CLUB VITA

Club Vita's Mega Trends

Our predictions for upcoming changes to the longevity landscape

Foreword

Yogi Berra – the baseball-playing philosopher - had it right: "it's tough to make predictions, especially about the future".

It turns out that longevity predictions are harder than hitting home runs. History reveals a lousy record of serial underestimation by experts, at least when you study the country level expectations. When you look at the classic Vaupel and Oeppen chart (updated in a recent Club Vita Top Charts article) you notice that simply putting a ruler through the past would have been more accurate than the complex models that underpinned the estimates.

Why have lifespan gains been under-estimated?

The received wisdom was that there was a biological limit on human lifespan, as with domesticated pets. The logic was that the more the average lifespan rose, the harder it would become to achieve further gains as the remaining pool of unhealthy people would shrink. Thus, there was a widespread belief that the past would not have been a good guide to the future. The experts calibrating their models had a presumption that there must be a slowdown, but the timing of it was more art than science (maybe as uncertain as calling the top of the bitcoin bubble?).

Investment in medical research gives us hope for new health breakthroughs, but where they will come from? Their timing and their materiality are all uncertain. Not only have we had to contend with a lack of visibility in the innovation pipeline, but projections become mired in a cocktail of psychological[1] and political biases. "Longevity optimism" tends to have expensive consequences for social programs, leading to higher taxes. And the financial impact falls beyond the next election. Little surprise then that the political pain gets deferred. But this short termism and pessimism have caused painfully bigger adjustments to state retirement ages – as shown in France - than would have been the case had the projections been more realistic earlier.

By becoming conscious of our biases, we can try to improve our judgements.

2022: which way next?

Now we have reached an interesting juncture. Having had two decades of consistent annual lifespan gains in the nineties and the noughties (largely fuelled by cigarettes being extinguished), most developed countries have seen as many downs as ups since 2010. Shortly after COVID hit in 2020, a decade of gains in period life expectancy seemed to be wiped out in a few weeks, bringing the figures more into line with the maligned historical projections. This dip could be short-lived and the legacy of COVID could be the greatest social change to our societies since the second world war.

And to add to that, twenty years on from the first sequencing of a human genome, we're starting to see the benefits of the genomics revolution. This was beautifully shown by the speed and effectiveness of the mRNA COVID vaccines. Could this new molecular level world of medicine be the propellant of a new wave of lifespan gains in the biggest disease of all: aging? And could it even consign the biological limit on life to the history books?

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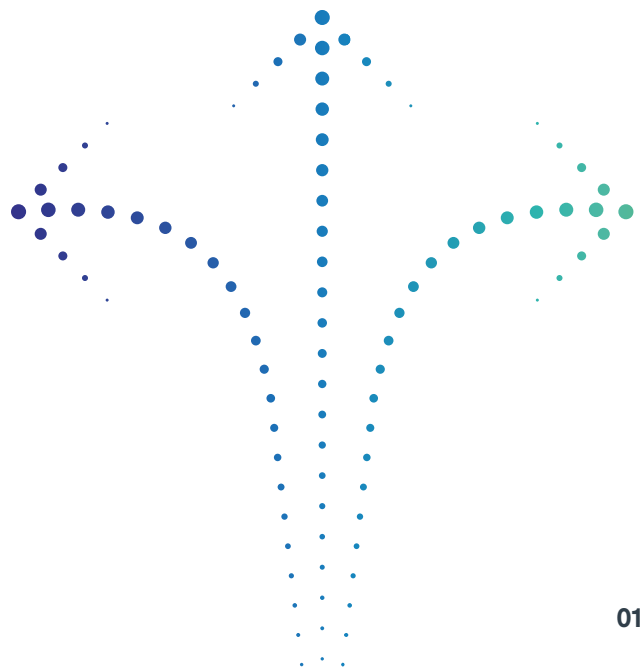
[1] Several of which are discussed in Erik Pickett's entertaining blog series. See for example here, here, or here.

Introducing our Mega Trends

Against this conflicting picture of pluses and minuses, we invited the multi-talented Club Vita team to have a stab at some longevity futurology.

The challenge? To share their personal thoughts on the trends that would define the world of longevity over the next decade. We encouraged freedom of expression: with the aim of introducing others to topics that they may not have considered. We see this multi-disciplinary approach as the first foundation in building more resilient long-term longevity predictions.

And how they rose to the challenge! I learned several new and surprising things. To pick out a few: thanks to Mark, I appreciated the interaction between longevity and climate change, Jenny challenged my presumptions with her beliefs that longevity risk will return to institutions from individuals and Jacklyn reminded me of the importance of nutrition.

I heartily commend all 13 blogs to you, and hope that you find something new too.

Naturally, we will report back in 2031 to see whether Yogi's prophecy applied!

Lang may yer lums reek,

Douglas Anderson
Founder and Chief Visionary Officer
Club Vita

	Mega Trend		Author	Date
1.	UK longevity inequality will grow		Douglas Anderson	24 May 2021
2.	Longevity becomes a tradeable commodity		Nick Chadwick	3 June 2021
3.	Pension plans start seeing longevity as a risk not just an assumption		Erik Pickett	14 June 2021
4.	Pension funds and insurers will include longevity impact in climate risk management		Mark Sharkey	23 June 2021
5.	Longevity risk will move back to institutions from individuals		Jennifer Haid	30 June 2021
6.	Healthy life expectancy will increase at a quicker pace than life expectancy		France Panneton	12 july 2021
7.	Wearable technology will drive life expectancy increases		Conor O'Reilly	3 August 2021
8.	Big data grows up – from open banking, to open insurance, to open health		Saeed Ahmadi	23 August 2021
9.	We'll be measuring age biologically, not just chronologically...		Nikiya Marilla	15 September 2021
10.	Democratization of longevity across the globe		Shantel Aris	22 September 2021
11.	+ COVID becomes a watershed moment... and lifespans lengthen		James Maloney	4 October 2021
	– COVID becomes a watershed moment... and lifespans shorten		Dan Reddy	6 October 2021
12.	Improved nutrition drives greater longevity improvements		Jacklyn Hopkins	7 December 2021

Mega Trend 1:

UK longevity inequality will grow

By Douglas Anderson
Founder and Chief Visionary Officer

My annual health check

One day last week, I spent three hours reflecting on the healthiness of my lifestyle, prompted by a string of health indicators. It's become an annual ritual, which started when I was in my late 40s, when I was shocked to learn that my sprightly father-in-law had been diagnosed with stage 4 prostate cancer. Trevor was a stoic Brit who did not want to trouble the busy doctors and nurses of the NHS.

My health check is a privilege that is not available to all. I have the knowledge to know it's a wise thing to do, the motivation to want to improve, and the money to pay the bill. Although health tests are available for free on the NHS, their frequency and coverage is lower and, perhaps most importantly, the amount of discussion time to explore how to change stubborn habits, is much reduced.

What I'm describing here is an example of how health inequalities play out in practice, even in a society that is proud of its free health care at "point of need".

Past performance

In the recent past, the gap in life expectancy between the rich and the poor, underpinned by such health inequalities, has increased in the US and Canada, as well as my homeland of the UK. Indeed, this Lancet article sets out the scale of the UK's challenge as the sick man of Europe.

The question on many people's lips is, will this gap shrink or grow in the coming years? To help us think about the future trend, let's focus on the extremes ends of the income distribution.

Have the highest socio-economic groups reached their limit?

I think not. They don't appear close to any biological limit on life. Future longevity megatrend blogs will discuss the strong pipeline of amazing new health technology that will start to be deployed in the next decade (such as more personalized therapies enabled by the genetic revolution). Initially, these longevity innovations are likely to be expensive, and only accessible to those with more disposable income or savings.   When new thinking has emerged in the past, the wealthiest have shown themselves to be more likely to be early adopters, only later creating a social cascade effect down towards the poor.

Given this, to close the longevity gap, our leaders (both politicians and employers) have to be bold in their ambitions to "level up" the poor.

Are there bigger gains in lifespan to be found in prevention, not cure?

Scientists now regard lifespan as the outcome of the lifelong process of ageing. Ever more persuasive research shows that the healthiness of your lifestyle (exercise, diet, alcohol, smoking, sleep) affect the pace of your ageing. So, if we really want a guide to lifespan in a decade or more – and, in particular, the gap between rich and poor – we should search for evidence of improving health. In other words, is the message that prevention is better than cure really getting through, particularly in harder to reach groups?

For the rest of this blog, let's take a deeper dive in to UK developments.

The UK government latched onto the problem in 2018, forced by the upcoming economic challenges of ageing baby boomers: a problem that has been evident since the 1970s. In "Prevention is better than cure", it set out a target of five more years of "healthspan" (that is, disability-free life) by 2035, along with a reduction in inequality. The vision is bold and the target (unusually long-term for politicians), is stretching given the incremental nature of health gains.

How do different people embrace prevention?

To see how different socio-economic groups embrace preventative health measures, we can look at healthiness of residents of small areas, based on postcodes grouped together according to their level of social deprivation.

The infographic below shows the position in England, drawn from a series of different sources around 2013-2015. You can see the stubbornly steep social gradients in propensity to smoke, eat healthily and take exercise. The only thing that looks like a level playing field is the likelihood of being overweight: with a staggering two in three residents of all areas, irrespective of level of deprivation, being overweight.

Prevalence of selected risk factors in England

3.9 Figure 9: the prevalence of selected risk factors in adults by deprivation decile, England

The prevalence of risk factors varies across upper tier local authorities grouped into deprivation deciles, whereby the least deprived areas had the lowest prevalence of risk factors
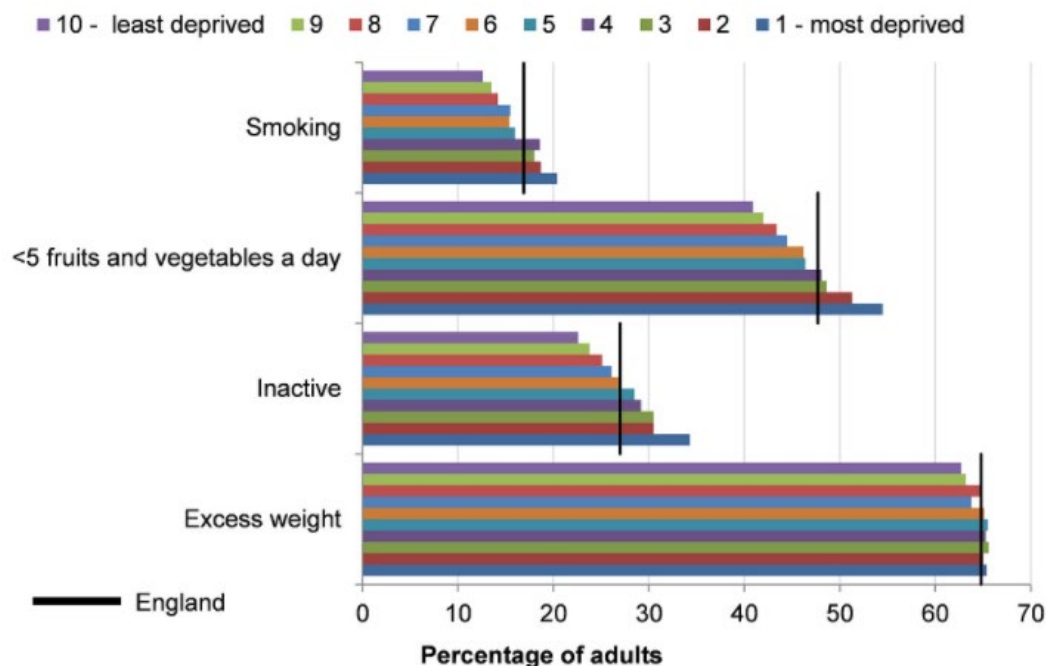

Chart source: UK government, Chapter 5 "Inequality in health"

My search for more recent data took me to Public Health England, who, to its credit, has developed a great interactive website covering a range of different indicators of health. Sadly, many out the data sources remain old and none revealed any great grounds for optimism. In the three years since the UK government created its goal, the UK seems to have gone backwards (even before taking COVID into account).

Show us your money

The policymaking is rich in ideas, with the emphasis squarely put on prevention, rather than cure.

The 2018 conservative-led initiative has morphed into a bipartisan group, the All Party Parliamentary Group. This collective action is to be applauded, but where is the funding?

Employers can – and should – be more proactive in tackling the problem at early ages. I like the sound of Business for Health's campaign to get 'Health' into Environmental, Social and Governance (ESG) frameworks - that is, ESHG. This would create a four-pronged social change programme for a more sustainable society.

To make such a huge difference in a short period, there would have to be major investment in public services, requiring an appetite for bold, redistributive tax policies, and a willingness to discourage unhealthy habits through targeted taxes.

The NHS should be the perfect delivery mechanism to improve the nation's habits. But, sadly COVID has highlighted just how little spare capacity exists. It is too busy trying "to cure" to spend enough resources on prevention.

To turn the UK around, I reckon you need significantly more investment in reducing health inequalities, persistent effort and more patience.

The bottom line: UK longevity inequality looks set to continue rising over the next decade

I wish I could be more optimistic, but I struggle to see how the UK government will be able to narrow the healthspan gap sufficiently fast to have any material effect on narrowing the lifespan gap in the next decade. Remember that the pattern of future lifespan reflects the delayed outcomes of the healthiness of past lifestyles (so the historic health gradient data is actually more relevant despite its age). Even if the collective action can nudge more of the poor into materially healthier lives by 2035, those gains would only slowly filter through into a future narrowing of the lifespan gap.

To all the Brits, I hope I am wrong and will be glad if anyone wants to hold me to account in 2031 (when I very much hope to still to be working!).

Wherever you live, what is the outlook in your country?
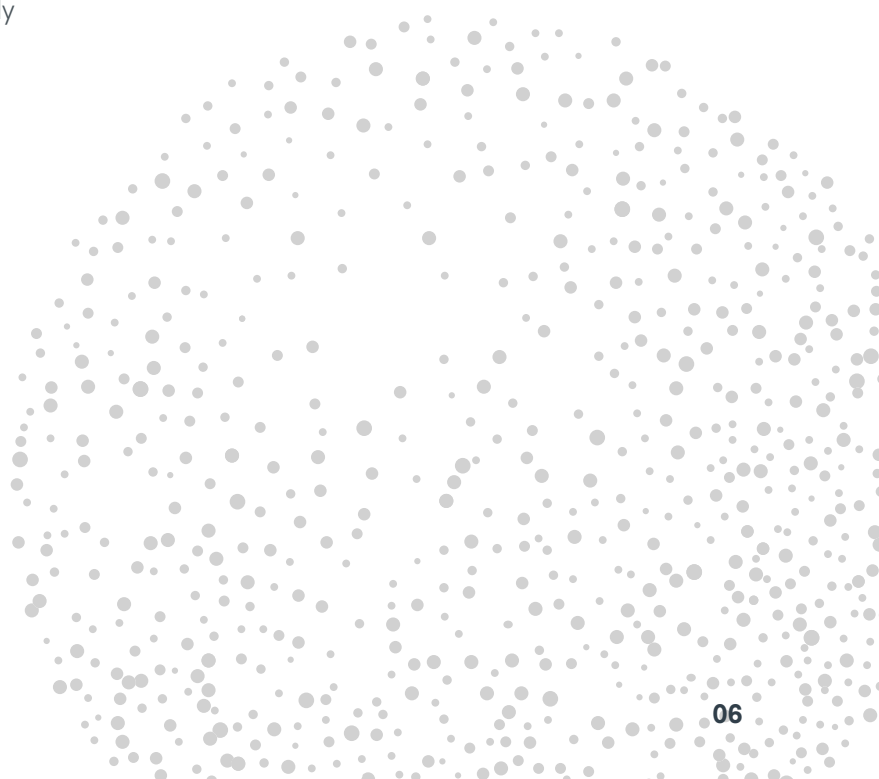
Mega Trend 2:

Longevity becomes a tradeable commodity

By Nick Chadwick
Longevity Risk Specialist

I am sure that like me, many of you are looking forward to the delayed Euro 2020 football championships – that's soccer for our American friends -which take place across Europe this June and July.

