

# COVID-19 longevity scenarios: *a bump in the road or a catalyst for change?*

March 9<sup>th</sup>, 2021

9am PT / 12pm ET



@ClubVita



[linkedin.com/company/club-vita](https://www.linkedin.com/company/club-vita)

# COVID-19 longevity scenarios: *a bump in the road or a catalyst for change?*



Dan Reddy  
**Webinar chair**

US CEO,  
Club Vita



Dan Ryan  
**Panelist**

Founder and Chief  
Science Officer,  
COIOS Research



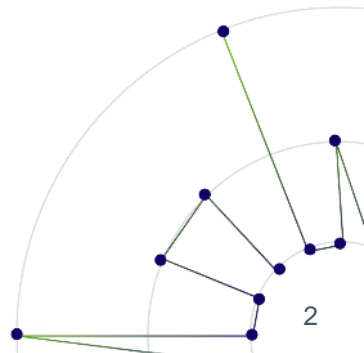
Erik Pickett  
**Panelist**

Actuary and Chief  
Content Officer,  
Club Vita



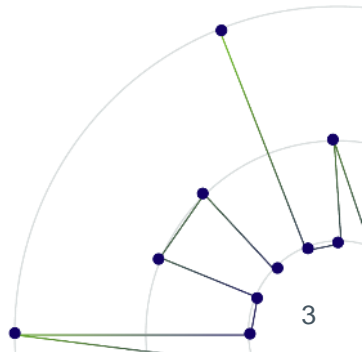
Ellen Kleinstuber  
**Panelist**

Chief Actuary,  
Bolton

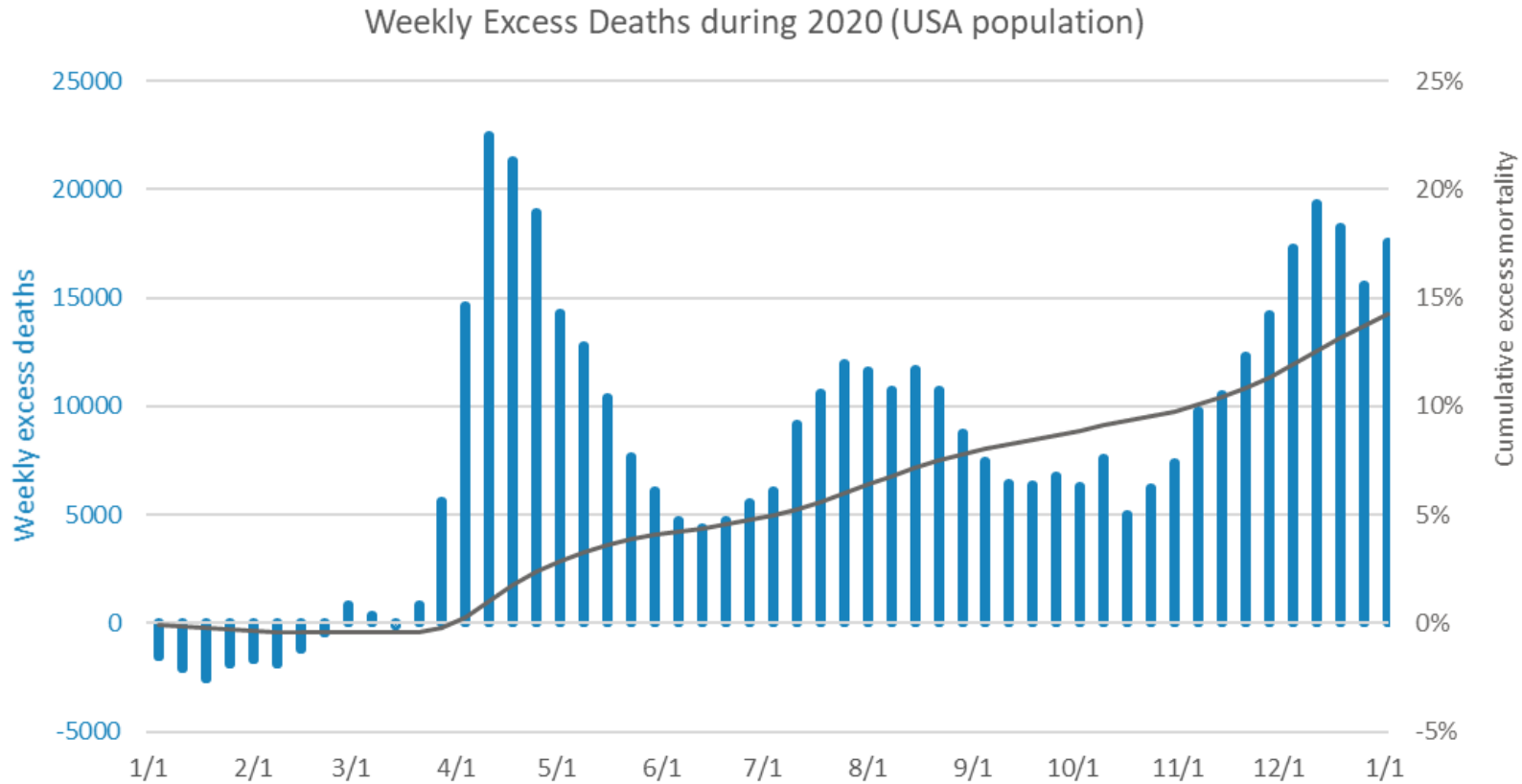


# Agenda

1. Introduction
2. Current state of the pandemic
3. Scenario modeling for COVID-19
4. Risk management for pension plans

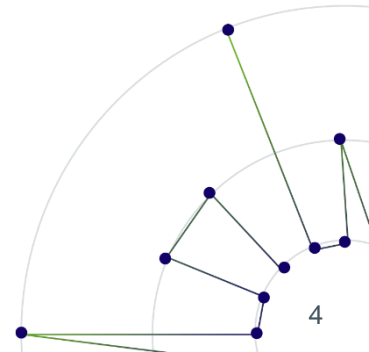


# US population level statistics

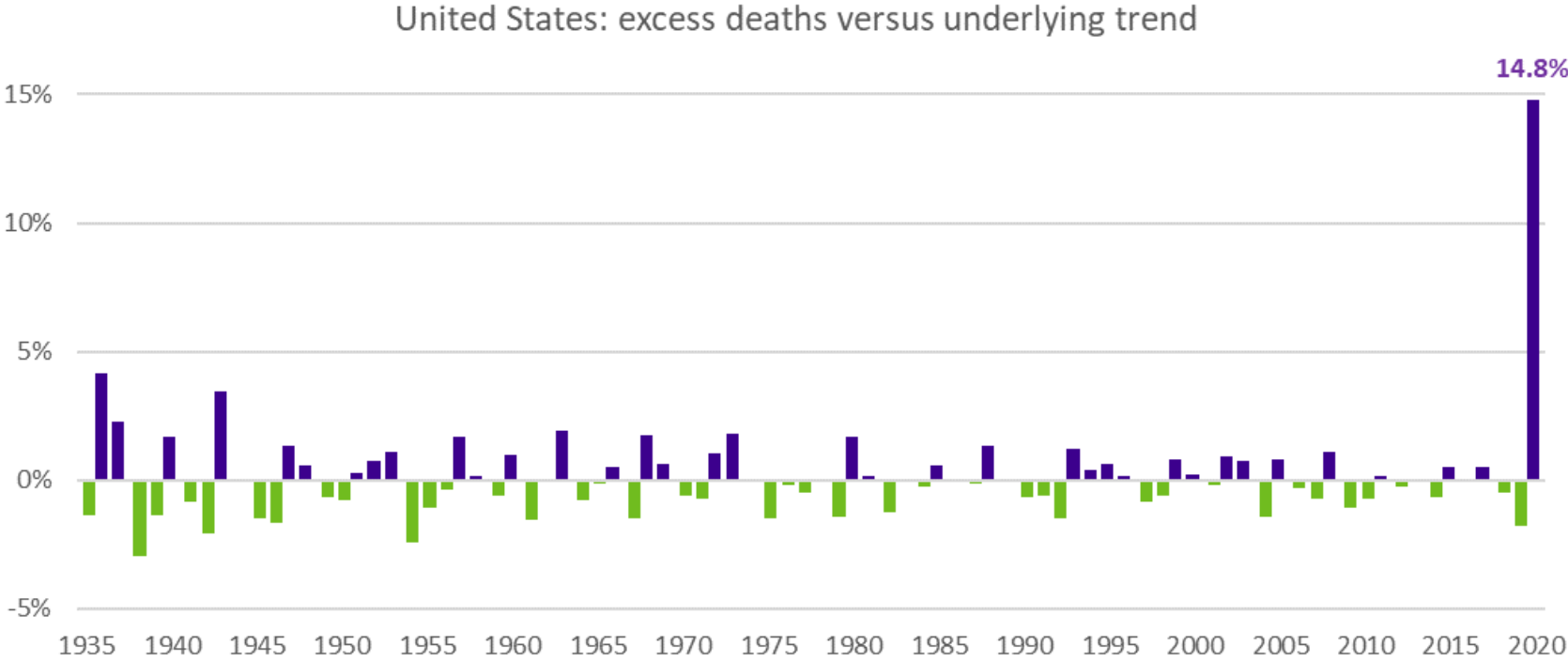


Source: Club Vita calculations using CDC and COVID Tracking Project data

c425k / c15% more deaths than expected in 2020

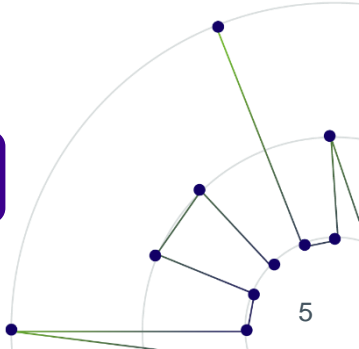


# Historical context of 2020 experience



Source: Club Vita calculations using HMD, CDC and COVID Tracking Project data

In isolation 2020 excess deaths will not significantly affect pension plan liabilities

