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Fertility decline: trends, drivers and differences

HSBC Insurance and the Oxford Institute of Ageing have entered into a strategic alliance in order to build a cutting-edge research base on global ageing which will provide key information for policy and corporate decision makers. As part of the agreement, HSBC Insurance funds three research fellowships at the OIA, jointly runs the Future of Retirement research programme, and sponsors Ageing Horizons – a quarterly review bulletin which collates and integrates current research and analysis on the medium-term implications of population ageing.

This brief is a supplement to Ageing Horizons. The full review is available online, with regular updates reflecting new developments and ideas on the themes chosen for each issue.

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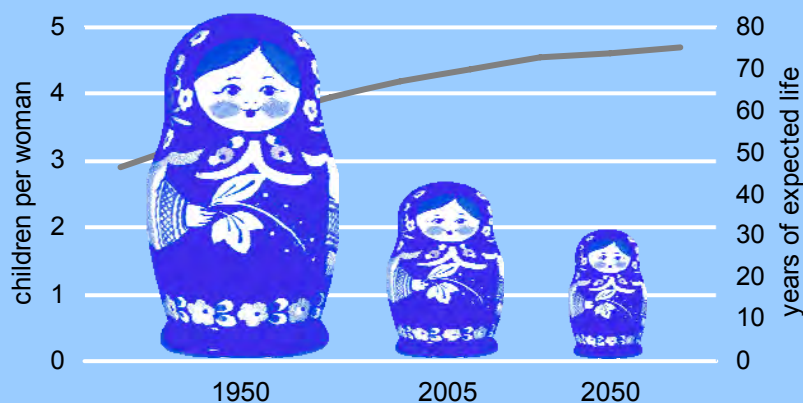
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If life expectancy increases and fertility remains constant, the age structure of the population changes: a greater proportion of the population falls into the older age groups. The same would happen if life expectancy were to remain constant and fertility fell. The world population is now 'getting older', not only as a result of unprecedented improvements in life expectancy, but also as a result of very sharp declines in fertility. Both trends are likely to continue, and together will have a profound impact on the age structure of the world's population. 'While the 20th century was the century of population growth... the 21st century... is likely to become the century of population aging' (Lutz and Sanderson, 2004).

This briefing summarises recent global trends in fertility and looks at current forecasts for continuing decline in fertility levels across the world. In the more developed world, where fertility rates are almost everywhere below-replacement level, these trends are a source of considerable concern to policy-makers. They worry that reductions in fertility may go 'too far' – or may indeed have gone too far already. In the less developed world, where declining fertility levels are more likely to be seen as providing relief from the pressures of rapid population growth, the changing age structure of the population is arguably more of an opportunity than a problem. ■

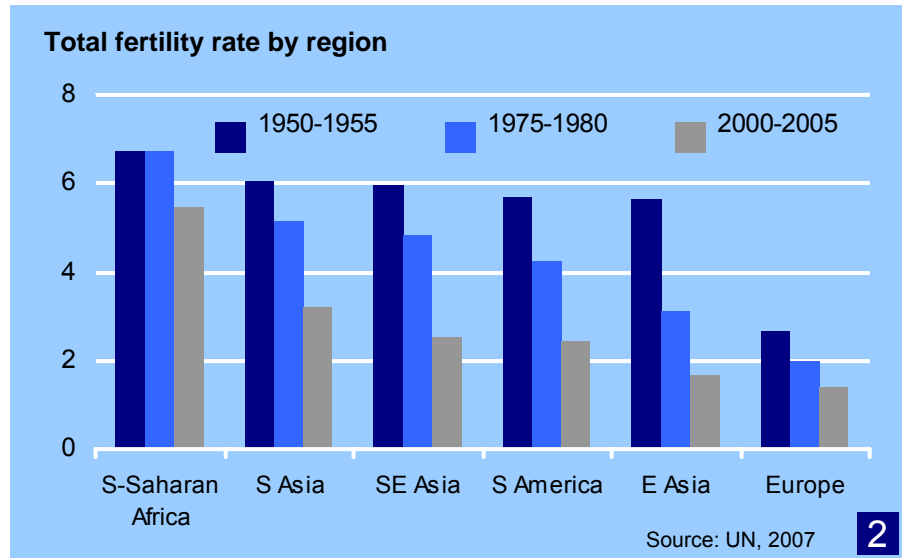
► Ageing populations

One of the most common measures of fertility is the 'total fertility rate (TFR)' – the average number of children that would be born to each woman if current age-specific fertility rates stayed constant across her childbearing years. The TFR for the world as a whole stayed at the level of around 5 children per woman in the 1950s and 1960s but it has been declining dramatically ever since: from 5.02 in 1950 to 2.55 in 2005 and by 2050 it is expected to be around or below 2.0. At the same time, the life expectancy at birth has been rising: from 46.4 in 1950 to 67.2 in 2005 and in 2050 it is projected to increase above 75.

