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The longevity society

Andrew J Scott



As the demographic transition enters a new stage of a longevity transition, focus needs to extend beyond an ageing society towards a longevity society. An ageing society focuses on changes in the age structure of the population, whereas a longevity society seeks to exploit the advantages of longer lives through changes in how we age. Achieving a longevity society requires substantial changes in the life course and social norms, and involves an epidemiological transition towards a focus on delaying the negative effects of ageing. The broad changes required to achieve healthy longevity include an increased focus on healthy life expectancy, a shift from intervention towards preventive health, a major public health agenda to avoid increases in health inequality, the establishment of longevity councils to ensure coordinated policy across government departments, and intergenerational assessment of policies, to ensure that in adapting to longer lives, policies are not skewed towards older people. A longevity society represents a new stage for humanity and requires deep-seated notions about age and ageing to be challenged if society is to make the best use of the additional time that longevity brings.

Introduction

In 1900, the fertility rate in France was 2.9 children per female and a newborn baby had a 35% chance of surviving to 65 years old, whereas by 2018, these numbers were 1.85 and 88%. Together, these changes define an ageing society consisting of smaller cohorts of younger people and larger cohorts of older ones. The result has been an increase in the proportion of the French population aged 65 years and older (from 8.5% to 20.0%) and a rise in average age (from 32.4 to 41.7 years). This is a global occurrence, with the proportion of the world aged 65 years or older set to rise from 9.3% in 2020 to 22.6% by 2100 (figure 1).

There is another way to view the data in figure 1; rather than draw a horizontal line that focuses on the increase in the older population, instead we can draw a vertical line that focuses on longevity. From this second perspective, it is apparent that individuals need to plan for a longer future. Referring once again to France, at every age there have been substantial gains in remaining life expectancy (table 1). This increase has profound implications for how life is structured around education, work, marriage, fertility, and retirement,³ and involves changing behaviours at each age to prepare for these longer lives.

An ageing society view focuses on changes in the population structure, whereas a longevity society perspective focuses on changes in how we age and the exploitation of life-expectancy gains. Both the ageing society and the longevity society pose crucial challenges for the decades to come, and both are unprecedented developments in human history—never before have so many lived for so long—yet longevity is the more distinct of the two. The problems of an ageing society are related to scale and are about how many people are living to older ages. Throughout history, many individuals have survived into their 70s and 80s. By contrast, longevity poses a distinct and original problem, that is, the need to plan for the very plausible probability that children born today in high-income countries will live into their 90s and even beyond.⁴

The combined forces of ageing and longevity produce a mix of both opportunities and problems. This Health Policy examines some of the broad issues a longevity society needs to overcome if the benefits of living longer and healthier lives are to be realised, and the costs of an ageing society are to be minimised. In the first section, we consider the different impacts of ageing and longevity. In the remaining sections, we examine the implications for individuals, the health system, and society and outline required changes, before our concluding final section. An accompanying Health Policy⁵ paper considers the implications for a longevity economy.

From an ageing society to a longevity society

Samuel Beckett's play *Waiting for Godot* was published in Paris in 1949.⁶ In the play, the character Pozzo says of humans that "They give birth astride a grave, the light gleams an instant, then it's night once more".⁶ Beckett's words might be metaphorical but they can also be interpreted literally; at the time he was writing, the modal age at death in France occurred before the first birthday.

Beckett was writing at the end of a long period of substantial improvements in infant mortality (figure 2) and when there was beginning to be a shift in the ages