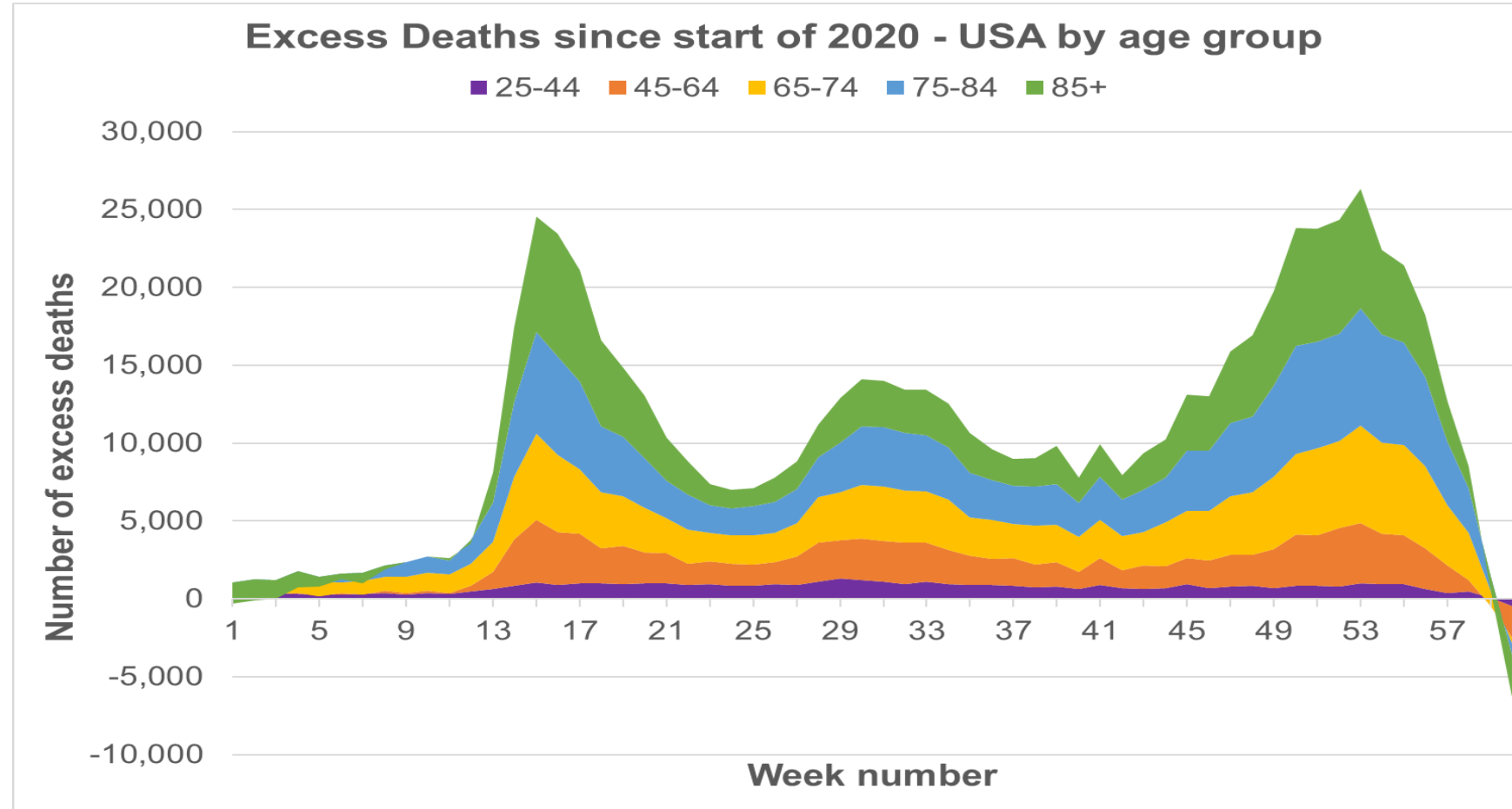


# Current state of the pandemic

# Reduction in excess mortality in USA in 3<sup>rd</sup> wave

Rapid reduction in excess deaths since start of year but care needed because of late reporting

47% of excess deaths under age 75 (vs. 28% in UK)



Source: [Weekly deaths by state from CDC](#)



# Reduction in excess mortality in USA in 3<sup>rd</sup> wave

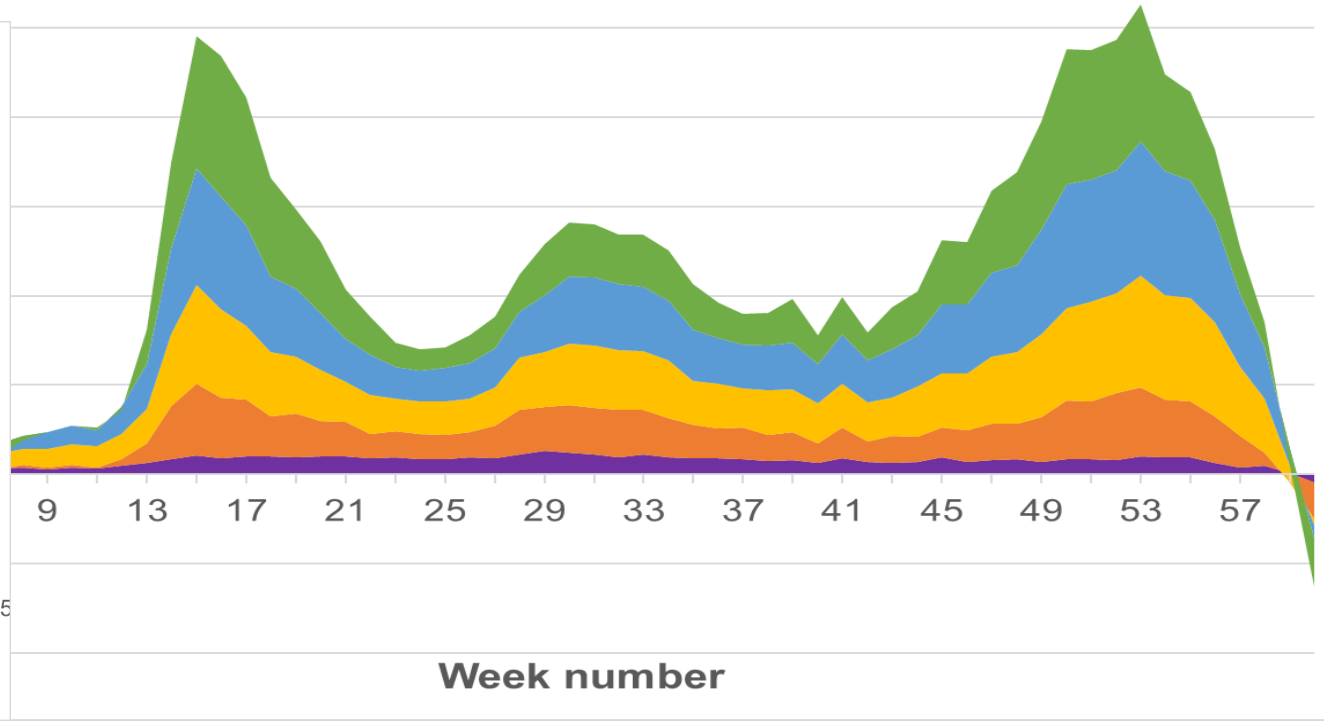
Similar patterns in number of reported deaths to mid-February across all age groups, in advance of impact of vaccines

### Excess Deaths since start of 2020 - USA by age group

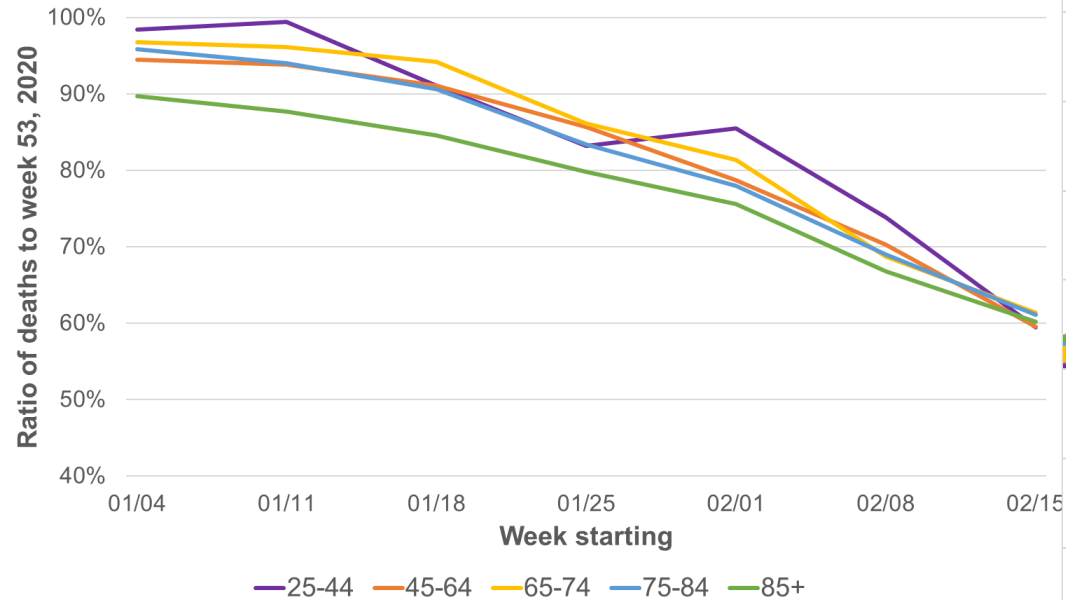
■ 25-44 ■ 45-64 ■ 65-74 ■ 75-84 ■ 85+

30,000

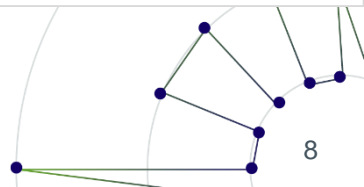
25,000



### Reduction in number of weekly deaths since start of 2021 - USA by age group



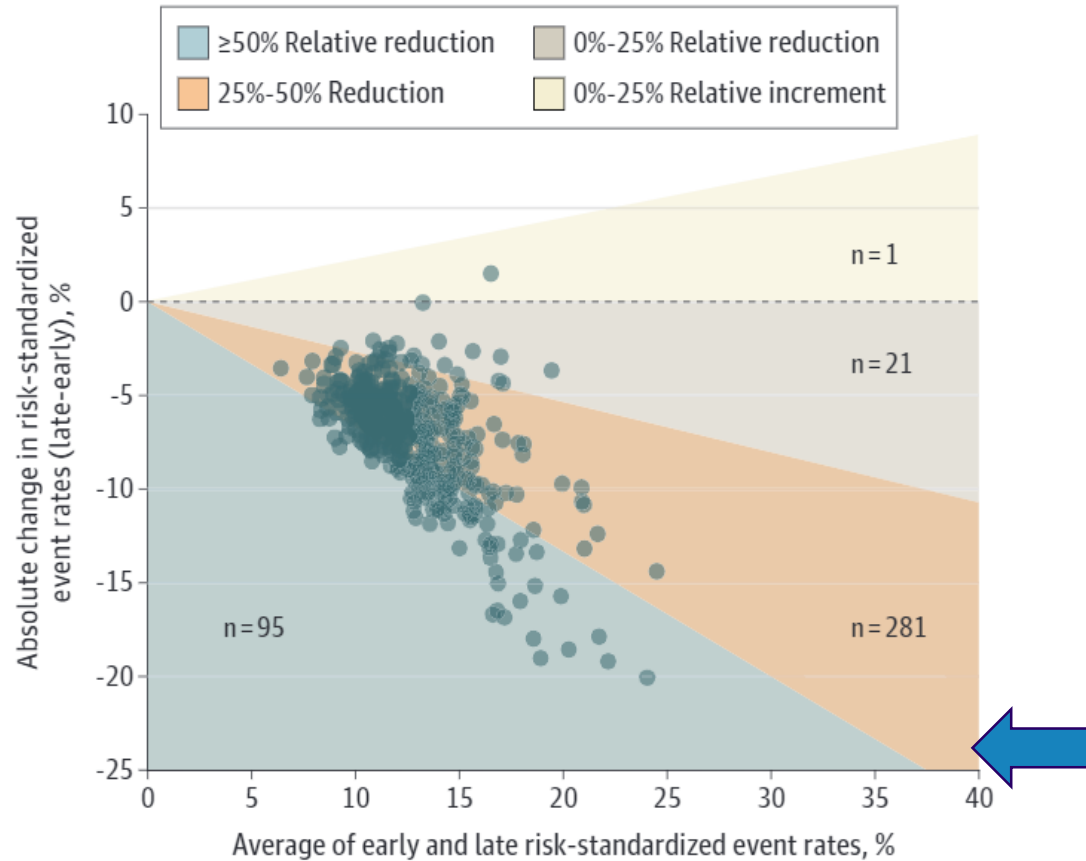
Source: [Weekly deaths by state from CDC](#)



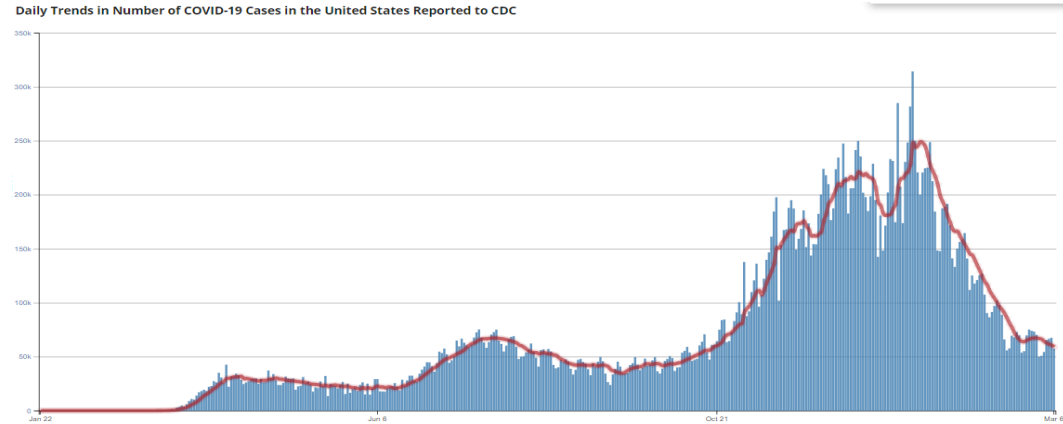


# Multi-factorial nature of improving mortality

## Cumulative improvements in treatment



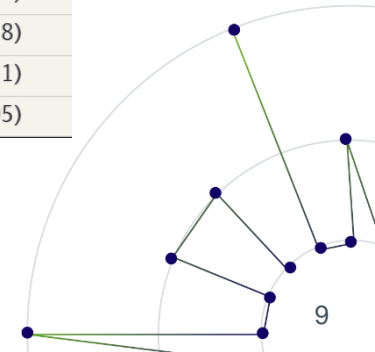
## Reducing number of infections



Source: [COVID Data Tracker](#)