World total fertility rate & life expectancy at birth, medium variant

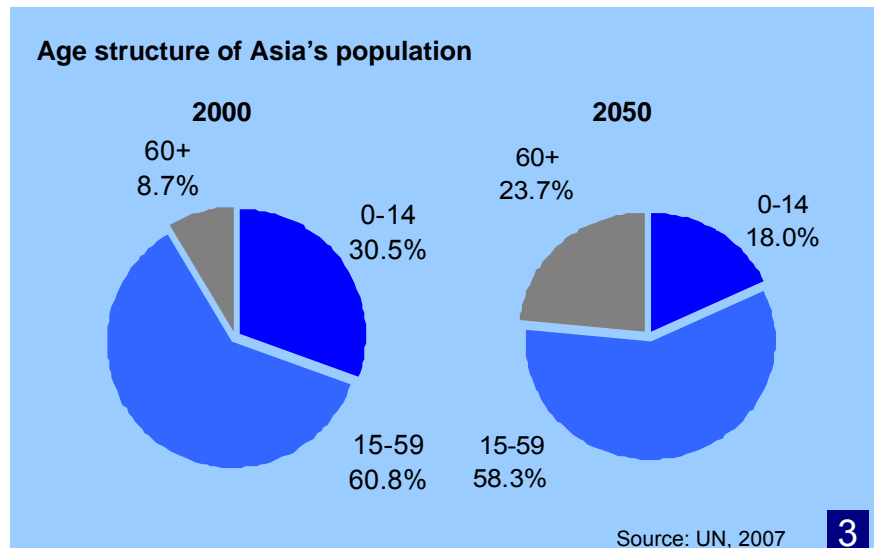
Source: UN, 2007

Fertility decline is a global phenomenon, but it is moving faster and farther in some parts of the world than in others



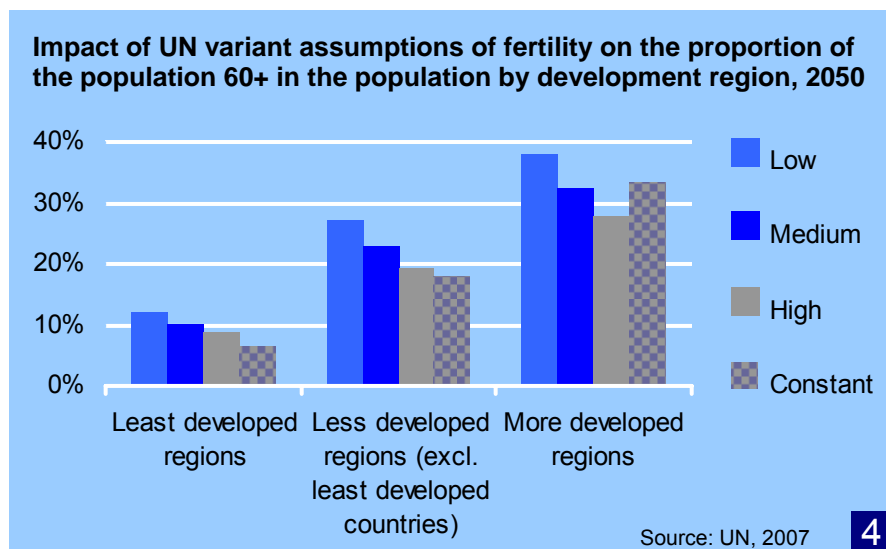
Although fertility decline has been a global phenomenon, it has proceeded farther and faster in some parts of the world than in others. Fertility levels have dropped only slightly in sub-Saharan Africa, for example, where the TFR still exceeds 5 children per woman. In Europe, on the other hand, where fertility was already low in the 1950s, the TFR is now below replacement level. It is South America and Asia, however, that have seen the largest declines, and in the countries of eastern Asia (China, Japan, Korea etc), as in Europe, the TFR is now below replacement level. It takes time for these changes to work their way through the age-structure of the population, which is why the proportion of older people (60yrs + in these calculations) in the population has not yet risen above 10% in any of these regions apart from eastern Asia (and of course Europe). And in sub-Saharan Africa, the proportion of older people in the population has actually declined – from 5.2% in 1950 to 4.8% in 2005 (partly because of the AIDS epidemic).

