Institute and Faculty of Actuaries

Independent thinking from the IFoA

February 2025

think

The population implosion: What choices do we have?

by **Dermot Grenham**

Independent thinking from the IFoA

Part of the IFoA's purpose is to promote debate within and beyond the profession, and to position our members as leading voices on the biggest public policy challenges of our time.

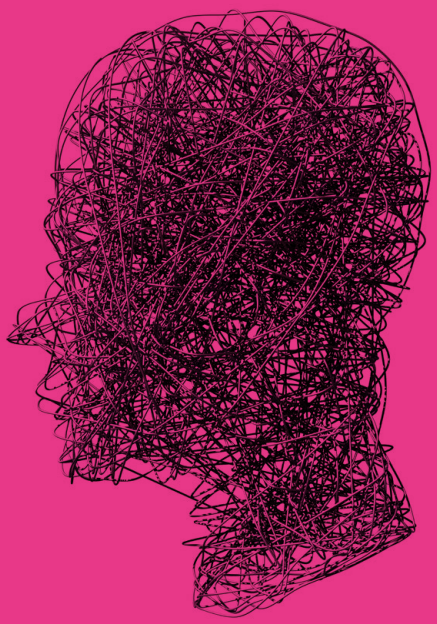
We aim to showcase the diverse range of expertise and critical thinking both within and outside the profession.

Our 'think' series seeks to promote debate on topics across the spectrum of actuarial work, providing a platform for members and stakeholders alike and sharing views that may differ from the IFoA's house view. In doing this, we hope to challenge the status quo, question the orthodoxy, and shine a light on complex or under-examined issues, thereby stimulating discussion and dialogue to help tackle issues in a different way.

Dermot Grenham

Dermot Grenham's actuarial career has spanned life and general insurance in a number of public and private, mutual and shareholder organisations over more than 35 years. He has just started his third period as a member of the IFoA Council. He lectured in demography at the London School of Economics for five years and recently co-authored a paper on fertility for actuaries, which was published in the British Actuarial Journal (BAJ). He is proud to be a member of the Board of Management of Glasgow Kelvin College, a further and higher education college serving some of the most deprived areas of Glasgow.

Contents



think

Introduction

The issue of low and falling birth rates is increasingly becoming a topic of media and academic interest. For example, *The Economist* ran an article in its 29 October 2024 issue under the title: "Britain's birth rate has crashed. It is likely to recover."

In this paper, I discuss the context of falling birth rates, consider the causes and consequences, and identify some possible options for governments facing economic pressures and financial costs associated with increases in the old age to working age ratio.

This topic is relevant to actuaries both from a technical perspective and from a broader social perspective.

think

Context

Demographic change is one of the "megatrends" or global, society-wide forces which are predicted to have a dramatic effect on economies, cultures and international relations.

Across the globe, all three of the main demographic variables (mortality, fertility and migration) are experiencing significant changes:

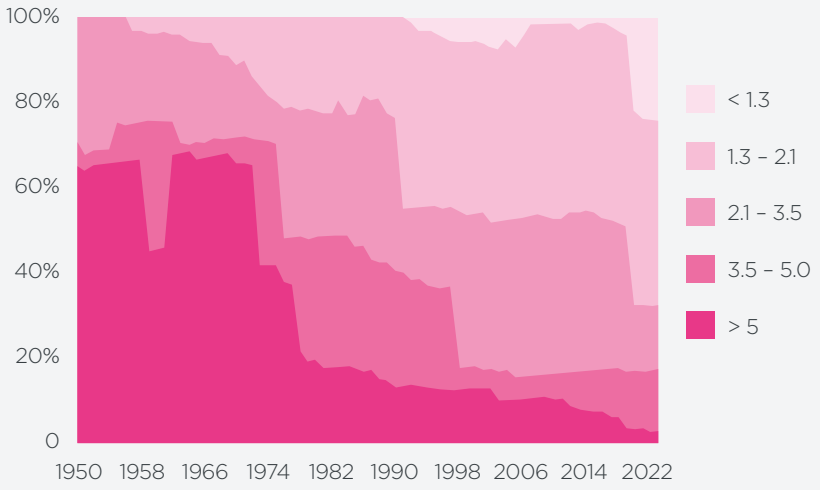
- We're generally living longer, even if improvements are slowing down in some places.
- Birth rates are falling everywhere and are now low in many places.
- People are moving within countries and across borders more often and for longer.