Quintile	RSMR (95% CI)		
	Overall (N = 955)	Early period (n = 398)	Late period (n = 398)
<b>Mortality alone</b>			
Q1	5.17 (5.09-5.25)	7.26 (7.07-7.44)	3.32 (3.23-3.41)
Q2	6.12 (6.09-6.16)	9.20 (9.10-9.30)	4.20 (4.15-4.25)
Q3	7.08 (7.04-7.12)	10.85 (10.74-10.97)	5.12 (5.06-5.18)
Q4	8.43 (8.35-8.50)	13.10 (12.93-13.26)	6.13 (6.06-6.21)
Q5	11.88 (11.51-12.24)	18.61 (17.85-19.36)	8.69 (8.32-9.05)

Source: [Variation in US hospital mortality rates in 1<sup>st</sup> 6 months of pandemic](#)



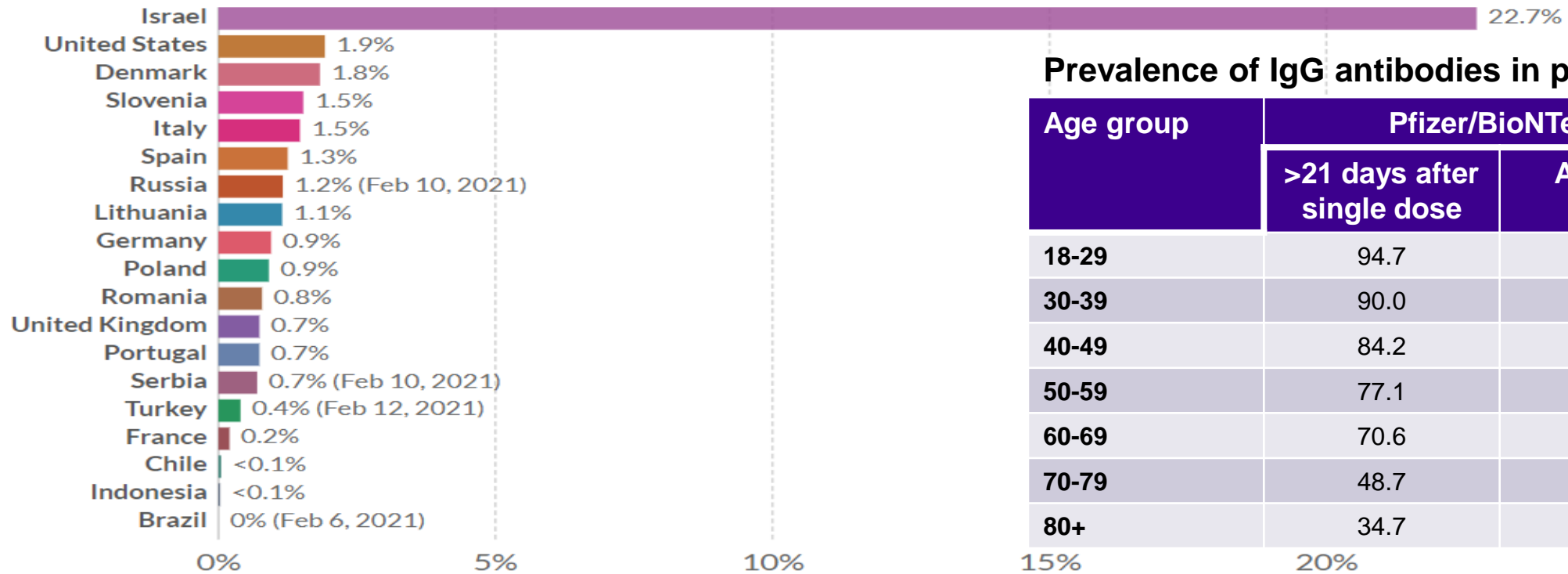
# Global picture of vaccination programmes

## Share of the population fully vaccinated against COVID-19, Feb 3, 2021

Share of the total population that have received all doses prescribed by the vaccination protocol. This data is only available for countries which report the breakdown of doses administered by first and second doses.

Our World  
in Data

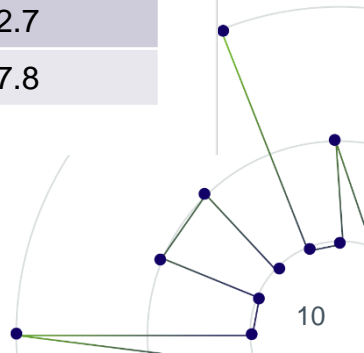
+ Add country



## Prevalence of IgG antibodies in population

Age group	Pfizer/BioNTech	
	>21 days after single dose	After two doses
18-29	94.7	100.0
30-39	90.0	100.0
40-49	84.2	96.3
50-59	77.1	92.2
60-69	70.6	95.9
70-79	48.7	92.7
80+	34.7	87.8

Source: [Our world in data](#), [REACT-2 study antibody prevalence](#)



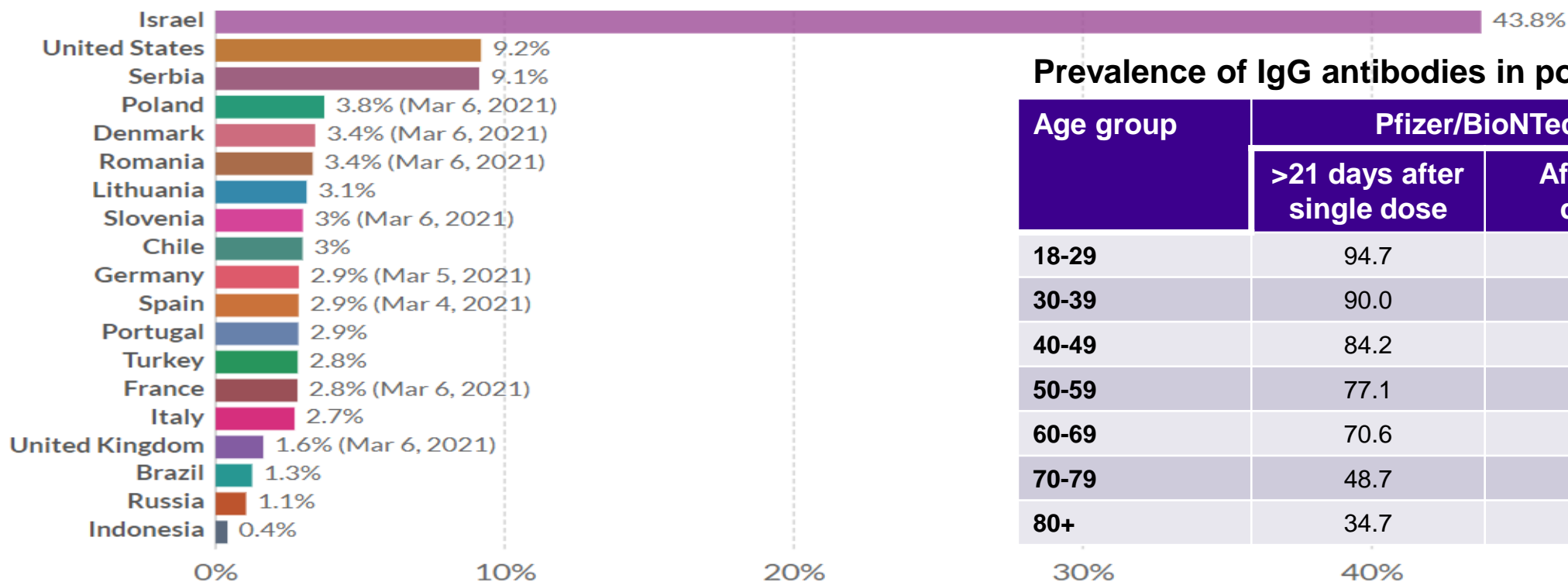
# Global picture of vaccination programmes

## Share of the population fully vaccinated against COVID-19, Mar 7, 2021

Share of the total population that have received all doses prescribed by the vaccination protocol. This data is only available for countries which report the breakdown of doses administered by first and second doses.

Our World  
in Data

+ Add country



## Prevalence of IgG antibodies in population

Age group	Pfizer/BioNTech	
	>21 days after single dose	After two doses
18-29	94.7	100.0
30-39	90.0	100.0
40-49	84.2	96.3
50-59	77.1	92.2
60-69	70.6	95.9
70-79	48.7	92.7
80+	34.7	87.8

Source: [Our world in data](#), [REACT-2 study antibody prevalence](#)

# Vaccine acceptance, hesitancy and access

Attitudes to vaccination vary significantly, between and within countries. **Framing** highly relevant to stated intentions.