As fewer children are born populations are ageing rapidly



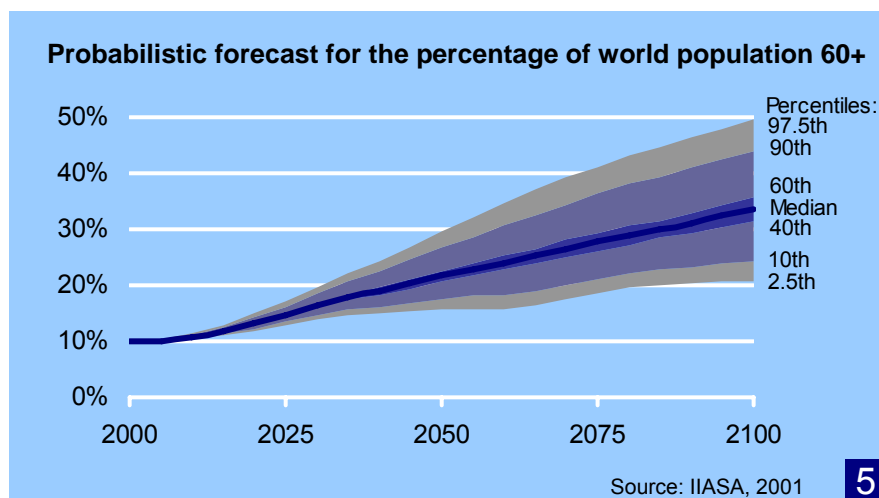
Between 2000 and 2050 the proportion of people aged 60+ in the population of Europe is projected to increase from 20.6% to 34.5%. Over the last 35 years the proportion of older people in the populations of Asia has increased from 6.3% to 9.2%; and by 2050 it is projected to increase to 23.7% – a much larger percentage change than will occur in Europe (UN, 2007).

Changes in fertility make for large changes in the age structure of the population



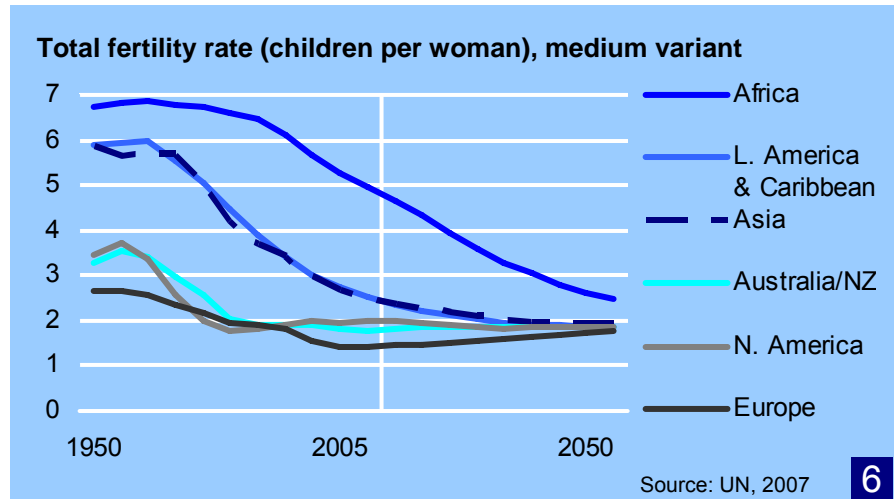
The UN's projections incorporate different fertility scenarios. Their medium-variant scenario assumes that fertility rates will converge to 1.85 children per woman (UN 1995, 2004a). If fertility rates are lower than this, there will be a higher proportion of older people in the population – and *vice versa*. The differences in the age structure of the population shown in figure 4 depend solely on different assumptions about future fertility trends. In the richer parts of the world relatively small shifts in fertility rates may have a big impact on age structure.

Population projections can turn out to be inaccurate, and the possibility of error cannot be eliminated (only made explicit).



Population projections are based on assumptions about what will happen to fertility and mortality in the future; and these assumptions may be proved wrong. The UN has consistently underestimated fertility declines and longevity improvements (Keilman, 1998); and although these errors compensate each other when it comes to the population size, they reinforce each other when it comes to population ageing (Lutz, 1996). The use of variant scenarios can help with this problem, but the help they provide is limited (as the number of variants is itself kept within manageable limits). Probabilistic forecasts work differently, and they also allow for an explicit representation of the estimated likelihood of future outcomes. This figure shows that in the year 2100, there is a 95% probability that the 60+ population will comprise between 20% and 80% of the total population. The median offers the 'bestimate' for the size of the older population i.e. 37%.

