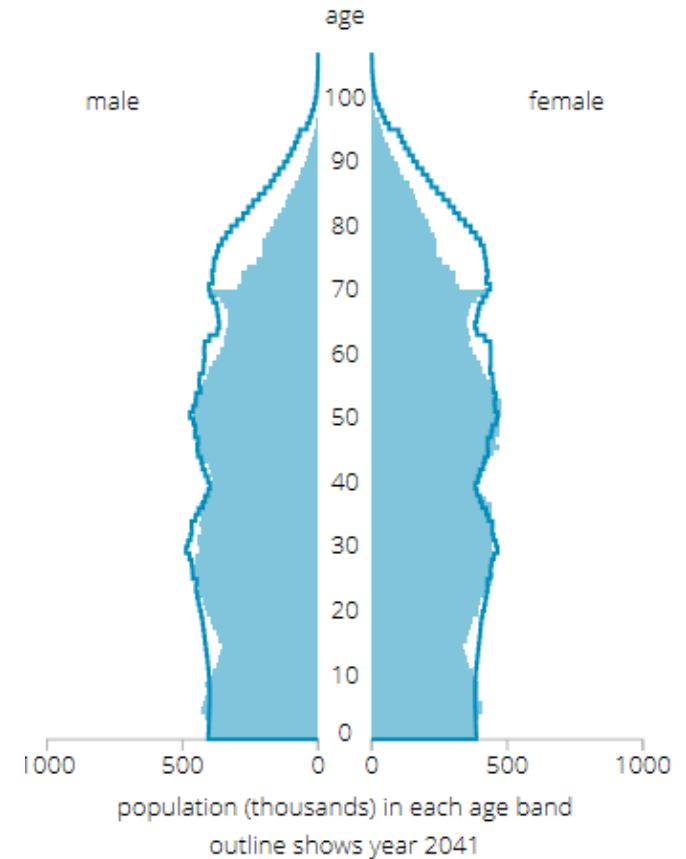
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# Setting mortality assumptions for the National Population Projections

Sophie Sanders, Senior Research Officer, Demographic  
Analysis Unit, Office for National Statistics

# National Population Projections

- Provide estimates of future size and age structure of the population
- Not forecasts - do not take account of future government policies
- Projected period and cohort life tables.



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# Example uses of projections

- Office for Budget Responsibility (OBR) - key input to long-term fiscal projections
- Government Actuary's Department (GAD) - quinquennial review of National Insurance
- Department for Work and Pensions (DWP) - analysis for policy on benefits and pensions
- Department for Education (DfE) - basis for projections of future school pupil numbers
- Base for sub-national population projections, widely used for resource allocation and planning.

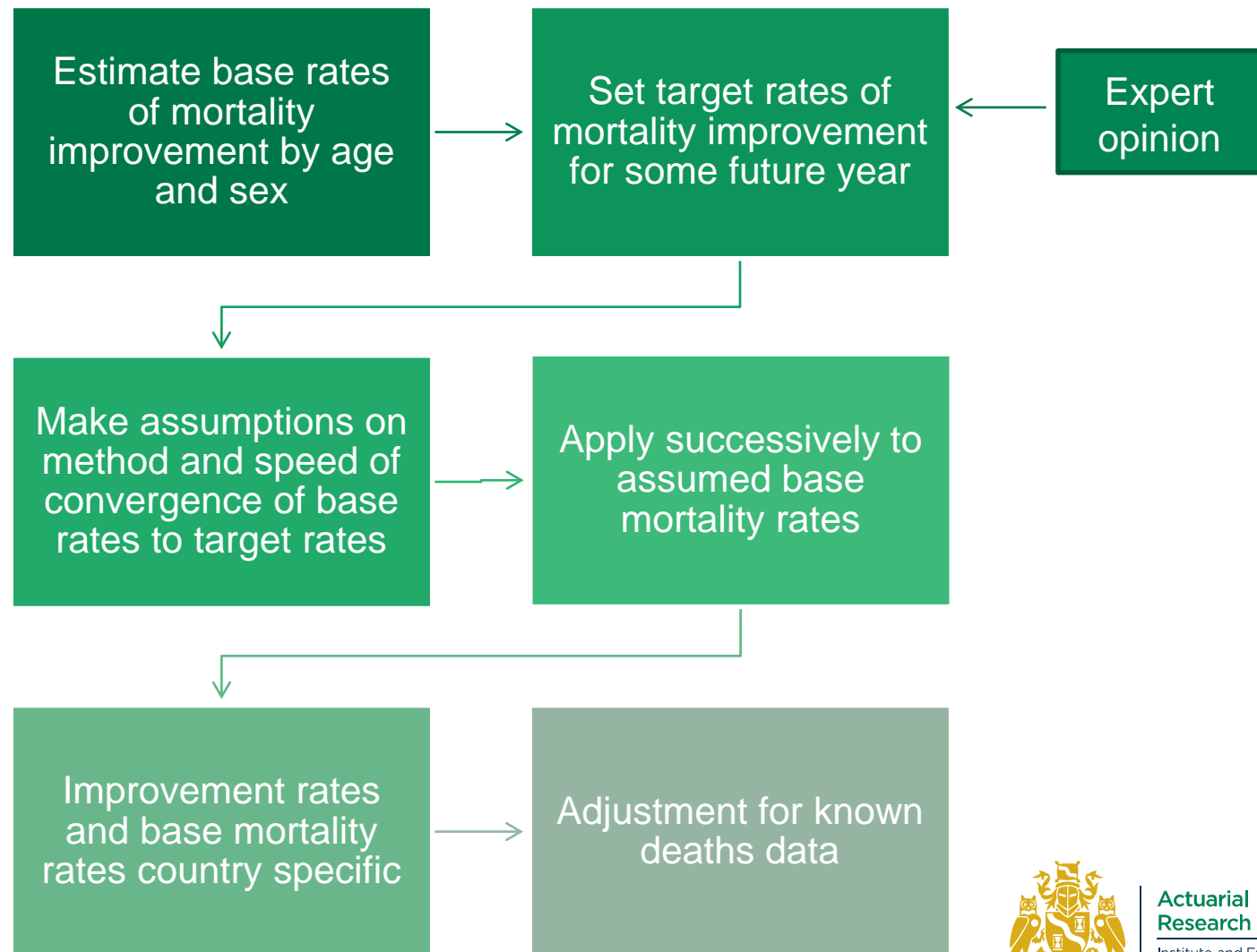


# How are the projections produced?

- Cohort component method
  - Population (year x) + Births (between years x and y) - Deaths (between years x and y) + In-Migrants (between years x and y) - Out-Migrants (between years x and y) = Population (year y).  
(mid year basis)
  - assumptions about the future – fertility, mortality and migration
- Variant projections as well as principal projection – using differing assumptions.



# How do we produce the mortality assumptions?



# Who is involved?

- NPP Committee
  - ONS, devolved administrations and Home Office
  - Sign-off decisions on assumptions etc
- Expert advisory panel
  - advise on demographic trends through questionnaire and meeting
- NPP Consultations
  - England, Scotland, Wales and Northern Ireland consult with users