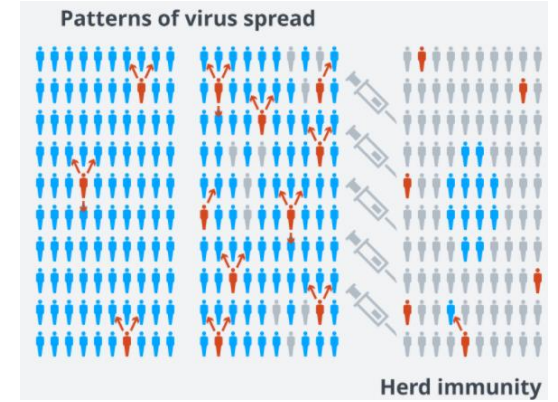
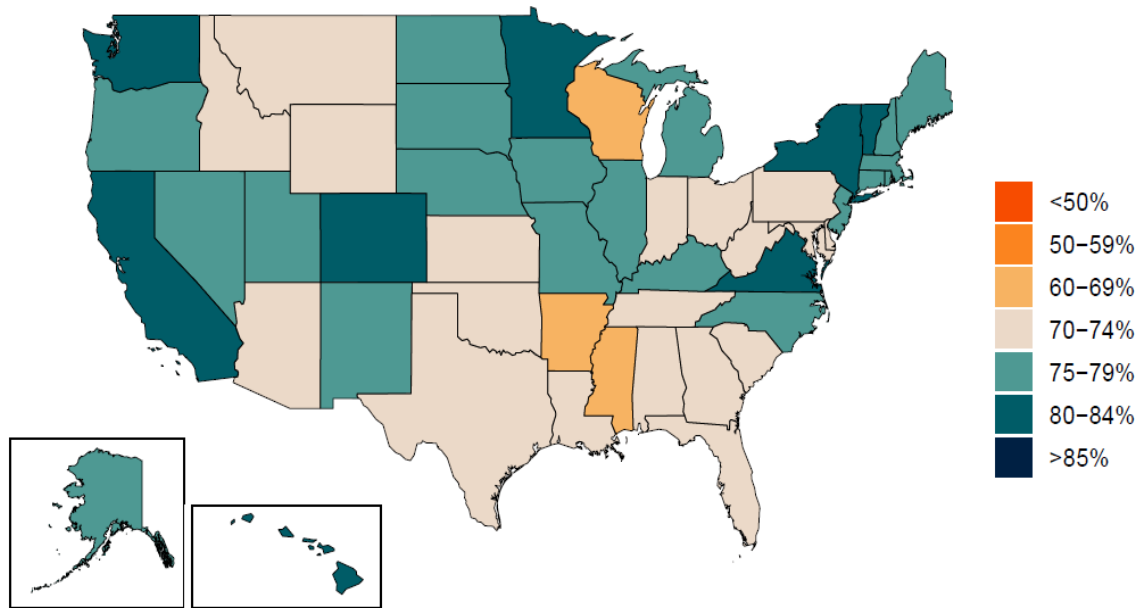
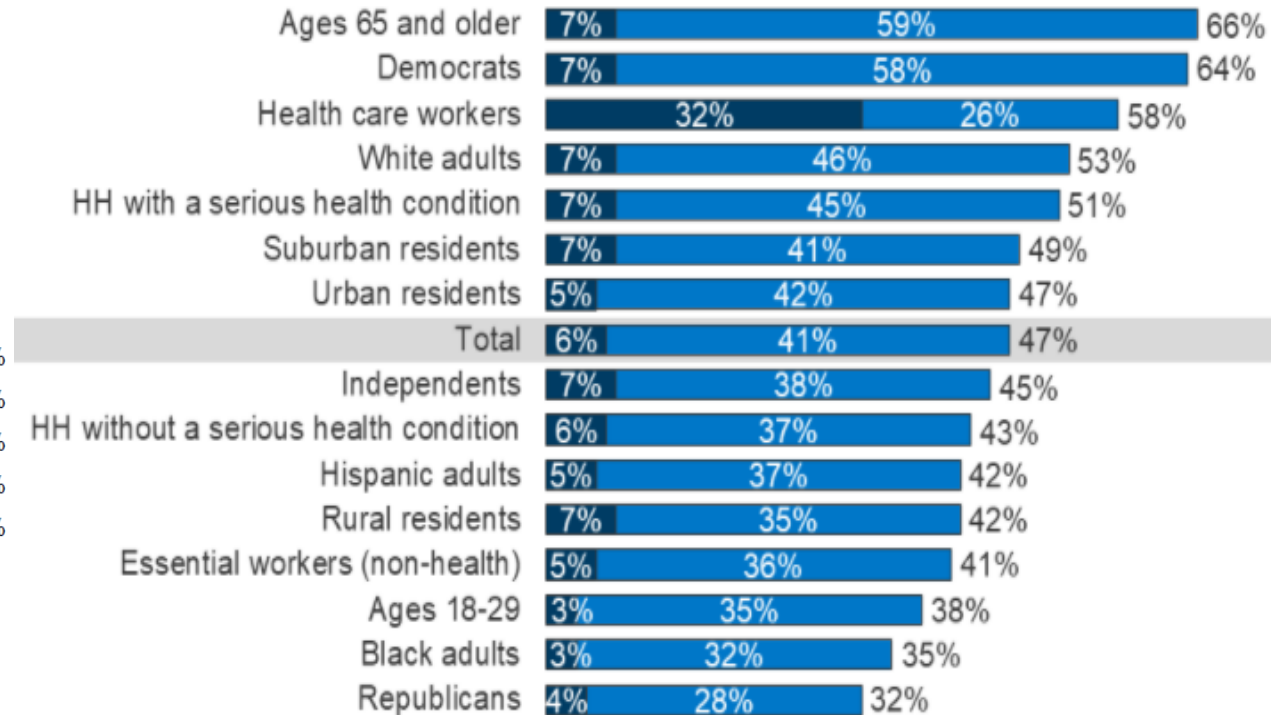


Figure 12. This figure shows the estimated proportion of the adult (18+) population that is open to receiving a COVID-19 vaccine based on Facebook survey responses



Source: [IHME COVID-19 Results Briefings – Dec 22](#)

## % already vaccinated or will get vaccine as soon as possible

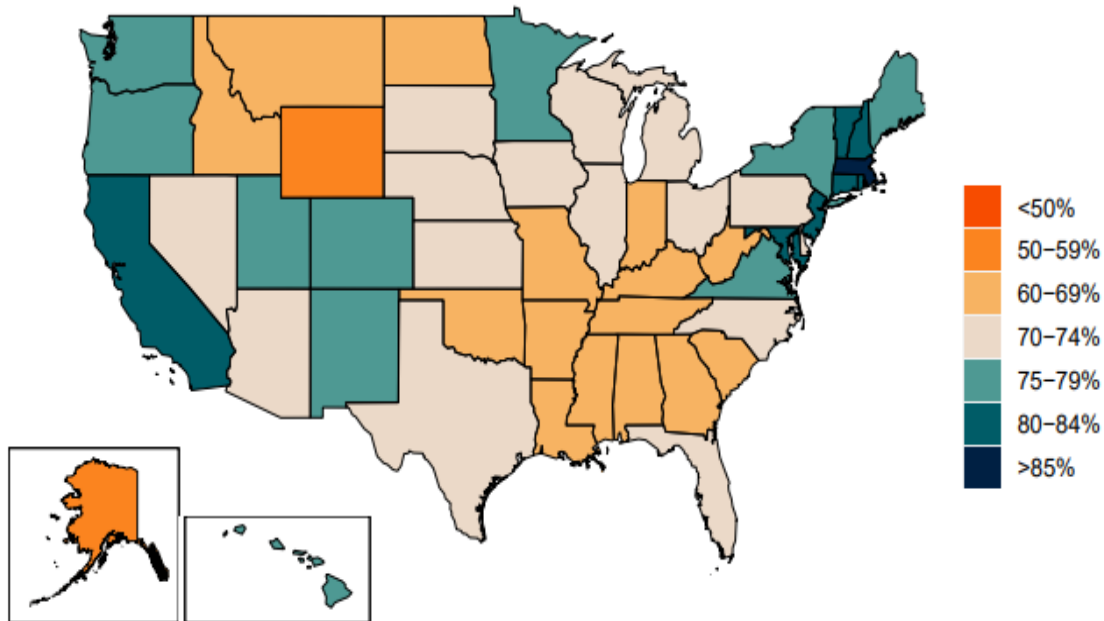


Source: [KFF COVID-19 Vaccine Monitor \(Jan\)](#)

# Vaccine acceptance, hesitancy and access

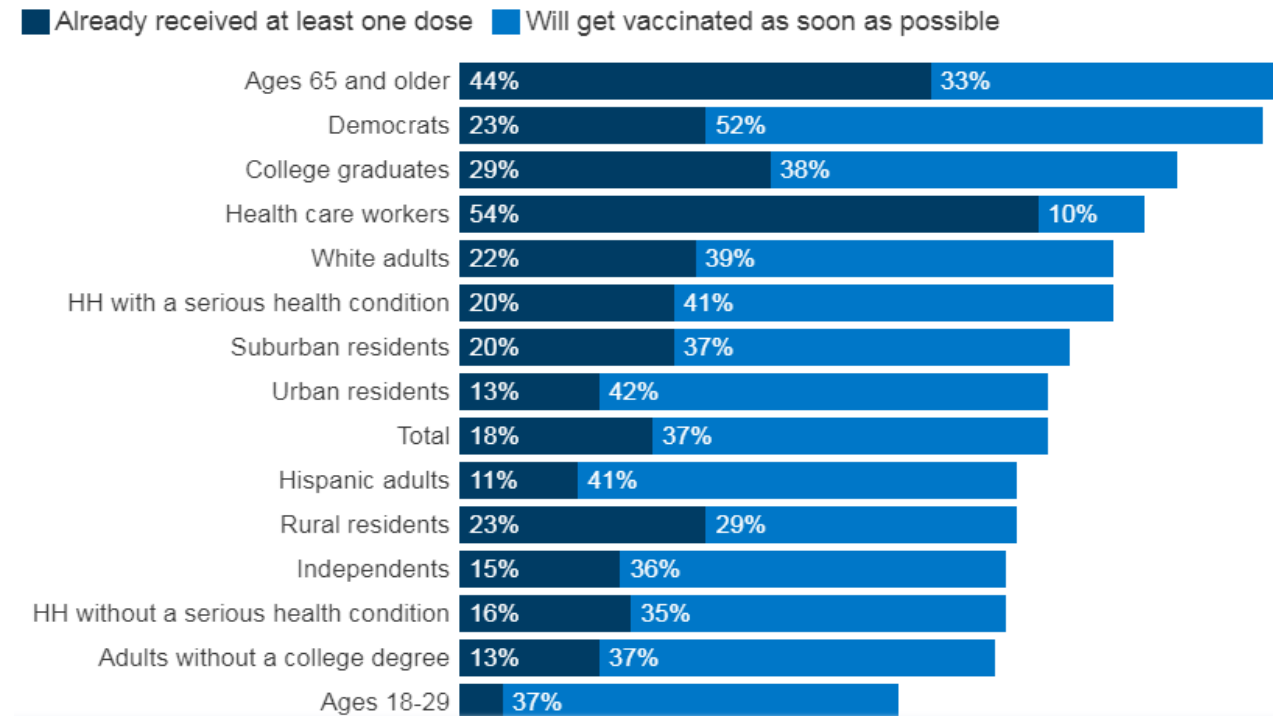
Attitudes to vaccination vary significantly, between and within countries. **Framing** highly relevant to stated intentions.

**Figure 15.** This figure shows the estimated proportion of the adult (18+) population that is open to receiving a COVID-19 vaccine based on Facebook survey responses (yes and yes, probably).



Source: [IHME COVID-19 Results Briefings – Mar 6](#)

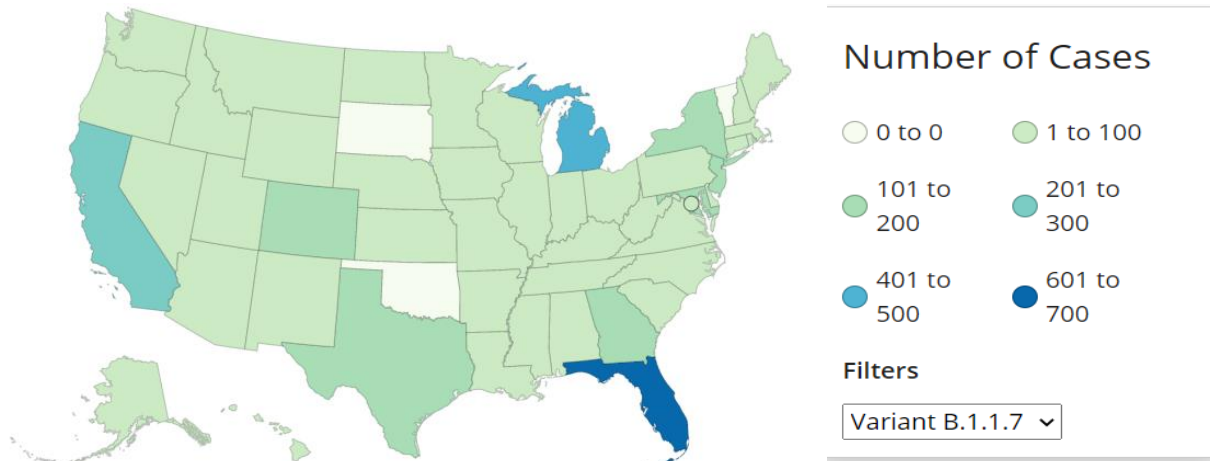
## % already vaccinated or will get vaccine as soon as possible



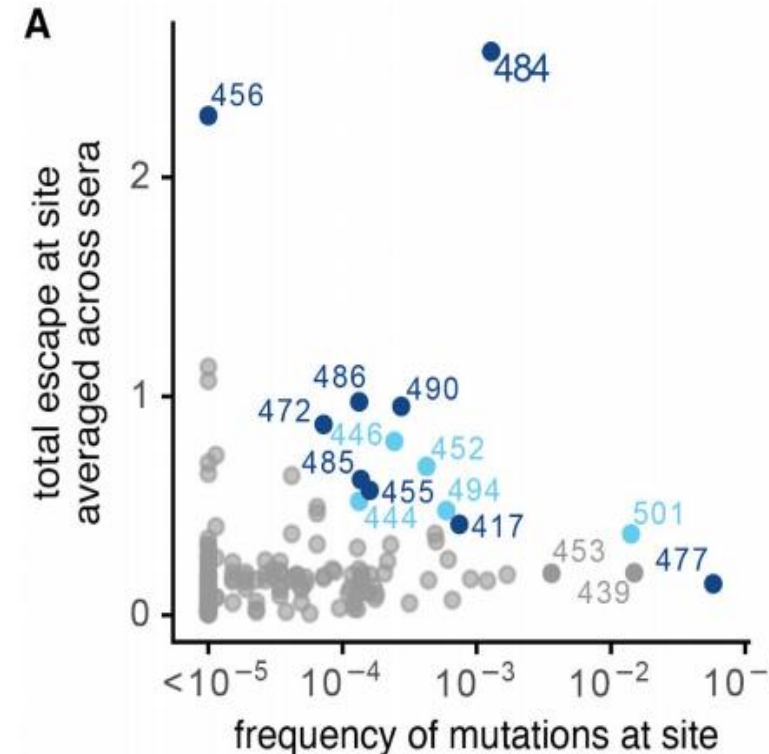
Source: [KFF COVID-19 Vaccine Monitor \(Feb\)](#)