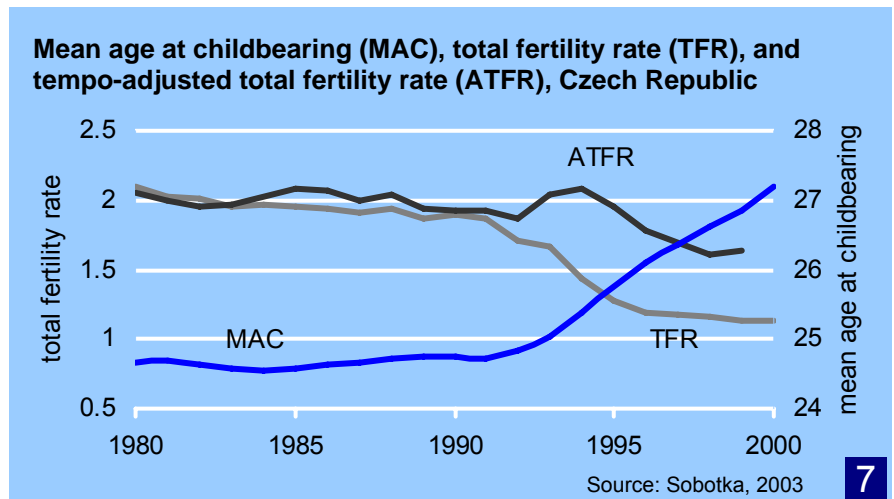
There may be no escape from the 'low fertility trap'



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The UN population projections assume that fertility rates around the world will converge. In the 1990s it was assumed that they would converge to natural replacement level (around 2.1). Although this figure has now been revised downwards, the UN projections still assume that there will an increase in fertility in those countries where the TFR has already dropped below 1.85. It has to be remembered, however, that 'through the introduction of modern contraception, the evolutionary link between the drive for sex and procreation has been broken' (Lutz et al., 2006); and it is possible that fertility levels may not 'recover' in countries which already have low fertility (e.g. below 1.6 children per woman). Such countries could find themselves stuck in a kind of low fertility trap from which it is very hard to escape. Much smaller families will have become the norm (ibid.).

Because of the 'tempo effect' actual fertility may not be as low as TFR shows



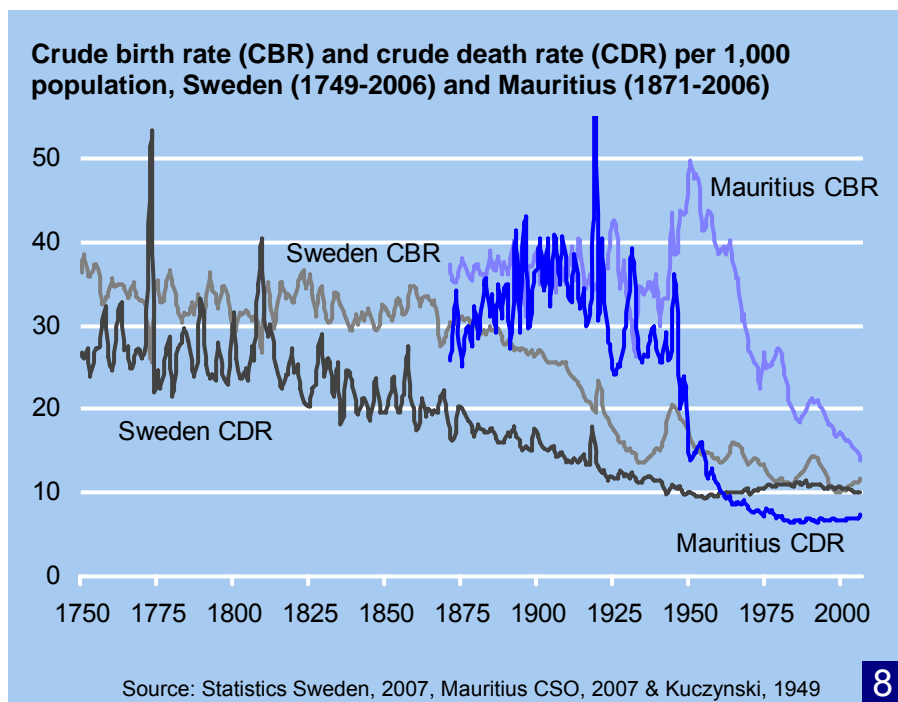
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TFR is a period measure calculated on the assumption that the timing (*tempo*) of childbearing over the life cycle does not change, but today women across the world postpone childbearing until older ages. Postponement leads to fewer births in a given period, and hence to a lower period TFR even if women still have the same number of children over their life course (IIASA, 2006). Data for the Czech Republic show very clearly that, after 1989, women started to postpone childbearing. If the TFR is adjusted to take account of this postponement (i.e. it is assumed that what is happening here is a change in timing only), fertility rates are revised upwards, though they still show a decline (Sobotka 2004).