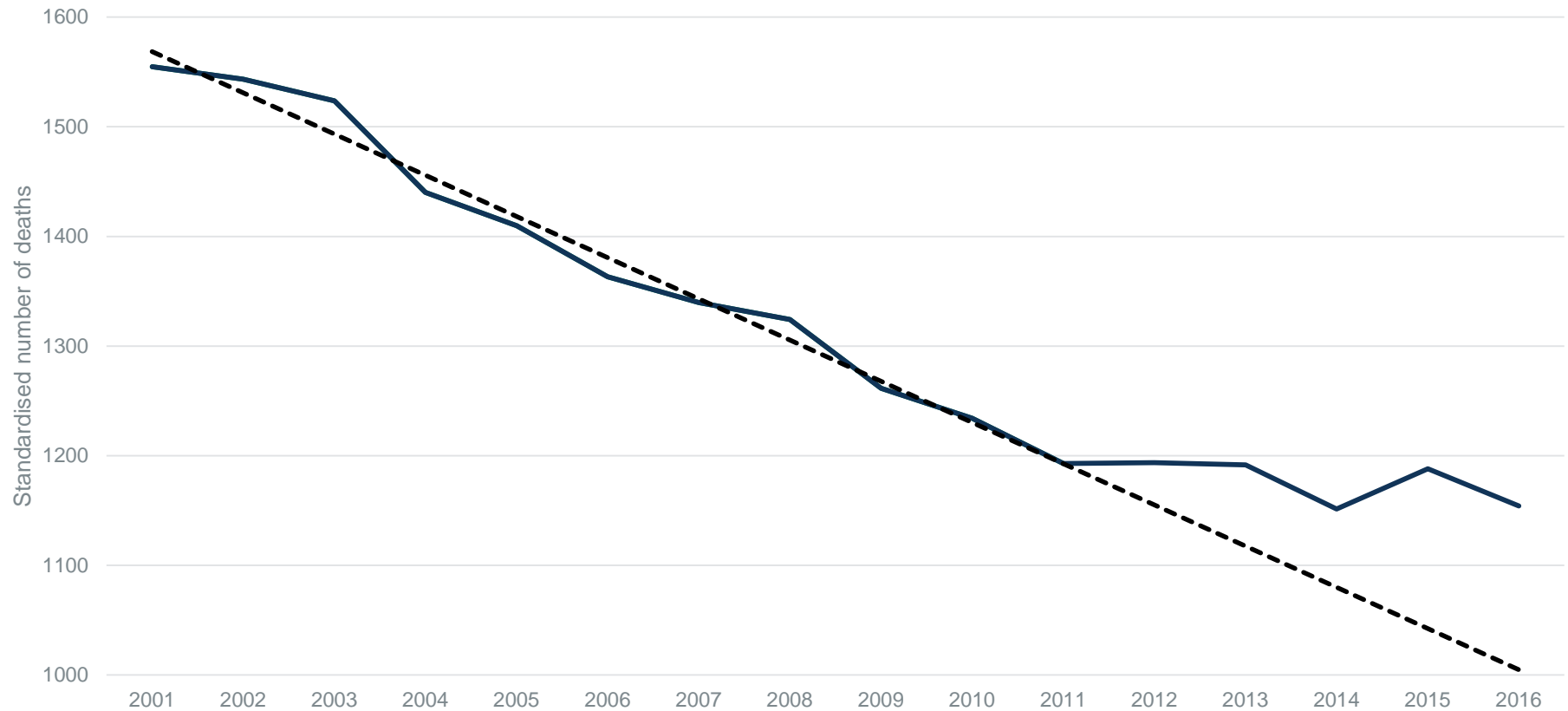


# Discussion with expert group

- Choice of target rate:
  - **Common target rate for all ages or vary by age?**
  - **Same target rates for males and females or different? What level?**
  - **Same target rates for all four countries of the UK or different?**
- Cohort patterns – will they persist at older ages? Will we see cohort patterns for younger ages?
- Convergence/divergence/same differential between male and female mortality rates/expectation of life?
- Migrant mortality
- Socio-economic class differentials
- Mortality at oldest ages (90 and over)