# Impact of viral mutations on vaccine effectiveness

B.1.1.7 (501Y.V1) variant first detected in Kent, UK in September. Now dominant variant in UK. Since then, variants from South Africa & Brazil with E484K mutation, but limited numbers outside those countries. Threat of viral mutation in receptor-binding domain reducing effectiveness of antibodies from prior infection or vaccination



Variant	Reported Cases in US	Number of Jurisdictions Reporting
B.1.1.7	3037	49
B.1.351	81	20
P.1	15	9



mutation	cumulative prevalence
4 most frequent mutations	
S477N	5.69%
N439K	1.49%
N501Y	1.39%
Y453F	0.36%
mutations at key sites	
E484K	0.11%
K417N	0.07%
S494P	0.06%
L452R	0.02%
G446V	0.02%
F490S	0.02%
L452M	0.02%
L455F	0.02%
E484Q	0.02%
F486L	0.01%
G485R	0.01%

Source: [COVID-19 Cases caused by variants](#)

Source: [Comprehensive mapping of SARS-CoV2 mutations](#)

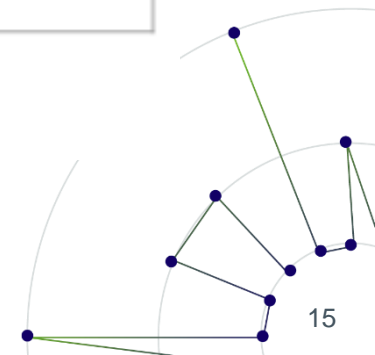
# Behaviours & concerns during a pandemic



% who, in this situation would...	Current compliance (n=670)	Imagine many others have been vaccinated, but not you (n=659)	Imagine you have been vaccinated (n=746)
follow current safety guidance*	65%	51%	44%
book a coronavirus test if developed symptoms	83%	83%	75%
self-isolate for 10 days if developed symptoms	91%	88%	82%
self-isolate for 14 days if close contact developed symptoms	88%	85%	77%

\*would wash hands regularly, keep distance from others, not meet up with other people to socialise  
 Green shading identifies statistically significantly highest (or joint highest) value within row.  
 Data collected by BIT on 3,538 UK adults on 11-15 December 2020.

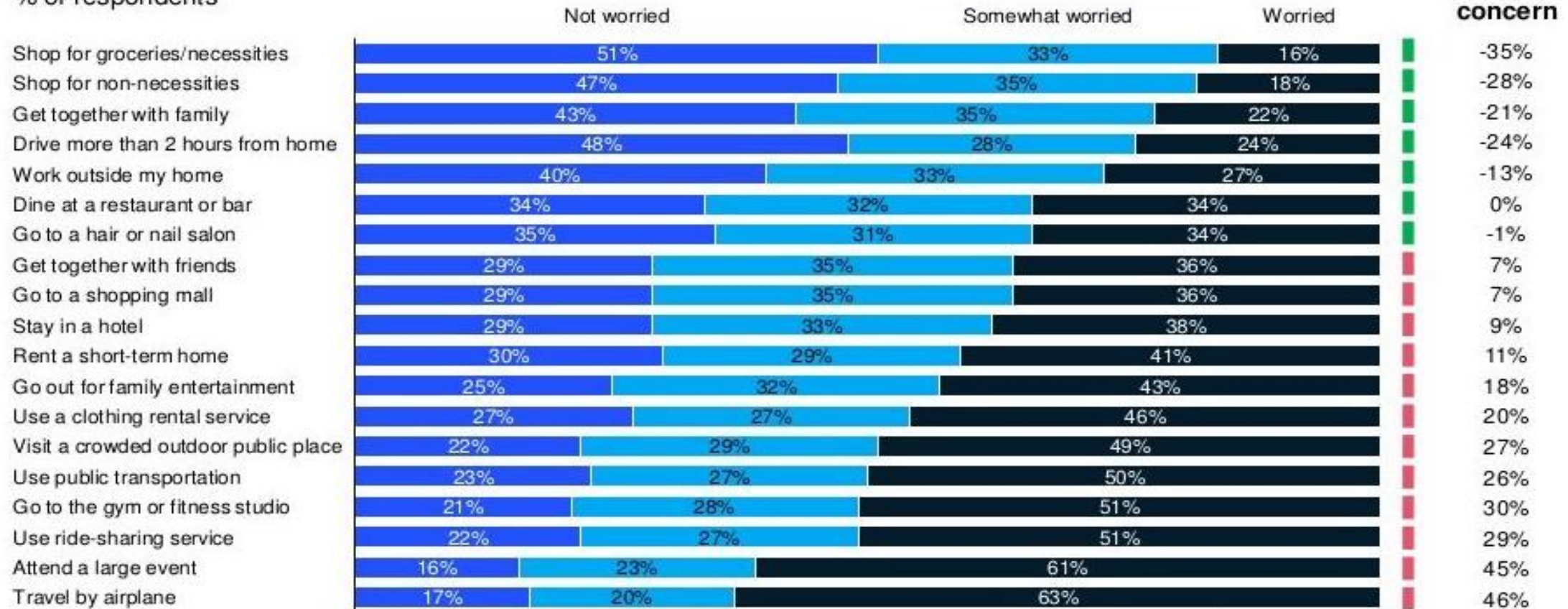
Source: [Behavioural Insights Team](#)



# Behaviours & concerns during a pandemic

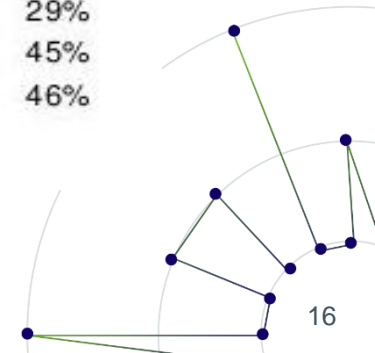
## Consumers' level of concern undertaking various activities

% of respondents



Source: McKinsey & Company COVID-19 United Kingdom Consumer Pulse Survey 9/24-9/27/2020, n = 1,083; sampled and weighted to match the UK's general population 18+ years

Source: [How COVID-19 is changing consumers](#)

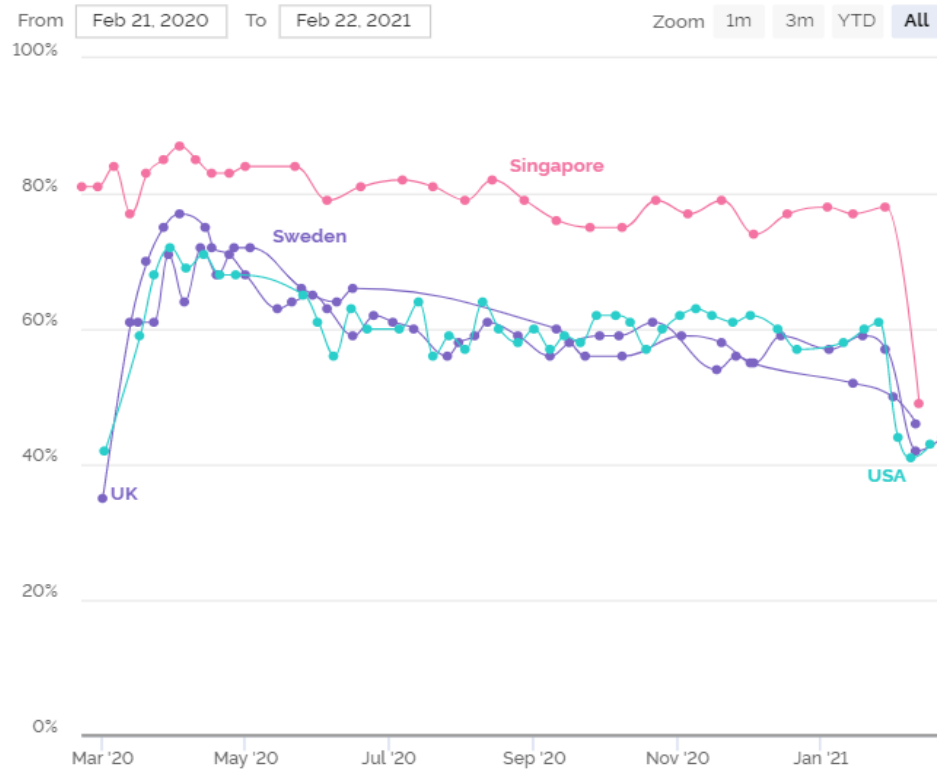




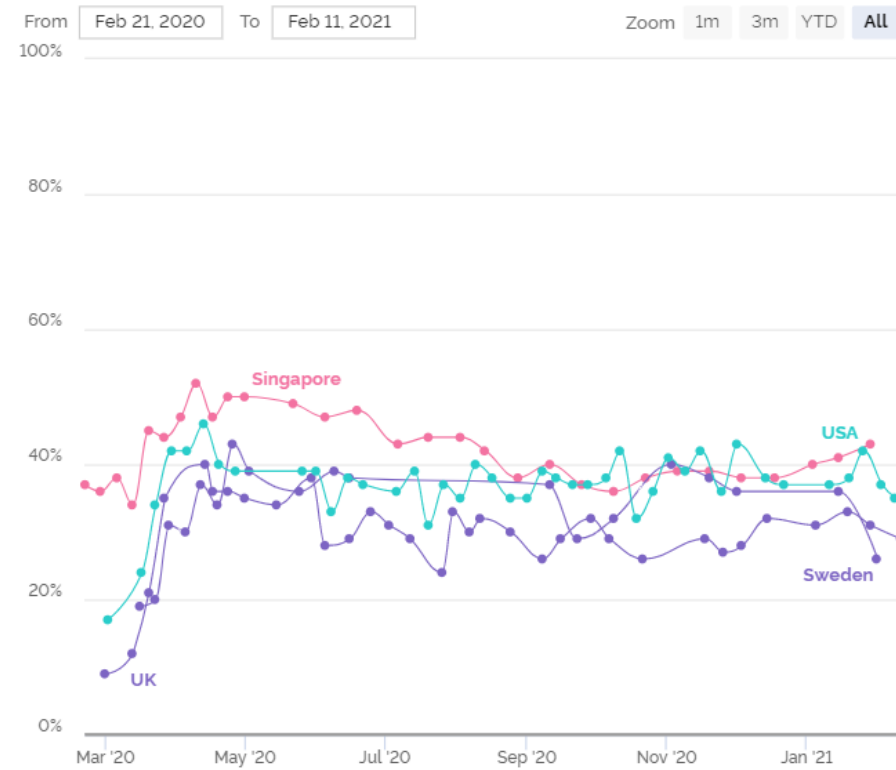
# International dimension to COVID behaviors

YouGov has been tracking behavioral changes across 25 countries for the last year through weekly surveys

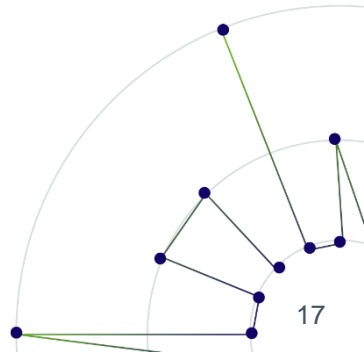
% of people in each market who say they are: Improving personal hygiene (e.g. washing hands frequently, using hand sanitiser).