► Demographic transition

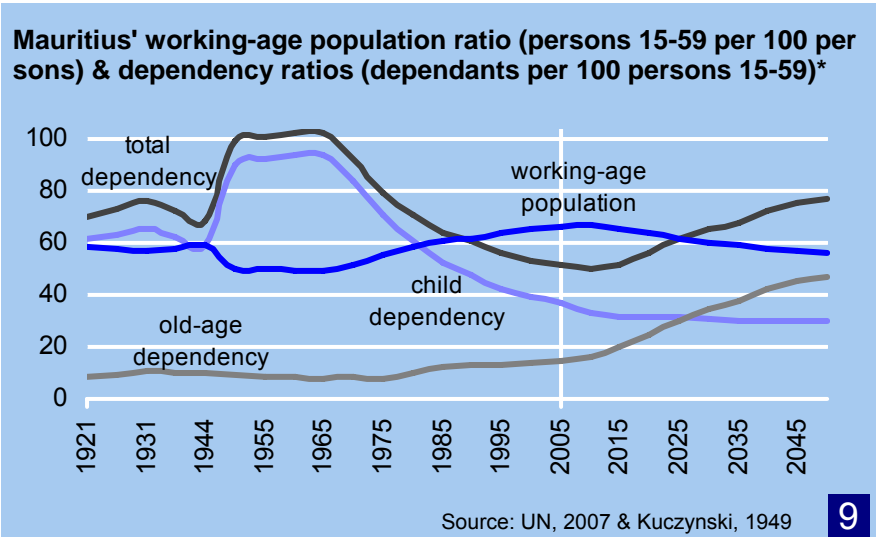
The *demographic transition* is the name given to the shift from high mortality and fertility rates characteristic of rural agrarian societies to the low mortality and fertility rates associated with more urban industrial societies. The prediction that sooner or later all countries experience a decline in mortality followed by a fall in fertility is one of the foundations of demographic theory. Furthermore, the demographic transition is assumed to be irreversible – once started, it will continue.

Demographic transition in less developed countries occurs later but faster than in more developed countries



These series of birth and mortality statistics from Sweden and Mauritius (which has unusually good data from the nineteenth century) show that the demographic transition follows the same pattern in less developed countries as in more developed countries, even though it is delayed. Birth and death rates in Mauritius fluctuate substantially – with only negligible natural increase in the population – before the onset of the demographic transition in the mid-1940s. Although mortality plummeted, fertility remained high causing the population to grow very rapidly. Mauritius' population is still growing because of population momentum (Lutz and Sanderson, 2004), despite the drop in the fertility rate after 1950s, now below replacement level. The comparison between Sweden and Mauritius serves to illustrate one very important difference between more developed and less developed countries: the pace of the demographic transition is much more rapid in less developed countries. The fall in birth and death rates in Mauritius over two decades parallels the experience of Sweden over almost two centuries. The time lag between the beginnings of mortality decline and fertility decline was more than 50 years in Sweden; in Mauritius no more than 15-20 years.

Transition to low fertility brings the demographic dividend – a chance to increase economic growth and per capita income

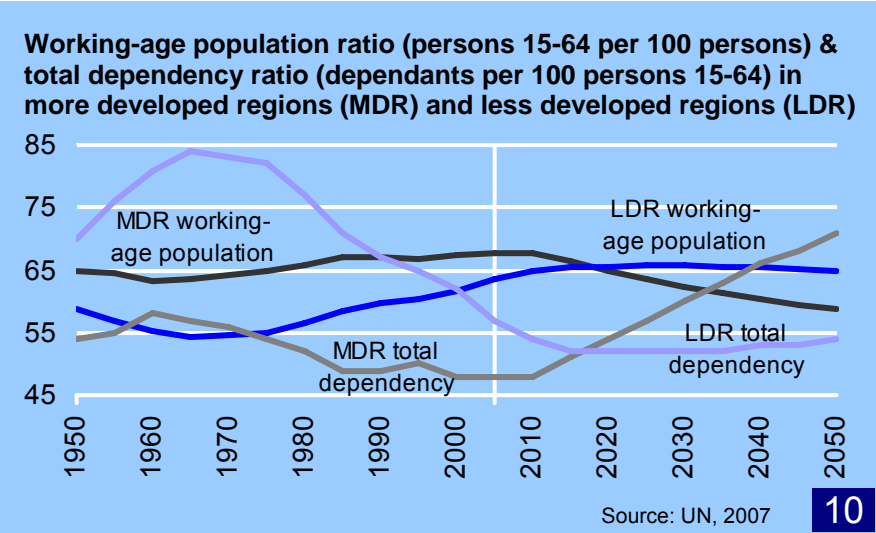


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* The statutory retirement age in Mauritius is 60 (AARP, 2007).