And if you're a betting person, the tournament provides endless opportunities to profit from your footballing expertise (or more likely, line the pockets of the bookmakers). As well as more traditional markets like tournament winners (favourites France) or top scorer (favourite Harry Kane), the spread betting markets allow you to apply your nous to such esoteric matters as the total number of throw-ins (sold at 2,130 and bought at 2,170 at time of writing) and "Total Goal Yardage" (sold at 1,710 and bought at 1,750).

For those not familiar with spread betting, here's an example of how it works. If I were to buy throw-ins today at £1 per point, and at the end of the tournament the total number of throw-ins was in fact 2,270 (or 100 more than the buy price), then I would win £100. However, if I were to have sold at 2,130, I would lose £140. The gap between the buy and sell price (or the "spread") provides the bookmaker's margin. If during the tournament, the throw-in action was getting a bit too hot for me, I could also close out my position based on the latest buy or sell price. This latest price will reflect the number of throw-ins won to date, as well as any emerging trends in throw-in frequency as assessed by other market participants.

If I (and in fact Hedge funds!) can bet on whether the total distance of the goals scored in Euro 2020 will exceed a mile, why can't I bet on whether people are going to live past 90? I'm not talking about individuals here, but rather a large group of lives. What if I could bet on the average lifespan of a current 65-year-old? If it were possible to take a position on this metric, this would provide an excellent hedge for pension plans to help meet their commitments to their members.

What's stopping this market from developing?

Whilst, pandemic permitting, Euro 2020 will be done and dusted by July, we won't know the average lifespan of a current 65-year-old for 50 years or so, when the last of that generation will have passed away. In footballing terms, this would be more like betting on how many league titles Tottenham Hotspur will win by 2070[1]. To make this market work, we need parties interested in taking up both sides of the bet. And unfortunately, there aren't many organisations out there looking for a 50-year hedge against lower than expected longevity improvements. What's needed is for the other side of the hedge to be seen not as a long-term bet but as a short-term source of speculation, traded on a day-to-day basis.

My vision for the next ten years is that a liquid longevity trading market will emerge, driven by the sheer level of demand from sponsors to remove legacy defined benefit pension plan risk from their balance sheets.[2] Just like the financial markets currently allow pension plans to hedge their exposure to interest rate and inflation risk, holders of longevity risk will now have access to a natural hedge. On the other side of the trade, capital market players will have an additional trading class, providing diversification with all the other assets they hold. Once this market has developed, it will also help those of us in defined contribution pensions to manage our own longevity risk, perhaps in combination with pooling mechanisms designed to help manage our individual lifespan risk.[3]

Can you imagine a world where the daily change in life expectancy is quoted on the radio alongside the FTSE100 and the $:Euro exchange rate? COVID is encouraging bright modelling minds to consider a career in epidemiology. The awareness that the capital markets are assessing their every move would certainly focus politicians' minds in relation to improving public health. There will of course be technical challenges to address before we can make this work, but we at Club Vita look forward to playing our part in nurturing this important stepping-stone towards better longevity risk management.

What do you think?

Will the increasing demand for longevity protection from pension plans encourage the industry to overcome the barriers of creating a liquid longevity trading market?

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[1] Spoiler: None.

[2] In their 2014 paper Strategy for Increasing the Global Capacity for Longevity Risk Transfer, Michaelson and Mulholland estimated that at the end of 2013 the combined capital of the entire global insurance and reinsurance industries was barely 80% of the global potential for longevity risk. For all pension plans to offload their longevity risk to the insurance industry (where risk capital must be held), a lot more capital is going to be needed! https://longitudesolutions.com...

[3] See https://www.theactuary.com/2021/04/30/staying-course-how-pooled-annuity-funds-are-proving-attractive-alternative

Mega Trend 3:

Pension plans start treating longevity as a risk to manage rather than an assumption to get 'right'

By Erik Pickett
Actuary and Chief Content Officer

At the beginning of my actuarial career, when I was transitioning from the world of academia, I studied for a part time Master's degree in Actuarial Finance at Imperial College. As I got to grips with my new industry, a highlight for me was a weekly session where different industry experts would talk to us about their practice areas and pass on wisdom amassed during their careers. The common theme that emerged to me was the importance of actively managing risk. In fact, this seemed so central to actuarial best practice, that I was surprised to learn that "holistic risk management framework integrated into key decision making" was not the motto of the profession.

Following the 2008 economic crisis there has been a growing movement to improve risk management practices underpinning actuarial work, resulting in risk management frameworks being introduced by regulators around the world[1] and a growing number of actuaries (particularly those newly qualifying) attaining the global Chartered Enterprise Risk Actuary (CERA) credential[2]. So maybe the motto change is coming...

Risky business

For defined benefit pension plans, the fact that contributions made today need to cover uncertain promised benefits in the future introduces a number of risks.

Some risks relate to assets – the risks of investing contributions until they are needed. Other risks relate to liabilities – the uncertainty of the level, timing and duration of the benefits that will be paid. There are even risks around how willing and able the sponsor will be to step in if things don't go according to plan.

Pension plans have embraced the active management of investment risk. The de-risking of assets and a growing adoption of Liability Driven Investment strategies over the last 10 years has resulted in a large reduction of investment risk, leaving liability side risks becoming the largest unhedged funding risks for pension plans in the UK. It is time for liability side risk management to catch up.

Eyes on longevity risk

The key liability risk for a pension plan is longevity risk: the possibility that participants will live longer lives than expected, resulting in the need for more assets to pay benefits. Many pension plans view longevity as an assumption that they need to get 'right' rather than recognising it as a risk with a range of potential outcomes that can be measured and actively managed.

Pooling a large number of participants in a pension plan removes risk from random variations of experience between individuals (individual risk) – but this is not the only form of longevity risk. Without robust ways to measure the longevity characteristics of its participants, a plan is exposed to the possibility of systematically mis-estimating the longevity of their participants (basis risk). Even with the best estimation techniques for current longevity, plans are still exposed to the risk that life expectancies change in an unexpected way over time (trend risk). We only need to look at the mortality experience through the recent pandemic for an example of how external events can disrupt previous trends.

Unrewarded does not mean unmanageable

Investment risk is thought of as a 'rewarded risk' because investors taking on more risk are compensated with higher expected returns. No such reward exists for pension plans holding longevity risk, but that does not mean that it should be neglected. There are many options for pension plans to manage longevity risk with varying degrees of associated cost.

Tolerate

Continue unchanged

Accept effect on sponsor contributions

Treat

Raise pension age

Cease accrual

Purchase longetivity linked assets

Risk Management Options

Transfer

Swap actual for fixed cashflows

Purchase annuity Policies

Terminate

Terminate / wind up plan

A new approach?

It is difficult to assess the real value of different mitigation options if you don't have a good grasp of the risk that is being removed. To understand and manage a pension plan's risks we can apply the actuarial control cycle:

1. Measure the risk (define the problem)
2. Manage the risk (develop a solution)
3. Monitor the outcome

Monitor

Measure
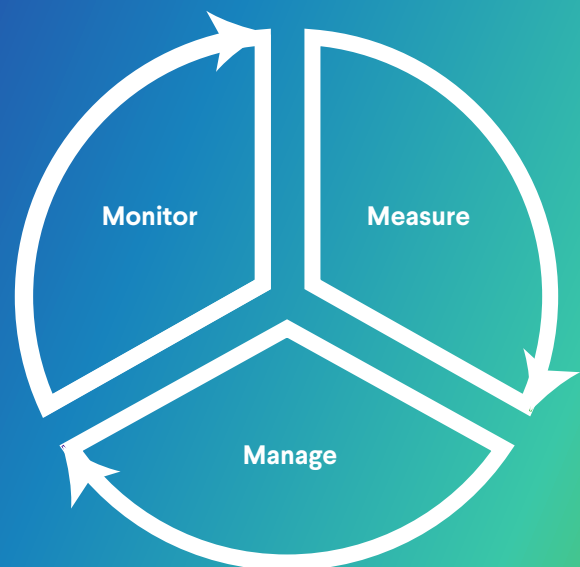
Manage

This approach is commonly used by pension plans to manage their investment risk. Below I explore this and the corresponding approach that could be applied to longevity risk.[3]

	Investment	Longevity risk
What is the risk?	Your assets, in aggregate, underperform your assumed return	Your participants, on average, outlive your assumed life expectancy
Measure the risk	1. Understand the risk characteristics of different asset classes (volatility, expected return, credit ratings etc) 2. Analyze your asset portfolio to identify your exposure to different asset classes 3. Calculate a 'best estimate' assumption for return 4. Use stochastic models or economic scenario models to assess the range of future outcomes	1. Understand the predictive effects of different factors on life expectancy (gender, ZIP/post code, benefit amount, type of work, plan specific events, etc) 2. Analyze your plan's population to identify their longevity factor profiles 3. Calculate a 'best estimate' assumption for life expectancy 4. Use stochastic models or economic scenario models to assess the range of future outcomes
Manage the risk	Rebalance your portfolio into a set of assets that better fits your desired risk profile	Choice of the following approaches: • **Tolerate** the risk (continue unchanged) • **Treat** the risk (cease accrual, adjust benefits) • **Transfer** the risk (purchase annuity or a longevity swap) • **Terminate** the risk (terminate/wind up the plan)
Monitor the outcome	Regularly monitor acytual return on investments (ROI) Regularly monitor market implied risk metrics for different asset classes Compare to previous views on different asset classes and adjust if necessary	Choice of the following approaches: • **Tolerate** the risk (continue unchanged) • **Treat** the risk (cease accrual, adjust benefits) • **Transfer** the risk (purchase annuity or a longevity swap) • **Terminate** the risk (terminate/wind up the plan)

What do you think?

How widely do you think longevity risk management techniques are used by pension plans? How long before everyone is using them? How long before the actuarial profession updates its motto?

[1] Such as Basel III for the global banking industry, Solvency II for the European insurance industry and the Pensions Regulator's IRM framework in the UK.

[2] Supported by, among others, the Society of Actuaries in the US, the Institute and Faculty of Actuaries in the UK and the Canadian Institute of Actuaries.

[3] noting that the ultimate aim is to bring all risks together into one holistic control cycle

Mega Trend 4 :

Pension funds and insurers include longevity impact in climate risk management

By Mark Sharkey
Head of Client Delivery, UK

Does it take the experience of living through a 1 in 100-year pandemic to give us a true understanding of how systemic risks impact the world we live in?

Every year the World Economic Forum (WEF) publishes its global risks report, exploring the major risks the world is likely to be facing in the coming year. It may come as no surprise that the report published in January 2021 places the risk of infectious diseases at the top of the list, although it's worth noting that the same risk sits much further down the agenda in the report published twelve months previously – back in the day when everyone with a correct understanding of the word "furlough" could be squeezed into the Club Vita stationery cupboard.

In contrast, a recurring feature of every edition of the WEF global risk report that has ever crossed my desk is the focus on climate-related risks. Given the potential consequences of climate change on global financial systems, as set out in these reports and by high profile individuals such as Larry Fink, it should be no surprise that the industry is beginning to sit up and take notice. An example of the spotlight on climate related risks is the rapidly increasing interaction of pension funds and insurers with the disclosure recommendations published by the Task Force on Climate-related Financial Disclosures (TCFD).

A key pillar of the TCFD recommendations is the need to disclose metrics to assess climate-related risks (and opportunities!) where the impact could be material. As we pointed out in a recent Top Chart, longevity risk is now the largest unhedged risk for pension funds in the UK and no doubt also weighs heavily on the minds of those responsible for risk management at insurance companies and pension funds in other regions – so these institutions will need to think carefully about the longevity impact when considering climate related risks.

An example of how pension funds and insurers could think about the potential impact on life expectancy (and therefore liabilities) is the "Hot and Bothered" scenario analysis that Club Vita published back in 2018. This research remains relevant and can be used to consider possible evolutions of life expectancy under three specific scenarios, where climate change and resultant resource constraints impact the future environment in which we live.

The following three scenarios are considered in the analysis:

1. **Green revolution** assumes that widespread calls for change and rapid technological advances lead to positive adaptation to climate change, leading to improved longevity, higher life expectancy and, ultimately, higher pension fund liabilities.

2. **Challenging times** considers an outcome where we achieve some positive adaptation to the changing environment, but still struggle to adapt quickly enough to overcome the limitations of finite resources. For example, we consider the implications of the possibility that we have reached 'peak oil flow' and that the availability of oil will become a constraint to economies in the future.

3. **Head in the sand** simulates a range of disastrous outcomes resulting from a total lack of response to resource and environmental risk. This includes global crop failures and food shortages, as well as more favourable conditions for disease vectors leading to the incidence of infectious diseases akin to what we might have seen a century ago.

Of course, these scenarios are merely three examples out of a wide range of potential future outcomes of climate change; intermediate and more extreme scenarios are certainly possible. Material changes to the liabilities of a pension fund or insurer could follow– the spread of life expectancies in our scenarios for current pensioners of c2.5 years would broadly equate to a swing of c10% in liability terms, with the impact even greater on younger members. And, of course, assets and employer covenant strengths would be affected too.

What do you think?

So, as financial institutions start to weave the TCFD requirements into their overall risk management frameworks, it will be important to consider longevity risk alongside other potential effects of climate change that impact asset portfolios or the strength of sponsoring employers. Fresh from the experiences of a 1 in 100-year event that took many of us by surprise, is there any excuse for not measuring and monitoring a systemic risk that has been in front of our eyes for some time now?
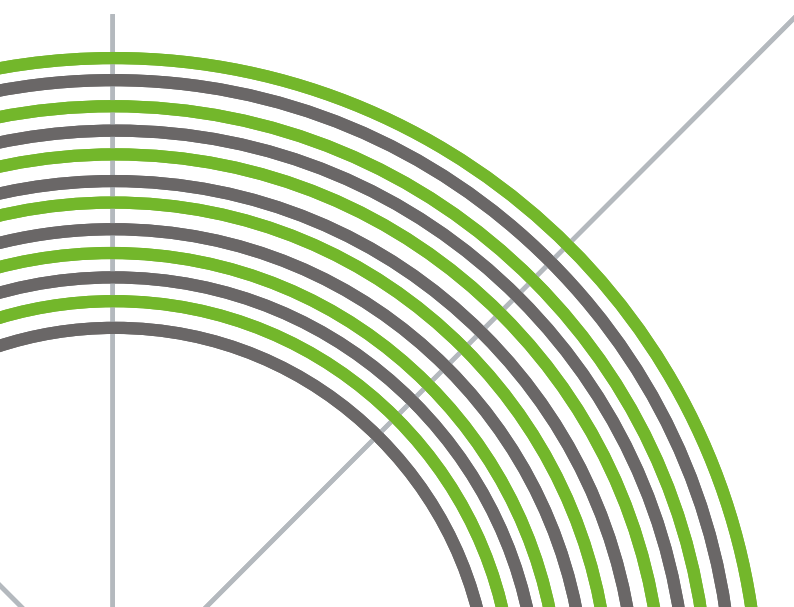
Mega Trend 5:

Longevity risk will (is already) moving back to institutions from individuals

By Jennifer Haid
International CEO

For as long as I've been working in the retirement space, headline attention has been focused on the move from defined benefit pension plans to defined contribution style arrangements and on the clawbacks applied to social security systems – along with personal savings, these are the three legs of the traditional retirement savings stool. This move creates greater choice and flexibility for the individual, while at the same time increases their responsibilities for managing future financial risks.