The combination of increased life expectancy, which has reached 76 years for women and 71 years for men globally, and lower fertility, with a global fertility rate down to 2.4, has caused the median age of the global population to increase from 22 in 1950 to 30 now. The median age is projected to increase to 42 by the end of the century.[1]

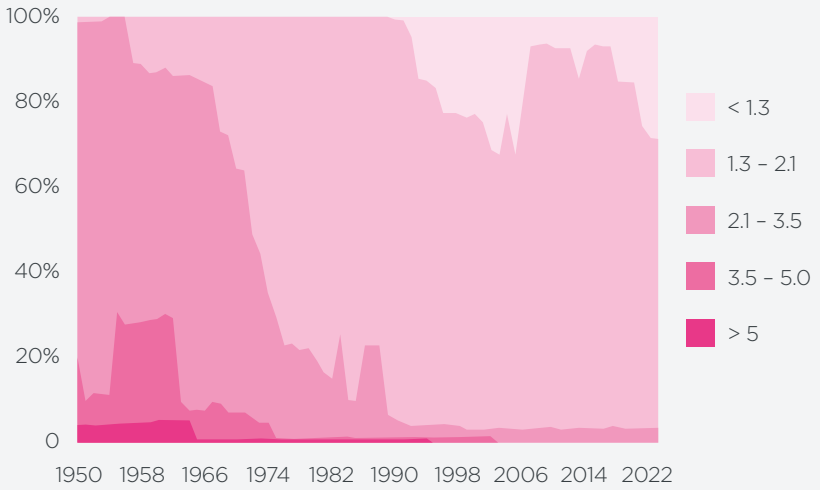
The changes have been even more dramatic in higher income countries, where life expectancy is now 84 for women and 79 for men, the fertility rate is 1.47 and the median age is already 41.

According to a UN survey of governments, one third of those who responded considered population ageing to be a matter of major policy concern, while two thirds marked it as a concern for the coming decades.[2]

Distribution of the global population by fertility level, 1950–2023[3]



Distribution of high-income country population by fertility level, 1950–2023[3]



The following charts show the declining trend in fertility rates over the past 70 years. The first chart is for the global population, the second chart for the population of high income countries.

The first chart shows that, in 1950, 70% of the global population had a fertility rate greater than 3.5. By 2022, around 70% of the global population had a fertility rate of less than 2.1, the level at which a population would tend to remain at the same level over time.

The second chart shows that, in high income countries, almost 100% of the population had a fertility rate of 2.1 or more in 1950. However, by 2022, around 95% of the population had a fertility rate of less than 2.1. Only about 5% have a fertility rate sufficient to maintain the population.

Causes

The causes of the fall in fertility rates across all countries can be analysed on two levels. Firstly, the socio-economic drivers. These include the impact of increased urbanisation and education, reduced infant and childhood mortality, increased wealth, and cultural changes such as lower levels of religious practice and belief and increased environmental concerns.

The second level covers the more immediate influences on birth rates such as:

- Rates of marriage and partner formation
- Female and male sterility and reduced fertility
- The level of still births
- The availability and acceptability of abortions and contraception
- The length of time for which babies are breastfed
- How often partners have sexual intercourse
- The use of assisted reproduction techniques.

Paradoxically, at least at first sight, the richer a country is the lower the birth rate tends to be. This is often due to richer countries also being those where girls have more equal educational and career opportunities but also where the cost of raising a child is higher. These combine to increase both the opportunity cost and the actual cost of bringing up a child.

The richer a country is the lower the birth rate tends to be.

In some countries, cultural changes over the past half century have reduced the desire for children, although the desired number of children can still be higher than the actual fertility rate. In the USA, for example, 44% of the population think that having two children is the ideal number, while 41% think that three or four is ideal. In spite of that, the US fertility rate is currently 1.79. There are some interesting reasons for this discrepancy both at the data level and the societal level.