At an early stage in the demographic transition in Mauritius, the total dependency ratio jumped from 0.6 to over 1, but in the mid 1960s continuing fertility decline coincided with growth in the working age population to drive down both the child and total dependency ratios. At this point, Mauritius' economic development accelerated and per capita income rose: there were more people in the labour force and fewer mouths to feed. Such demography-induced acceleration of economic development and prosperity is known as the *demographic dividend* (Lee & Mason, 2006). Both the East Asian 'tiger' economies and Ireland owe much of their growth to this dividend. It is of course transitory – eventually the working-age population ceases to grow and the older population starts to increase in size.

Demographic fortunes of more and less developed countries are about to reverse

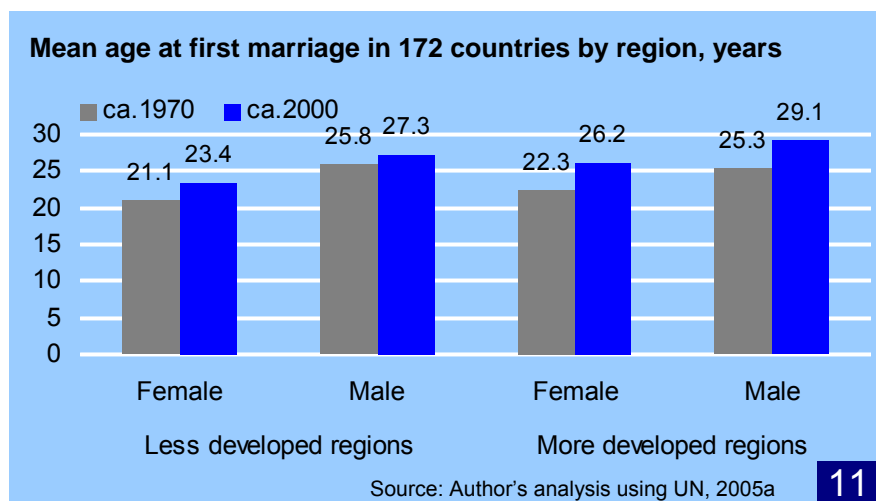


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Like Mauritius, other less developed countries started their demographic transition later than more developed countries. Rapid declines in fertility and expanding labour forces have caused their total dependency ratios to fall; and it is reasonable to expect these trends to continue in the near future. In more developed countries, the growth of the working-age population has been slowing down – and in some countries the working age population may start to shrink in the future. Continuing reductions in fertility in more developed countries are unlikely to have much impact on overall dependency ratios in the near future as fertility is already at very low levels, and when the baby boomers start retiring overall dependency ratios will increase steeply. ■

► Postponement of childbearing

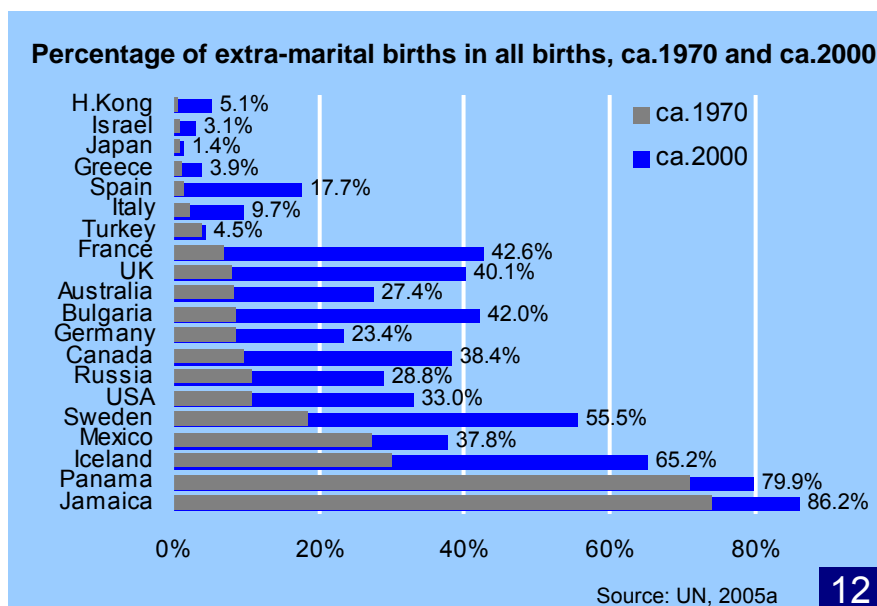
Both men and women spend a longer period in 'singlehood'



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The average length of life spent as a 'single person' has risen over the last few decades, both for men and women. Thirty years ago women in developing countries married on average only a year earlier than women in developed countries. The gap now has widened to almost 3 years. Men in more developed countries in the 1970s were marrying on average half of a year younger than men in less developed countries; now it is almost two years later. These averages, however, do conceal huge variation between different countries in the age of first marriage, which is much greater in less developed regions than in more developed regions.