% of people in each market who say they are: Avoiding physical contact with tourists.



Source: [Our shifting behaviour around coronavirus](#)

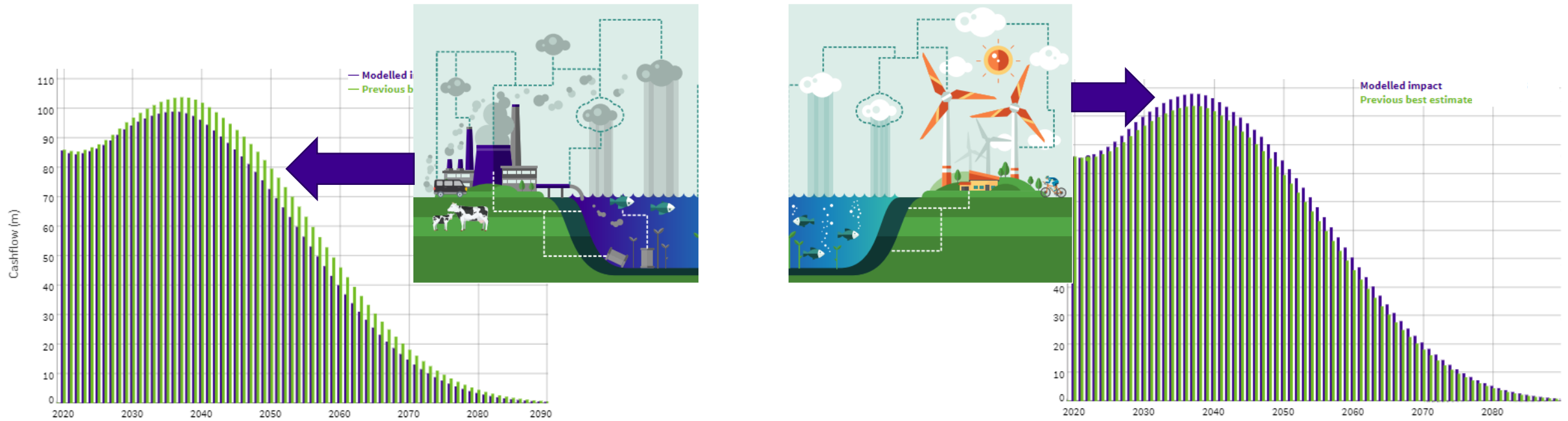


# Longevity scenario modeling

# Introduction to scenario modeling

## Scenario modeling

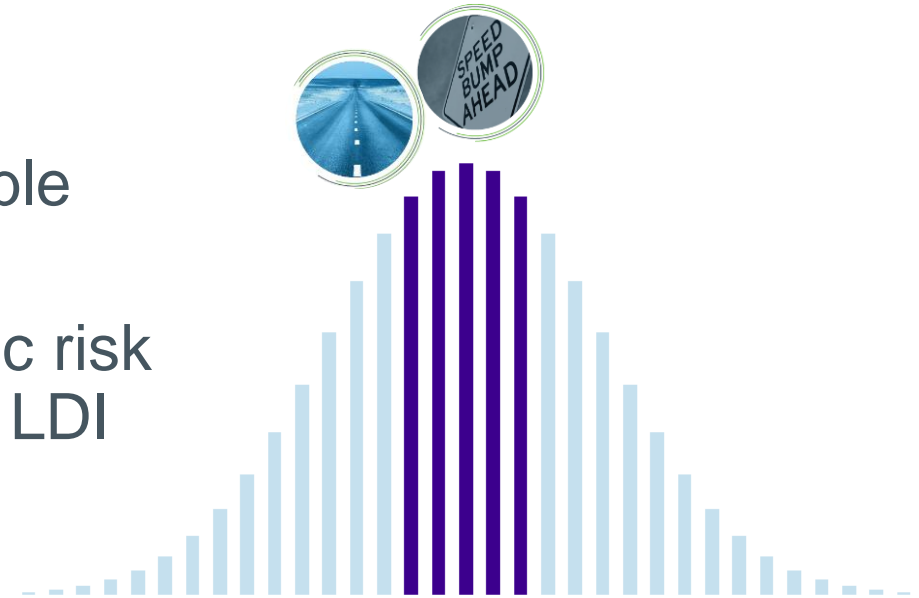
*The process of assessing the effects of specific scenarios on a pension plan's future financial position.*



# Uses of scenario modeling

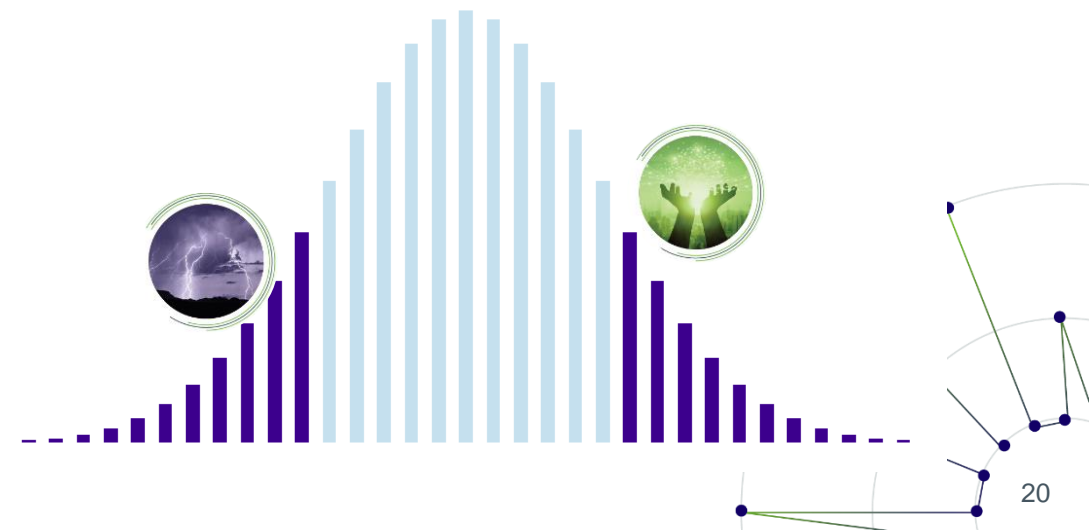
**Middle ground** – understand range of reasonable best estimates

- Understand frictional costs of demographic risk on funding and investment strategies and LDI portfolios

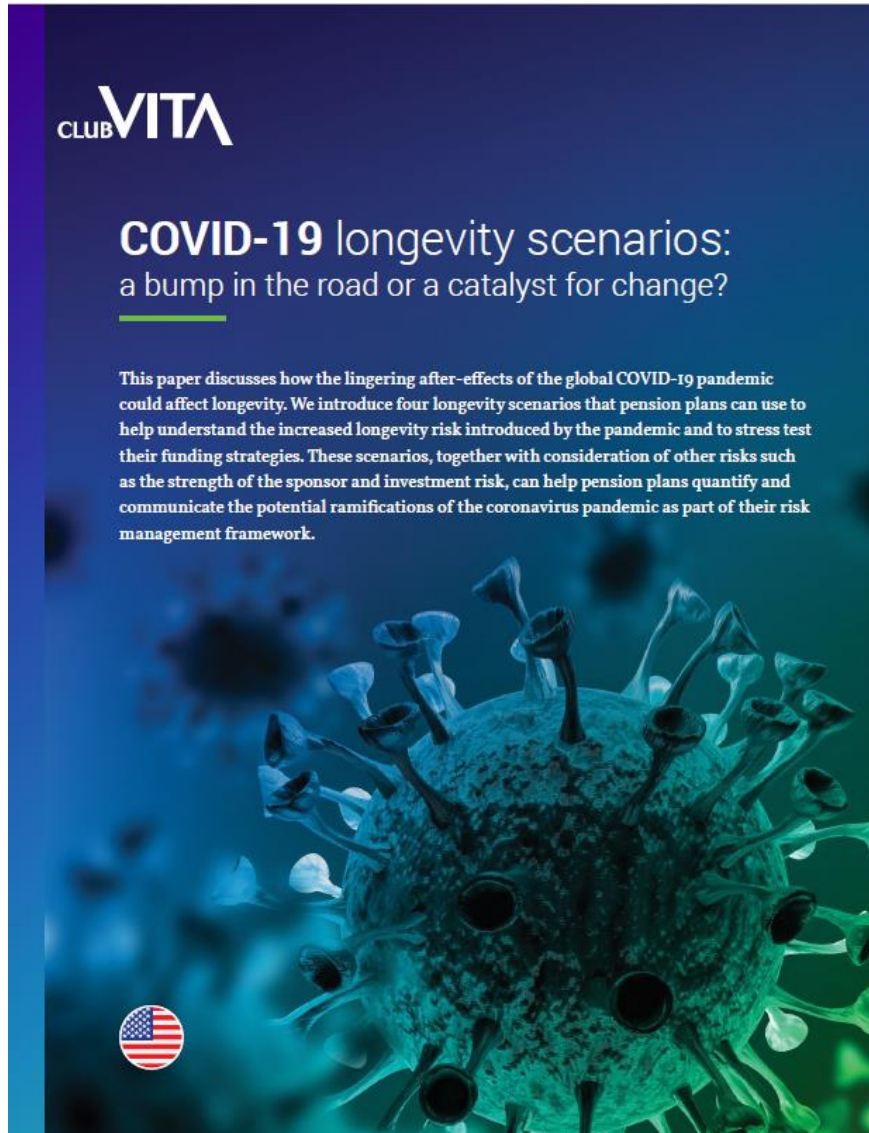


**Extreme events** – understand effects of tail events

- Identify unmanaged risk and possible mitigation strategies
- Test resilience of funding and investment decisions

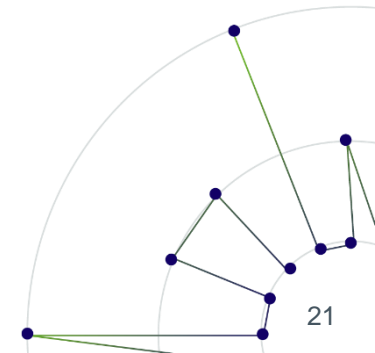


# Club Vita research paper



## Research paper and accompanying technical appendices

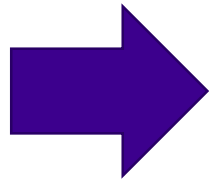
- US: <https://www.clubvita.us/collaborative-research/covid-19-longevity-scenarios-a-bump-in-the-road-or-a-catalyst-for-change>
- UK: <https://www.clubvita.co.uk/collaborative-research/covid-19-longevity-scenarios-a-bump-in-the-road-or-a-catalyst-for-change>
- Canada: <https://clubvita.ca/Collaboration/Scenarios>



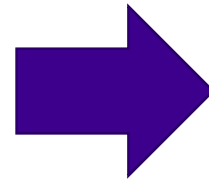
# Calibration process







Define scenarios

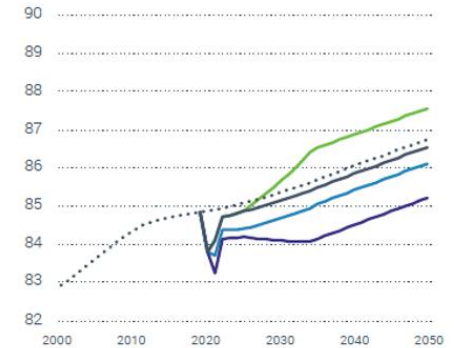
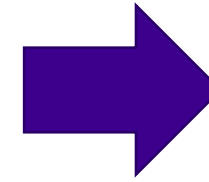


Distil available research on specific / similar events

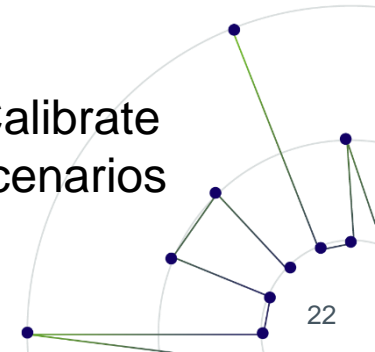


Key mortality drivers	
	Direct short-term risk of COVID-19
	Disruption to non-COVID medical care
	Changes to health and care systems
	Global Recession