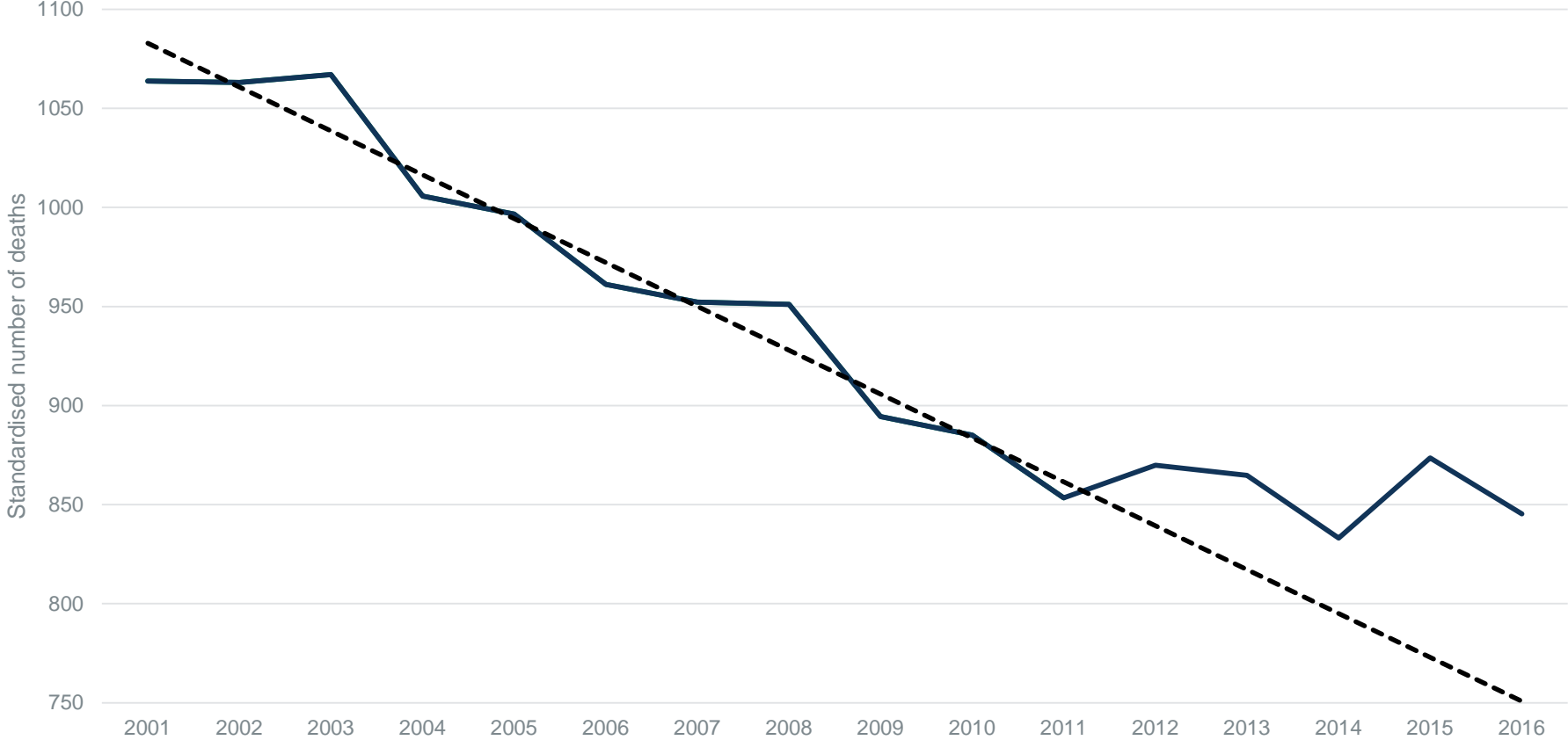
# Deaths- Males, UK



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# Deaths- Females, UK



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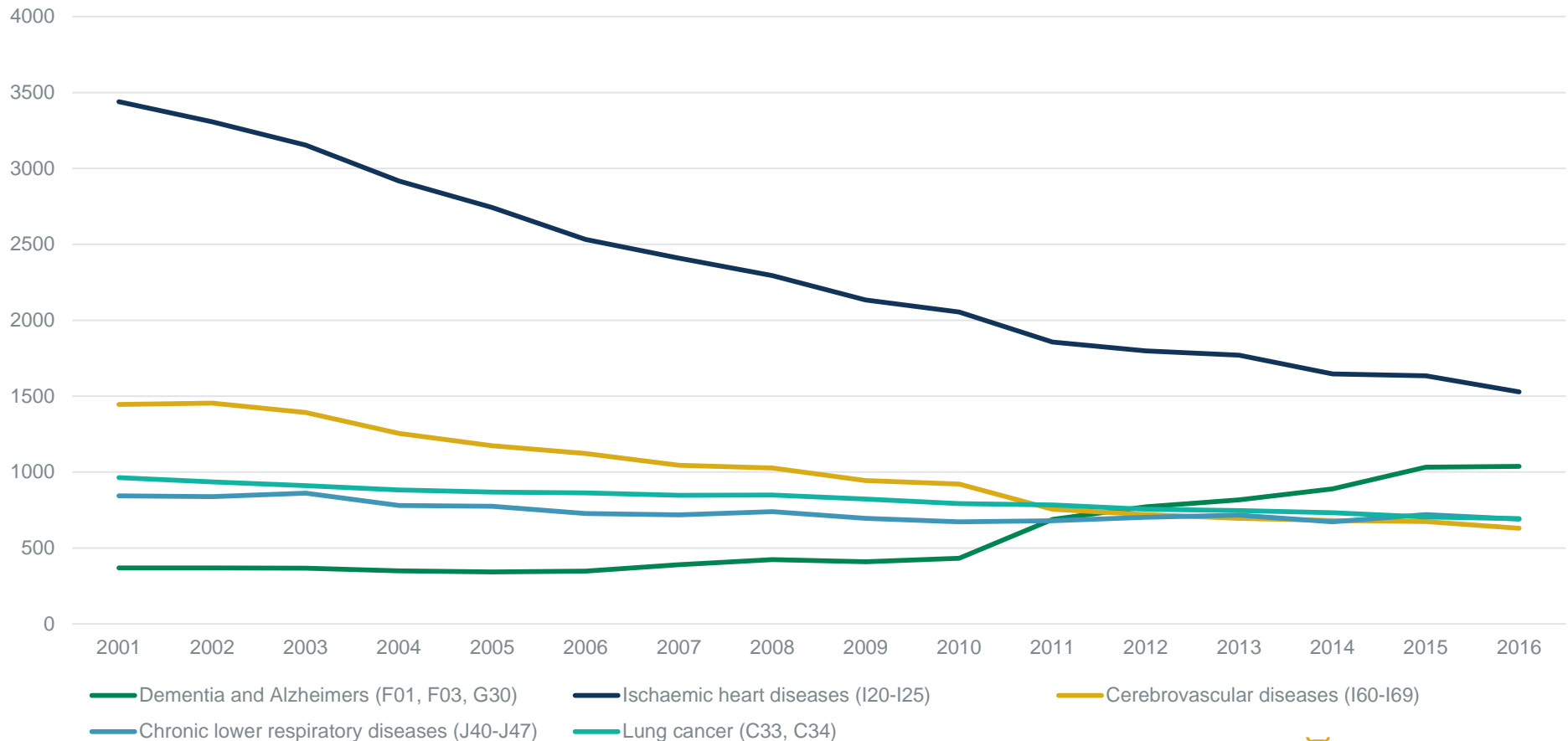
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# Leading causes of death in 2016

Males		Females	
1. Ischaemic heart diseases	13.7%	1. Dementia and Alzheimer disease	15.6%
2. Dementia and Alzheimer disease	8.2%	2. Ischaemic heart diseases	8.4%
3. Malignant neoplasm of trachea, bronchus and lung	6.5%	3. Cerebrovascular diseases	7.0%
4. Chronic lower respiratory diseases	6.1%	4. Influenza and pneumonia	5.9%
5. Cerebrovascular diseases	5.4%	5. Chronic lower respiratory diseases	5.6%