This shift of risk from institutions to individuals has led to less certainty in the level of assets available at retirement and less certainty in how long those assets will last through retirement. The retirement stool is starting to look very unstable, so my prediction is we will begin to see a reversal of this trend.

Where are we now?

A 2019 paper on the American retirement system presented by the National Institute on Retirement Security reports the following sobering statistics.

Many Americans are without retirement savings, and those who have them have less than $50,000.

A staggering 77 percent of Americans won't meet retirement savings targets, even if they are willing and able to work until age 67.

In addition, where defined benefit plans were the most common form of retirement benefit in the 1980s, now, only 17% of private sector workers claim access to one.

Managing risk as an individual is hard

For those individuals who do manage to make it to retirement with a reasonable savings balance, managing those savings on their own can be challenging. Many people will be familiar with how difficult it is to predict volatile financial markets, particularly in periods of uncertainty such as the recent COVID-19 pandemic. It's just as hard to predict our individual lifetimes.

According to the Stanford Center on Longevity, the majority of people underestimate their life expectancy in retirement. And even if they know their life expectancy, there is still over a 50% chance they will live even longer. We only become more confident in managing this risk the more we can mask those individual fluctuations by looking at suitably large populations.

The American public agrees. The table below reports the key struggles Americans face as they look to prepare for the retirement my generation saw advertised in the Freedom55 ads. The bottom four relate directly to the issues discussed above.

To what extent are the following making it harder to save to retirement?

The rising cost of healthcare in retirement	74%
The rising cost of long term care	66%
Salary stagnation	61%
Increasing debt load	57%
Uncertain expected lifetime	57%
Fewer employer sponsored pensions	56%
Reliance on individuals to save	51%
Market volatility	37%

Source: National Institute on Retirement Security Retirement Insecurity 2019: Americans' Views of the Retirement Crisis

Americans believe that employers need to contribute more to retirement security. And more people than I thought – nearly half – seem to be willing to invest at least part of their retirement wealth in some form of guaranteed income.

What does the future hold?

Luckily the wheels of the global innovation engine are spinning to meet this growing commercial and social challenge, marrying the concepts of flexibility and control over one's assets with a component of guaranteed income for life.

Looking to the insurance market first: while single premium annuities have long been available at retirement, a new breed allows the deferral of income to much later in retirement. This structure provides both flexibility and the ability to participate in the market much longer than traditionally available. Once their expected lifetime is reached, and the retiree starts to win the longevity lottery, these products allow for guaranteed income for the remaining duration of their uncertain lifetime.

Asset managers are also taking a hand at addressing this growing need by reviving the concept of the tontine structure, in partnership with the regulatory community. Tontines pool the investments of a large cohort of people, deploying institutional investing, and pay dividends based on the mortality experience of the group to protect those who live the longest out of their peer groups in the later years of their life.

Governments are similarly stepping in: one example from the UK are Collective Defined Contribution (CDC) plans. Regulation has been introduced to allow the pooling of individual employee retirement accounts into a special master trust, which provides both cost certainty for the employer through fixed contributions, and more reliable income for the annuitants as they pool their longevity outcomes.

These developments, while still in their exploratory phases, represent an important reversal from the transfer of risk management to the individual (which isn't really risk management at all) to allowing the pooling of risk by institutions which are better able – through their size, expertise, and negotiating power – to manage the risk efficiently.

What do you think?

Will individuals embrace the new products coming to market and better manage their longevity risk in retirement?

Mega Trend 6:

Healthy life expectancy will increase at a quicker pace than life expectancy

By France Panneton
Head of Pension Strategy, Canada

Before the pandemic put an end to group activities, the last part of my spinning class would consist of a series of stretches. Whenever the trainer would begin this section, I would pause and remember the wise advice of my physiotherapist "choose quality over quantity" and I would opt to do my own series of a smaller number of longer duration (higher quality) stretches.

Now I wonder if the quality over quantity argument will influence the push to increase healthy life expectancy more rapidly than total lifespan.

Where are we now?

First let's define the term. According to the World Health Organization (WHO), healthy life expectancy is the average number of years a person can expect to live in "full health", (without disease or injury), also commonly known as Health Adjusted Life Expectancy (HALE).

The WHO's Global Health Estimates show the progression of both life expectancy (LE) and HALE at age 60 between 2000 and 2019 for Canada, UK and US combined for women and men.

	LE at age 60	LE at age 60
Canada	From 22.51 to 25.15	From 17.32 to 18.99
UK	From 21.31 to 24.13	From 16.26 to 18.25
US	From 21.41 to 23.13	From 15.72 to 16.35

Increase in LE and HALE at age 60 (2000-2019)

■ Increase in LE at 60 (2000-2019) ■ Increase in HALE 60 (2000-2019)
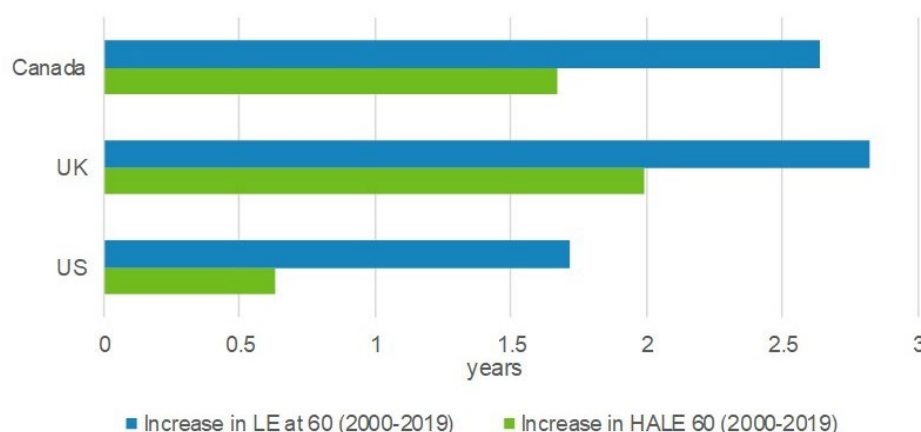
Source: The WHO's Global Health Estimates

These figures reveal a consistent pattern of the latest elderly generation spending more time at the end of their lives in frail health across all three countries. Is it possible that the next generation can turn this around?

Where are we going?

We all know that there are many tailwinds and headwinds affecting both life expectancy and healthy life expectancy. My vision for the next 20 years is that the gap between HALE and LE in the US, UK and Canada will narrow. In other words, that improving the quality of life will be valued more than improving the quantity of life.

My prediction is based on my assessment of the Baby Boomer generation, a fascinating generation for someone from the generation just after. I consider the Baby Boomer generation as those born between 1946 and 1964. There was a large boom in births in this era (following the second world war and before the widespread availability of contraception) resulting in a generation much larger than those before and after. People of this generation are currently aged between their mid-fifties and their mid-seventies, so will have a large influence on the next steps for both LE and HALE.

Baby Boomers became adults during a time of unprecedented prosperity and triggered dramatic social change. They are often portrayed as experimental, embracing of technology and new culture and having an anti-establishment attitude.

Let's look at a few angles to determine the score between increases in quality of life quality and quantity of life.

A look at demography

The demographic impact of the massive Baby Boomer generation reaching older age will certainly put more pressure on our health systems. Will they cope with the increased demand (and potentially increased costs and labor shortages) due to the shift to an older population with more health conditions?

Potentially there could be a vicious circle of more health costs being borne by a smaller tax-paying population, resulting in a lower quality of care.

How will the government react to this increased demand? Could they focus on providing more "home care" assisted services ? Could they focus on prevention by increasing taxes on "unhealthy" products which could have economic repercussions?

Demography scores 1 point to Quantity

A look at health

With the population aging, the challenges associated with the "graying of disability" – people with disabilities living longer than in the past - will likely continue and even increase as time goes by.

Is the Baby Boomer generation in better health at retirement than the prior generation? On one hand we see fitness, exercise and food consciousness more culturally ingrained – the idea that prevention is better than a cure may have resonated with this generation. However, on the other hand we see a general trend of decreased physical work, increased obesity and chronic diseases.

A look at culture

Baby Boomers' value and pursue social engagement and healthy lifestyle behaviors and have high expectations for wellness and independence in later life. This makes me think that this generation will work hard to maintain their health.

I believe this is amplified by a growing appreciation for quality of life developing in Baby Boomers as they look to their parents' generation. In Canada, this is highlighted by assisted dying legislation being introduced in the last few years.

Culture scores 1 point for Quality.

Mixing it all together

Having had lots of opportunities, how will the Baby Boomer generation feel about the intrinsic limitations that comes with non-healthy life?

Having had lots of control over their life, how will they face the typical inevitable mourning caused by aging?
The score is tied at 2 each, but I am an optimist so feel that the whole is greater than the sum of the parts for Quality. Namely, that the interaction of the factors makes me award another point to Quality. My prediction, which may be influenced by my Baby Boomer physiotherapist, is that in the end quality will prevail over quantity and healthy life expectancy will increase at a faster pace than life expectancy.

Final score Quality 3, Quantity 2

What do you think?

What would you do if faced with choosing between quality and quantity of life? I would love to hear what you think!

Mega Trend 7:

Wearable tech drives life expectancy increases

By Conor O'Reilly
Head of Analytics, UK

The pace of technological advances has been astonishing. It took just 66 years to go from the Wright brothers' first flight to Neil Armstrong having a stroll on the moon. There was less than 40 years between the first computer mouse and the release of the iPhone. From the excitement of the Channel 5 launch in 1997 bringing the number of terrestrial channels in the UK up to a full handful, we now have access to a seemingly never ending range of streaming services providing entertainment on demand (on a recent rural holiday I struggled to explain to my 5 year old the concept of only having 'live' TV to watch...).

One of the latest technological trends is the Internet of Things (IoT for short) – the surge in so called 'smart' products that are connected to the internet. Your local electronics store will no doubt be full of appliances that boast of integration with Alexa/Siri/Google (although quite why you'd want to talk to your washing machine isn't immediately clear...). The dazzling array of smart lights, cameras, doorbells, thermostats etc enable you to monitor your home from the other side of the world, and set up automations worthy of Tony Stark.

While the 'benefits' of some of these enhancements aren't always immediately clear, one area that could be beneficial when it comes to life expectancy is 'wearable tech'. I explore below some of the potential benefits.

One step at a time

The benefits of regular exercise have long been known. One metric to keep an eye on is simple step count. While the fabled 10,000 step daily goal is actually somewhat arbitrary, it does at least give a target to aim for. A whole range of step trackers are now available, many of which offer some form of gamification to help encourage users to meet their exercise goals.

As technology has advanced, the range of possible measurements has also increased.

The latest smart watches from the likes of Apple and FitBit can now measure things like heart rate, blood oxygen, sleep patterns and even stress. Built in ECG apps enable users to look for signs of atrial fibrillation (my latest reading looks OK thankfully). My Apple Watch reminds me to wash my hands for at least 20 seconds, to take a moment to breathe, and to regularly stand up throughout the day, and warns me if sound levels are too high. It can also be set to trigger a call to emergency services if it detects a fall.

My ECG reading while writing this blog

There are already numerous stories of smart tech saving peoples' lives, through highlighting an otherwise unknown medical condition, or helping in an emergency situation.

Another benefit of this stream of health-related data being constantly recorded is that it can help medical professionals with diagnosis. If patients can share detailed ECG readings or heart rates measurements then it enables objective analysis, compared with the much more subjective details typically given verbally. Having a rich history of previous readings can be very useful in determining the 'normal' level for the individual, so highlighting where things may have changed. A number of health institutions are now integrating their electronic heath records to enable their patients to get easy access to their own health data – another big step forward.

Widening the pool

While this is clearly of benefit to individuals, there is also potentially much wider health benefits through the use of such smart tech in medical research. Over recent years a wide range of studies have made use of data gathered by smart devices such as Fitbits across a range of fields, including physical activity, chronic pain, sleep patterns and mental health.

One of the typical struggles of any health studies is gathering enough participants, and subsequently gathering and analysing their data – a time consuming and often expensive process. By making use of the proliferation of smart devices this process can be simplified to a few clicks and opened to a much wider potential group. As an example, Stanford University partnered with Apple in a study of how accurate the Apple Watch was in detecting atrial fibrillation. While the results (an impressive 84% match to a full ECG) were impressive enough, perhaps more interestingly the researchers had almost 420,000 participants sign up for the trials. Fitbit have recently launched a similar heart study, looking for up to 250,000 owners to sign up.

Could this be a sign of things to come in the medical research field? Apple certainly think so – they've launched the Apple Research app in the US to make the process even easier – the app allows users to easily enrol in a range of health studies, currently including heart health, women's health and hearing. As companies continue to add more and more measurements to devices (e.g. blood pressure, blood glucose and even blood alcohol) the scope for future health studies is enormous.

Quality Control

While more data is usually preferable to less, there's always a need to ensure quality too. So while some of the numbers above look impressive, it's worth remembering that there will still be some issues for researchers to consider. For example, are the 'right' type of individuals signing up to your trial? The type of individuals who have the necessary tech, and are aware of and willing to participate, may be limited. If you're carrying out say a study of the impacts of dementia, participants aged under 50 say are unlikely to be of much use, given the very low prevalence at younger age groups. There may also be thorny issues around old chestnuts like who owns the data and what they can do with it. And recently there's been reported issues around consistency of reported data – with a change in algorithm seemingly resulting in different data being reported for the same time period when extracted at different points in time.

It seems that smart tech, and wearables, are here to stay, and with ever expanding sensory abilities there's lots of potential for great health benefits, both for individuals and, through a rapidly expanded pool of potential participants in health studies, wider society.

