USS

The Universities Superannuation Scheme

Implications of COVID-19 for pension scheme longevity

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Longevity 16 Conference

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Longevity 16

COPENHAGEN '21

Impact of Covid-19 on pension plans

Members' mortality	Impact on longevity and pension liabilities over the short term and long term
Members' well-being	Long-Covid, mental health, deferral of other medical treatment, working practices
Members' behaviour	Early retirement, other member options, lifestyle choices
Investment	Changing investment opportunities and risks
Operations	Technology, digital channel communications

This presentation focuses on Covid-19 mortality impact
from the perspective of pension actuarial valuations and ongoing management at USS

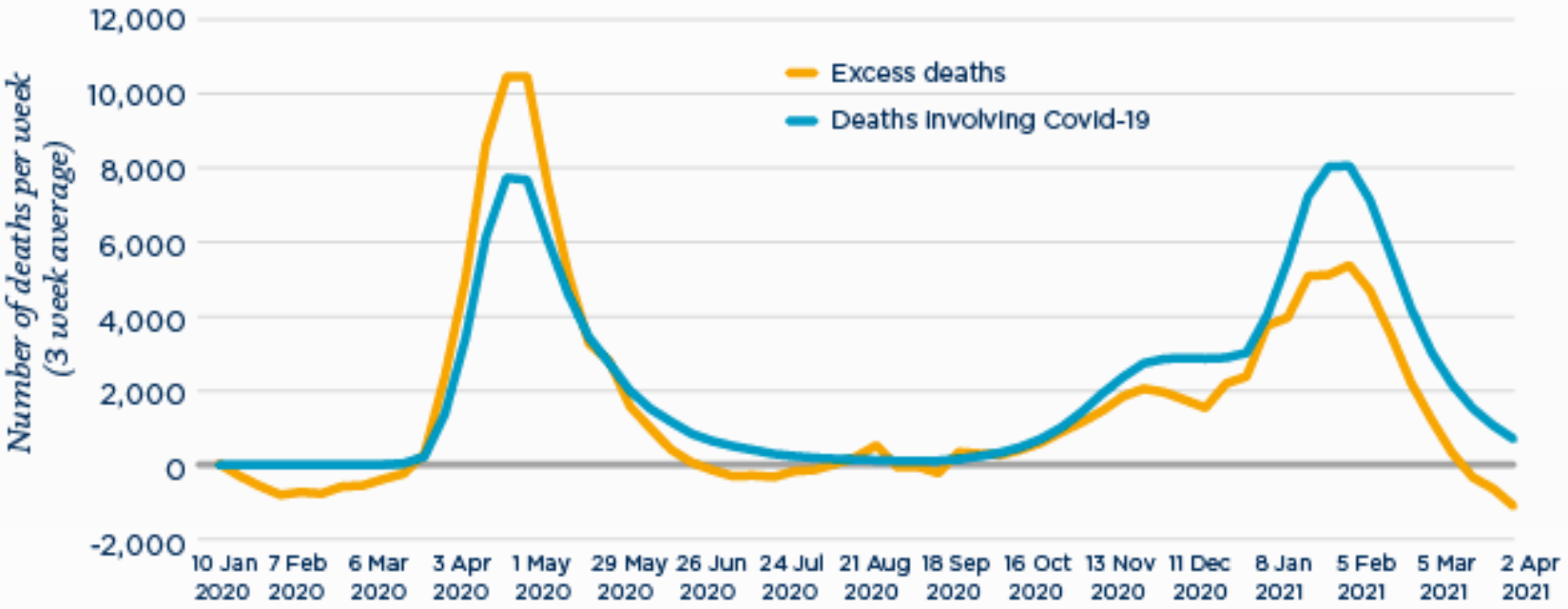
Agenda

1. **Backdrop: Covid-19 impact on national mortality**
2. Implications for pension plan mortality
3. Experience of USS
4. Future outlook

Mortality in England & Wales during the Covid-19 pandemic

- Two waves of high mortality beginning in March and September 2020
- In 2020 deaths in England and Wales were 14% higher than average
- Excess deaths and Covid-19 deaths are highly correlated, but not identical

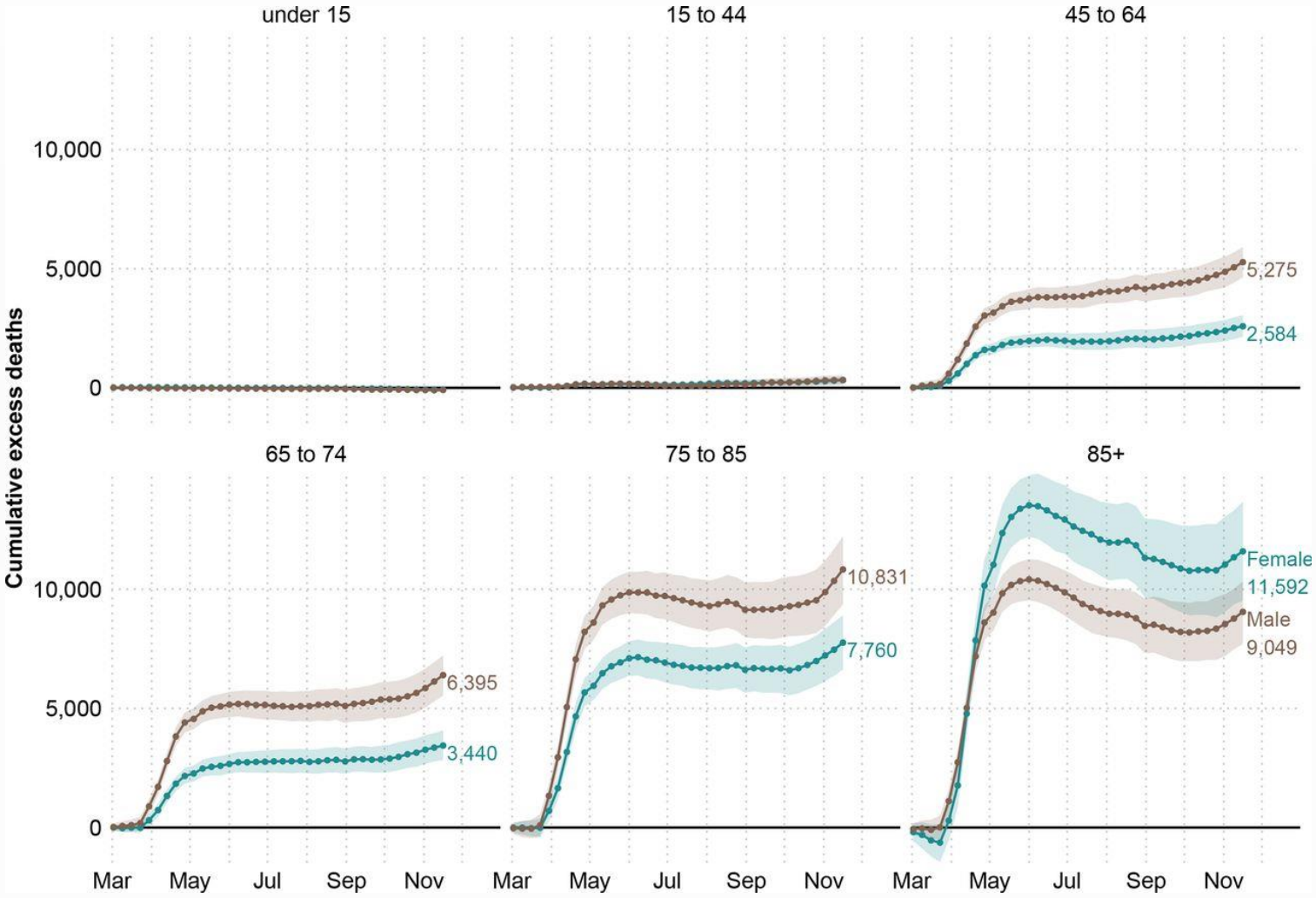
England & Wales:
Covid-19 deaths and deaths in excess of the 5-year average