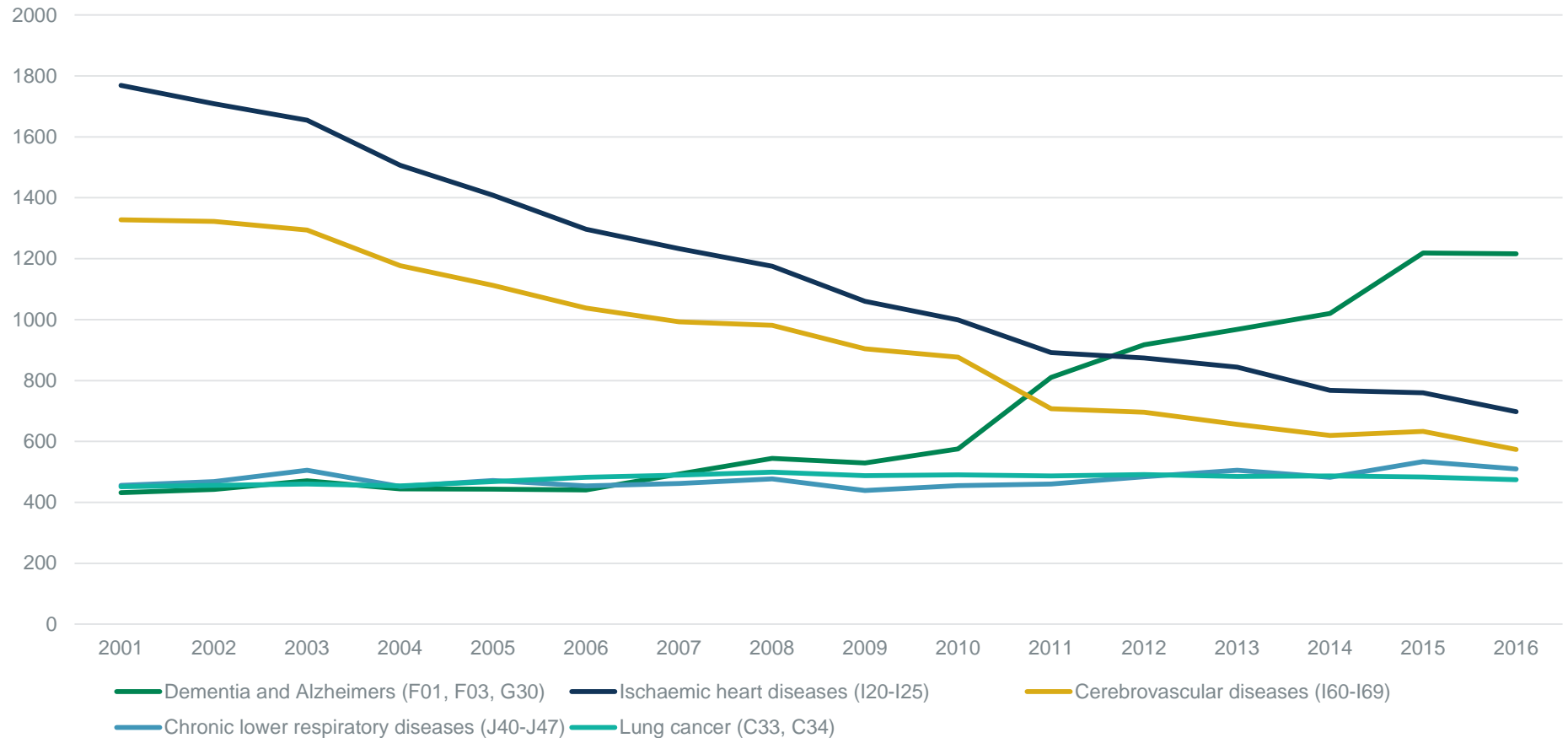


# Male age-standardised mortality rates for top five leading causes of death, 2001 to 2016, E&W



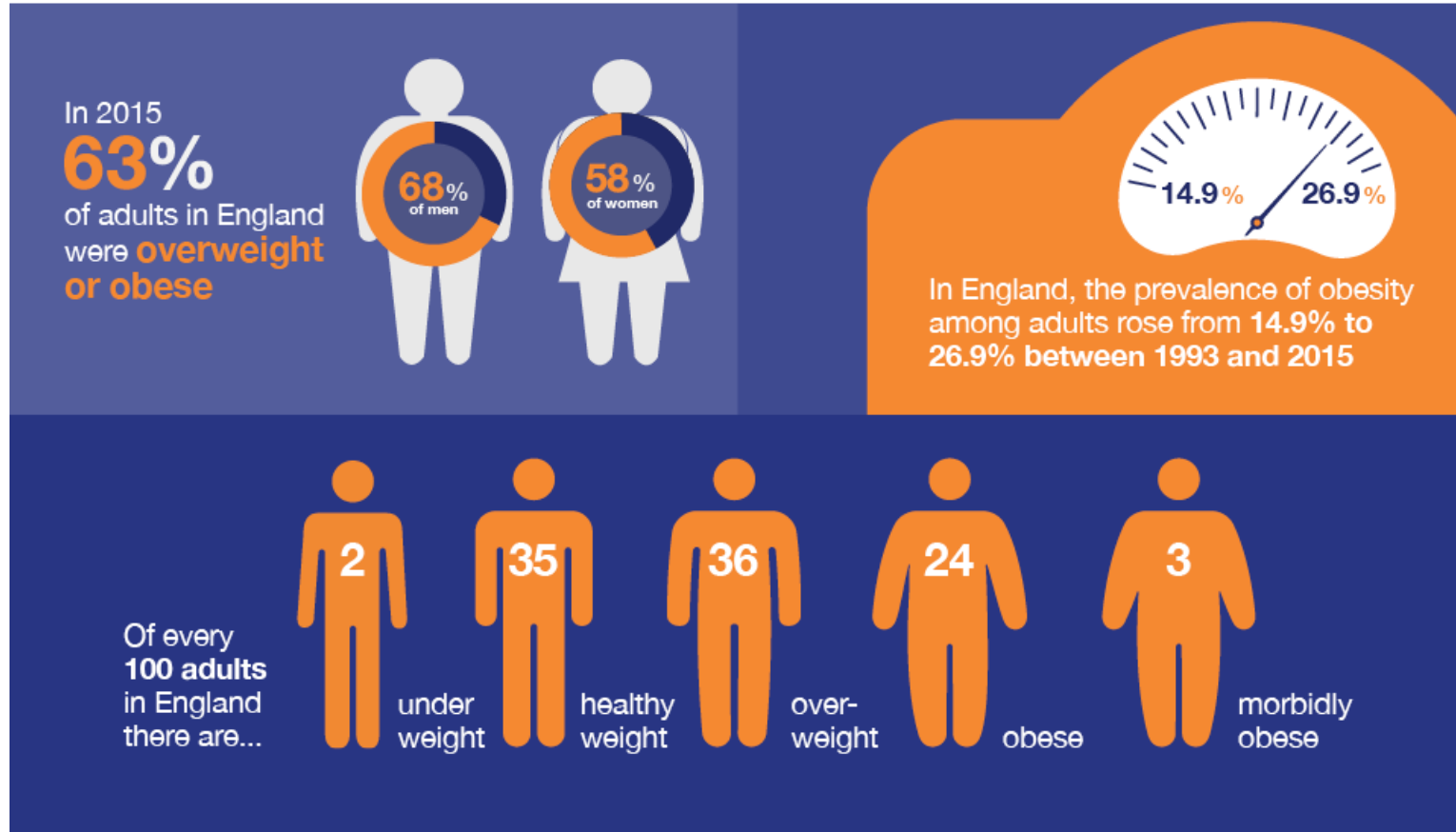
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# Female age-standardised mortality rates for top five leading causes of death, 2001 to 2016, E&W



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# Obesity in adults



Source: Public Health England



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# Obesity in children



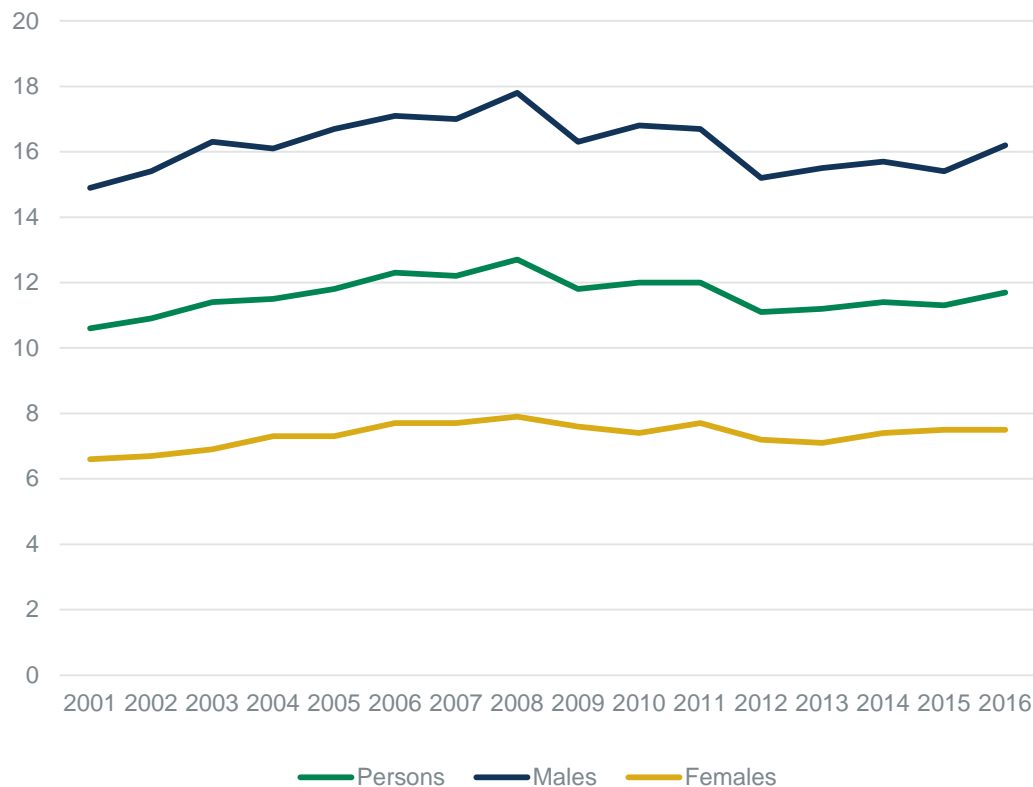
Source: Public Health England



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# Alcohol specific deaths

## Age-standardised alcohol-specific death rates per 100,000 population, UK



In 2016, a total of 7,327 people died from alcohol-specific causes in the UK, which equates to a rate of 11.7 deaths per 100,000 population.

The rate observed in 2016 is significantly higher than that observed in 2001, when there were 10.6 deaths per 100,000 population.

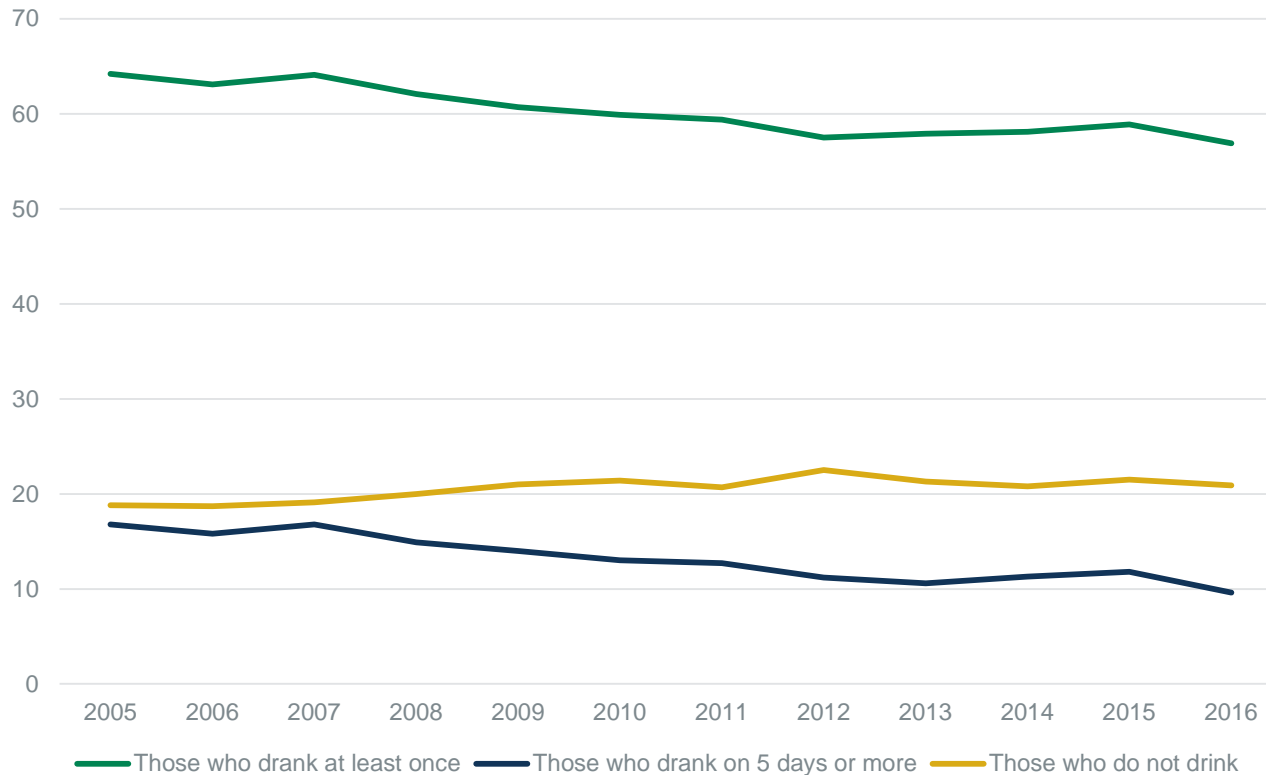


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# Alcohol consumption

The proportion of respondents who drank alcohol in the week prior to interview, Great Britain, 2005 to 2016



In 2016, 56.9% of adults aged 16 years and above drank alcohol in the week before being interviewed for the Opinions and Lifestyle Survey, the lowest level seen since the time series began in 2005 (64.2%).