Determine effects of specific events on key longevity drivers



Calibrate scenarios



# Club Vita's COVID longevity scenarios



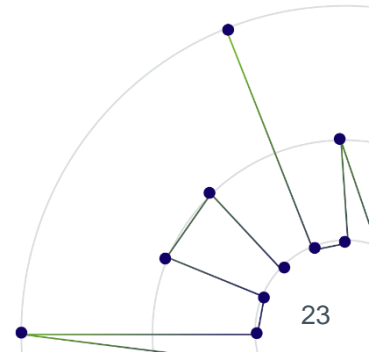
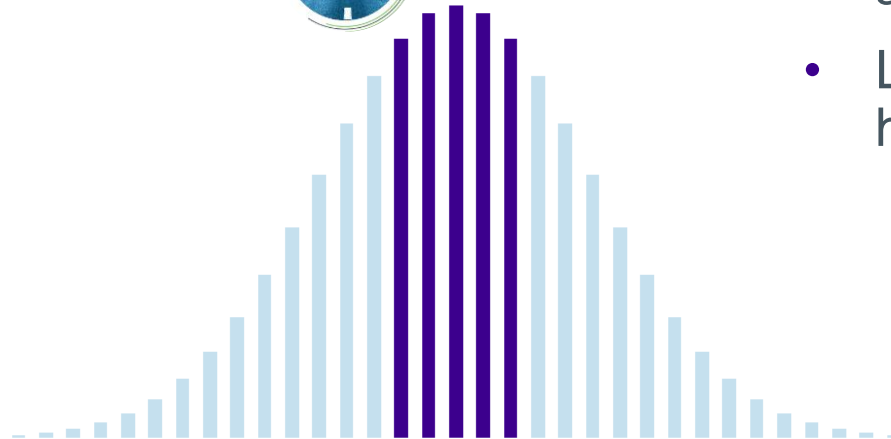
## Bump in the Road

- Effective roll out of vaccine results in a swift recovery from the pandemic
- Marked increase in deaths in 2020 and 2021
- Then largely return to pre-pandemic trajectory
- ...but with a couple of “lost-years” of improvements



## Long Road to Recovery

- Challenges to efficacy and take up of the vaccine result in prolonged effect of the pandemic.
- COVID related excess mortality continues through first half of 2020s
- Longer term disruption to non-COVID medical services: low levels of improvements in 2020s and 2030s
- Lower socioeconomic groups hardest hit



# Club Vita's COVID longevity scenarios



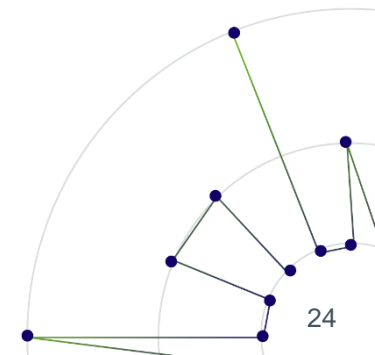
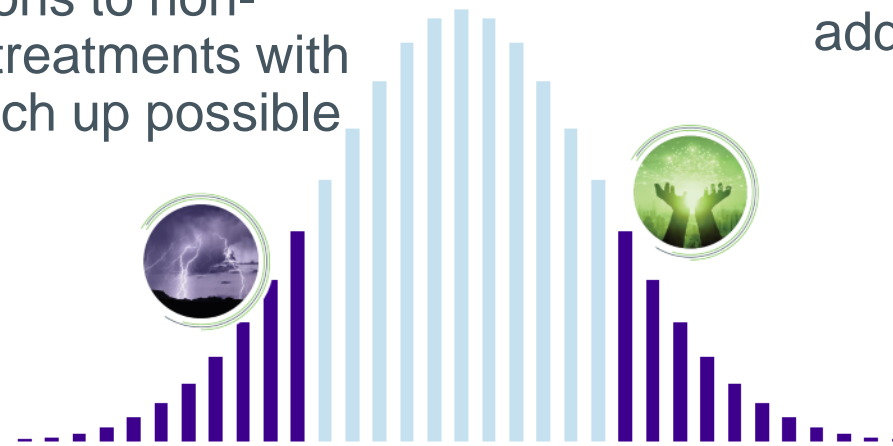
## Healthcare Decline

- Initial optimism around the vaccine proves unfounded – adverse publicity limits uptake and new mutations limit effectiveness
- Persistent waves of COVID-19 mortality through 2020s
- Healthcare provisions overwhelmed by each wave
- Massive disruptions to non-COVID medical treatments with no periods of catch up possible



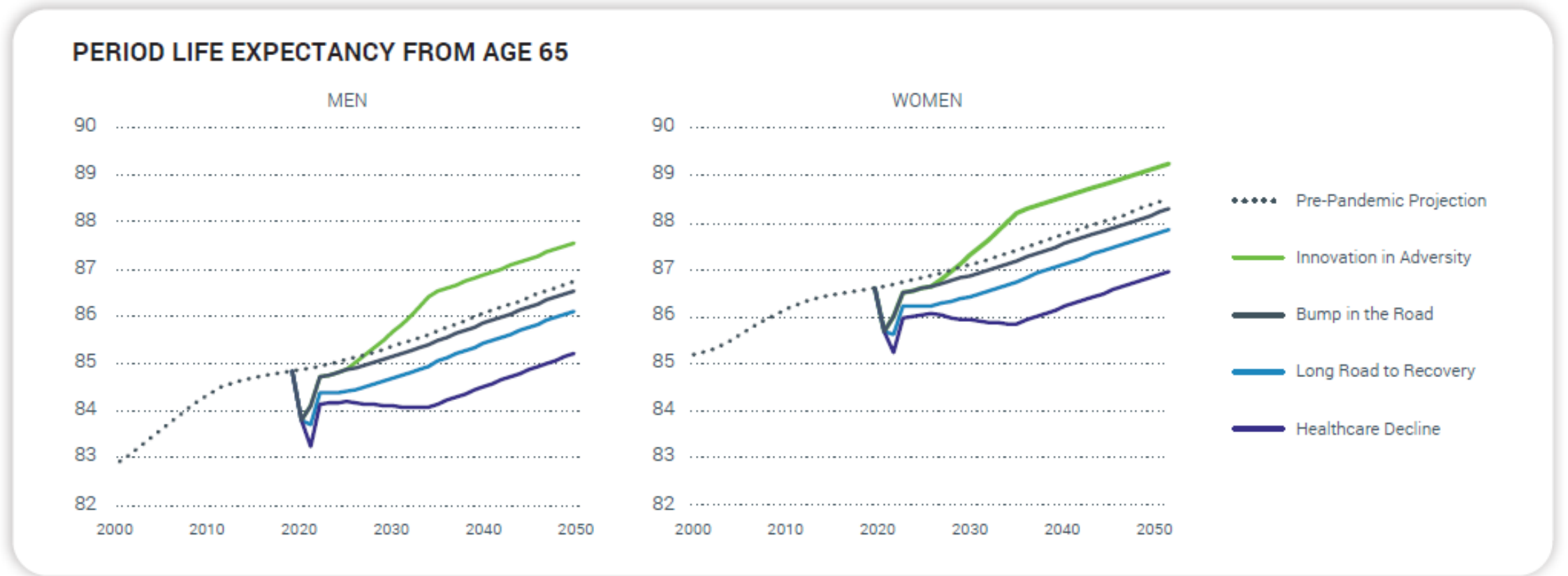
## Innovation in Adversity

- Effective roll out of vaccine results in a swift recovery from the pandemic
- 'V-shaped' economic recovery allowing catch-up in lost years of improvements
- Lessons learned act as catalyst for longer term improvements – directly from medical advances and indirectly from efforts to address health inequality