CLUB VITA
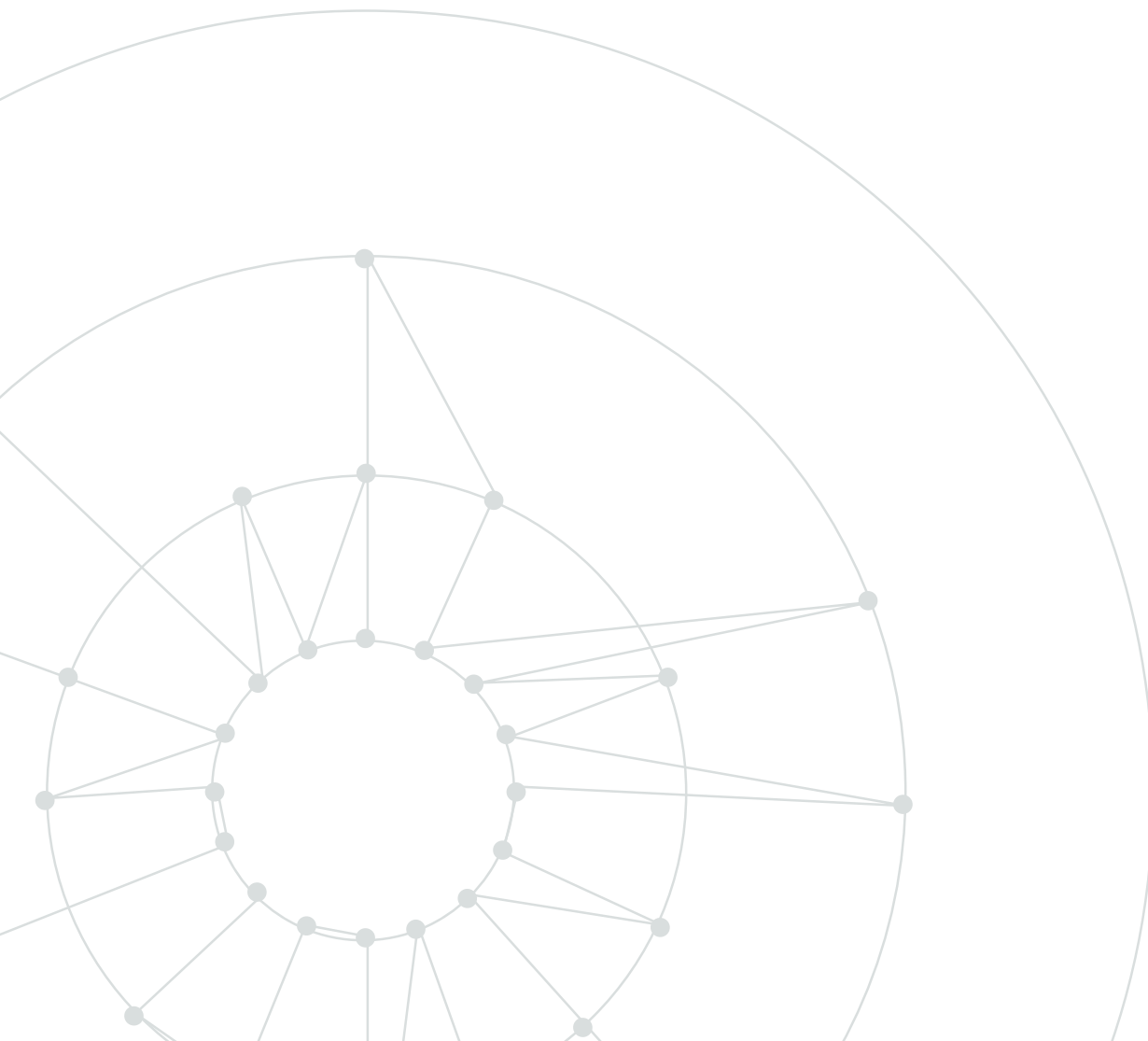
Mega Trend 8:

Big data grows up – from open banking, to open insurance, to open health

By Saeed Ahmadi
Data Scientist, Canada

I can still remember the time when "floppy disks" with maximum capacity of 2.8 mega bites (MB) were popular: a term that some of you probably haven't even heard of!

Back in the 1970's, storage devices were not as advanced as they are today, and people relied on simple storage devices with limited capacity. Those times are now in the history books and as more data becomes available, more advanced storage devices (e.g., compact disks, DVDs, USB drives) have been introduced. Currently flash drives are available with 4TB capacity i.e., 4x106 MB.

My prediction is that developments in data storage, data interrogation and data access will have wide and far reaching implications, from driving innovation in longevity risk transfer to increasing life expectancy itself.
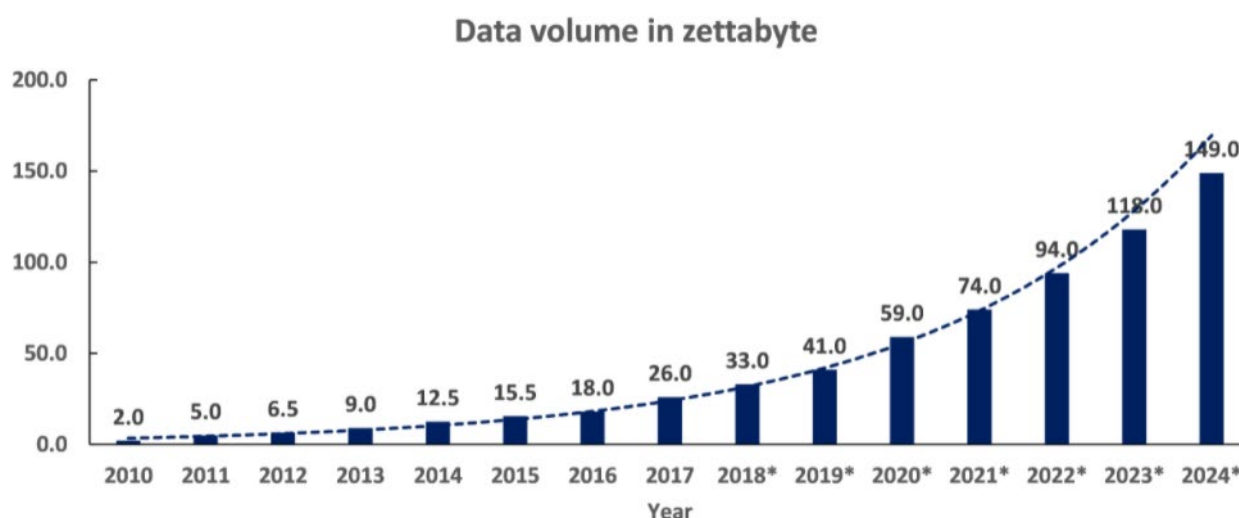
Big data growth

The Cambridge dictionary defines "big data" as: "very large sets of data that are produced by people using the internet, and that can only be stored, understood, and used with the help of special tools and methods". In other words, the data set is so massive and complex that traditional data management systems cannot be used to store or analyze it.

The following chart clearly demonstrates three main components of big data commonly referred as 3 V's, Volume, Velocity and Variety.
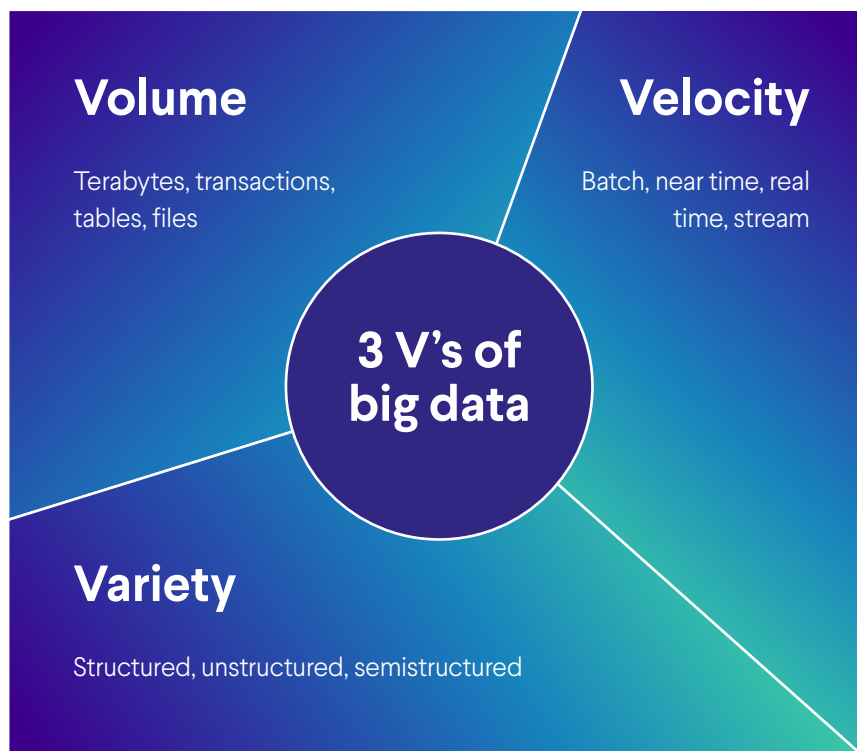
As indicated by Berisha and Endrit, big data has been growing extremely fast within the past few years.
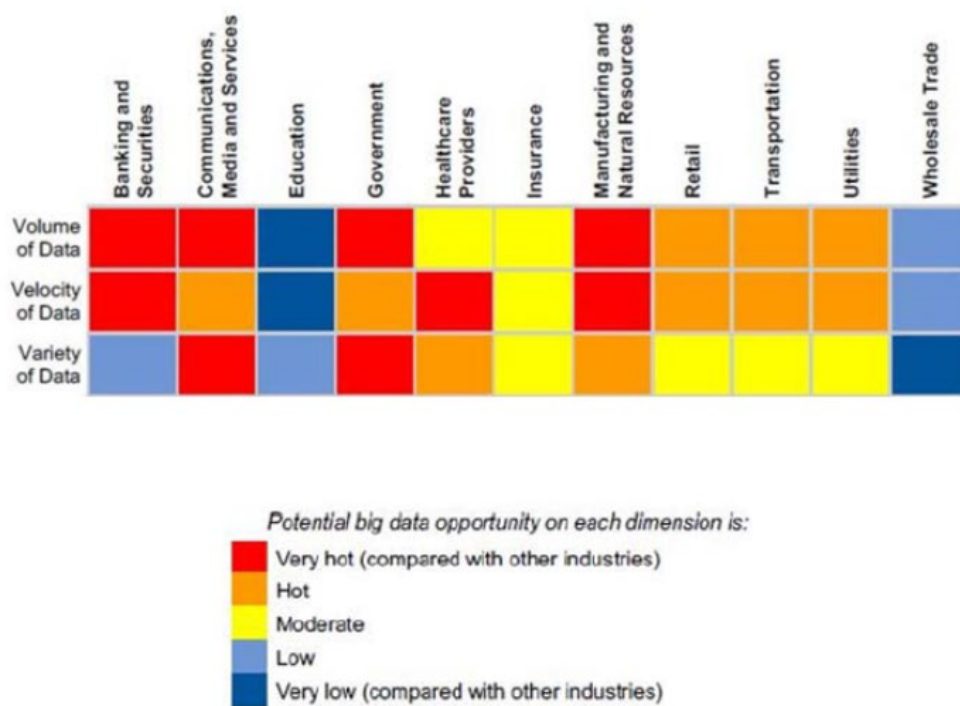
Volume
Terabytes, transactions, tables, files

Velocity
Batch, near time, real time, stream

3 V's of big data

Variety
Structured, unstructured, semistructured

Data volume in zettabyte

Source: (Berisha and Endrit 2021)

The chart above shows volume of data/information (in zettabyte[1]) created, captured, copied, and consumed worldwide from 2010 to 2017 and then forecasted from 2018-2024 on an exponential basis.

Initial pattern recognition methods like regression analysis can be dated back to 1800. Advances in computer science in recent years with the developments in machine learning algorithms and artificial intelligence together with the growth in big data has significantly enhanced our ability to gain valuable insights from data. This can be inevitably considered as one of the main indirect impacts of big data growth.

While the growth in big data use is undeniable, big data opportunities per industry can reveal a different pattern. The following heat map from Kart shows big data opportunity per industry and by 3 V's. Banking & securities, communications, media, and services together with government and manufacturing were among the top industries to benefit from big data. Healthcare providers and the insurance industry on the other hand exhibited relatively moderate potentials for big data

Big data opportunity heat map

Potential big data opportunity on each dimension is:

- Very hot (compared with other industries)
- Hot
- Moderate
- Low
- Very low (compared with other industries)

Source: Kart, L. 2012. Market Trends: Big Data Opportunities in Vertical Industries. Gartner

Open Banking

The beginning of the big data revolution has come in the guise of open banking, a practice of granting certain types of access to customers' personal and financial data to third-party financial service providers through open application programming interfaces (API) [subject to appropriate customer consent].

Open banking started in October 2015 when the European Parliament adopted a revised Payment Services Directive, known as PSD2. In August 2016, the United Kingdom Competition and Markets Authority required the nine biggest UK banks – HSBC, Barclays, RBS, Santander, Bank of Ireland, Allied Irish Bank, Danske Bank, Lloyds and Nationwide to grant licensed startups access to their customers' data. These regulations came into effect in January 13, 2018. Open banking has been spreading ever since across Europe and globally as highlighted by Corcoran and shown in the following map:
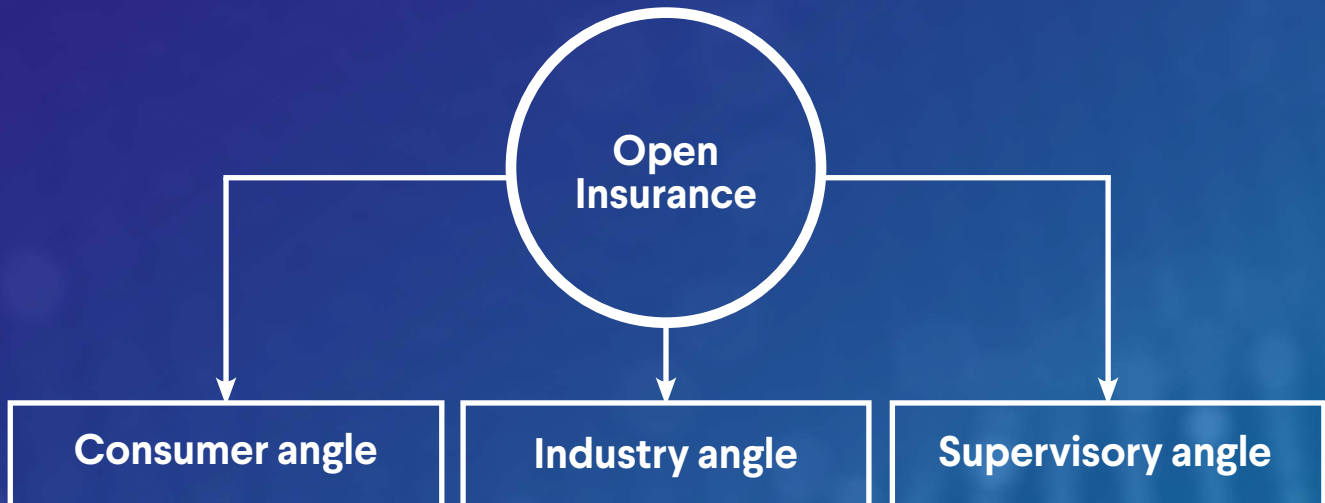

Source: https://www.bbva.com/en/open-banking-regulation-around-the-world/
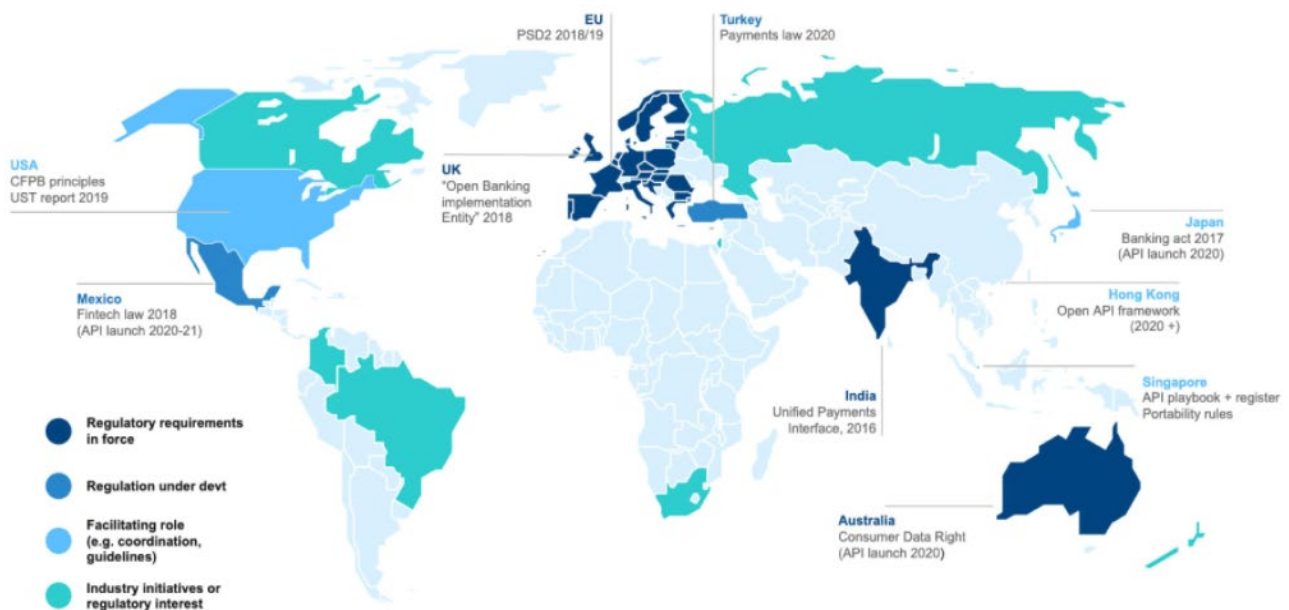
It is believed that open banking will facilitate great innovation in financial technology and both customers and financial institutions can already benefit from open banking regulations from:

- Account aggregation: A customer's financial data from multiple accounts can be aggregated by personal financial apps where expenditure data can be cleaned, classified, and analysed.