Marriage rates and fertility are closely linked. A reduction in the number of people married tends to go hand in hand with a falling birth rate. One of the contributors to the fall in fertility rates in England and Wales, and the same holds true in a number of other western countries, is the fall in the number of teenage pregnancies.[4]

The reduction in fertility rates has followed as a consequence of women having greater access to education and career opportunities. A female's fertility declines naturally over her lifetime, with a particularly rapid decline from her early 30s. As the average age at first birth in the UK is now 29, and even higher in some EU countries, this implies that women are less likely than in the past to have many more children. It is not just female fertility that declines.

Male fertility also declines with age, although more slowly. There is also evidence that there has been a general reduction in male fertility over time. Sperm counts are reducing due to changes in diet, lifestyle and the prevalence of chemicals in our environment.[5]

The impact on fertility of assisted fertility techniques is currently quite limited but is growing, particularly for women at older ages. This may have a much larger impact on fertility rates if rates at younger ages continue to decline.

Consequences

Falling birth rates will impact societies at many levels, not just economic. A country which is experiencing increasing life expectancy and low fertility will have a higher and growing proportion of its population in older age groups.

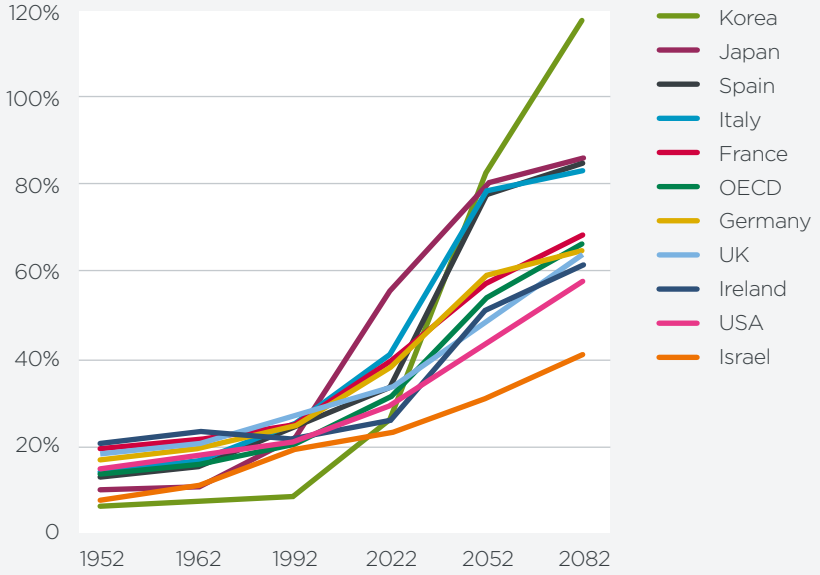
When birth rates first start to fall, countries may have an opportunity to benefit from a 'demographic dividend' as the number of children will be reducing, the number of workers increasing and the number of older, non-working people will not yet have started to significantly increase.[6] Whether or not countries actually make the most of this dividend will depend on those countries' institutions, improvements in education standards, productivity levels, and national and international economic opportunities.

If birth rates remain low, or even continue to fall, and people live longer, the demographic dividend eventually fades away and is replaced by a growing old age dependency ratio. In some countries, particularly in Asia, this is happening very quickly and as a result they are getting old before they get rich.[7]

Putting this together, we can see in the following chart the progression of the ratio of old age (65 and above) to working age (20 to 64 year olds) populations. The projected increase is particularly stark in South Korea, where the fertility rate is now 0.72.[8]

Changing demographics have a major impact on a country's economic fortunes. The UK's Office for Budget Responsibility discussed the effect of demographic changes and other risks in its Fiscal Risks and Sustainability report, published in July 2022.[10] It described the benefits for government expenditure in the short term of fewer children but the negative impact this will have over the longer term, especially if the UK restricts immigration.