Source: LCP based on ONS data

Different mortality experience across ages and gender

England & Wales: Cumulative excess deaths weeks 10-47 of 2020

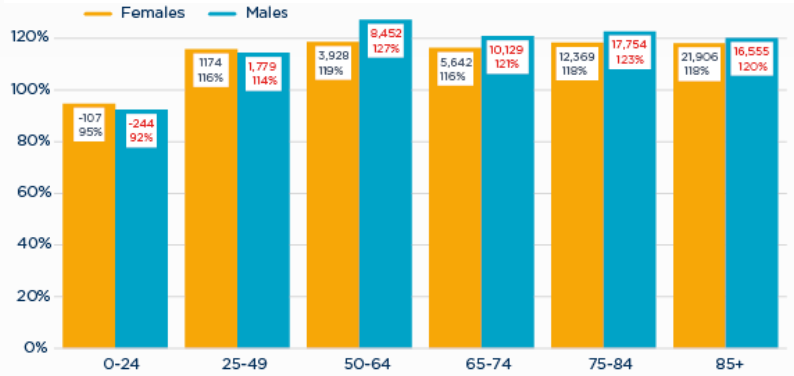


Source: Jose Manuel Aburto et al. J Epidemiol Community Health 2021;75:735-740

- The cumulative number of excess deaths shows considerable variation across age group and gender
- But the cumulative percentage excess deaths and the ratio of deaths to expected deaths is more uniform