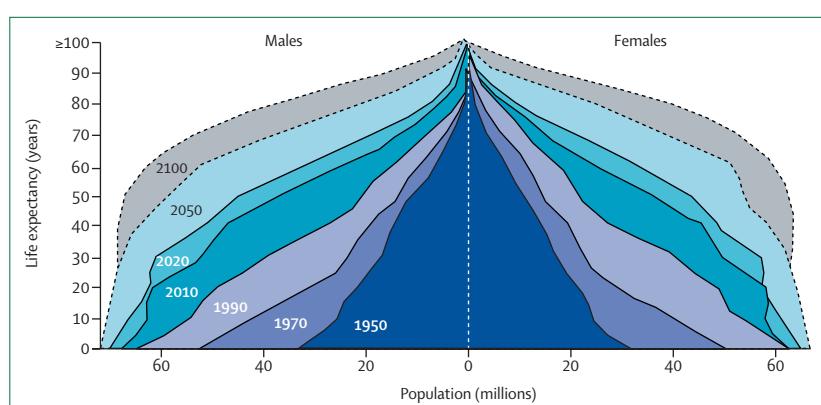


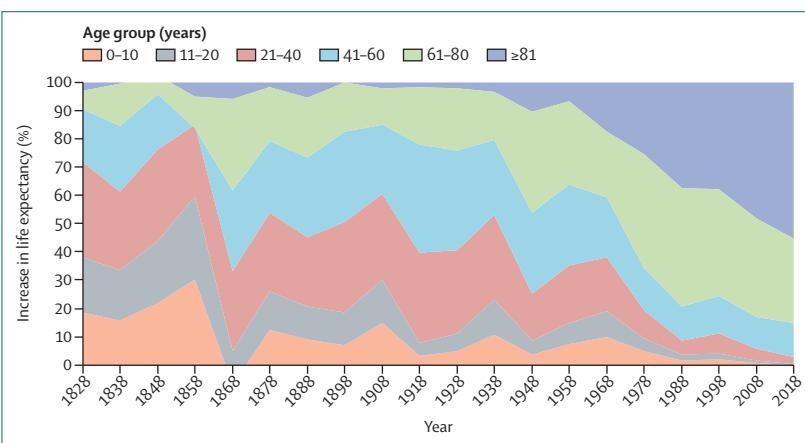
Figure 1: UN estimates and projections for the global population between 1950 and 2100 by age¹

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	At birth	Age 20 years	Age 40 years	Age 60 years	Age 80 years
Remaining life expectancy in 1900, years	45.1	41.1	26.9	13.3	4.2
Remaining life expectancy in 1938, years	58.9	46.2	30.0	15.3	5.2
Remaining life expectancy in 1978, years	73.9	55.3	36.5	19.7	7.1
Remaining life expectancy in 2018, years	82.6	63.1	43.7	25.6	10.4

Table 1: Gains in French life expectancy between 1900 and 2018 by age²Figure 2: Percentage increases in French life expectancy between 1828 and 2018 by year and age group
Data were calculated by the current author using the Human Mortality Database.²

driving increases in life expectancy. Whereas previous gains had been driven mainly by people aged younger than 60 years, improvements in life expectancy started to increasingly involve older people; the demographic transition became a longevity transition.

An initial period of falling fertility rates and increased numbers of people living to older ages (the classic demographic transition⁷) led to a focus on an ageing society, but the pattern of gains in the past decade has prompted growing interest in longevity. By 2018, the modal age of death in France had reached 89 years, and now more than half of the French increases in life expectancy occur in people aged 80 years or older.² The instant that Pozzo spoke of has become much longer.

The challenge is that these gains in life expectancy are now occurring at ages that tend to be economically inactive and characterised by poor health. As a result, the historically positive relationship between health, life expectancy, and gross domestic product (GDP) is fragmenting.⁸

This combination of an ageing society and gains in longevity brings forth a complex mix of issues—some positive, others negative, and many just plain confusing. Separating out the different strands and implications of having a rising number of older people and the implications of longer lives is necessary to prevent this confusion from constraining policy development and

social change, and leading to adverse individual and social outcomes.

On the positive side, the fact that more people survive to an older age is surely one of the greatest achievements of the 20th century. It means fewer infant deaths to mourn, more grandparents and grandchildren who will be able to meet each other, and many more people benefiting from extra years of life. Furthermore, the majority of these added years are healthy ones. The Global Burden of Disease dataset⁹ estimates that, on average, the proportion of life that is healthy has remained broadly constant over time; we are living for longer and are healthier for longer.