- Credit risk checking: Customers credit history can be quickly reviewed by banks, for example, during a mortgage pre-approval process. In addition, more informed decisions can be made by financial institutions when estimating their credit risk.

- Opening bank accounts: By sharing customers personal data, banks can quickly and more accurately open accounts, issue credit cards etc.

Open Insurance

Following in the footsteps of open banking, is open insurance. The European Insurance and Occupational Pensions Authority defines open insurance as "accessing and sharing insurance-related personal and non-personal data usually via API". Open insurance could then be viewed from three following linked angles:

```
              ┌──────────────┐
              │     Open     │
              │   Insurance  │
              └──────────────┘
        ┌────────────┼────────────┐
        ▼            ▼            ▼
  ┌──────────┐ ┌──────────┐ ┌──────────────┐
  │ Consumer │ │ Industry │ │ Supervisory  │
  │  angle   │ │  angle   │ │    angle     │
  └──────────┘ └──────────┘ └──────────────┘
```

- **Industry angle:** Insurance data can be widely combined and exchanged via API's by partnering insurance companies.

- **Consumer angle:** Insurance related consumer data such as benefits, claims or coverage can be shared between insurers.

- **Supervisory angle:** Regulators can access insurance service related data on a real time basis to enhance their oversight capabilities.

Greater access to data in the insurance industry could help drive innovative new product lines, improve distribution channels and improve risk management practices. It could even help open up a liquid secondary market for longevity linked policies and move us closer to a situation where longevity risk is fully tradeable.

There is still some way to go for open insurance. Although insurance API usage has been increasing over the last decade, it is still lagging the banking and financial sector as highlighted by Gasc in this blog.

Open Health

What comes after open banking and open insurance? Open health! As of July 1, 2021, the Center for Medicare & Medicaid Services started to implement requirements for certain payers to support patient access and provider directory APIs. This can be considered as a major break though since enforcing new requirements means faster processing time particularly when compared to the older Electronic Data Interchange protocol that was developed in 1970's. Implementing data privacy and data security features and being compliant with Health Insurance Portability and Accountability Act of 1996 (also known as HIPAA) are important parts of the new API integration.

If the health industry can follow the banking industry in tapping into the power of big data, it could have big implications for the health of average people. Data driven accessible technology innovations that encourage people to live healthier lives could ultimately increase both lifespans and healthy lifespans.

Nowadays, banking & securities have already moved toward big data and API usage in their day to day decision making. Healthcare systems and Insurance companies are increasingly applying predictive modelling and big data analytics to improve their performance and more accurately estimate risks. It is not unrealistic to see in the near future both open insurance and open health be fully engaged with big data as insurance and health data are being widely shared. This may ultimately enable tech companies to develop innovations to improve people's health and cause people to live longer.

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[1] One zettabyte is equal to 1x1015 MB

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Mega Trend 9:

30 really is the new 20 (for some people – determining who they are will become crucial for pension plans and insurers)

By Nikiya Marilla
Data Operations Lead, US

Should lifespan be determined by how many times you've circled the sun? Should we determine our age based on a linear equation of current year subtracted by year of birth? What if there was a way to determine age differently; a measurement that would be better at determining longevity and/or mortality? How could measuring age differently impact mortality assumptions for pension plans or even insurers?

In a once popular Jay-Z song, he made the statement that thirty is the new twenty and with that the notion of biological age was introduced to a generation. Often growing up, I always heard that we age backwards; and the notion that as I would grow older, I would look younger was embedded in my mind. I can remember a time when my grandmother, mother, sister and I would be walking together; everyone would assume my grandmother was the mother of us all, and the fact that my mother looked like she was more like my sister always remained with me. As a child, I equated getting older with looking younger. But is it deeper than just looking younger? Could your lifestyle potentially help you to feel younger and due to feeling and looking younger, in fact live longer?

You might ask yourself how it is possible to measure how old you are based on how you look and feel; this is a concept known as biological age and it is determined by measuring certain indicators of the body's biological condition. It is my prediction that pension plans and insurance companies will soon be using biological age more commonly than chronological age to predict the future longevity, mortality and morbidity of people.

Biological age vs chronological age

Chronological age denotes the actual amount of time a person has been living; biological age refers to a person's physiological condition, taking into consideration effects of lifestyle factors like diet, exercise, sleeping habits, stress, smoking status or alcohol consumption.

Chronological age is used in a lot of ways in modern society; it's a primary factor in determining the risk of chronic diseases, mortality, and any impairments to bodily functions like hearing and memory. However, if we can measure biological age, that may be better at determining the risk of many of these events.

Moshe Milevsky claims that someone could be up to 20 years younger biologically than their chronological age, and that biological age is a much be a better way of determining a person's longevity. If this is true, is there a way that organizations that specialize in longevity and/or mortality and that use mathematical calculations in order to determine risk could use biological age instead of chronological age to predict future health and longevity?

How is biological age calculated?

There are two methods used to calculate biological age, coined by Milevsky as the "living" methodology or the "dying" methodology a.k.a. the mortality-adjusted approach.

Both methods begin with the collection of data. A researcher would first gather data from a large group of people at a wide range of ages, collecting biological samples and measurements in order to record various physiological and molecular variables (such as heart rate, blood pressure, mutations of DNA, or the presence of certain proteins in the blood). Researchers may also collect data on variables that they believe will be correlated with enhancement or deterioration of a person's physiological condition, such as their wealth, occupation or even their appearance or number of Facebook friends!

For the living methodology, a regression analysis is then performed for the collected data against the chronological age of the data subjects. This analysis will highlight the levels of correlation of certain biomarkers and other data fields with a person's age and will provide a methodology to predict a person's age based on the values of their biomarkers. One area of concern with this approach is that it weighs one person against another; so your biological age is dependent upon people who are similar to you, as opposed to directly estimating how long a person would live or how soon a person is likely to die. Insurers, and pension plans would be interested in the latter, and not how similar a person in their plan or policy is to other people.

For the dying approach, or the mortality-adjusted biological age approach, we would also need to collect data on when the data subjects die. The other data fields could be the same as in the living methodology, but this time the regression analysis is performed against the remaining life span observed in each subject rather than their chronological age. Using the mortality-adjusted approach therefore gives a direct prediction of someone's mortality based on the covariates of the model.

What does it all mean?

Is 30 the new 20? Given Milevsky's estimate that a person's biological age could be up to 20 years younger than their chronologic age, for some people, it could be! Determining for whom this is true then becomes the crucial exercise for pension plans and insurers who need to estimate future longevity, mortality or morbidity for individuals.

At Club Vita, we do not collect data on specific biomarkers for individuals, but we do collect a range of data fields that are correlated to lifestyle factors, such as income, address and occupation. Our VitaCurves model for baseline longevity is therefore a special case of the mortality-adjusted biological age approach discussed above. Our model predicts differences of around 10 years in life expectancy at age 65 depending on an individual's characteristics. We could rephrase that to say that we have actually captured a difference of up to 10 years between different individuals' biological and chronological ages.

Just for kicks you might want to know how old you are based on your biological age, I took the following 2 tests and have found out I'm about 8 – 13 years younger than my chronological age. Good times! If you want, you can try these tests to determine what your biological age is:

https://www.womanandhome.com/us/health-and-wellbeing/biological-age-calculator-20430/

https://biological-age.com

Truth is, we've already had a master lyricist tell us, 30 is the new 20![1] Maybe we should have believed him years ago, but now we have science and math to back him up, so we know it can be true!

[1]and given that high wealth is correlated to living longer lives this is especially likely to be true for someone like Jay-Z!

Mega Trend 10:

The democratization of longevity

By Shantel Aris
Longevity Risk Modeler, Canada

Life expectancy across the world has seen a dramatic increase since the 18th century. The emergence of preventative medicine and vaccines that minimized infant mortality, the agricultural and trade revolution, and the development of sanitation have all greatly contributed to the increase. This evolution of life expectancy had greater preponderance in developed countries.

Today life expectancy is vastly unequal across, and even within, geographies. This is demonstrated in recent Society of Actuaries' (SOA) research showcasing the widening inequality in life expectancy between the lowest and highest socioeconomic county-level deciles within the United States. The difference in life expectancy at birth between these socioeconomic groups grew from 4.1 years to 7.2 years, and 1.6 years to 5.8 years, for men and women respectively over the period 1982 to 2018.

The concept of "democratization of longevity" refers to making longevity or "long life" accessible to everyone, in all countries and in all walks of life. Many will agree that this concept is both desirable and idealistic. My prediction is that despite the recent widening in inequality we will see greater democratization of longevity in the future through innovations in health technology, particularly tackling three pillars: greater prevention of disease, greater affordability these new innovations, and greater accessibility to them.

A look at the evolution of life expectancy

Illustrated below is the evolution of life expectancy at birth for seven Organization for Economic Co-operation and Development (OECD) countries: Canada, Hungary, Japan, Latvia, Poland, the United Kingdom, and the United States. Across the seven countries, male life expectancy at birth ranged from 64.8 years to 68.2 years in 1960, and 69.8 years to 81.1 years in 2017, demonstrating an increase in the inequality of life expectancy of almost eight years between these countries over the period. For females, the increase was approximately four years. The inequality in life expectancy is more apparent and unsettling if we consider, for example, developing countries in Africa, averaging a life expectancy of around 63 years in 2019.

Evolution of male life expectancy at birth for seven OECD countries, 1960 - 2018

Evolution of female life expectancy at birth for seven OECD countries, 1960 - 2018
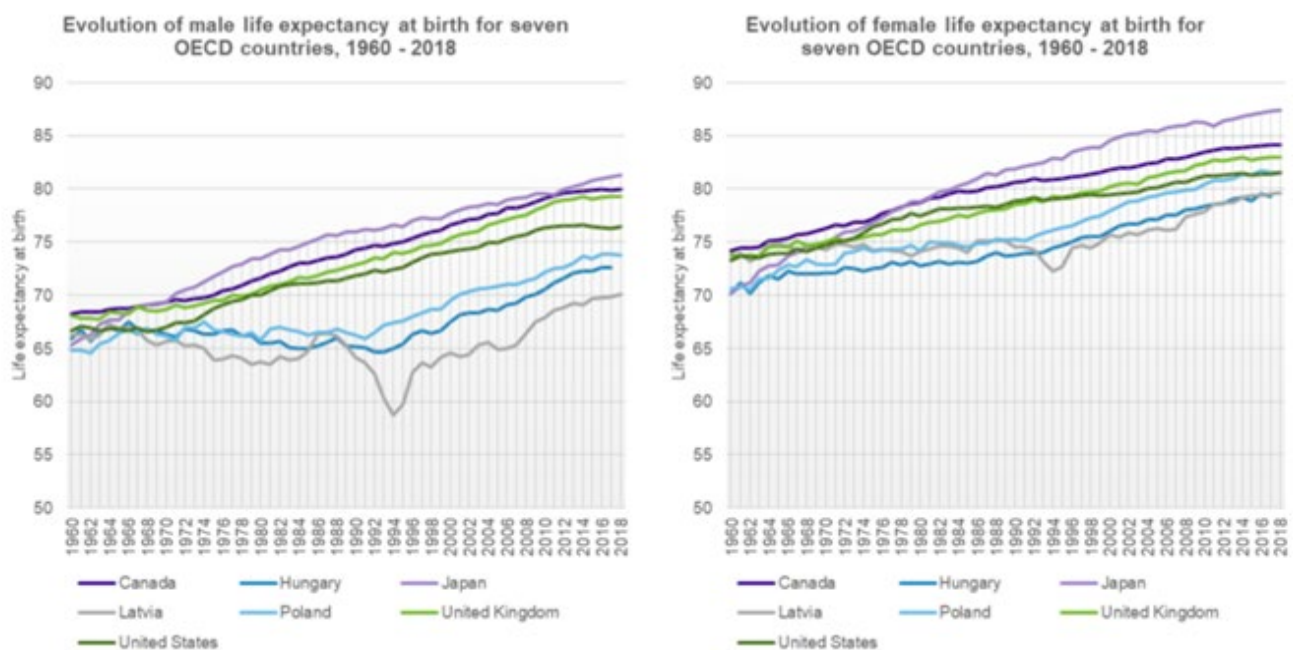
Source: Data from Human Mortality Database. University of California, Berkeley (USA), and Max Planck Institute for Demographic Research (Germany).

URL: http://www.mortality.org (data downloaded on August 10, 2021).

Notes: Life expectancy in 2018 for Hungary was unavailable on the date of download

Closing the gap in life expectancy will stem from innovations in health technology

My fascination with living a very long life began from a young age, but it was not until I started my career that I appreciated the sheer complexity of the factors that would impact this outcome.

First, the inequality in longevity is influenced by individual factors; those related to one's biology, status, or lifestyle (e.g., sex, genetics, income, education, employment, and geography). Apart from one's sex and genetics, the individual factors are largely connected to one's life choices. The extent to which individuals adopt a healthy lifestyle can certainly improve their chances of living longer, but this is only one piece of the puzzle. The broader view is that closing the gap in life expectancy will be dependent on addressing social and economic issues affecting society such as wealth inequality and efficacy of healthcare systems.

If we address wealth inequalities between and within countries then we will increase democratization of longevity, however, this is not where I see the immediate gains coming from. With continued focus on innovations in health technology, I believe we will see further improvements in the performance and delivery of healthcare services. Technology has the potential to bring healthcare costs down and healthcare accessibility up to address inequalities. Generally speaking, if health services are of a high quality, accessible, and affordable to all, then we will have better health outcomes and a healthier global population overall.

The great equalizers?