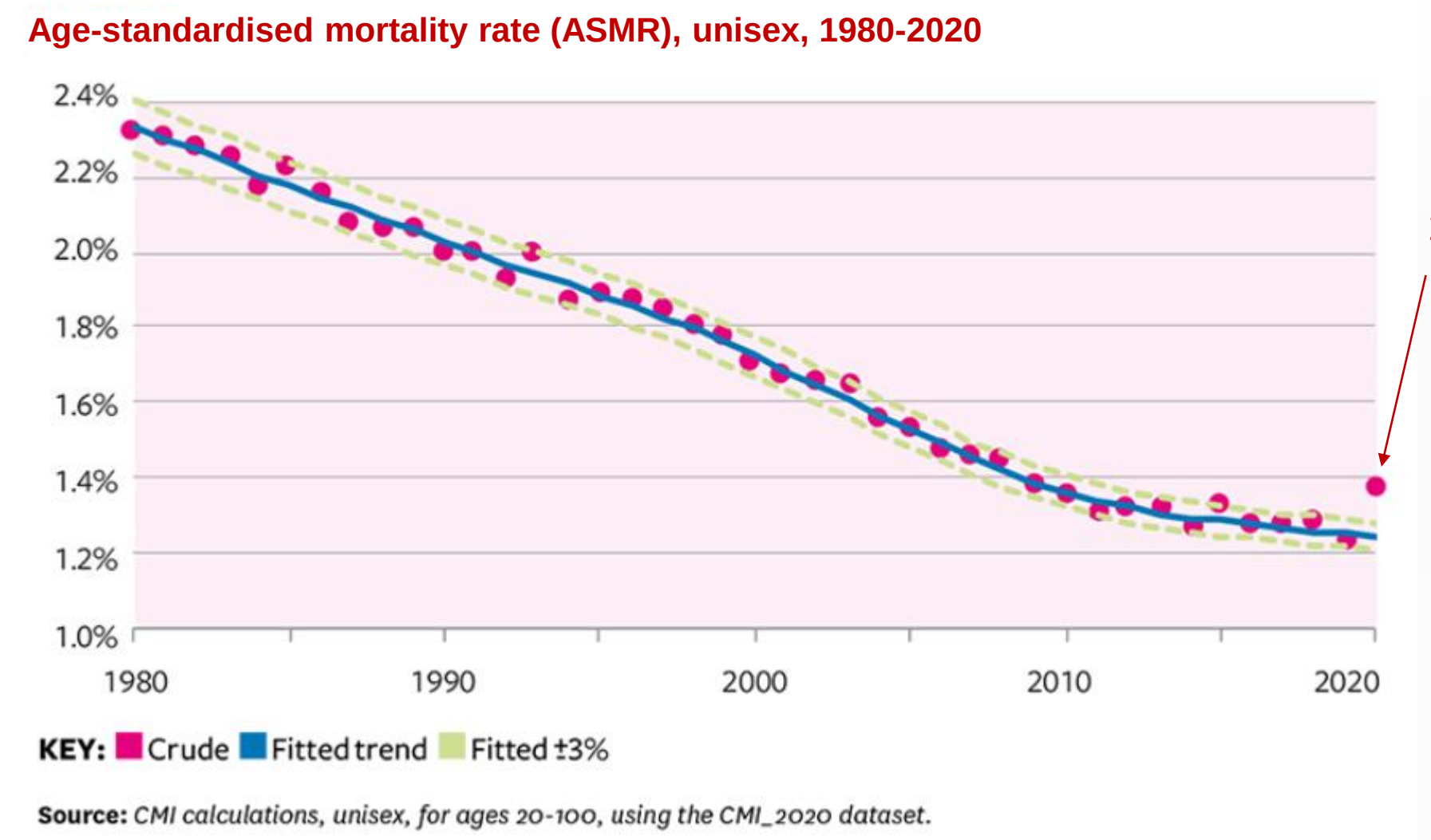
Ratio of deaths to expected deaths

Year to 28 Feb 2021



Source: LCP based on PHE data

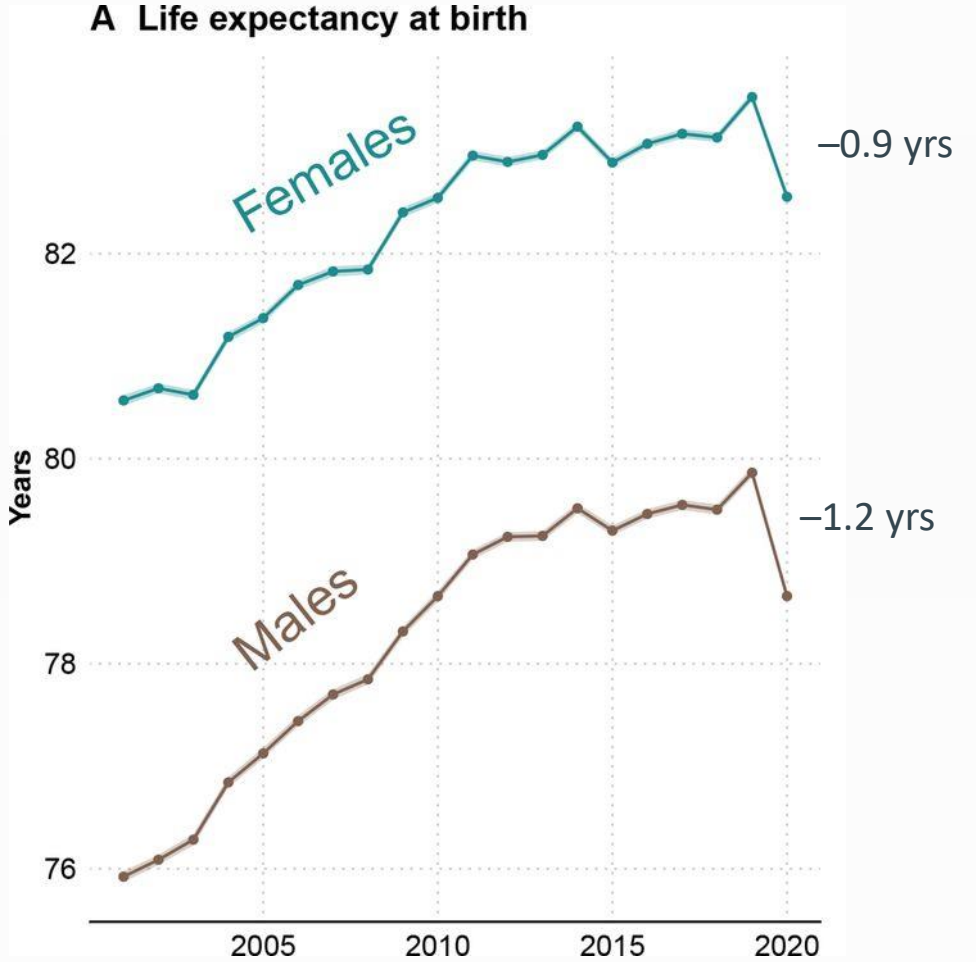
Converting numbers of deaths into mortality rates, shows 2020 as a clear outlier relative to history

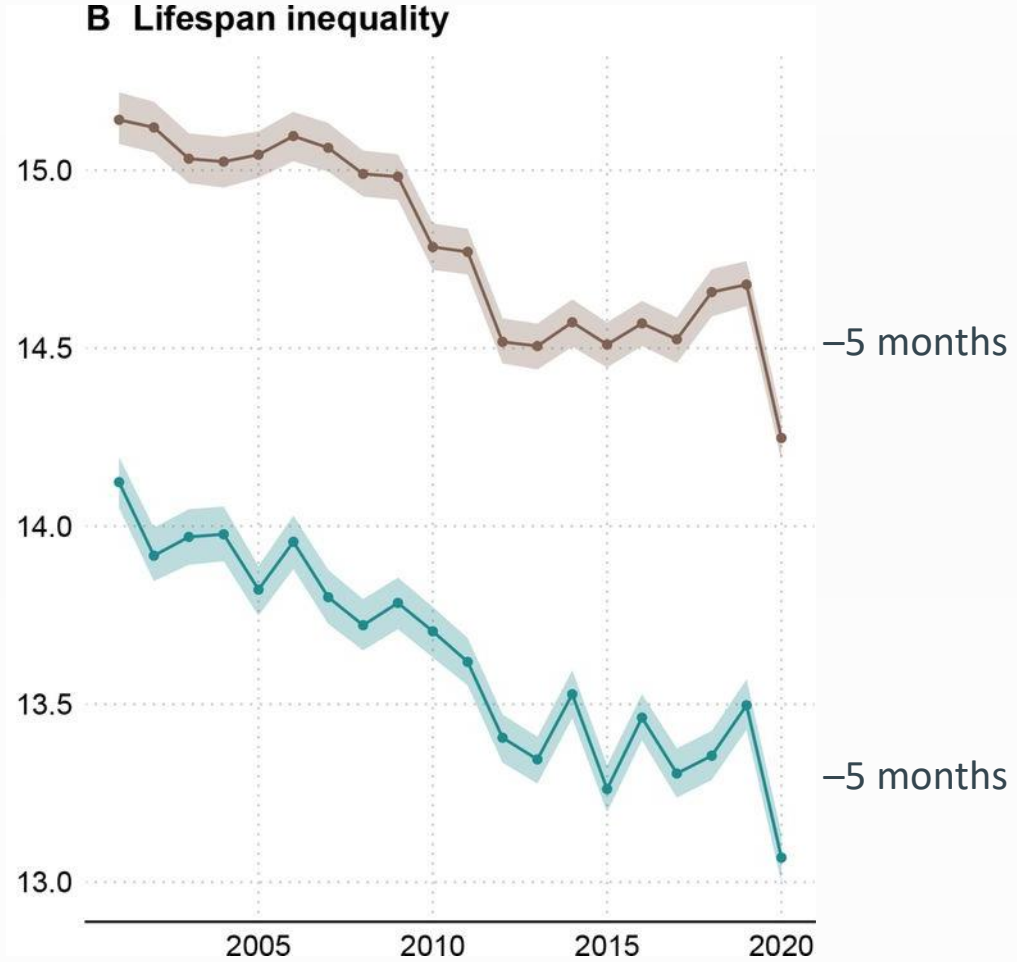


Source: Cobus Daneel and Jon Palin, *The Actuary,* 5 May 2021. https://www.theactuary.com/2021/04/28/year-no-other-cmis-mortality-projections-model0

Both life expectancy and lifespan inequality have fallen

Life expectancy and lifespan inequality (SD of ages at death) estimates for 2001–2020
(Only reflects first 47 weeks of 2020)