To support this improvement, there is evidence that how we age is malleable and that the relationship between health and age has improved over time,^{10–12} which in turn has helped to support employment at older ages. In G7 countries, between 2008 and 2018, the employment rate in people aged 55 years and older grew by 100%.¹³

However, there are also many negative factors; an ageing society means fewer people of working age, lower GDP, and higher health and pension expenditures.¹⁴ Furthermore, although the proportion of life that is healthy has remained constant, there is an implied increase in the number of years spent in ill health. The result, according to Sleeman and colleagues,¹⁵ is that by 2060, 48 million people (accounting for 47% of all deaths globally) will die having experienced pain during their final stage of life. A shift in the disease burden from infectious diseases towards chronic non-communicable diseases is also expensive. Bloom and colleagues¹⁶ calculated that the total cost of dementia to the economy (including informal care) is equivalent to a tax worth 3% of GDP.

Age malleability also creates challenges with rising concerns around health and life expectancy inequalities.^{17–19} Rising fears around obesity lead to concerns about declining health trends in younger age cohorts.^{20,21}

Similarly, although this increase in the proportion of people aged 55 years or older who are working helps to support the economy and finance longer lives, it also creates tensions. Increases in the state pension age are politically unpopular and, given inequalities in ageing, disproportionately affect the most disadvantaged.

The combined effects of ageing and longevity also lead to confusion while society adapts to new norms and shifts in the age structure. Ageism and views on age-appropriate behaviour run into conflict with the changes that longevity brings about.²² A rising proportion of older citizens in the population also leads to intergenerational tensions,²³ to the extent that in Japan, the neologism *rougai* has emerged to express the harm inflicted on Japan by its elderly.²⁴

From this medley of effects, four things should be emphasised. First, demography is not destiny. Although little can be done to offset changes in the population

structure, adapting to a longevity society offers the promise of exploiting the gains that longevity offers.

Second, the experiences of countries will differ considerably. In part, these variations will reflect both the degree to which countries successfully migrate to a longevity society and the relative magnitude of changes in the age structure of the population compared with improvements in healthy longevity. Countries such as Japan and China, which have seen very rapid falls in their fertility rates, will have far greater challenges of an ageing society than countries such as the USA and the UK.

Third, a key component of a longevity society is a focus on how we age and not just on supporting those who are old. Ever-increasing resources will be focused on healthy ageing, requiring actions and interventions across the life course.

Finally, the challenges of an ageing society are often seen as a problem only for high-income countries at an advanced stage of the demographic transition. However, the longevity society implies that regions with a currently large young population, such as Africa and the Middle East, need to ensure that those who are young now grow to be the healthiest old-age cohort ever; ageing does not begin when a population becomes old.

Individual implications

The ageing society narrative, with its focus on population structure, tends towards an aggregate perspective, whereas the longevity society view more readily accommodates individual implications.

The most obvious of these implications is that individuals gain additional time, which from an economic perspective is valuable in itself.²⁵ The better the person's health in these additional years, the greater the value to the individual of this extra time. This issue feeds into the second key feature of a longevity agenda: exploiting the malleability of age. Longer lives mean that at every age, individuals have more future ahead of them than their predecessors could have expected to have, so the importance of ageing well increases.

This combination of increased time and age malleability implies changes in how individuals should behave over their lifetime. Having increased future time increases the value of investing in education,²⁶ health,²⁷ and financial savings.²⁸ Increased time also increases the value of enlarging one's options and delaying taking on commitments, which is consistent with marked changes in behaviour across the life course (table 2).

Another implication of longer lives is the need to work for longer,³⁵ explaining why the proportion of people remaining in the labour force after age 65 years has increased (table 2).

However, longer working lives will require substantial accompanying changes.³ In the 20th century, a three-stage life of education, work, and retirement emerged, but is unlikely to be optimal stretched across longer working careers. Longer careers increase the risk of skill

	1990	2019
People aged 18–21 years in tertiary education, % ²⁹	19.0%	51.8%
Age of mother at first birth, years ³⁰	25.5	28.8
Ratio of mothers older than 40 years versus younger than 20 years when giving birth ³¹	0.16	1.43
Age of woman at first marriage, years ³²	25.2	31.8*
Divorced men older than 65 years, % ³³	3.4%	7.7%
Labour force older than 65 years, % ³⁴	5.6%	10.9%

*Data are for 2018, the latest available year.