Greater disease prevention

Many of the gains in life expectancy over the last 100 years have been credited to revolutionary vaccines against diseases such as smallpox, measles, and polio. Researchers are currently undertaking the development of a universal flu vaccine with the goal of protecting against existing or emergent flu strains which could in turn eliminate the need for an annual flu shot. This could reduce the death toll from the seasonal flu and mitigate the effects of flu pandemics.

Furthermore, artificial intelligence (AI) has transformed the healthcare space and will continue to aid in the prevention of chronic diseases. With the help of AI, healthcare professionals are already achieving more rapid and accurate patient diagnoses and disease detection.

Greater accessibility

A 2019 publication by the OECD highlighted that barriers to accessing treatment persist across countries with 20% of adults who need to see a doctor not doing so, and with even less access available to those who are lower on the social spectrum.

Telehealth has had some success in addressing physical accessibility to care by connecting doctors and patients using videoconferencing software. This provides an opportunity for people who are disabled, severely ill or geographically disadvantaged to access medical advice on demand and eliminate unnecessary travel time. The coronavirus pandemic increased the utilization of telehealth in low-income groups, and with the convenience of home care and monitoring from one's mobile phone, we could continue to see widescale adoption in rural communities and developed countries. Telehealth has also brought forth the concept of "networked care" which involves connecting local health centers with specialist hubs of expertise, equipped with the staff and technology required.

Greater affordability

The medical advancements discussed will not have much success in achieving democratization of longevity if they are not affordable. In fact, without affordability, they can further increase the gap in life expectancy.

Fortunately, the technological era with AI, "Internet of Things" solutions, and Cloud Computing has provided an avenue for reducing healthcare costs by facilitating the completion of tasks with greater speed, accuracy, and lower resource utilization. Some examples include automation of administrative tasks and the digitization of health information and infrastructure. The health industry is often criticized for its inefficiencies and rising costs; still, there is real opportunity if there is greater adoption of new age technologies.

We should also seek more tailored solutions for those who cannot afford traditional healthcare and insurance – microinsurance is such a solution. It operates the same as conventional insurance except that it is designed to offer certain levels of coverage at very low premiums. It is specifically targeted at 50% of the world's lowest-income households (making it relevant for up to 80% of the population in some countries).

Altogether, I believe greater democratization of longevity is achievable with the adoption of health technologies, while ensuring they are accessible and affordable. I am hopeful but I see several challenges ahead. Such a reality will be reliant on governments, health care professionals, and patients' acceptance and reliance on what the future of health holds. It will also

What do you think?

Will we see greater longevity democratization across the globe and within nations in the future?

Mega Trend 11-:

COVID-19 is seen as a landmark moment in the evolution of life expectancy…and in the future, we end up living shorter lives.

By Daniel Reddy
US CEO

COVID-19 and its global rampage over the last 18 months is undoubtedly a major event in the field of longevity demographics and, sadly, in many people's lives. In the future, the pandemic will catalyze changes in life expectancies – some driving increases in life spans and some driving decreases. In this blog, I will focus on those expected to decrease life expectancy in the near and long-term.

Mutations

Greek letters used to be the purview of mathematicians and philhellenes. Unfortunately, though, as the coronavirus that causes COVID-19 has mutated over the last 18 months, we've been receiving a crash course in the Greek alphabet. This is an improvement over the prior approach of identifying the latest mutation by the country that found the mutation (reducing some of the associated stigmatism and xenophobia).

The United States CDC classifies variants into four groups:

Variants being monitored – there are currently 10 variants being monitored in the US

Variant of interest

- A variant with specific genetic markers that have been associated with reduced effectiveness of antibodies generated against previous infection or vaccination, reduced efficacy of treatments, potential diagnostic impact, or predicted increase in transmissibility or disease severity.

- There are currently no variants classified in this group in the US
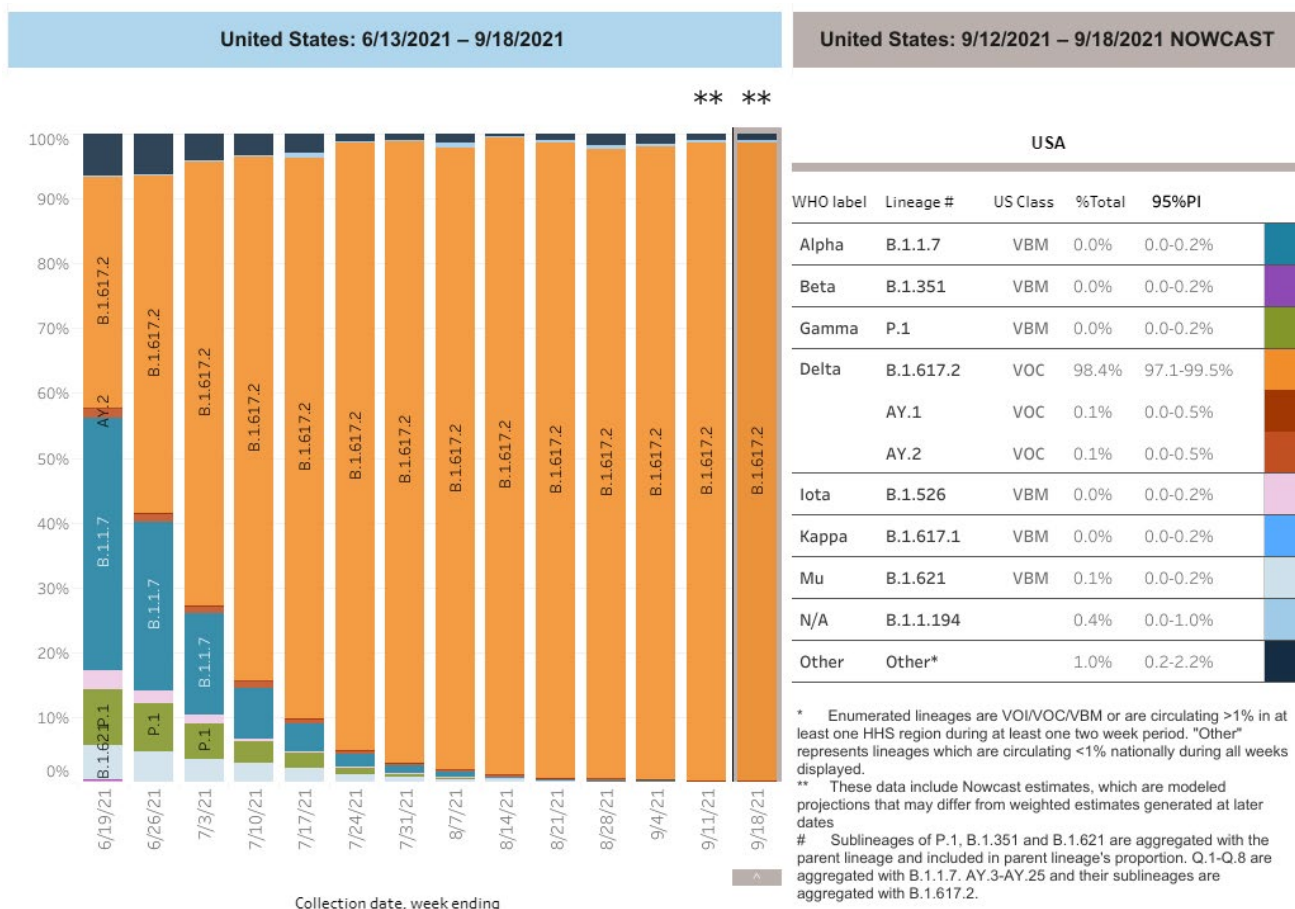
Variant of concern

- A variant for which there is evidence of an increase in transmissibility, more severe disease (e.g., increased hospitalizations or deaths), significant reduction in effectiveness of antibodies generated during previous infection or vaccination, reduced effectiveness of treatments or vaccines, or diagnostic detection failures.

- The Delta variant is the only variant of concern in the US

Variant of high consequence

- A variant of high consequence has clear evidence that prevention measures or medical countermeasures (MCMs) have significantly reduced effectiveness relative to previously circulating variants.

- There are currently no variants classified in this group in the US
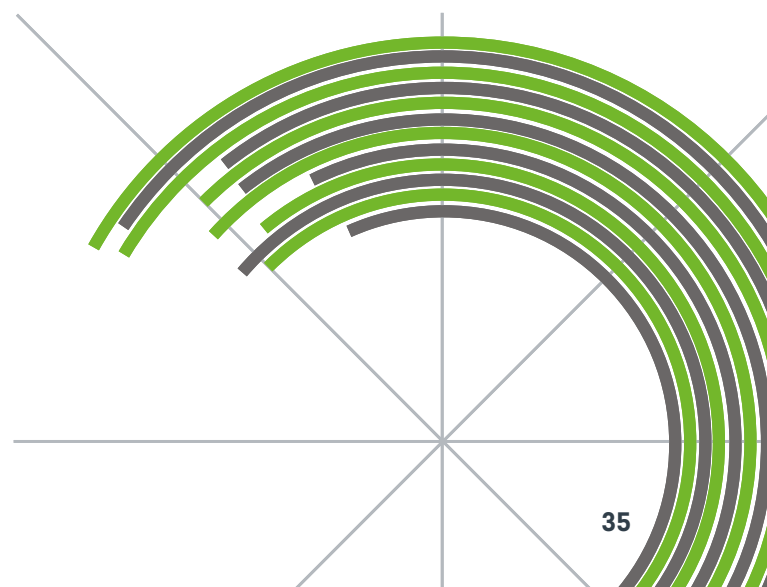
While it is encouraging that the 'pipeline' of dangerous variants is relatively low (while some variants are being monitored, only Delta has risen above the baseline level of risk), it is shocking how quickly a new variant can emerge and overtake all others. The chart below, underlined produced by the CDC shows how quickly the Delta variant overtook all other variants to become nearly 100% of the current cases in the United States. In the space of 3 months' Delta went from around one-third of all cases to nearly all US cases.

	United States: 9/12/2021 – 9/18/2021 NOWCAST			
		USA		
WHO label	Lineage #	US Class	%Total	95%PI
Alpha	B.1.1.7	VBM	0.0%	0.0-0.2%
Beta	B.1.351	VBM	0.0%	0.0-0.2%
Gamma	P.1	VBM	0.0%	0.0-0.2%
Delta	B.1.617.2	VOC	98.4%	97.1-99.5%
	AY.1	VOC	0.1%	0.0-0.5%
	AY.2	VOC	0.1%	0.0-0.5%
Iota	B.1.526	VBM	0.0%	0.0-0.2%
Kappa	B.1.617.1	VBM	0.0%	0.0-0.2%
Mu	B.1.621	VBM	0.1%	0.0-0.2%
N/A	B.1.1.194		0.4%	0.0-1.0%
Other	Other*		1.0%	0.2-2.2%

*   Enumerated lineages are VOI/VOC/VBM or are circulating >1% in at least one HHS region during at least one two week period. "Other" represents lineages which are circulating <1% nationally during all weeks displayed.
**   These data include Nowcast estimates, which are modeled projections that may differ from weighted estimates generated at later dates
\#   Sublineages of P.1, B.1.351 and B.1.621 are aggregated with the parent lineage and included in parent lineage's proportion. Q.1-Q.8 are aggregated with B.1.1.7. AY.3-AY.25 and their sublineages are aggregated with B.1.617.2.

Source: CDC COVID Data Tracker: https://covid.cdc.gov/covid-da...

While the CDC is not yet concerned about other variants, this virus has shown an ability to mutate and quickly overtake prior variants. If this continues, there is no doubt this will increase mortality in the near term.
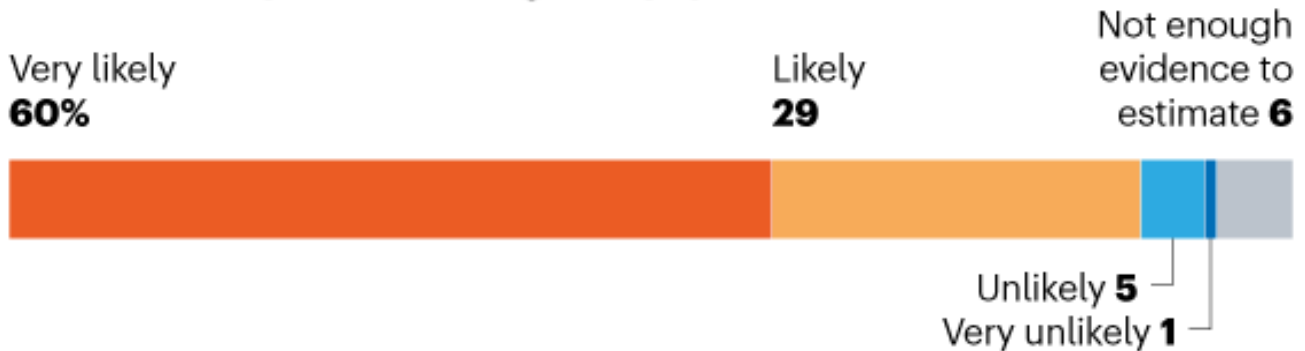
The New Flu

One of the dangerous characteristics of the influenza virus is its ability to quickly mutate to new variants that are not recognized by our immune systems. This causes annual flu seasons along with the need for scientists' best guess for targeted flu vaccinations. The annual flu is an endemic disease – one that is always present in a certain population or region.

Many experts believe COVID-19 is on its way to becoming an endemic disease – one of which we will never rid ourselves completely. However, while we may not eradicate it, it is expected to become less deadly to the population than it was over the last 18 months.
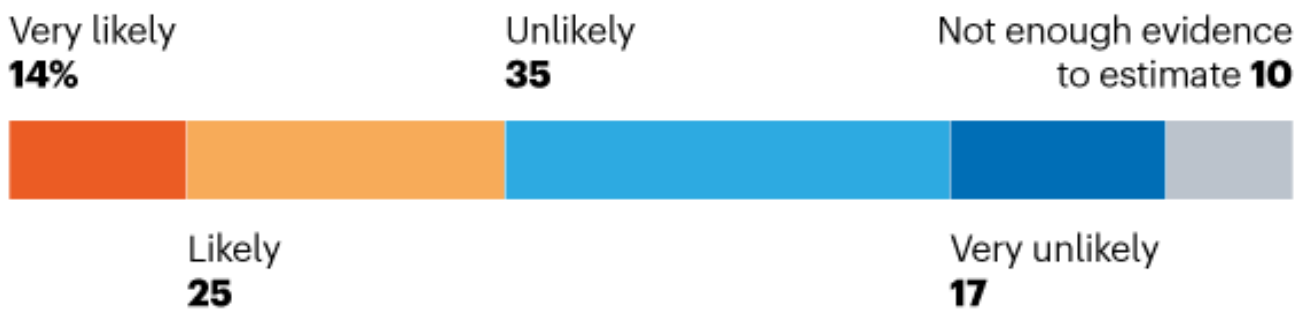
ENDEMIC FUTURE

In a *Nature* poll, 89% of scientists felt that SARS-CoV-2 was either very likely or likely to become an endemic virus.

How likely do you think it is that SARS-CoV-2 will become an endemic virus: that is, one that continues to circulate in pockets of the global population?

Very likely
60%

Likely
29

Not enough evidence to estimate **6**

Unlikely **5**
Very unlikely **1**

How likely do you think it is that SARS-CoV-2 can be eliminated from some regions?

Very likely
14%

Unlikely
35

Not enough evidence to estimate **10**

Likely
25

Very unlikely
17

119 immunologists, infectious-disease researchers and virologists from 23 countries. Percentages do not add up to 100% because of rounding.