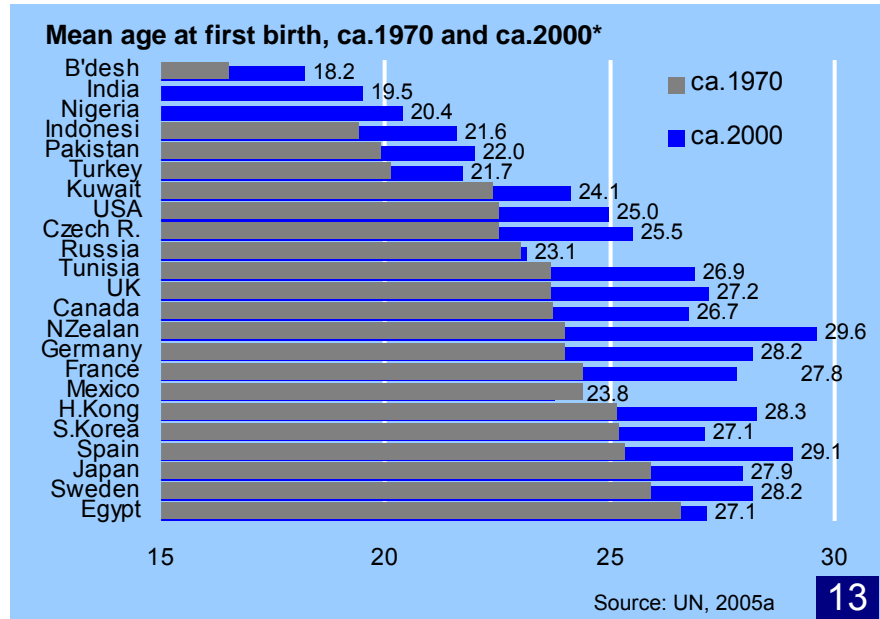
Transition to a high number of extra-marital births is not universal



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Delayed marriage and its increasing instability have probably contributed, especially in more developed regions, to a rapid increase in the number of extra-marital births. Religion may explain some of the international variation in extra-marital births, but only part. In Orthodox Greece, for example, the percentage of extra-marital births has stayed low; in her Orthodox neighbour Bulgaria there has been a fourfold increase. Mexico has a higher rate of extra-marital births than Spain, even though it is a 'more Catholic' country. Whatever the explanation for these variations, it seems clear that European countries with relatively high TFR (by European standards) have a larger proportion of extra-marital births.

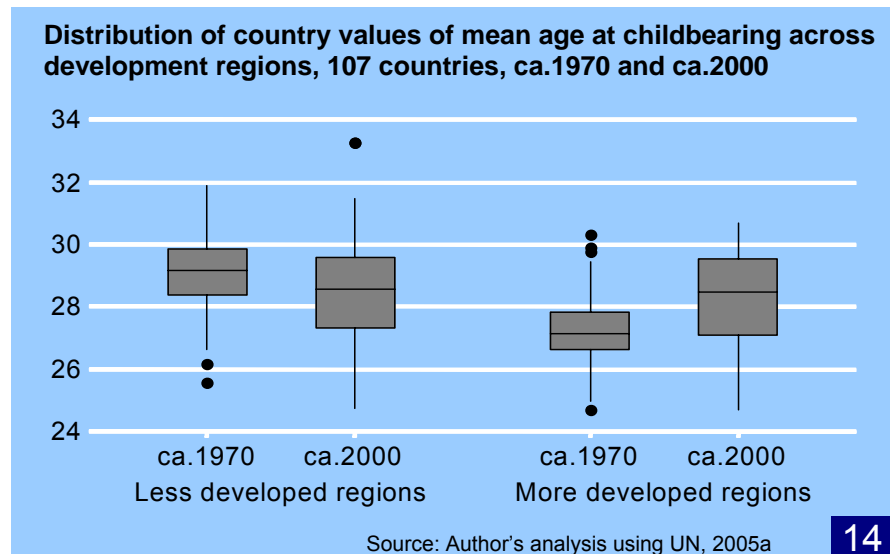
A major worldwide shift in the timing of first births towards later ages has occurred



* No data for India and Nigeria around 1970

Together with a shift towards later marriages there has been a major world-wide change in the timing of first births. They are being postponed. As a general rule, the countries that have seen the largest delays in the timing of first births are richer and more developed countries.