Table 2: Comparison between 1990 and 2019 in lifecycle data for UK population

obsolescence, suggesting that increased education, available across the life course (ie, lifelong learning), is needed. This increase in adult education should focus not just on job-related skills, but also on supporting personal transitions along the career path. Such transitions and career shifts will not just be a consequence of technological change; needs and preferences shift with age and, at different stages, individuals will need to focus on finances, caring, reskilling, relationships, and their own sense of purpose. The consequence is the emergence of a multi-stage life characterised by shifts, both between full-time, part-time, and flexible working, and in terms of focus, motivation, and roles.

This shift to a multi-stage life places increased demands on individual self-responsibility in two ways. First, existing social norms will be challenged as social experimentation occurs to find out how best to adapt to longer lives. Just as the 20th century saw the emergence of teenage^{36,37} and retirement stages,^{38,39} so too the 21st century will see other new stages of life created. This absence of existing social norms for a multi-stage life places an emphasis on the individual to experiment and discover new ways of behaving at a variety of ages.

Second, longer, multi-stage careers are less likely to occur while working for a single employer. Individuals will need to take greater self-responsibility in navigating their career path, thinking ahead about the skills they need and the roles they want, and choosing when to instigate change and transitions. Doing this individually will be hard but will be aided by emerging social norms and a growing range of support services aimed at guiding and helping transition. Some of these services will become part of the activities provided by educational institutions, because lifelong learning breaks down distinctions between students and alumni.⁴⁰

As lives become longer, the ability to make decisions on the basis of long-term considerations will grow in importance. Throughout human history, the high probability of mortality at all ages led to a considerable focus on preparing for the possible imminent end of life.⁴¹ However, as the mortality risk declines and is

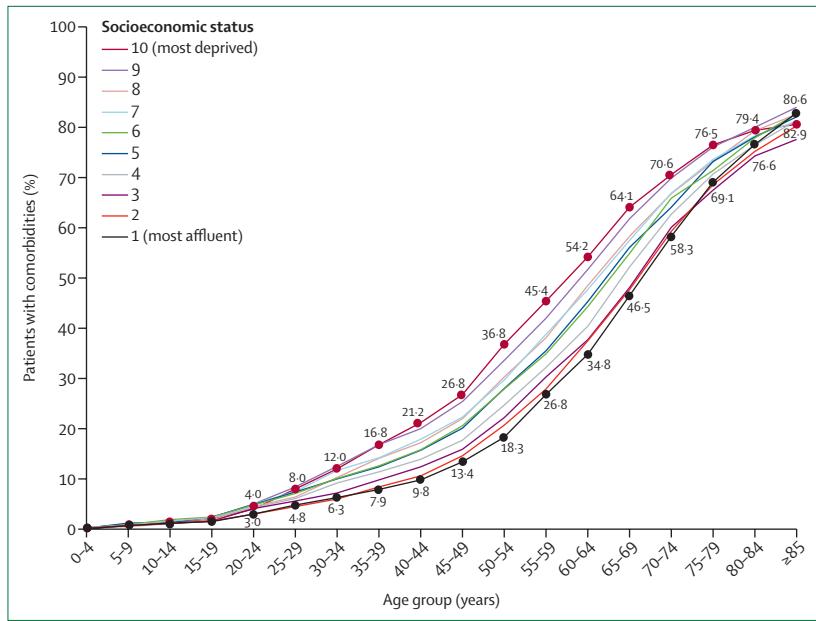


Figure 3: Comorbidities in the UK by age and socioeconomic status⁴⁹

concentrated in people's later years, there will be a much greater focus on a longer remaining life.

This refocus requires investments in developing greater patience, tolerance, and self-control. The famous Marshmallow test study⁴² claimed that showing self-control at a young age led to a range of better outcomes later in life, the importance of which will only become greater as life expectancy increases. Watts and colleagues⁴³ argued that self-control itself is influenced by a range of variables, suggesting that individuals can take action to lower how much they discount future benefits.⁴⁴ Although there is considerable scope for public health and government policies to support having a longer life, achieving healthy longevity will inevitably place increased responsibility on the individual, and will require additional resources and information and the development of new tools, such as the integration of big data into individual health monitoring. More broadly, there is a major digital agenda around finding easy-to-use ways to support older individuals in controlling and influencing more of their lives.