Demographic old-age to working-age ratio



Source: OECD Pensions at a Glance 2023[9]

The report states:

"We project total non-interest public spending to rise from 38.7 per cent of GDP in 2026-27 to 48.4 per cent in 2071-72 (Table 4.9). The increase of 9.7 per cent of GDP is equivalent to £245 billion in today's terms. The main drivers of the increase in non-interest spending [include the] ageing effects on state pensions and pensioner benefits, and the pressures on health spending from an ageing population."

Goodhart and Pradhan in their book *The Great Demographic Reversal* [11] forecast increased pressure on public policies in many countries, both fiscal and monetary, as a result of the ageing population, and in particular the increased costs of looking after a higher proportion of the elderly living with dementia in all of its forms. They predict that this will lead to increased taxes, inflation and interest rates.

As the number of births reduces and, as a consequence, the labour force contracts 20 years or so later, there will be an increased demand for women to enter and remain in the workforce. Paradoxically this could put further downward pressure on birth rates.

Fewer babies means, in 20 or so years' time, absent migration, fewer workers. This reduced supply may increase wages but without improvements in productivity this could lead to inflation and therefore no increase in real income. Taxes may have to increase to pay for increased expenditure on state pensions, health services and social care.

On the other hand, some hail this reduction in fertility rates and potentially a falling total global population as a good thing.[12] Fewer people, they contend, would put less pressure on the planet.

Choices

Faced with the current situation of low and falling fertility rates, governments, like individuals and communities, have choices as to how they should respond.

One option would be to do nothing, and let nature take its course. This would be consistent with the approach often taken by governments to matters not expected to have a significant impact for some time, and certainly not within the typical political time horizon. It could be justified by an understandable reluctance of governments to get involved in what are deeply personal decisions. However, given the likely upward pressure on public spending as a percentage of GDP, this could be a risky approach. Markets may not allow further increases in borrowing, and voters may reject governments if they impose ever-higher levels of taxation. Alternatively, governments might have to increase state pension ages, reduce the value of pensions and restrict health and social care provisions.

Another option would be to encourage higher birth rates. Governments in a number of countries have introduced campaigns to encourage more births. Zhang et al reviewed the experience in OECD countries.[13] A number of policies have been tried, including tax incentives, baby bonuses and increased maternal and parental leave but they don't seem to have moved the dial significantly, especially where fertility is already very low. The impact of these policies has tended to be short-lived, possibly because couples decided to have a child sooner than they would have done, in case the promised benefit might be withdrawn.

Governments cannot predict the future, but they can make preparation for the likely future.

In Australia in 2004, Peter Costello, the Treasurer, issued a plea for parents to *"have one for Mum, one for Dad and one for the country"*. Australia's fertility rate rose between 2004 and 2008, whether or not in response to Costello's encouragement, but has since declined to only 1.5, about half a baby for each of Mum, Dad and the country. Governments could also remove barriers to parents being able to fulfil their desires for the number of children they will have, for example tax rules that penalise larger families or making suitable housing more available and affordable. History, though, shows that governments have been more successful in reducing fertility rates, for example in China with it's one child policy, than in increasing them.

To the extent that the reduction in fertility rates is due to cultural rather than material causes, as is the case in most developed countries, government intervention may have a limited impact. Absent a major cultural shift back to a more religious outlook[14] it seems as if we are faced with an inevitable decline in national and global populations.

In conjunction with any of the above, consideration should be given as to how artificial intelligence and machine learning (AI/ML) could help. This might involve the use of robots and drones to replace low-income routine manufacturing and delivery roles. It might involve the use of machine learning to analyse big data in medicine, to improve personalised — and hopefully early — diagnosis and treatment and to achieve significant savings in healthcare costs. In this as in other areas, governments cannot predict the future, but they can make preparation for the likely future.