©nature

Source: Nature https://www.nature.com/article...

While an endemic COVID-19 will almost certainly become less deadly, adding a new endemic disease that is similar to flu will drive down life expectancies. The flu ranks among the top 10 causes of death in the UK, US and Canada. Annual deaths from flu in the United States ranges from 12,000 to 60,000
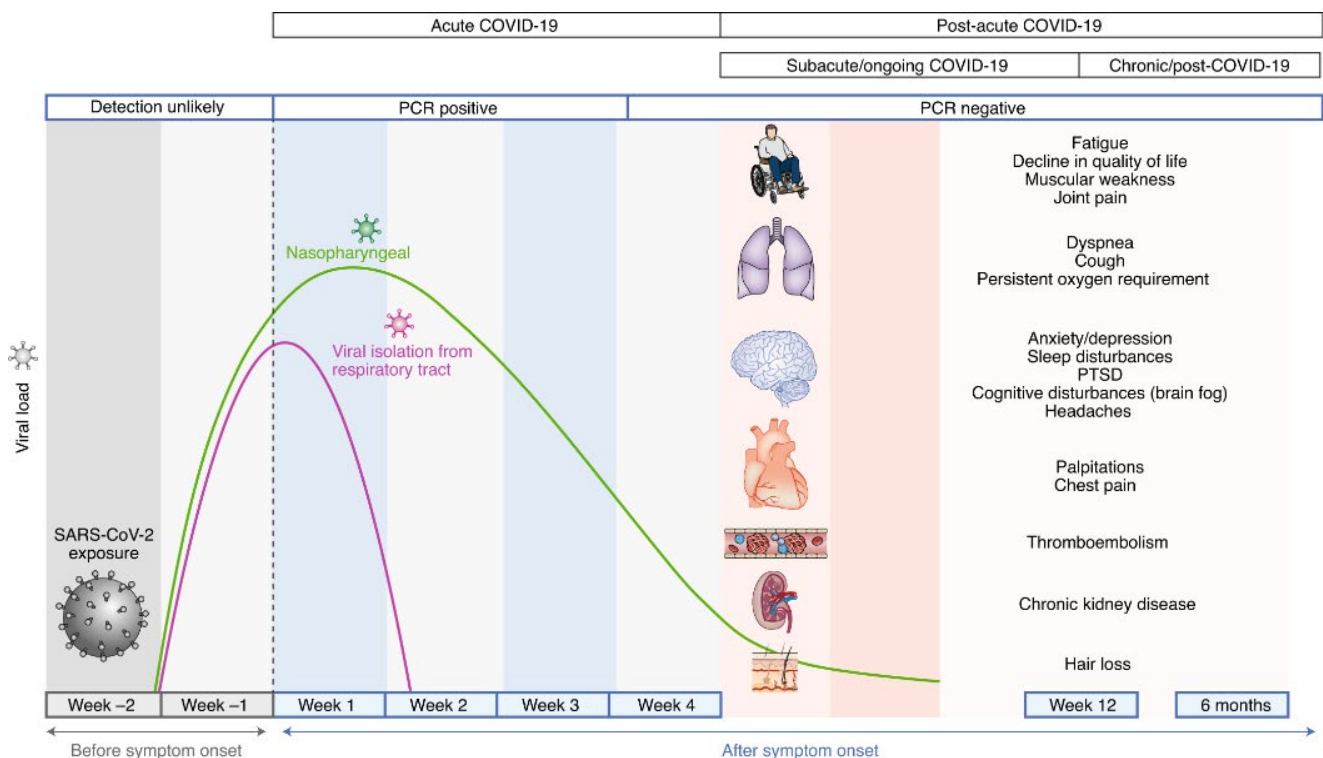
Long COVID

COVID-19's acute respiratory effects are well-documented and deadly. Less well-known are the effects of post-acute COVID-19 syndrome, often referred to as "long COVID." This is an area of much speculation since the pandemic is only around 18 months old. Scientific studies will certainly continue to monitor this syndrome for years to come.

Long COVID is "characterized by persistent symptoms and/or delayed or long-term complications beyond 4 weeks from the onset of symptoms.

" A study published in the journal "Nature" splits long COVID into two subcategories:

- subacute or ongoing symptomatic COVID-19, which includes symptoms and abnormalities present from 4–12 weeks beyond acute COVID-19; and

- chronic or post-COVID-19 syndrome, which includes symptoms and abnormalities persisting or present beyond 12 weeks of the onset of acute COVID-19 and not attributable to alternative diagnoses Below is a chart showing a timeline of COVID-19 disease for someone with long COVID including common symptoms.

Source: Nature https://www.nature.com/article...

As you review the long COVID symptoms on the right, you will quickly identify a number that could result in decreases in life expectancy: persistent oxygen treatment, thromboembolism, chronic kidney disease. It seems clear that many survivors of acute COVID-19 may still be at long-term risk of shorter life spans.
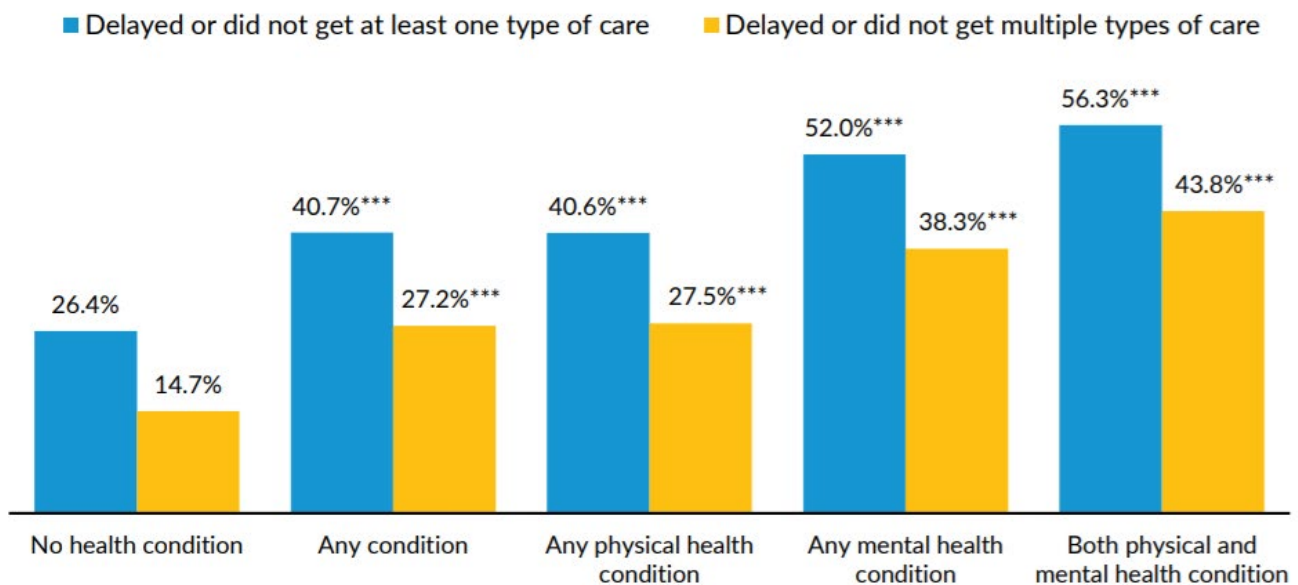
Health care access and research

Access

Much has been written about hospitalization rates and how hospitals have been overwhelmed by the pandemic. The pandemic has caused people to delay or forgo normal or emergent health care needs because they are worried about exposure to the coronavirus and/or their health care providers have limited services. The chart below shows how prevalent delayed or forgone health care is among adults during the pandemic.

Share of Adults Ages 18 to 64 Who Reported Delaying or Forgoing Health Care Because of the Pandemic, by Presence of Chronic Health Conditions, September 2020

■ Delayed or did not get at least one type of care   ■ Delayed or did not get multiple types of care

Category	Delayed or did not get at least one type of care	Delayed or did not get multiple types of care
No health condition	26.4%	14.7%
Any condition	40.7%***	27.2%***
Any physical health condition	40.6%***	27.5%***
Any mental health condition	52.0%***	38.3%***
Both physical and mental health condition	56.3%***	43.8%***

URBAN **INSTITUTE**

Source: Urban Institute Coronavirus Tracking Survey, wave 2, conducted September 11 through 28, 2020.
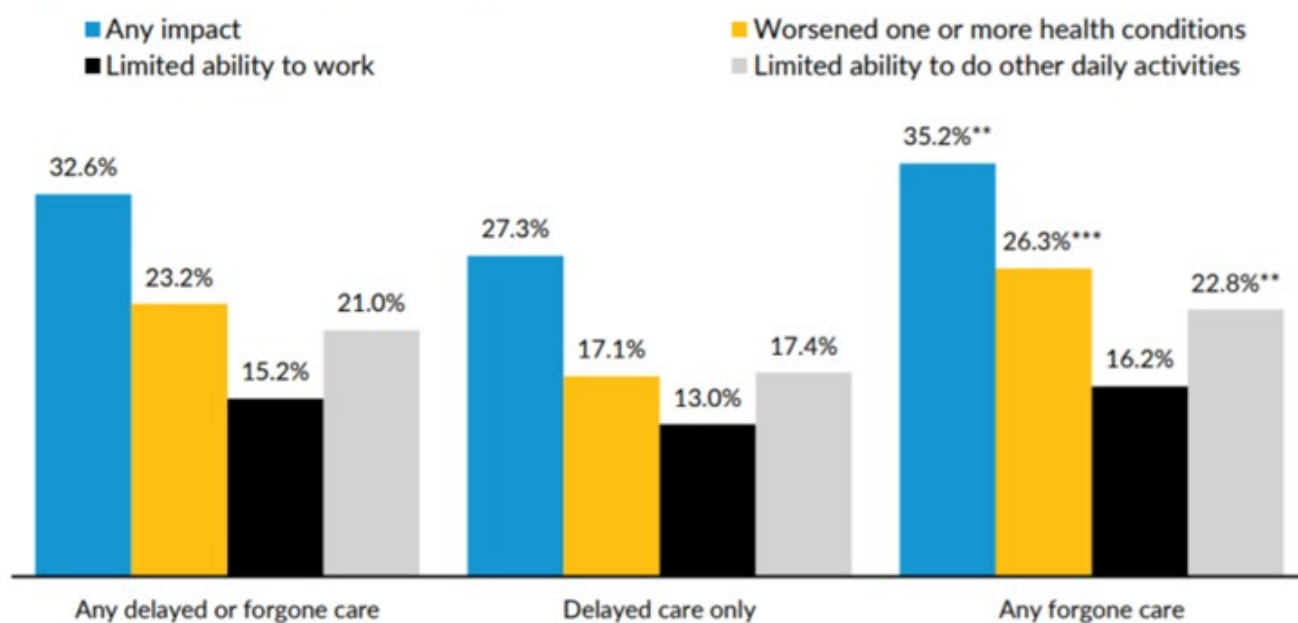**Notes:** Delayed or forgone health care is care not received because of worry about exposure to the coronavirus or because health care providers limited services because of the pandemic.
*/**/*** Estimate differs significantly from adults without chronic health conditions at the 0.10/0.05/0.01 level, using two-tailed tests.

Source: Urban Institute: https://www.urban.org/sites/de...

Depending on what health care has been delayed or forgone, the effects can be small or large. The chart below shows that the reported impact of missing health care during the pandemic has been significant for some people:

**Reported Impact of Delayed and Forgone Health Care among Adults Ages 18 to 64, September 2020**

- Any impact
- Limited ability to work
- Worsened one or more health conditions
- Limited ability to do other daily activities

Any delayed or forgone care
- 32.6%
- 23.2%
- 15.2%
- 21.0%

Delayed care only
- 27.3%
- 17.1%
- 13.0%
- 17.4%

Any forgone care
- 35.2%**
- 26.3%***
- 16.2%
- 22.8%**

URBAN INSTITUTE

Source: Urban Institute Coronavirus Tracking Survey, wave 2, conducted September 11 through 28, 2020.
Notes: Delayed or forgone health care is care not received because of worry about exposure to the coronavirus or because health care providers limited services because of the pandemic.
*/**/*** Estimate differs significantly from adults who reported only delaying care because of the pandemic at the 0.10/0.05/0.01 level, using two-tailed tests.

Source: Urban Institute: https://www.urban.org/sites/de...
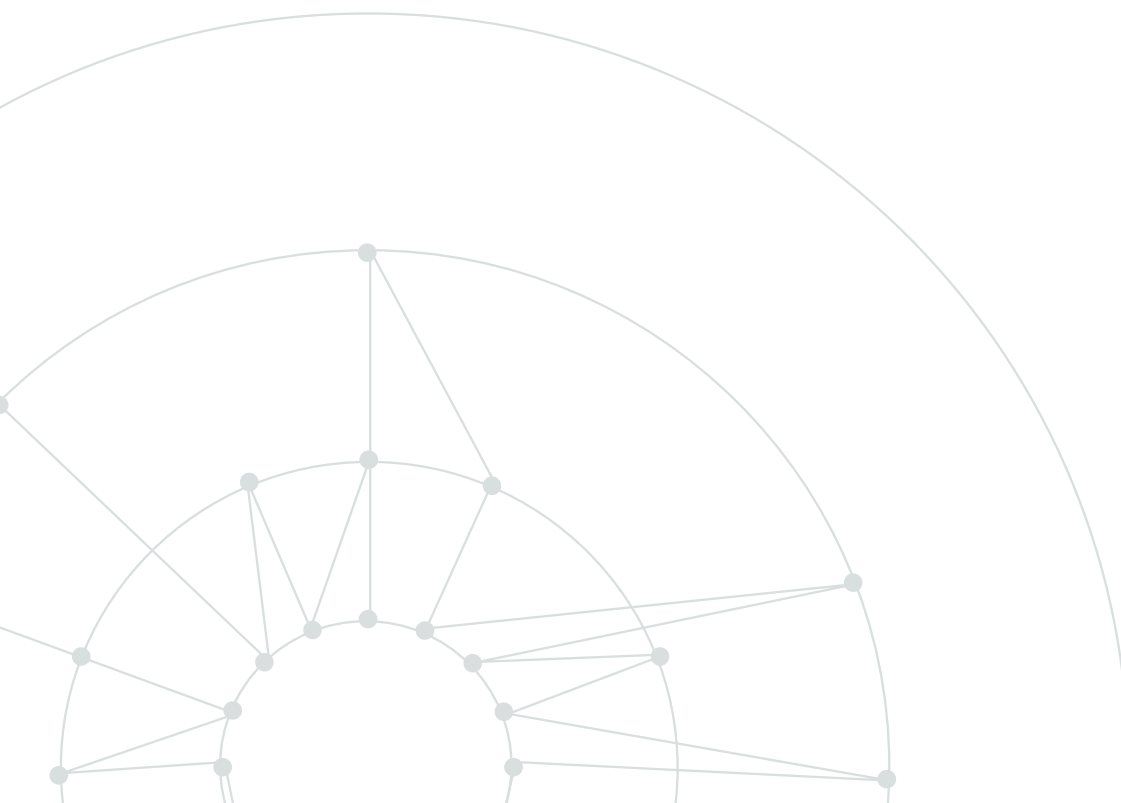
Research

I am an optimist about the future of health care research. I'm particularly excited about the ability to use mRNA vaccinations for diseases other than COVID-19. Unfortunately, though, there is evidence that the pandemic has caused a significant delay in critical health care research. The chart below shows that the pandemic will "likely slow the pace of clinical research and new drug discovery, with long-term negative consequences for cancer patients."