Health sector implications

A major challenge of an ageing society for the health sector is the rising importance of non-communicable diseases, and it is important to disentangle the effects of ageing and longevity in driving this shift. Kingston and colleagues⁴⁵ projected the 2015–35 care needs of people aged 65 years and older, using UK data. Results suggested that the proportion of people aged 85 years or older who required high-dependency or medium-dependency care would decline from 30.5% in 2015 to 26.3% by 2035. However, although the average health of older people is improving, the rapid increase in the

number of older people still means a substantial increase (from 402 000 to 739 000) in the number of individuals requiring such care. These statistics show the mixed news that ageing and longevity brings. Healthy life expectancy is increasing, but not at the same rate as life expectancy is, meaning that substantial welfare gains can be achieved from compressing morbidity.⁴⁶ According to Scott and colleagues,⁴⁷ achieving a full compression of morbidity is more valuable than any further gains in life expectancy. This suggestion makes it important for governments to set targets for healthy life expectancy,⁴⁸ as they also do for other important variables such as inflation and CO₂ emissions.

Improvements in healthy life expectancy will require a reduction in the rate at which comorbidities accrue with age (figure 3). One way of achieving this reduction is through further improvements in best practice, pushing down the lower line in figure 3. Substantial gains in healthy life expectancy can be achieved through reducing inequality, but this is more likely to be done by correcting instances of worse practice than by boosting best practice. One challenge is that supporting a healthy longevity agenda is most easily fostered in fit and healthy older people with resources and time at their disposal; if equitable healthy longevity is to be achieved, a major public health initiative is required (similar to those that help to improve health in childhood and middle age) that targets people with poorer health, fewer resources, and weaker support networks.

Reducing the age gradient for comorbidities requires a health system based on prevention rather than intervention. Given that only around 2.8% of health spending is allocated to prevention activities,⁵⁰ a substantial reallocation of expenditure is needed.

Such a shift raises three important implications for health care. First, although the health sector is the natural base for an intervention-based approach, successful preventive health policy goes well beyond the health sector. Healthy life expectancy is driven by a range of factors, such as regulation and taxes on food, education, pollution, quality of housing stock, transport policies, and city planning. Tackling health inequalities requires a much wider range of policies and measures than just health-care provision.

This prevention entails governments establishing, both nationally and regionally, longevity councils based around cross-departmental coordination. Although how we age will become increasingly important, the relative role of the health system in supporting this will decrease.

Second, a longevity society does not necessarily mean an increase in resources allocated to older age groups. Preventive health requires a life course approach, identifying key stages at which interventions are most likely to support healthy ageing—eg, prenatal, puberty, and middle age.

Third, a longevity society requires greater investment in research on the biology of ageing and treatments

targeting ageing (see Campisi and colleagues⁵¹ for a survey). Many non-communicable diseases have age as an important risk factor.⁵² If treatments can be developed that slow or even reset the ageing process, then the welfare gains are enormous. Scott and colleagues⁴⁷ estimate that a 1-year increase in life expectancy achieved through slowing down ageing is worth US\$38 trillion in the USA.

Furthermore, as emphasised by Olshansky and Ault,⁵³ focusing on delaying ageing is the obvious next step in a long-running historical process of epidemiological transitions.⁵⁴ Medical research will always be focused on tackling the diseases that affect the largest portion of the population. Given past improvements in infant and midlife mortality, that approach now means tackling age-related diseases.