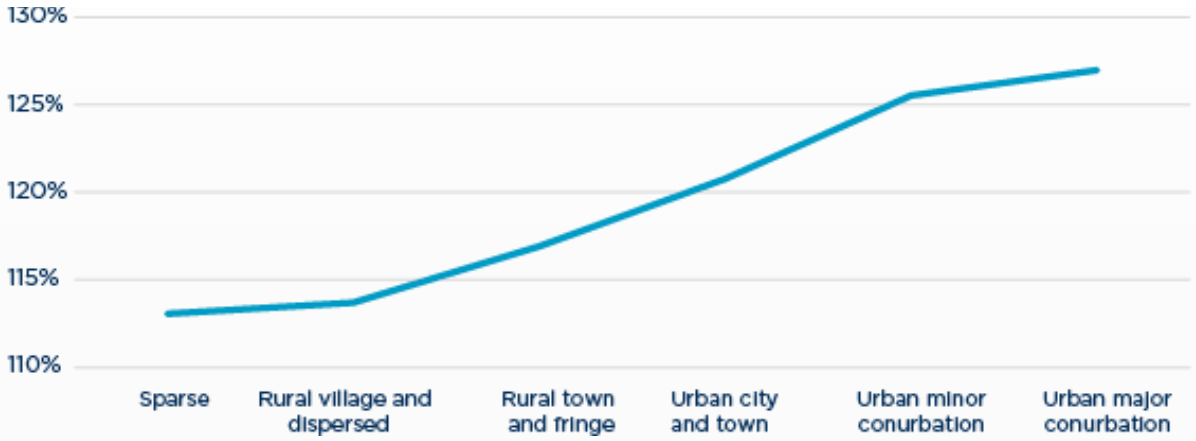




Source: Jose Manuel Aburto et al. J Epidemiol Community Health 2021;75:735-740

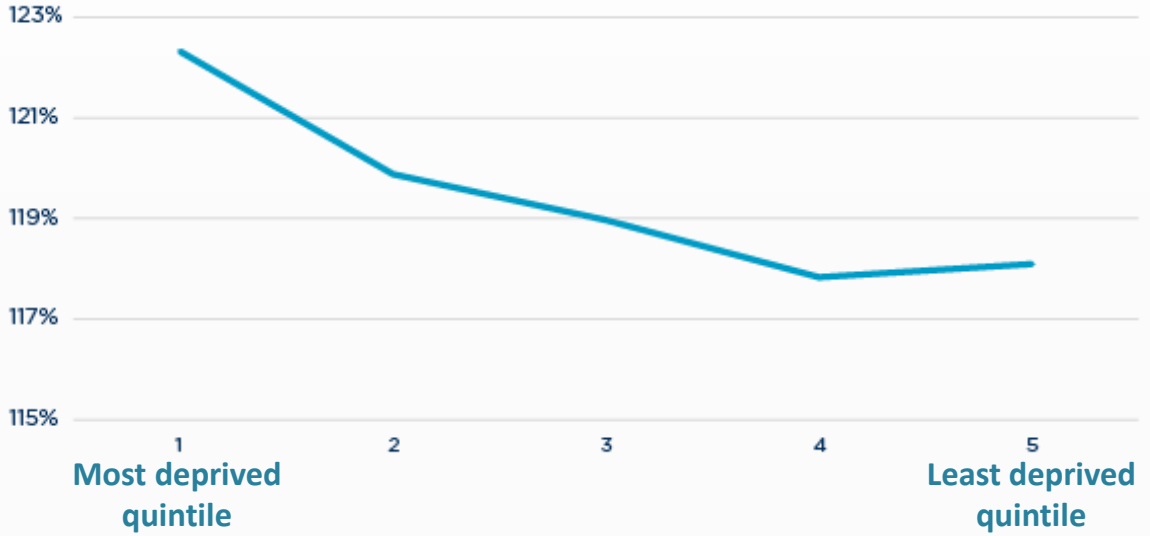
There is also variation across location and deprivation

Ratio of deaths to expected deaths, by population density

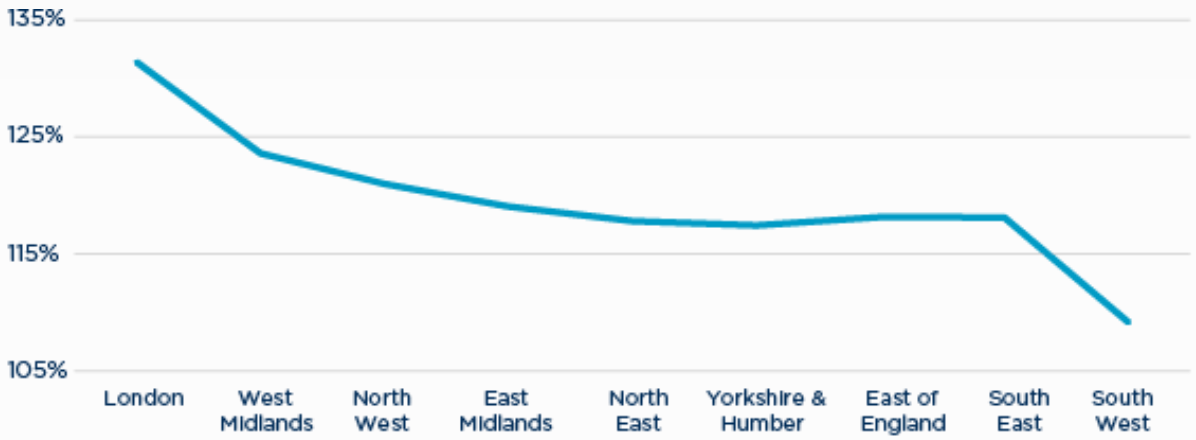


Ratio of deaths to expected deaths, by deprivation quintile

Based on Index for Multiple Deprivations (IMD)



Ratio of deaths to expected deaths, by region



- Proportionately lower mortality:
  - *Outside cities* and major population centres
  - In the *least deprived* and *most affluent* areas
  - In South England

Source: LCP charts based on PHE data

Agenda

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2. **Implications for pension plan mortality**
3. Experience of USS
4. Future outlook

How is the impact of Covid-19 at a national level reflected in pension plan mortality?

USS

Two key observations:

1. **Pension plans have very different member profiles**
   - Member profiles vary by gender, age, socio-economic group, location
   - Impact of Covid-19 on a particular pension plan's mortality reflects its particular member profile
     - It will not be the same as the impact on the national population

2. **Covid-19 mortality in adults appears to be proportional to all-cause mortality (at higher ages)**
   - Covid-19 mortality rate **= [**All-cause mortality rate**] × [**infection rate**] × [**relative frailty**]**

Source:
- Cairns, Blake, Kessler & Kessler (2020), "The Impact of Covid-19 on Future Higher-Age Mortality"
- Cairns (2021), "What can we learn from the Covid-19 pandemic?", presentation at this conference
- Kessler (2021), "Resilient in a crisis: How pandemic insights supported a rock solid longevity risk transfer market in 2020", presentation at this conference

Covid-19 mortality for a particular pension plan can be estimated from the all-cause mortality appropriate for its profile of members

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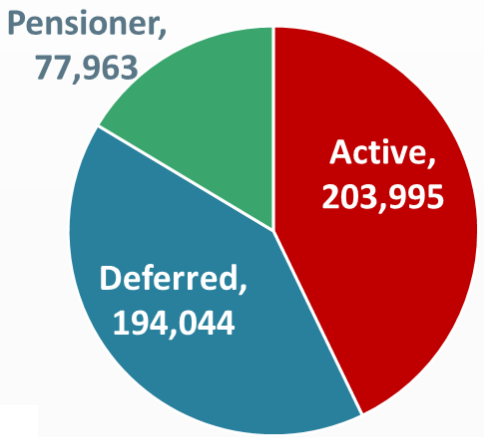
USS is an open pension plan for UK universities[1]