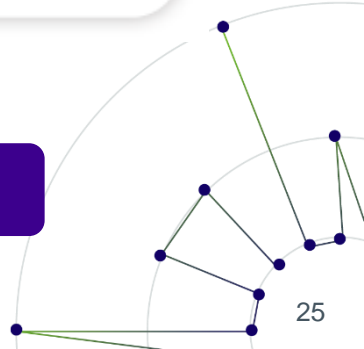




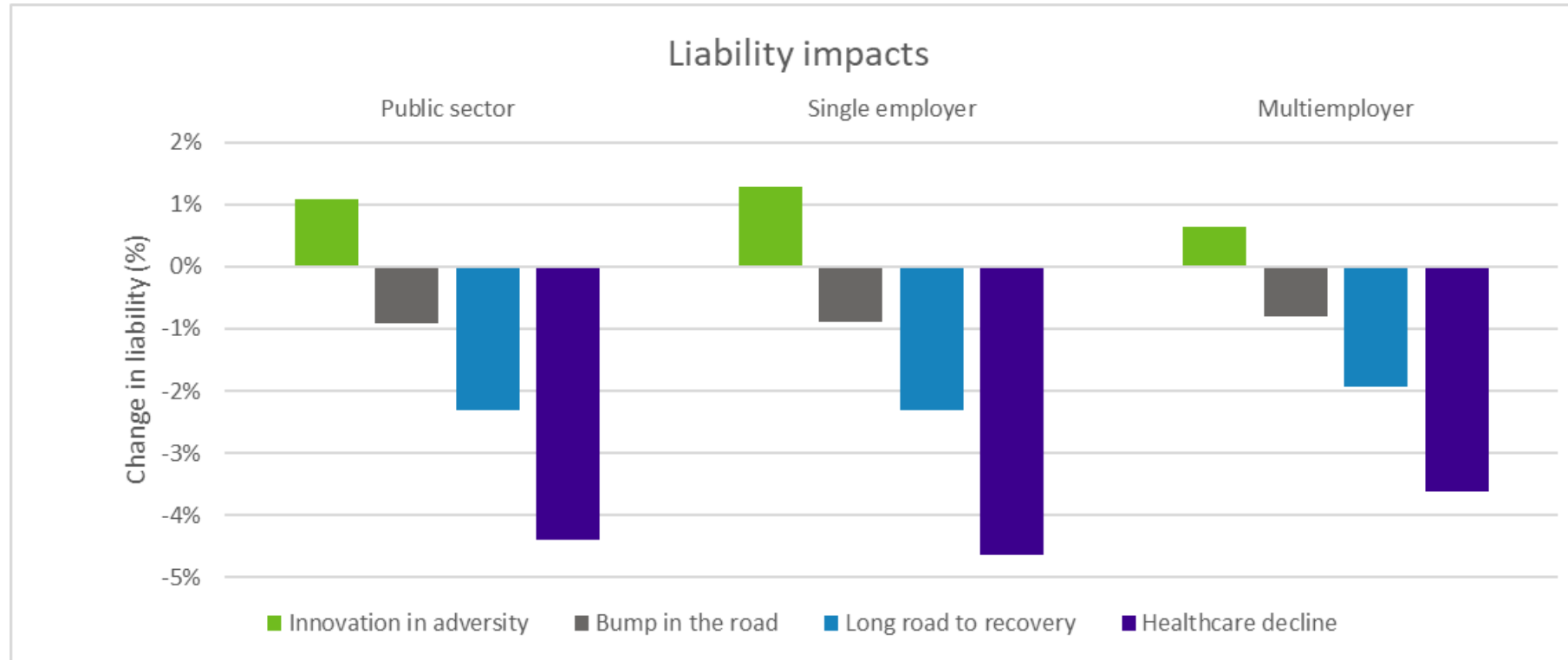
# Comparison of scenarios



Period life expectancy will only stay low if 2020/21 experience persists



# Comparison of scenarios



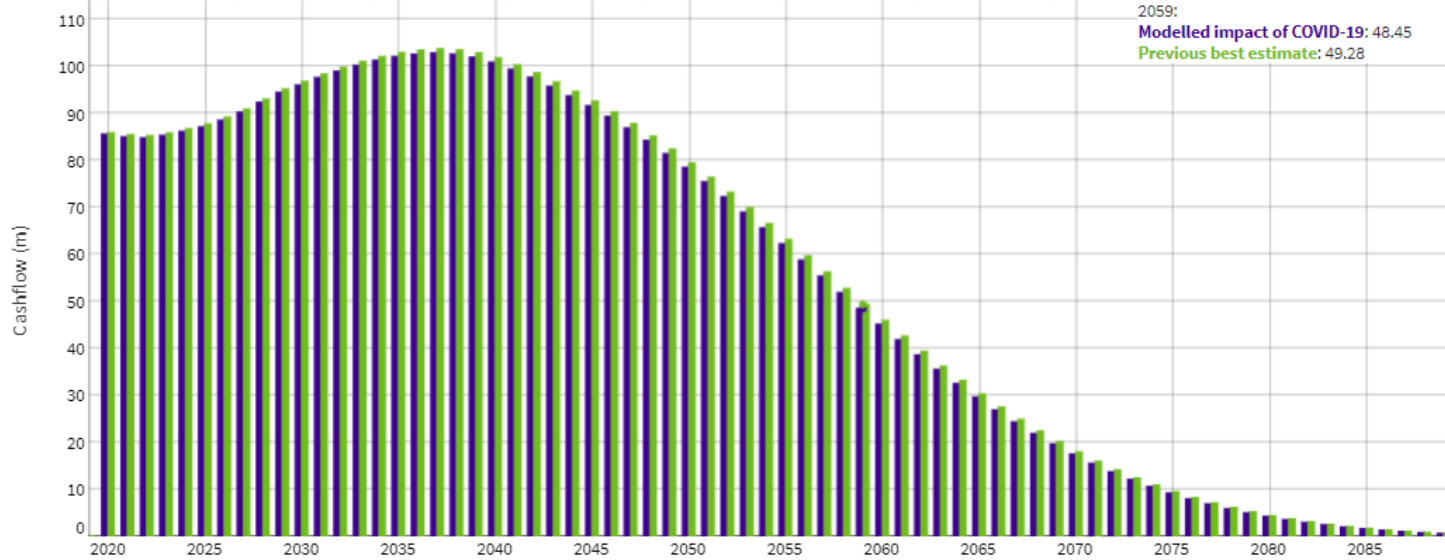
Liabilities will also be affected by changes to other demographics and financial conditions / outlook

# Calibration of scenarios



## Bump in the road

Modelled impact of COVID-19 on annual plan cashflows



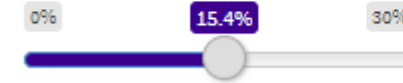
**-0.88%**  
CHANGE IN PRESENT VALUE

**-0.042 yrs**  
CHANGE IN DURATION

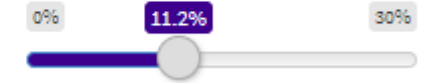
**-0.25 / -0.24 yrs**  
CHANGE IN AVERAGE LIFE EXPECTANCY

### Immediate impact of COVID-19\*

Year 0 (2020)

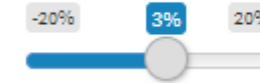


Year 1 (2021)

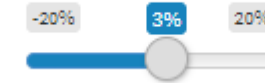


### Longer term impact\*

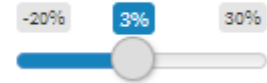
Initial



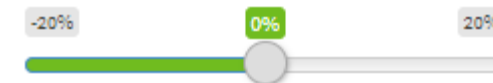
Intermediate



Ultimate



### Socioeconomic differences\*



\*calibration has been simplified for ease of presentation

# Dynamic scenario modeling

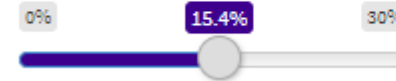
Larger impact in 2021?

Higher long term impact?

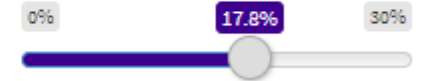
Reduced long term impact on higher socioeconomic groups?

## Immediate impact of COVID-19\*

Year 0 (2020)



Year 1 (2021)



## Longer term impact\*

Initial



Intermediate



Ultimate



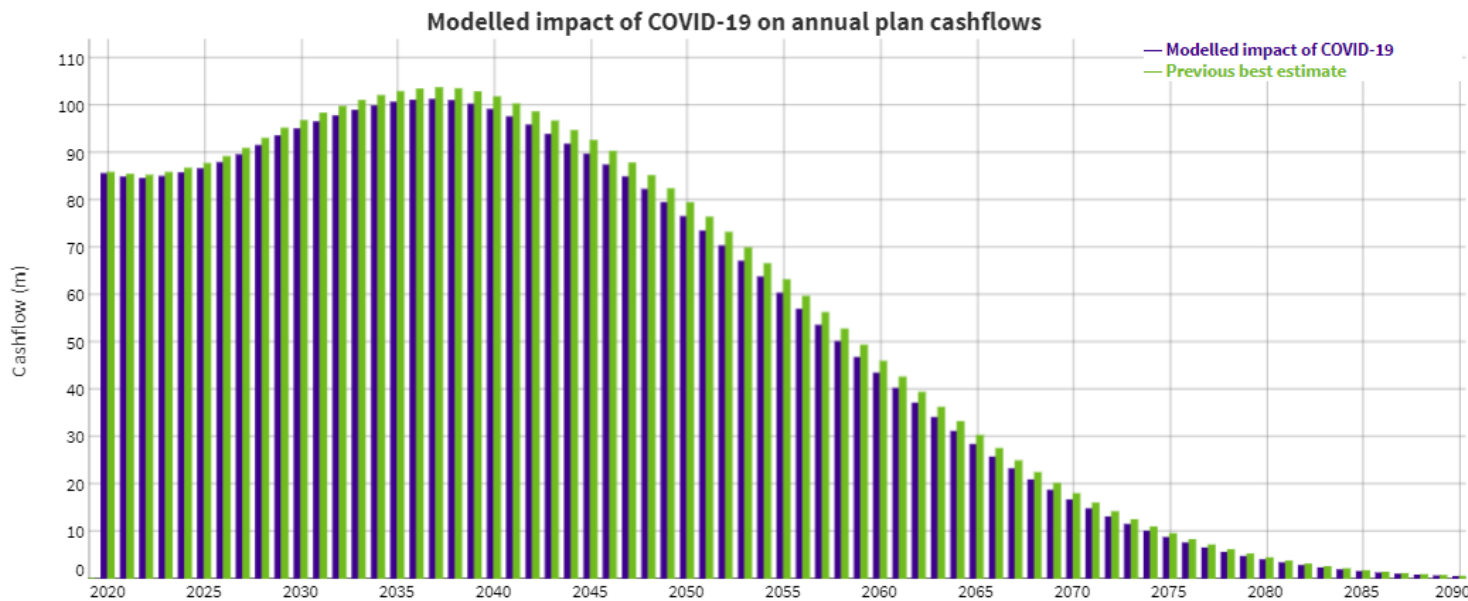
## Socioeconomic differences\*



\*calibration has been simplified for ease of presentation

# Dynamic scenario modeling

## Bespoke scenario



**-2.3%**

CHANGE IN PRESENT VALUE

**-0.16 yrs**

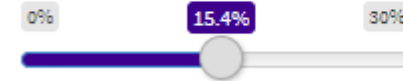
CHANGE IN DURATION

**-0.65 / -0.63 yrs**

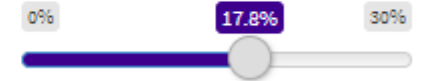
CHANGE IN AVERAGE LIFE EXPECTANCY

### Immediate impact of COVID-19\*

Year 0 (2020)



Year 1 (2021)



### Longer term impact\*

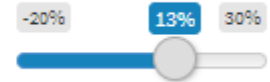
Initial



Intermediate



Ultimate



### Socioeconomic differences\*



\*calibration has been simplified for ease of presentation

# Risk Management for Pension Plans

*Informing discussions with plan sponsors*

What we know is a drop,  
what we don't know is an ocean.  
- Isaac Newton

# Leveraging the scenarios in consulting engagements

- ASOP 51 risk assessments
  - For some plans, this paper may be enough
  - For larger plans (or plans that can materially impact the employer), the scenarios create a starting point for a plan-specific risk assessment
- Actuarial assumption setting
  - Provides a framework for identifying and rationalizing proposed assumption modifications



# Assumption Setting Considerations

## Annual Valuation

---

- ASOPs 27 (Economic) and 35 (Demographic)
- Prescribed vs. actuary-selected/advised
- Professional judgment
- Views of experts may be considered
- Consider characteristics of covered group
- Relevant factors affecting future experience
- Reasonable
- Consistent
- No significant bias

## Risk Modeling

---

- ASOP 51
- Professional judgment
- Views of experts may be considered
- One or more assumptions differ from annual valuation measurements
- Plausible outcomes

## Constructing ASOP 51 Scenarios

There's more  
than just  
longevity to  
consider

- **Capital markets** will behave differently in each of these scenarios, and that dynamic should be considered when constructing consistent economic assumptions
- **Other demographic assumptions** may be impacted as expected employee behavior could differ with respect to retirement, turnover, disability, form of payment, etc.
- **Employer's view on risk** may be impacted by COVID-19 generally, and could vary by scenario

# Customizing Risk Modeling Scenarios

Potential Demographic Assumption Impact  
(Long Road to Recovery / Healthcare Decline)



	Nurses	Teachers	Consultants
<b>Longevity</b>	Decline	Decline	Increase
<b>Retirement</b>	Earlier	Earlier	Later
<b>Turnover</b>	Higher / Lower	Higher / Lower	Higher
<b>Disability</b>	Higher	Lower / Little Change	Lower / Little Change

**Caution:** These are broad generalizations; expectations may vary by employer, geography, plan design, and other factors.

Longevity driven by socioeconomic groupings and job classification

Retirement may be higher for front-line workers with more direct exposure to COVID and higher potential rates of burnout

Turnover may be higher where the ability to effectively work remotely increases job opportunities outside of current geography

COVID could have lasting effects that leads to increased long-term incidence of disability

# Annual Valuation Assumption Setting

- Base mortality table may not be impacted for 5+ years
  - Teachers plans may be the earliest adopters
- Mortality improvement assumption requires more immediate attention
  - How long is it reasonable to not make any adjustment?
  - Select and ultimate assumptions
  - Different projections scales for different plan sub-populations
  - Ultimate long-term rate of improvement
- Adjusting mortality assumption may be an opportunity to lower the discount rate
- Carefully reassess other assumptions for continued reasonableness and consistency

## Closing Thoughts

- Be aware of the interaction with other risks when constructing plausible scenarios for risk assessment
  - Funding and accounting bases
  - Investments
  - Strength of sponsor
- Consultants using these scenarios to consult with clients need to think about and really understand the associated economic implications of each

# Questions?



Dan Reddy  
**Webinar chair**

US CEO,  
Club Vita



Dan Ryan  
**Panelist**

Founder and Chief  
Science Officer,  
COIOS Research



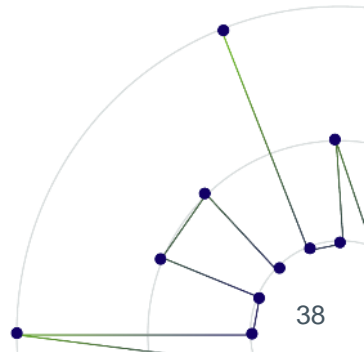
Erik Pickett  
**Panelist**

Actuary and Chief  
Content Officer,  
Club Vita



Ellen Kleinstuber  
**Panelist**

Chief Actuary,  
Bolton



# Thank you

This Powerpoint presentation contains confidential information belonging to Club Vita LLP (CV). CV are the owner or the licensee of all intellectual property rights in the Powerpoint presentation. All such rights are reserved. The material and charts included herewith are provided as background information for illustration purposes only. This Powerpoint presentation is not a definitive analysis of the subjects covered and should not be regarded as a substitute for specific advice in relation to the matters addressed. It is not advice and should not be relied upon. This Powerpoint presentation should not be released or otherwise disclosed to any third party without prior consent from CV. CV accept no liability for errors or omissions or reliance upon any statement or opinion herein.