Monthly Trial Activations Oncology Studies
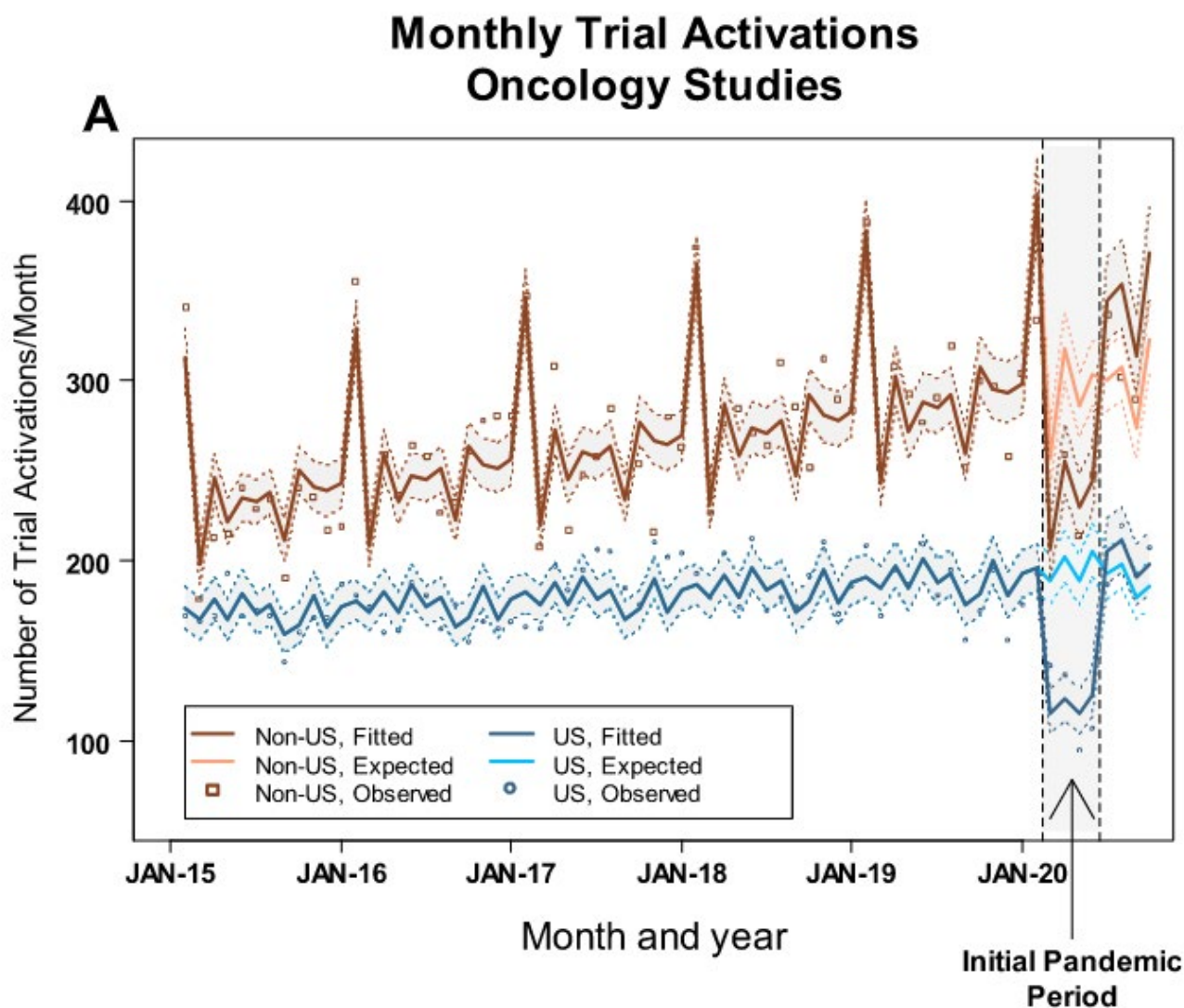
Source: Unger & Xiao, The COVID-19 pandemic and new clinical trial activations
https://creativecommons.org/licenses/by/4.0/

Will the delays and forgone individual health care access combined with delays in health care research trials lead to shorter life expectancies?

What do you think?

Will the negatives outweigh the positives in the aftermath of the pandemic? Are we at a watershed moment with decreasing life expectancy on the horizon?

Mega Trend 11+:

COVID-19 is seen as a landmark moment in the evolution of life expectancy…and in the future, we end up living longer lives

By James Maloney
Head of Longevity Modeling, UK

The devastating effects of the COVID-19 pandemic have been plain to see around the world. It is thought to be unlikely that the disease can be eradicated; the medium- and long-term effects on life expectancy remain uncertain. Thankfully though, there are some good reasons to be hopeful of a brighter outlook. In fact, there is some cause to speculate that we could see lifespans increasing faster than expected over the coming decades and that the history books could remember COVID-19 as the watershed moment that kickstarted a new era in higher life expectancy.

Tech rescue

In 2020, the world waited with bated breath to see how quickly vaccines could be created to help fight COVID-19. By early 2021, a handful had been deemed safe and effective by health bodies across the globe. While this was fantastic news in itself, there are further underlying causes for optimism.

Several of the COVID-19 vaccines (Pfizer-BioNTech and Moderna) are based on mRNA technology; this works differently to historical vaccines, in that it "trains" the body's cells to make a specific protein that triggers an immune response. Both vaccines proved remarkably effective against COVID-19 and some health experts now predict that we are only scratching the surface of mRNA's potential, with talk of future promising applications in the fight against cancer.

We should also be encouraged by the rate at which the vaccines were developed, tested and approved. The World Health Organisation, amongst others, had warned that it may take years to develop an effective vaccine, or that it may never happen at all! Such caution had largely been extrapolated from recent history and prior expectations, but in the world's time of need, COVID-19 vaccines were prioritised, funding was enhanced, production was scaled-up simultaneously with clinical trials and collaboration between scientists, medical professionals and regulators reached an all-time high (partly thanks to modern technology). This re-framed the art of the possible in speed of response.

The global roll-out of the vaccines remains an ongoing challenge, but the very fact that they exist to be produced and distributed gives us great hope. Not only could the future of mRNA technology be hugely exciting, but unlocking this potential could happen sooner than we might expect.

The (data) revolution will be catalysed

The world is certainly not short of highly-capable statisticians, modellers and data scientists, but everything starts with the data! When the very first case was identified in Wuhan in December 2019, this amounted to our first data point on the disease. Overnight, we all became part of a live data-collection program evolving in real time as the world raced to understand transmission rates, disease severity and effectiveness of possible treatments. For the statisticians amongst us, witnessing the pandemic unfold from the side-lines proved a frustrating experience at times. Over a year and a half in, there have now been upwards of 200 million known cases worldwide, but also many challenges to leverage the underlying data to its fullest potential.

- The speed at which data could be collected and recorded was crucial to an extent never seen before, but many administration systems, digitised to varying degrees, did not necessarily accommodate a rapid rate of information flow.

- Some historical recording practices also found themselves holding limited information (e.g. grouping records into wide age ranges), which detracted from the potential for detailed insight into a novel virus and its risk factors.

- Recording methods vary not only by country, but sometimes within regions of a country or by an individual administrator's discretion. For example, countries do not necessarily apply the same criteria to acknowledge COVID-19 as the direct cause of death. This makes the pooling and interpretation of data far more difficult.

The ability to "match up" data has also been mixed, with data-sharing agreements and integration between data sets often being insufficient to allow for timely flows of information.

The pandemic is likely to act as a "wake-up call" on the importance of data and the catalyst for investment in better collection techniques, international collaboration and integrated data systems. This is not only important in responding to new threats; efficient and far-reaching data systems could lead to insights that would otherwise never have even been imagined. Perhaps we will uncover the 21st century equivalent of smoking as a detriment to life expectancy.   Of course, the privacy of personal data is (quite rightly) an important consideration, but with the evolution of data anonymisation techniques and more sophisticated approaches becoming embedded in data processing, data accessibility is likely to increase.

It's a low-flu world

Historically, people have adapted their lifestyles in line with scientific developments and emerging threats. Sometimes the impact on life expectancy is obvious; smoking is far less common than in the middle of the 20th century after scientific studies uncovered its irrefutable health risks. Other times, the impact is more subtle and gradual; hygiene habits have improved incrementally with the advent and evolution of germ theory. Washing our hands wasn't always the common practice it is today.

The pandemic is likely to prove similarly influential. We have all become closely acquainted with the invisible enemy of transmissible viruses and embedded this awareness into our daily routines. We hope to return to something close to normality in the not-too-distant future, but some new habits are likely to persist.

The previously health-conscious minority, who used to wear masks on the London underground or the New York subway pre-COVID, currently find themselves part of the majority. While this is not expected to remain mandatory indefinitely, many may still choose to continue this practice given its ubiquity in the past 18 months and its known benefits to public health.

Viral transmission chains are also likely to be reduced. Going to work with a minor cold would not have seemed abnormal in the recent past, but with our newfound alertness to viral transmission, this practice has not aged especially well! And with new "hybrid" working models taking root, there will likely be fewer people on public transport and mixing in offices in the first place.

Then there is ventilation. How many of us would ever have walked into a shop or restaurant in the past and made a mental note of the fresh air supply? The difference between outdoors and indoors is no longer just about the temperature, as the health benefits of open air have come to the fore. Ventilation may therefore become a more prominent consideration in building services, and drive how people socialise and which establishments they choose to visit. The combined effect of the above may all help to reduce the circulation of viral illnesses, meaning some of the effects of heavy flu seasons and "harsh winters" (like those we have seen in the past) could be partially dampened.

What do you think?

Will the positives outweigh the negatives in the aftermath of the pandemic? Are we at a watershed moment with increased longevity improvements on the horizon?

Mega Trend 12:

Can nutritional awareness save us from the rise of fast food?

By Jacklyn Hopkins
Senior Marketing Consultant, Canada

Obesity has been on the rise in the US, UK and Canada for some time now and is strongly linked to reductions in life expectancy. This is likely to have a significant effect on future health and longevity, but with growing appreciation for the impact of nutrition on health, there is hope that we may be able to turn this tide.

My prediction is that nutrition and diet will be recognized and embraced as one of the major drivers of future health and longevity.

Increased awareness of what's actually in our food

Awareness around what's in our food is increasing; recommended daily intakes for food contents such as fat, saturated fat, sugars and salt are now well publicized and manufacturers are being pressured to disclose to us what actually makes up our food. Global fast-food chains such as McDonalds now disclose the calorie content of their menu items, and in the UK, they have even developed a traffic light system to allow consumers to easily identify warning signs for items in food stores. Long gone are the days when Nutella could be advertised as a healthy breakfast option!

Each burger contains:

ENERGY 924KJ 220kcal 11%	FAT 13g MED 19%	SATURATES 5.9g HIGH 30%	SUGARS 0.8g LOW <1%	SALT 0.7g MED 12%

% of an adults reference intake.
Typical values per 100g: Energy 966kJ/ 230kcal

Source: https://www.nhs.uk/live-well/e...

In response, supermarkets' "free-from" aisles are growing in size as consumers search for foods that are free from certain ingredients, and the global functional food ingredients market is causing manufacturers to innovate to match the high-growth demand of individuals looking for food promoting wider health benefits than just nutrition. A common food rule from the world's longest-living people suggests cutting out any food products that list sugar among its first five ingredients, especially added sugars. As you take a closer look at your ingredient labels, it'll be easier to identify which foods may fit the "not-so-great" category, and I hope also which foods can assist with living a longer life.

Food delivery services in a digital age

As our awareness around ingredients and healthy eating is growing, so is our need for convenience. The words "digital age" have been permanently ingrained in our brains lately, which is where our smartphones and our endless need for the world at our fingertips comes into effect. 2020 was a year of significant growth for grocery and food delivery apps. Uber Eats became the norm. The amount of times I thought "wow, how many bottles of wine can I get without having to go to the local store" was embarrassing. It's a bit ironic that I'd be reaching for that same wine bottle I'd just purchased through Uber Eats every time I was approached with the question at family gatherings "so, how often are you cooking now?" All jokes aside, usage of food delivery apps is expected to increase well into the future. In the U.S., studies suggest that frequent use of digital food delivery apps is overwhelming. In a study by Zion et al, 40% of people surveyed had used a multi-restaurant food delivery app in the past 90 days. With fast-food heavily linked to adverse health effects, this is of particular concern when 63% of food delivery app users are amongst those between 19-29 years of age. It is well-known that obesity is linked to lower life expectancy, and it has been observed that overall happiness decreases among those with excess weight. Generally speaking, we are sacrificing our health, life expectancy, and future quality of life for the convenience of food delivery.

The psychology of eating

Eating is a rewarding behaviour. Most of us choose what we eat based on our emotions; we eat when we're stressed, distracted, trying to cope, forget, or reward ourselves (that chocolate cake I adore certainly fits into the "reward" category). We eat when we're watching our favorite shows or when we're scarfing something down before our kid's soccer practice because we must not be late, or we may frustrate the coach again. We're not fully present and as a result, we're not completely aware of each bite we take. Unfortunately, food won't fully solve our problems. So, instead we can practice mindful eating. When our awareness increases as we are eating, we can slow down and enjoy the flavors, we can stop eating once we are satisfied instead of full, and we can avoid overeating. Our focus shifts and we learn to listen to what our bodies are trying to tell us. When we are more in-tune with our bodies, we're focused on how certain foods make us feel. As a result, we can make better food choices, we feel better about our lifestyle, and this opens the door for a happier, most-well version of ourselves as we look to live a longer life.

Can we have it all?

Until the convenience of food delivery apps can meet our demand for "better for you" foods, it's up to us to maintain a healthy balanced lifestyle. Did you know that genetics only account for a variation of 16% in overall life expectancy? I've gone most of my life thinking that if my grandma can make it to her 85th birthday, then I can too! This is true to a degree, but it seems our lifestyle choices and habits will greatly affect how long we get to experience our physical life here on Earth as we know it. And yes, this includes what we also choose to put on our grocery list. But, how can we make time for these choices when we're always so busy? My first step is this: acknowledging that conveniently delivered bottles of wine aren't so worth it, after all.

My prediction is this rising awareness will place nutrition and diet firmly in the forefront of future discussions on public health and longevity.

About Club Vita

Club Vita's mission is to improve later life financial well-being by promoting awareness of longevity risk and making its management transparent and efficient.

We work primarily with workplace pension funds in the UK, Canada and the US. On their behalf, we facilitate the accumulation and pooling of data underlying the longevity patterns of retirees with annuity benefits. Club member pension funds and their advisors use our analytics to understand their emerging longevity patterns, to drive more informed strategic decisions and to embed best-practice risk-management into their governance frameworks. We also support financial institutions that manage longevity risk: insurers, reinsurers and asset managers, helping them offer attractive longevity risk protection products in a tech-enabled, efficient manner. Our current community includes 400 pension funds, 7 pension advisory firms and 25 (re)insurers. Across our three clubs, we are tracking the survival patterns of a diverse population of over five million people with benefits in workplace pension plans.

Club Vita was born in the UK in 2008. Our systems and processes were designed by a multi-disciplinary team, with a shared passion for "allowing the data to do the talking" by combining modern technology and statistical techniques. Following a successful UK launch, we went on to build similar communities in Canada (2015) and in the United States (2019).