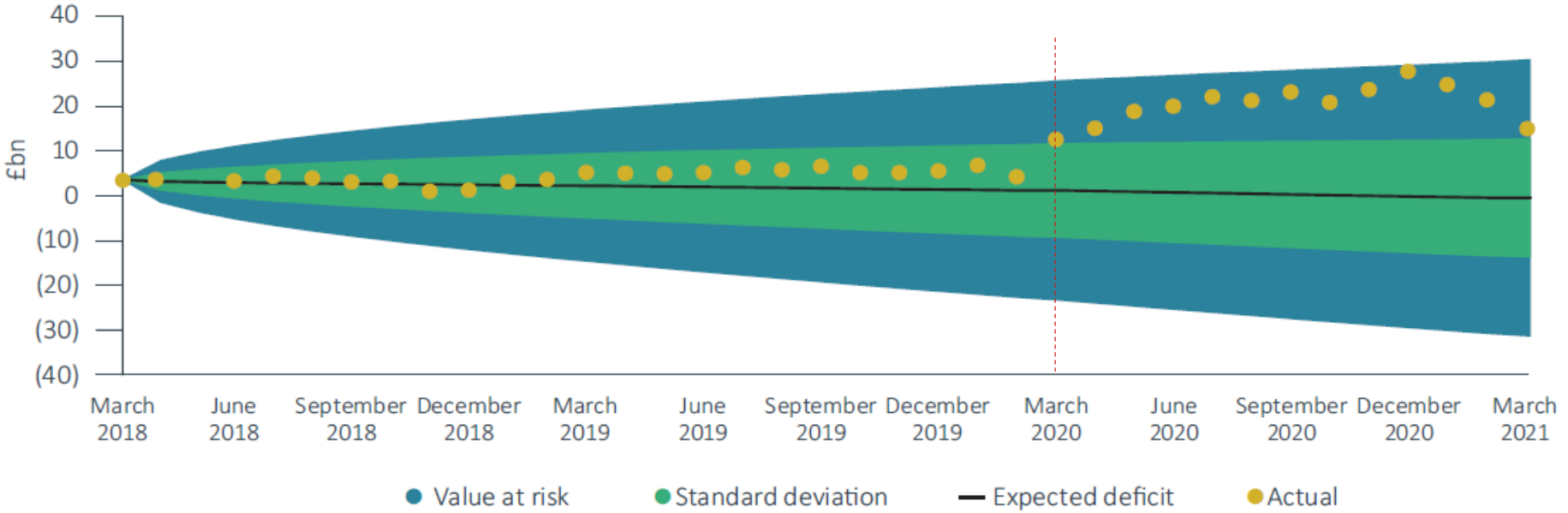
As of 31 March 2021[1,2]

- **Members: 476,002**
- **Assets: £80.6bn** in Defined Benefit (DB) section
- **Covid-19 impact:** TP funding ratio fell **from 93% to 84%** in March 2020

Member breakdown[1]



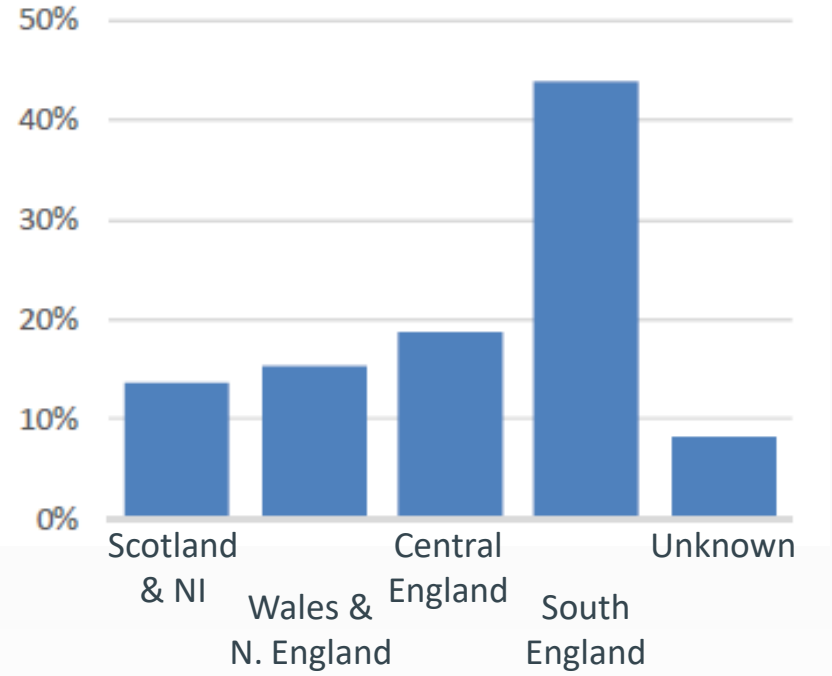
Deficit progression since 2018 valuation[1]



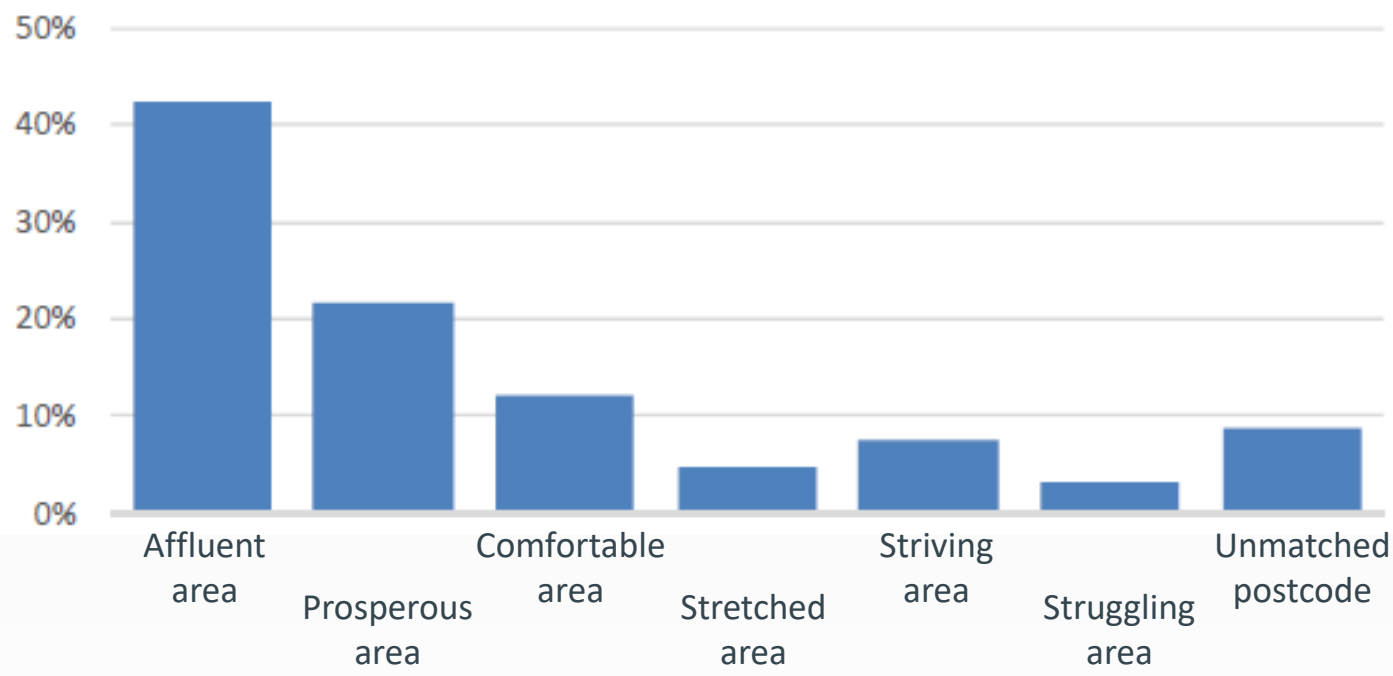
1 Source: USS 2021 Annual Report and Accounts
2 TP liability and deficit estimated on the monitoring basis of the 2018 valuation