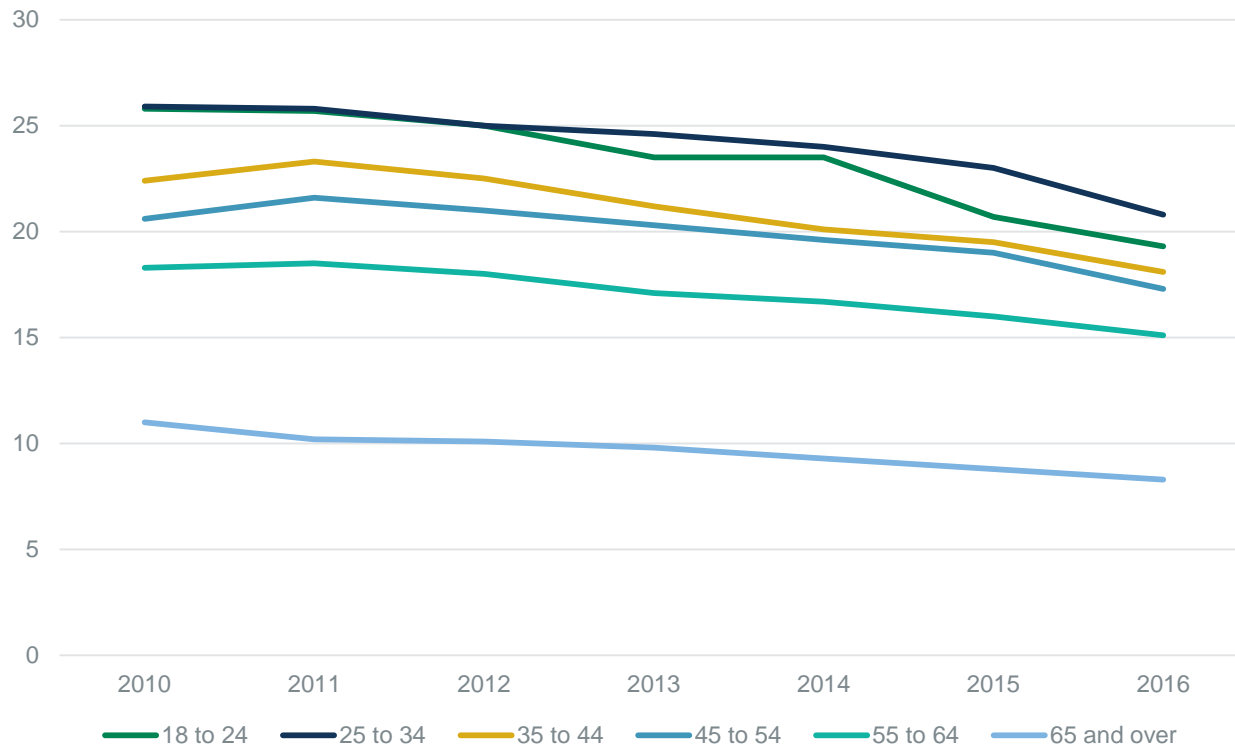
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# Smoking prevalence

Proportion of current smokers, all persons by age group UK, 2010 to 2016



In the UK, the proportion of current smokers in 2016 (15.8%) which was the lowest prevalence recorded since 2010

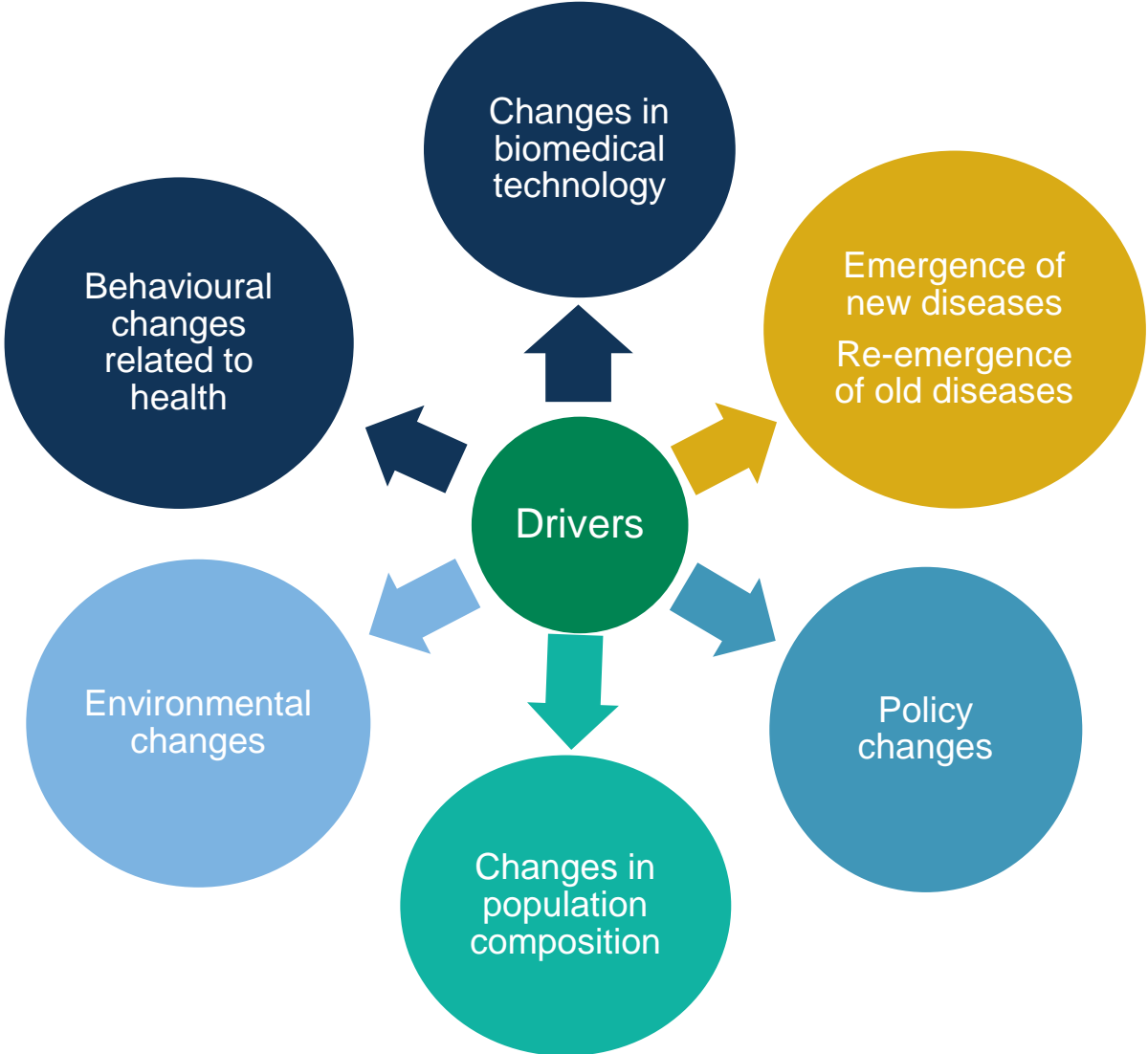
17.7% of men were current smokers, 14.1% of women.