As with so many past medical developments, this approach requires a shift in mindset about what is possible, what can be influenced, what is inevitable, and what the priorities are. Medawar⁵⁵ and Kirkwood⁵⁶ both noted that evolution has had little opportunity or incentive to focus on improvements in late-life ageing, and the same could be said of the health sector. The barriers to institutional reform in the health sector are considerable. First, existing health resources are already stretched, making substantial investments in preventive health care difficult to achieve. Second, senior figures will need to adopt different skills and mindsets from those that helped them to achieve their prominence. For instance, health practitioners will need training to better understand the longevity perspective rather than taking an interventionist approach. There also needs to be increased focus on ageing as a process, rather than on specialisation around specific diseases. Although the intellectual case for these changes might be clear, the organisational challenges are substantial. Because of the broad nature of precautionary health, many changes will come from outside the traditional health sector—eg, through local authorities, social entrepreneurs and charities, and private sector new products and services. However, because health care is widely seen as a luxury good in economic terms (ie, the share of income we devote to health increases with income, and probably with life expectancy) it seems inevitable that the health expenditure share of GDP will increase even further.⁵⁷ This increase creates a likelihood of bargaining between ministries of finance and ministries of health regarding the provision of additional resources, if reforms to support healthy longevity are adopted.

A focus on delaying ageing is likely to increase within a longevity society owing to the existence of a virtuous circle;⁴⁶ the better we age, the more we will value further improvements in healthy longevity. Currently, living into a tenth decade is a worrying prospect, because of the risk of deteriorating health. However, if improvements are made in how we age, then the value of living to 90 years or older rises, and there will be increased

demand for living beyond 100 years. A longevity society will lead to increased resources being devoted to improvements in how we age, with the outcome determined by whether human ingenuity or human mortality is the most powerful.

Social implications

Much of our contemporary attitude towards age is based on chronological measures. According to Thomas,⁵⁸ starting in the 17th and 18th centuries, rising public numeracy and increased government bureaucracy led to this focus. This tendency reached its apotheosis in the definition of old age as 65 years or older, still commonly enshrined in concepts such as the old-age dependency ratio.

This focus on chronological age ignores two main features of longevity—ie, malleability and future time—and therefore the only thing that chronological measures can detect is an increase in the number of old people.

One way to allow for age malleability is to adjust for age inflation.⁵⁹ Economic measurements are careful to distinguish between nominal and real variables. For instance, in 1987, the price of a pint of lager in the UK was £0·92, but by 2020 it had risen to £3·79. However, to know whether lager has become more expensive relative to other items requires an adjustment for inflation. The term age inflation captures the notion that age is just a number, and that the variable of interest is not the number of years, but the measure of underlying health. When defining old age, adjusting for improvements in mortality rates would increase the age at which pension entitlement should begin by 0·15 each year.⁵⁹

Sanderson and Scherbov's⁶⁰ prospective age concept also involves adjusting chronological age for improvements in mortality rates. This concept defines old age as having 15 years or fewer of remaining life expectancy, and therefore focuses on the forward-looking dimension of longevity. Using this approach dramatically reduces forward projections of the old-age dependency ratio and the challenge facing the ageing society.

The concepts of age inflation and prospective age focus on adjusting chronological age for changes in mortality rates. However, ultimately it is the relationship between underlying health and age that defines age malleability, which explains the growing focus on constructing measures of biological age.⁶¹ Although such measures are in their infancy and have no single overall measure, they should be a key part of discussions for individuals, health care, and broader policy.

Measures of biological age are needed, not only because of age inflation, but also to capture the diversity in ageing. Ageing is a diverse process, and as an increased number of people live into old age, what becomes apparent is that chronological measures of age provide diminishing information. The UK House of Lords reported that “The health of a 40 year old Pakistani or Bangladeshi person [living in the UK] is equivalent to

that of a 70 or 80 year old white British person.”⁶² Relying on chronological measures not only fails to highlight the longevity agenda and progress made towards a longevity society, but also fails to highlight priority areas for action.

This diversity in how people age has important implications for an ageing society narrative. A focus on changes in the age structure of the population aggregates the old together, often in a single group. Whether old age starts at 65 or 75 years is not the key issue if people age diversely; what matter are people’s individual circumstances. A longevity society requires an increased focus on diverse needs and circumstances and policies designed around healthy ageing for all, rather than specific collective policies for the old. Crucially, a longevity society should avoid simplistic measures of age to define the needs of individuals, and instead focus on increasingly nuanced policies. Governments do not have collective policies aimed at all people younger than 65 years, and nor are policies aimed at all people older than 65 years likely to be successful.