USS membership is diverse but with notable concentrations

Spread of USS members across UK regions



Spread of USS members across socio-economic categories



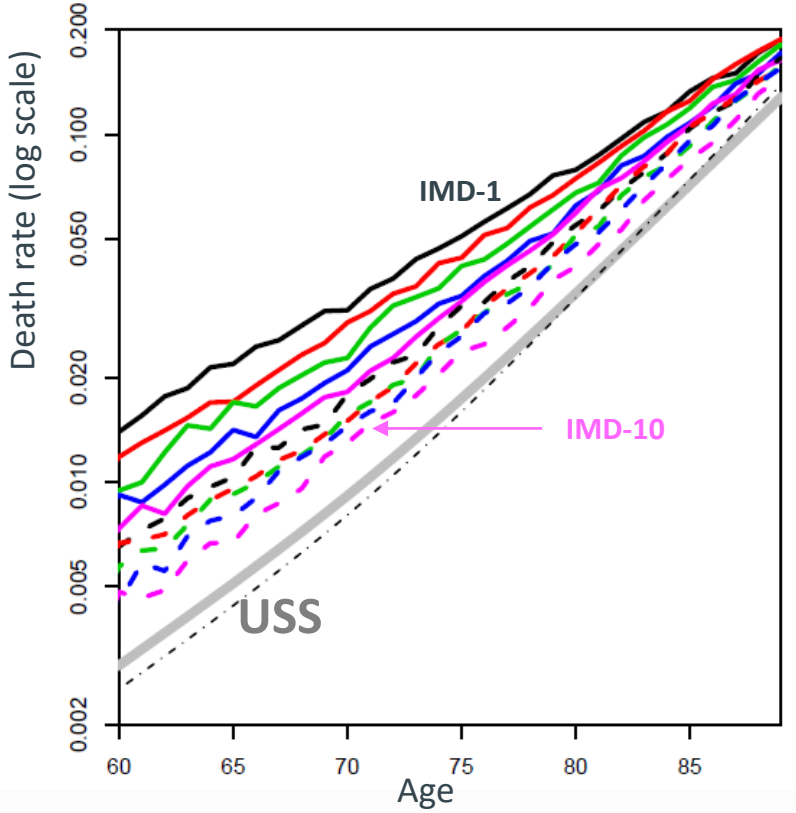
Source: LCP using USS data

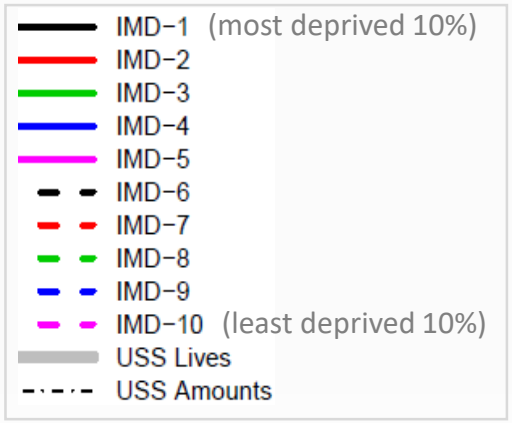
- Most members (> 60%) live in South and Central England – areas with *lower mortality*
- Most members (> 60%) live in the higher socio-economic categories – categories with *lower mortality*

Member profile suggests Covid-19 mortality for USS should be lower than for the national population

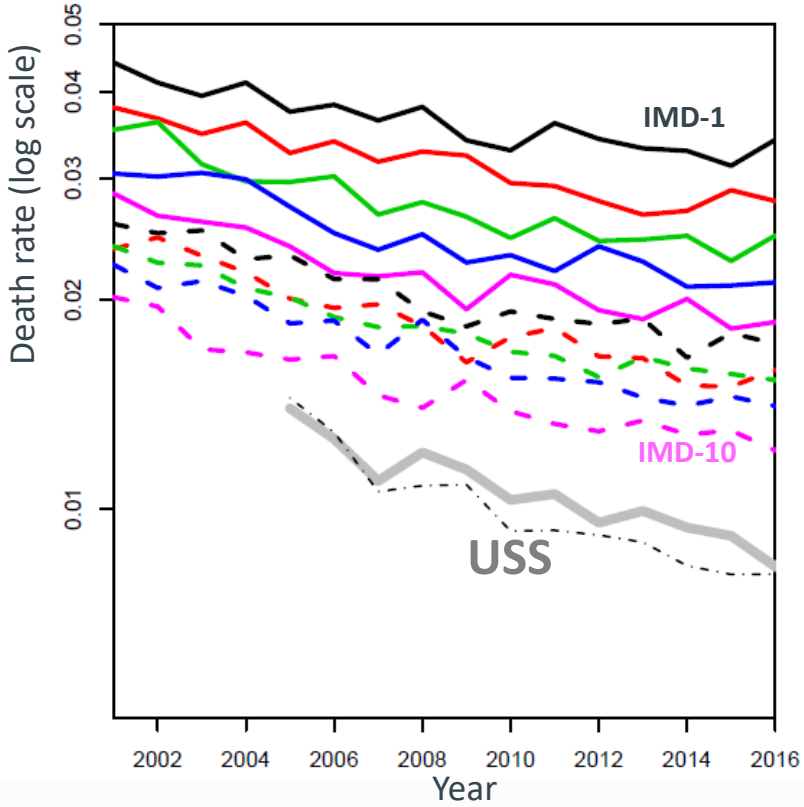
In fact, USS all-cause mortality is much lower than even the least-deprived decile (IMD-10)[1] of the English population

2015 male death rates by age: USS vs English IMD deciles[1]