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# Potential drivers for future mortality change

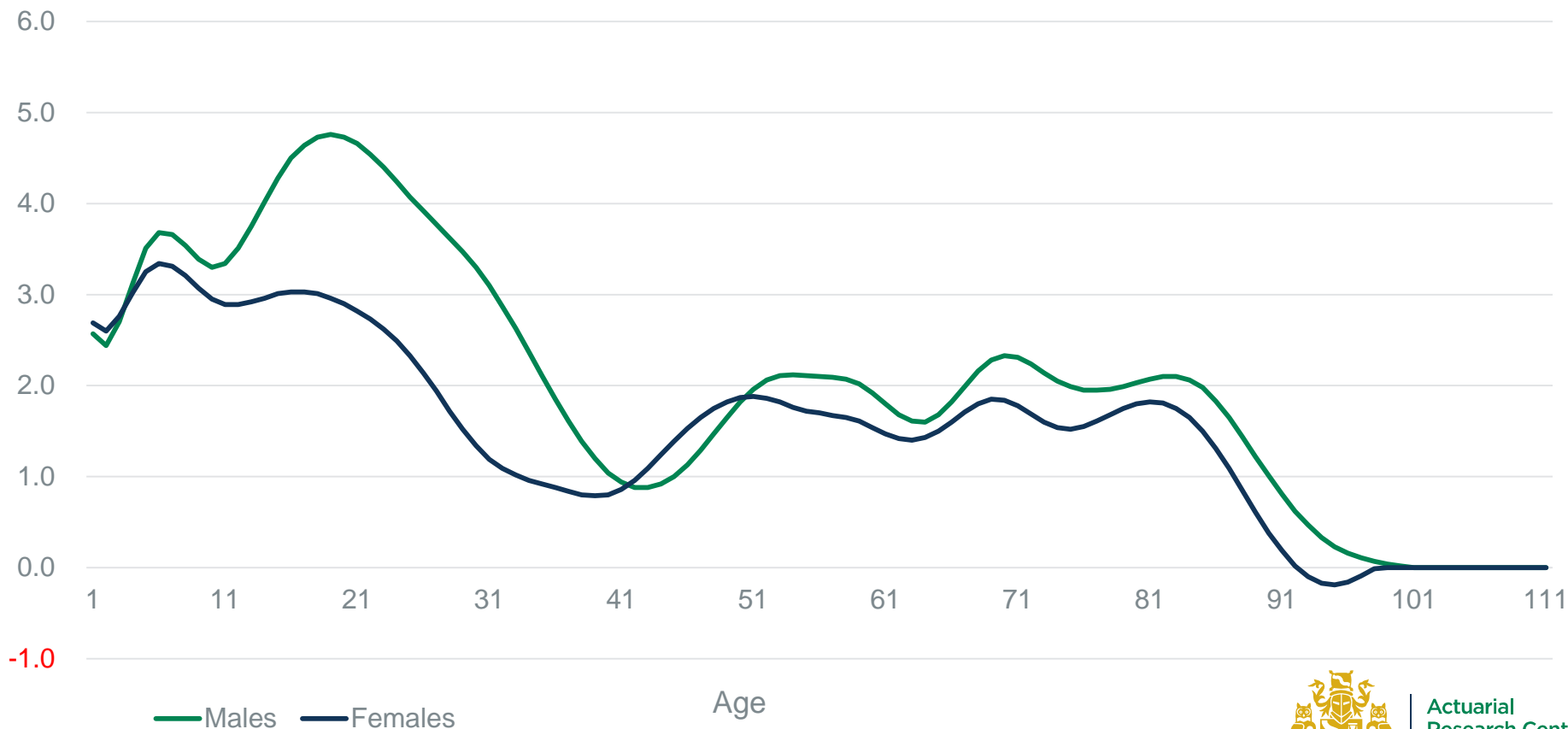


# Mortality assumptions

- Annual improvement in mortality rates in 25 years time of 1.2% for most ages, males and females
- Lower improvements for those born before 1924
- Rates of improvement remain constant beyond 25<sup>th</sup> projection year (by cohort for those born before 1960, by age for those born 1960 and later)
- No longer assumed higher long-term rates of improvement for those born between 1925 and 1938.



# Assumed smooth percentage changes in death rates between 2015 and 2016 by age, UK



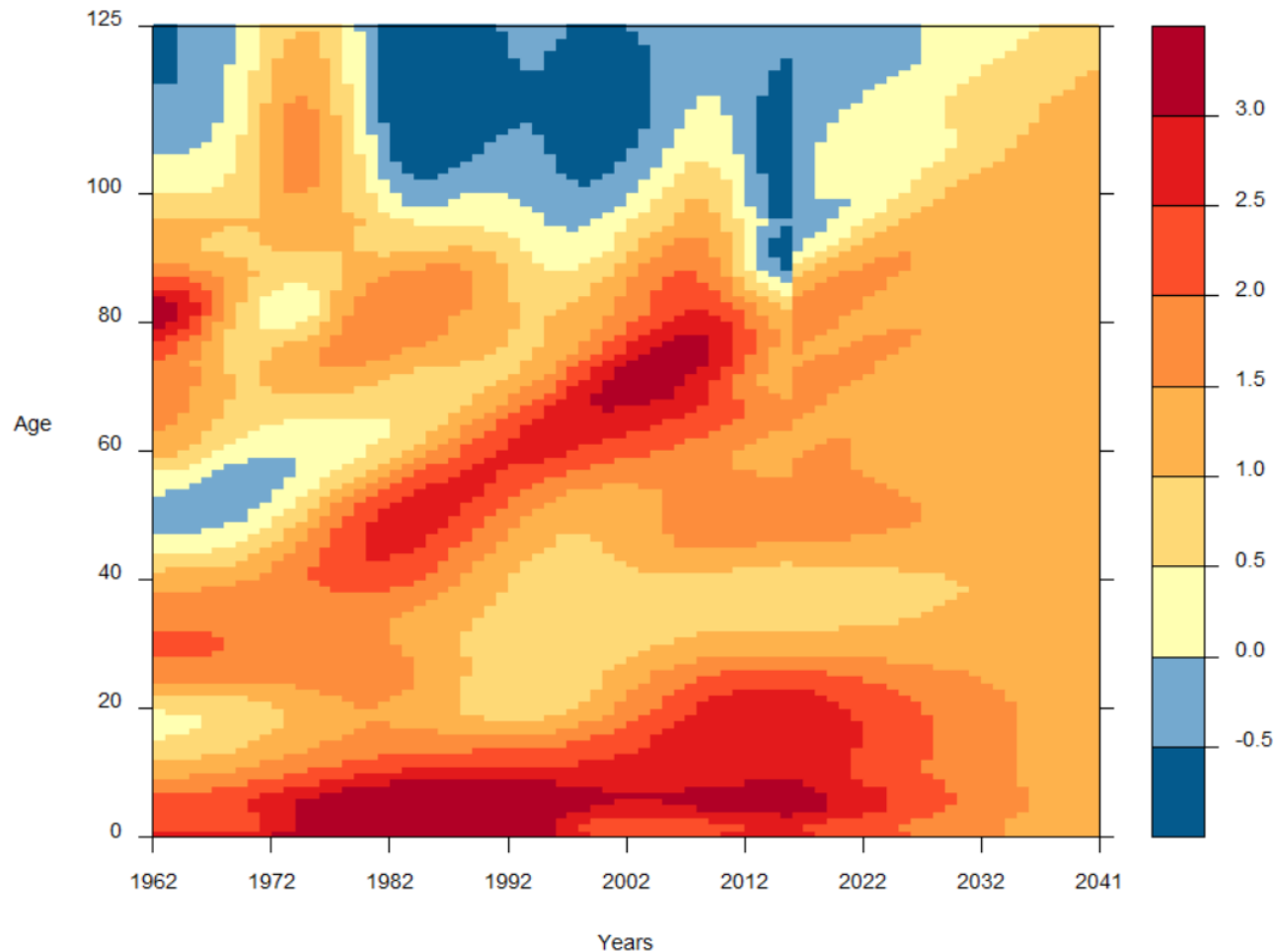
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# Actual and assumed overall annual rates of mortality improvement, ages 0-99, UK