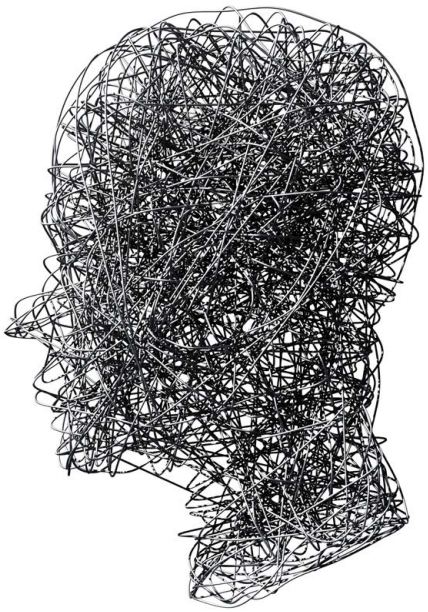
think

Conclusion

Low and falling birth rates is a phenomena affecting all countries. The causes are multifaceted and the consequences uncertain in timing and effect. Thus it is a topic ripe for actuarial analysis and discussion. Actuaries wishing to contribute to the debate need to understand the drivers of fertility change, the economic and social consequences of low fertility, the impact of policies that are being tried, future technological developments including AI, while bearing in mind the intensely personal nature of the topic. This is an issue that affects the whole of society, but where the key decision makers are millions of individuals.

Actuaries can contribute their skills in making long term projections, risk management, and in pension and social security systems to help policymakers develop suitable policies and programmes that enable men and women to have the number of children they desire.

This is an issue that affects the whole of society but where the key decision makers are millions of individuals.



think

References

1. Unless otherwise stated demographic values have been taken from the United Nations World Population Projections 2024 World Population Prospects - Population Division - United Nations
2. Government policies to address population ageing (un.org)
3. 2024 Revision of World Population Prospects – United Nations
4. Quarterly conceptions to women aged under 18 years, England and Wales - Office for National Statistics
5. Swan, S. and Colino, S. (2020) *Countdown,* New York, Scriber
6. Bloom, D. E. and Williamson, J. G. (1998), *Demographic Transitions and Economic Miracles in Emerging Asia*, World Bank Economic Review, 12: 419 - 455.
7. Large parts of Asia are getting old before they get rich (economist.com)
8. Birth Statistics in 2023 | Total | Population and Household | Press Releases : Statistics Korea
9. OECD (2023), Pensions at a Glance 2023: OECD and G20 Indicators
10. Fiscal risks and sustainability – CP 702 (obr.uk)
11. Goodhart, C. and Pradhan, M. (2020), *The Great Demographic Reversal,* Switzerland, Palgrave MacMillian
12. The global fertility crisis: are fewer babies a good or a bad thing? Experts are divided | Population | The Guardian
13. Zhang TT, Cai XY, Shi XH, Zhu W, Shan SN. The Effect of Family Fertility Support Policies on Fertility, Their Contribution, and Policy Pathways to Fertility Improvement in OECD Countries. Int J Environ Res Public Health. 2023 Mar 8;20(6):4790. doi: 10.3390/ijerph20064790. PMID: 36981698; PMCID: PMC10049131.
14. Morland, P. (2024), *No One Left,* Great Britain, Forum.

think

Institute and Faculty of Actuaries

Independent thinking from the IFoA **February 2025**

Beijing
Room 512 · 5/F Block A · Landgentbldg Center · No. 20 East Middle 3rd Ring Road
Chaoyang District · Beijing · 100022 · People's Republic of China
Tel: +86 (10) 6611 6828

Edinburgh
Spaces · One Lochrin Square · 92 Fountainbridge · Edinburgh · EH3 9QA
Tel: +44 (0) 207 632 2100

London (registered office)
1-3 Staple Inn Hall · High Holborn · London · WC1V 7QJ
Tel: +44 (0) 207 632 2100

Malaysia
Arcc Spaces · Level 30 · Frankfurt Room · The Gardens North Tower
Lingkaran Syed Putra · 59200 Kuala Lumpur
Tel: +60 12 591 3032

Oxford
Belsyre Court · 1st Floor · 57 Woodstock Road · Oxford · OX2 6HJ
Tel: +44 (0) 207 632 2100

Singapore
Pacific Tech Centre · 1 Jln Kilang Timor · #06-01 · Singapore · 159303
Tel: +65 8778 1784

actuaries.org.uk