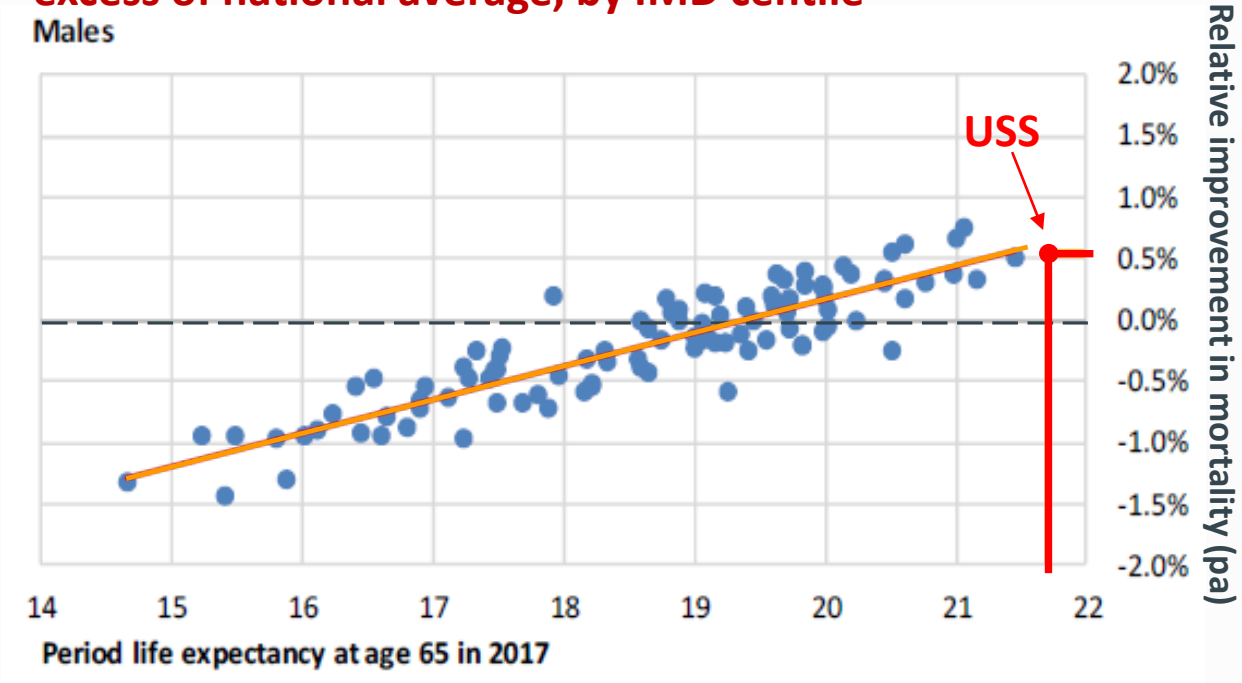
Historical death rates for males age 70: USS vs English IMD deciles[1]



[1] IMD = Index of Multiple Deprivations
Source: Cairns, Blake, Dowd, Coughlan, Jones & Rowney (unpublished)

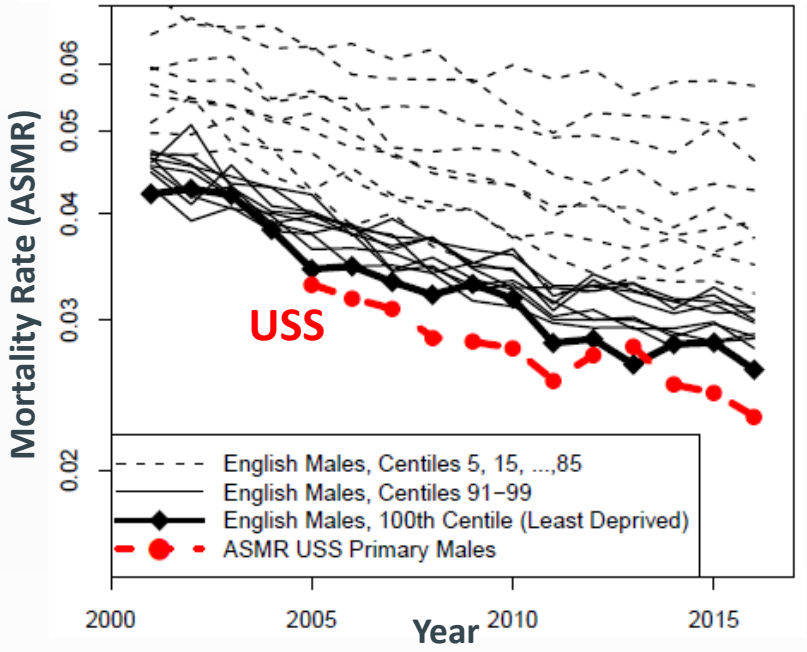
A closer look at IMD centiles, shows USS male life expectancy in the top 1% of the national population

Period life expectancy vs mortality improvements in excess of national average, by IMD centile



Source: LCP using USS data

Age standardised mortality rate (ASMR), Ages 65-89 by IMD centiles



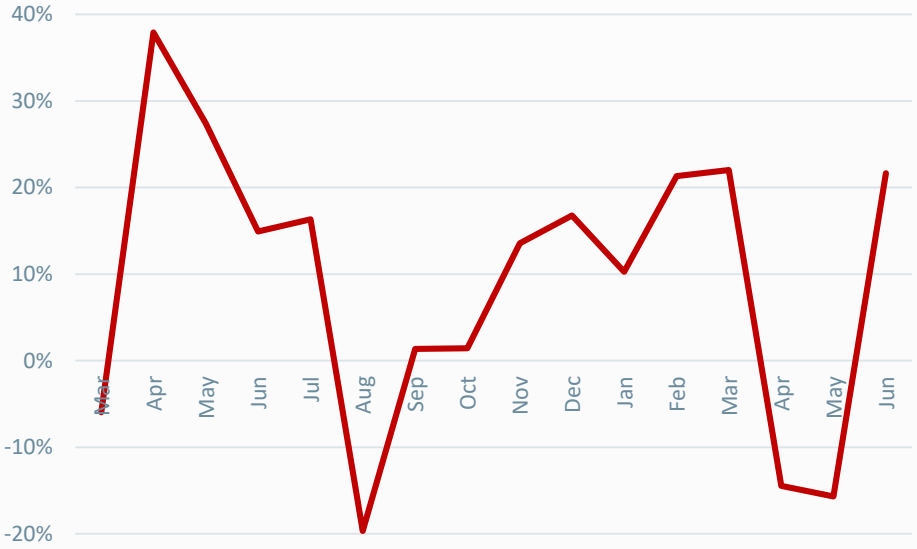
Source: Cairns, Blake, Dowd, Coughlan, Jones & Rowney (unpublished)

Because Covid-19 mortality is proportional to all-cause mortality, we expect the impact on USS to be very low

Excess deaths for USS over 2020-21 have followed a similar cumulative profile to the total for England, but at a lower level