The tendency to think of old people as distinct, homogeneous, and different to younger people underpins profound problems around ageism. Ageism is a major barrier to achieving a longevity society because it restricts and constrains the options that are available as people age. Ageism conflicts with both age malleability and age diversity. Age malleability implies that age-based stereotypes are out of date, whereas age diversity implies age-based stereotypes are unlikely to be informative.

Although existing social norms might eventually adjust in response to shifts in individual behaviour, the novelty of the longevity agenda conflicts with deep-seated historical prejudices. As a consequence, stronger age-discrimination legislation will be needed as part of a broader diversity agenda that also includes gender, ethnicity, and sexuality. Political support for this age-discrimination legislation will come from the ever-increasing proportion of older voters.

This rising share of older voters will lead to growing political tensions. If policies are skewed towards the interests of the median voter, then an ageing society implies a shift away from policies favouring the young to policies favouring the old. However, in a longevity society, political conflict between the young and old should be reduced, not increased. Back in 1938, an American aged 20 years had only a 24.5% chance of making it to 80 years, today that chance is 59%. Now, the young have never had a better chance of becoming old, so political conflicts between the generations should become less zero-sum orientated. However, use of the concept of generations and labels such as millennials and baby boomers, rather than life course labels such as young and old, create challenges. The young have a rising chance of becoming old, but millennials will never become baby boomers, which converts generational debates back into a zero-sum format.

The challenges that longevity and an ageing society bring to the young are substantial. In an ageing society,

those of working age have to provide the resources, taxes, and caring to support a large older generation. Furthermore, it is the young who are most affected by longevity trends and who require the biggest changes in terms of education, careers, pensions, and security. The danger of an enlarged older cohort is that their needs, rather than the substantial challenges faced by the younger cohort, will be what governments focus on.

Avoiding such intergenerational conflict will require three different strands. First is social experimentation aimed at increasing intergenerational mixing and removing generational prejudices on either side. Generational labels are another example of age segregation, and as an increased number of generations live and overlap, the longevity society needs to find ways of tackling such prejudice.⁶³ Many social experiments are underway, including measures within schools aimed at increasing awareness of longevity and experiments in intergenerational mixing. Second is the need to calculate life course audits to assess the implications of different policy measures and how they affect different generations.⁶⁴ Finally, the recognition that tackling an ageing society means ensuring that the future old (ie, the current young) are as healthy and supported as possible. What is required is the reconstruction of institutions that support jobs, careers, education, and pensions, to support the longer lives that the young can expect. As the mortality rate in care homes during COVID-19 reveals, or the age discrimination that older workers experience in the labour market shows, existing practices are not already supporting longer lives. There is need for cross-generational dialogue to improve things.

Conclusion

As the demographic transition has turned into a longevity transition, policy focus needs to extend beyond an ageing society to consider a longevity society. Changes in the age structure of the population and changes in how we age will define the success of countries in the years ahead and define unprecedented challenges and opportunities.

In response to this mix, there will be increasing efforts, both individually and collectively, to achieve the benefits of longevity and help mitigate the costs of an ageing society. As we live longer, what becomes increasingly important is how we age. This aspect requires substantial change in behaviour across the life course, as society adapts to having more future years ahead and exploits the malleability of age. This adaptation will require major changes in our social infrastructure around education, jobs, relationships, and community.

This new stage of a demographic transition in turn will lead to a new stage of an epidemiological transition, focused on healthy and delayed ageing. That focus requires a shift towards preventive health care and the rising importance of coordinating health and non-health policies. How we age will become increasingly important,

but the importance of the health sector in supporting this outcome will lessen.

In addition to a new stage of demographic and epidemiological transition, there is also a new stage for humanity, in which existing concepts of age and old are challenged and society experiments with how to make best use of the extra time that longer lives are creating.

Declaration of interests

AJS is a cofounder of the not-for-profit The Longevity Forum, an adviser to Genflow Biosciences, and serves in non-paid roles on a number of advisory boards. In 2021, he received a speaker honoraria from Elsevier for speaking at an event on age diversity.

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