Last/Next Years	Males (%)		Females (%)	
	Past (Actual)	Future (Assumed)	Past (Actual)	Future (Assumed)
20	2.32	1.59	1.54	1.33
25	2.20	1.52	1.45	1.31
30	2.12	1.47	1.43	1.29
50	1.68	1.36	1.33	1.25
80	1.29	1.30	1.28	1.23
100	1.15	1.29	1.14	1.24



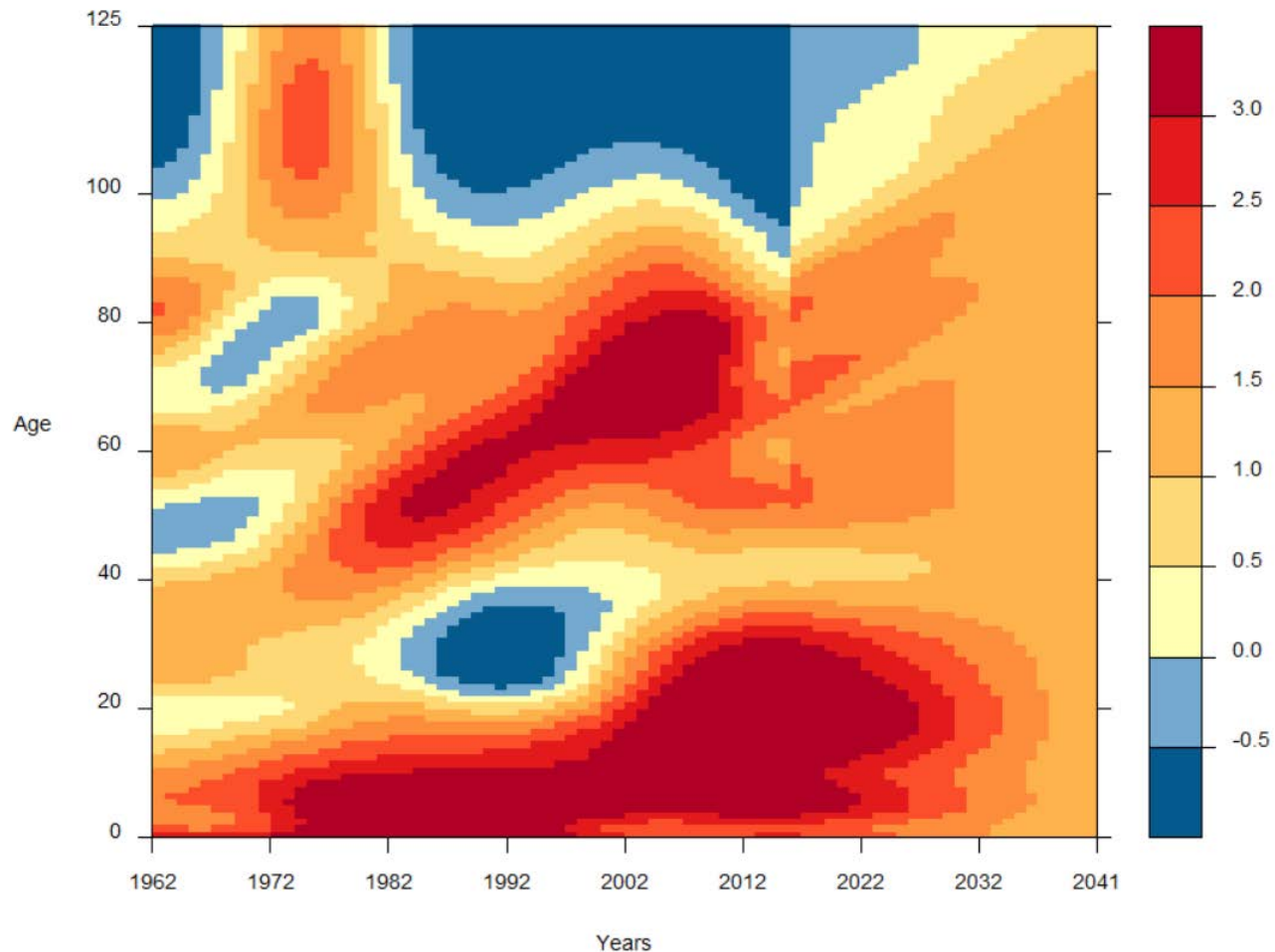
# 2016-based annual improvement in smoothed mortality rates, females 1961/2 – 2040/41



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# 2016-based annual improvement in smoothed mortality rates, males 1961/2 – 2040/41



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# Life expectancy projections for the UK

## Expectation of life at birth

	2016	2021	2031	2041	2091
Males	79.2	80.5	82.1	83.4	89.3
Females	82.9	83.8	85.1	86.2	91.5

## Expectation of life at age 65

	2016	2021	2031	2041	2091
Males	18.6	19.4	20.6	21.6	26.2
Females	21.0	21.6	22.6	23.5	27.9



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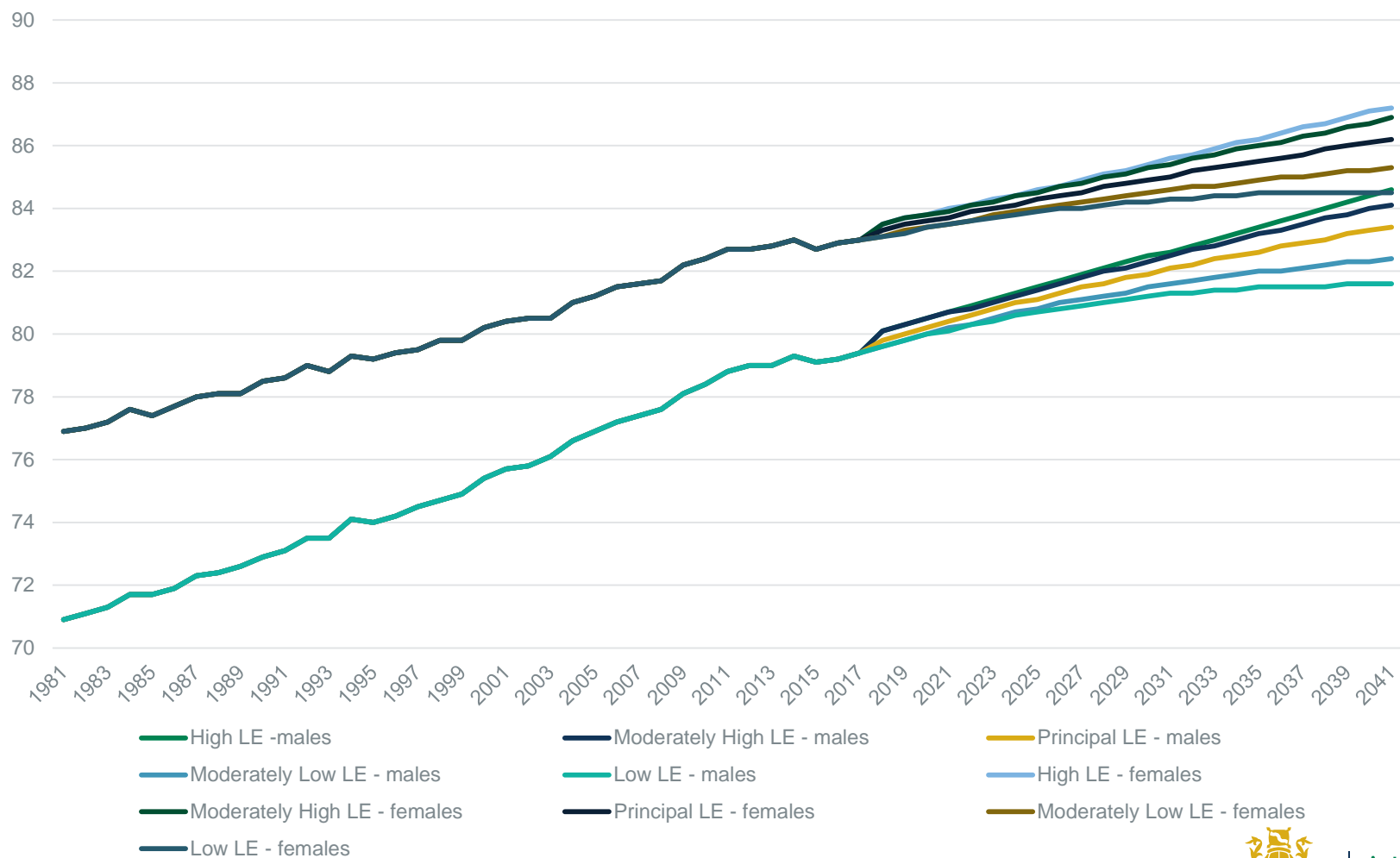
# Mortality variants

- High life expectancy (HLE)- 1.9% annual improvement at 2041
- Moderately high life expectancy (MHLE) - 1.6% annual improvement at 2041
- Moderately low life expectancy (MLLE) – 0.6% annual improvement at 2041
- Low life expectancy (LLE) – 0% annual improvement at 2041

Additional plus or minus 2.0% on improvement rate in first year of projection.