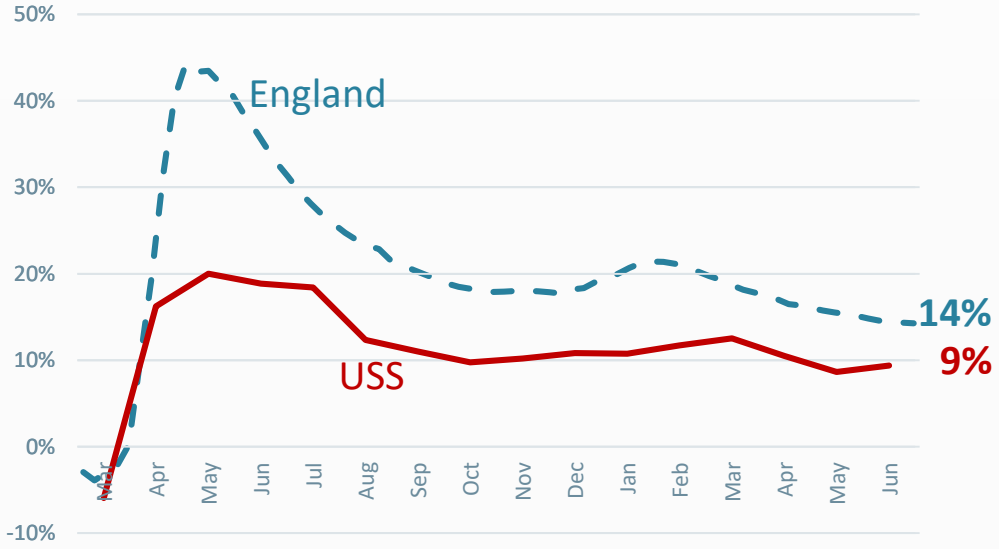
Excess deaths for USS[1]

Mar 2020 to Jun 2021



Cumulative excess deaths for USS vs England[1,2]

Mar 2020 to Jun 2021



- Cumulative % excess deaths for USS:
  - First peak was ***about half*** that of the national population
  - Second peak was ***40% lower***
- By comparison, two analyses for an LGPS pension plan: [3,4]
  - Experience was broadly similar to the England & Wales population [3]

[1] USS excess deaths relative to the three-year average, proxied by a count of USS bereavement processes. Source: USS data.

[2] England excess deaths relative to five-year average. Source: ONS weekly deaths to 23 July 2021.

[3] "ABC Pension Fund: Analysis of recent mortality experience in light of COVID-19", https://lgpsboard.org/images/Covid-19/MortAonAnon2.pdf

[4] https://lgpsboard.org/images/Covid-19/MortBWAnon2.pdf

What does this mean for USS mortality assumptions?

USS mortality assumptions for pension valuation purposes (31 March in stated year)

	2018 Valuation	2020 Valuation	2021 Update
Base tables	Fitted standard tables	Fitted standard tables	As for 2020 valuation
• Prudence	Reduction of 2%	Reduction of 2%	Reduction of 2%
Improvement projections	CMI 2017	CMI 2019	CMI 2020
• Initial parameter (pa)	N/A	0.5%	0.5%
• Smoothing parameter	8.5	7.5	7.5
• Long-term improvement rates (Male, Female; pa)	1.8%, 1.6%	1.8%, 1.6%	1.8%, 1.6%
Allowance for Covid-19	**N/A**	**None**	**2020 data excluded**
Impact on TP liability relative to previous	-	-3%	-0.2%

USS life expectancy in 2020 based on 2020 Valuation assumptions

	Cohort Life Expectancy (years)	Period Life Expectancy (years)
Male aged 45	44.2	40.7
Male aged 65	23.8	22.2
Female aged 45	45.9	42.4
Female aged 65	25.3	23.7

45-year-old female USS members can expect to live to nearly 91

Source: LCP based on USS assumptions

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The future evolution of the virus is uncertain

It is important to consider different potential scenarios

- The UK's Scientific Advisory Group for Emergencies (**SAGE**) has recently been considering scenarios for the long-term evolution of SARS-CoV-2

Scenario 1:	A variant that causes ***severe disease*** in a greater proportion of the population, with similar morbidity/ mortality to other zoonotic coronaviruses e.g., SARS-CoV (10% fatality) or MERS-CoV (35% fatality)	**Realistic possibility**
Scenario 2:	A variant that ***evades current vaccines***	**Almost certain**
Scenario 3:	Emergence of a ***drug resistant*** variant after anti-viral strategies	**Likely**
Scenario 4:	SARS-CoV-2 follows an evolutionary trajectory with ***decreased virulence***	**Unlikely short term; realistic possibility long term**

Source: https://www.gov.uk/government/publications/long-term-evolution-of-sars-cov-2-26-july-2021

- The impact of these scenarios will depend on **non-virus-related factors**, including:
  - ***Positive factors:*** Biotech innovation, increased healthcare funding, changes in lifestyle/behaviour, reduced flu cases
  - ***Negative factors:*** Disruption to non-Covid care, burden of long-Covid, reduced scope for retirees to socialise

The future impact of the virus on pension plans is uncertain

LCP's future Covid-19 scenarios and their potential impact in the UK

	1 Two wave pandemic	2 Seven years of high excess mortality	3 Lasting residual impact over long term	4 Prolonged increase in excess deaths	5 Long-term beneficial outcome
	After the second wave, pandemic is effectively managed. Indirect deaths for a few years	Pandemic waves of decreasing severity over the medium term with associated indirect deaths	Virus not eradicated. Recurring waves of decreasing severity with high indirect deaths	Unable to contain pandemic over the long term with devastating consequences	Improvements to behaviours, public health, medical R&D
Additional excess deaths over next 40 years	+210,000	+580,000	+900,000	+2,400,000	–660,000
Change in life expectancy at 65	–1 month	–3 months	–4 months	–13 months	+4 months
Impact on value of *total* liability	–0.2%	–0.5%	–1.1%	–4%	+1.1%
Impact on value of *pensioner* liability	–0.4%	–1.3%	–1.8%	–4%	+1.1%

Source: LCP, Charting Mortality Trends (April 2021) https://indd.adobe.com/view/54483cf1-033e-495d-9109-80207bb9604f

The impact on particular pension plans will vary depending on their member profiles, but is likely to be modest

Conclusions

- **The impact of Covid-19 on UK pension plans has been:**
  - Varied – **depends on the member profile**
  - **Low materiality** in terms of pension funding level

- **Looking to the future:**
  - Pension plans should (i) **monitor** excess deaths and (ii) **understand** the potential mortality implications
  - While not impossible, it seems **unlikely that Covid-19 will have a significant long-term impact** on pension plans

Aon says the outlook for future longevity in the UK has not necessarily worsened as a result of the pandemic

Aon, 26 February 2021[1]

Only an 'everlasting' Hangover' from Covid-19 will lead to big reductions in typical UK pension scheme liabilities

LCP, 19 April 2021[2]

1. https://www.aon.com/unitedkingdom/media-room/articles/outlook-for-future-longevity-in-the-uk.jsp
2. https://www.lcp.uk.com/media-centre/2021/04/only-an-everlasting-hangover-from-covid-19-will-lead-to-big-reductions-in-typical-uk-pension-scheme-liabilities/

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