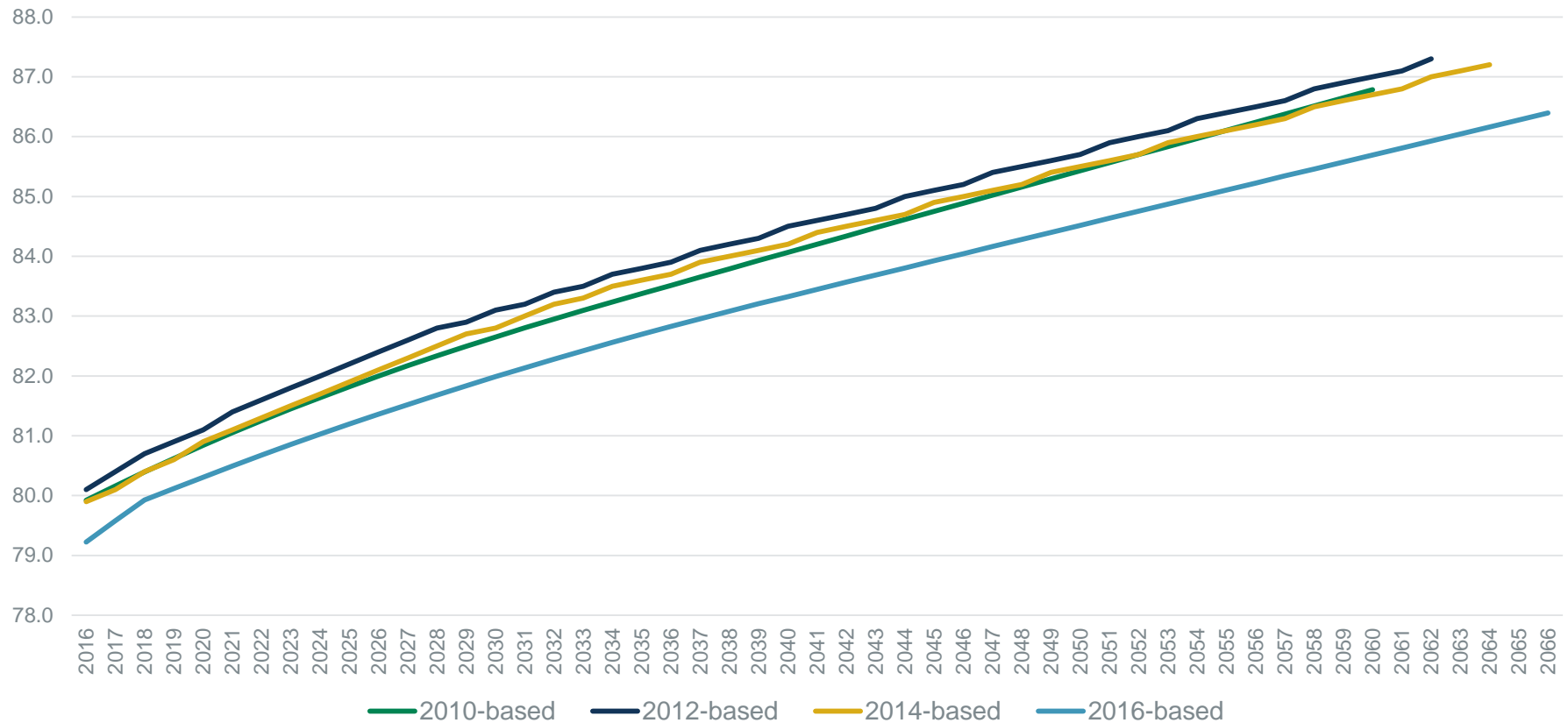


# Mortality variants



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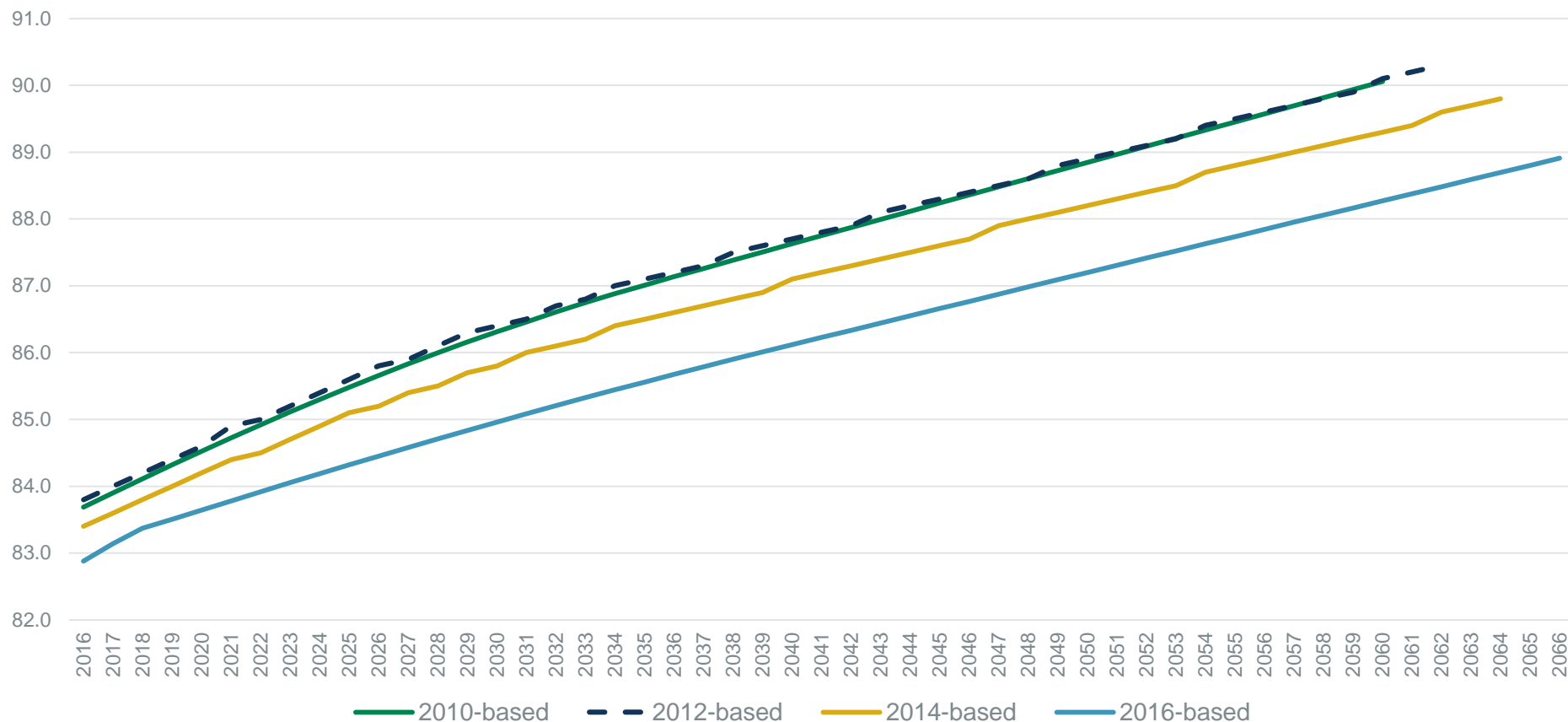
# Male period life expectancy at birth for selected projections and periods, UK 2016-2066



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# Female period life expectancy at birth for selected projections and periods, UK 2016-2066



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# 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 presenter.



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