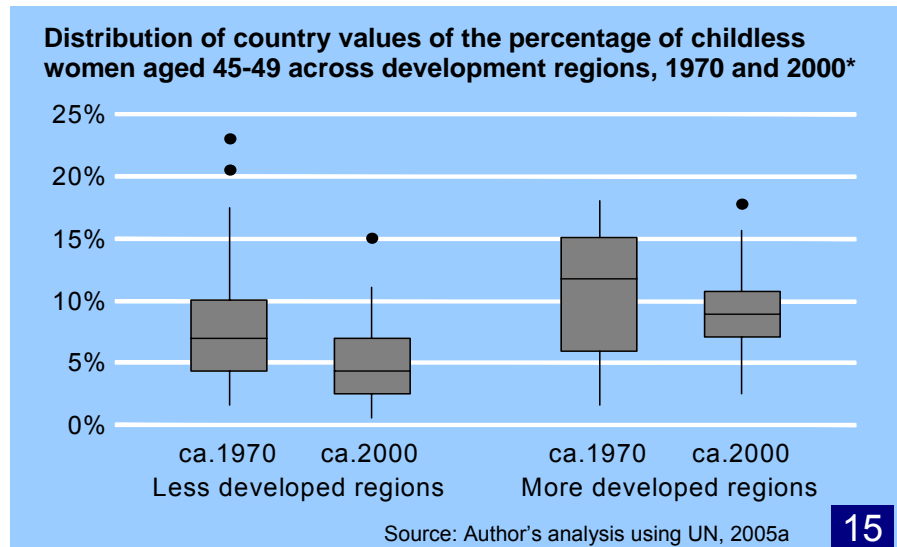
The timing of childbearing has changed in different ways across different development regions



Rectangular boxes represent the middle 50% of the country values for each region and date. The horizontal line inside the box indicates the median value. 'Whiskers' extending from the box represent the upper and lower 25% of the distribution. Outliers are indicated by dots.

In more developed countries women have been postponing the beginning of childbearing, and so the mean age of childbearing (counting all order births) has increased. In less developed countries, women have been having fewer higher order births (e.g. 4th, 5th, 6th etc), and because these come at older ages, there has been a decline in the mean age at childbearing.

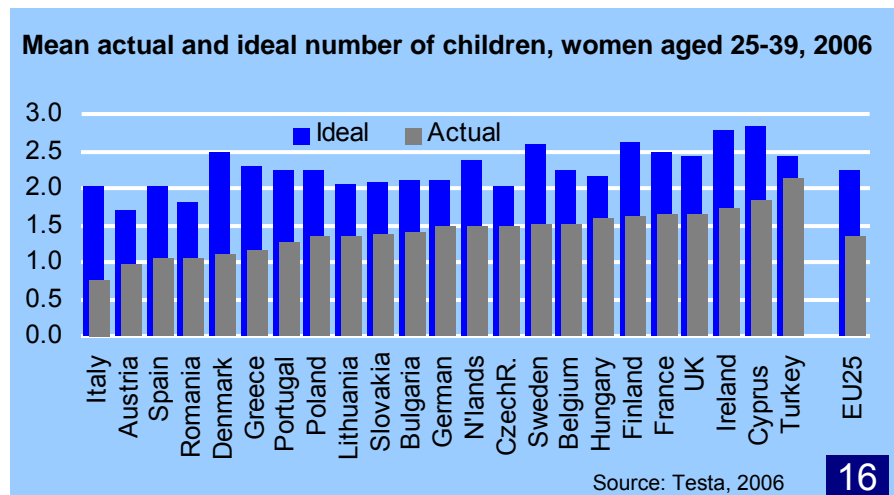
Childlessness has been on decline globally but remains higher in developed countries



* The sample of countries for which information was available for around 1970 (91 countries) is not identical to the sample of countries for around 2000 (121 countries).

The prevalence of childlessness has been declining globally. In developing countries, this is attributed to the decrease in sterility caused by sexually-transmitted diseases (UN, 2004b). In developed countries, the decrease in childlessness reflects the increase in rates of marriage and early marriages in cohorts born in the middle decades of the last century (UN, 2005b). In the short run, childlessness will probably continue to decline in both developed and developing countries. In the long run, it is set to rise in developed countries as the proportion of women born after 1960 who choose to remain childless is likely to be larger than among their mothers (UN, 2003). In the UK, for example, it is estimated that 23% of women born in 1973 will be childless when they reach the age of 45 years. This compares with one in ten of the women born in 1941 (ONS 2007).

The two-child family is most desired in Europe

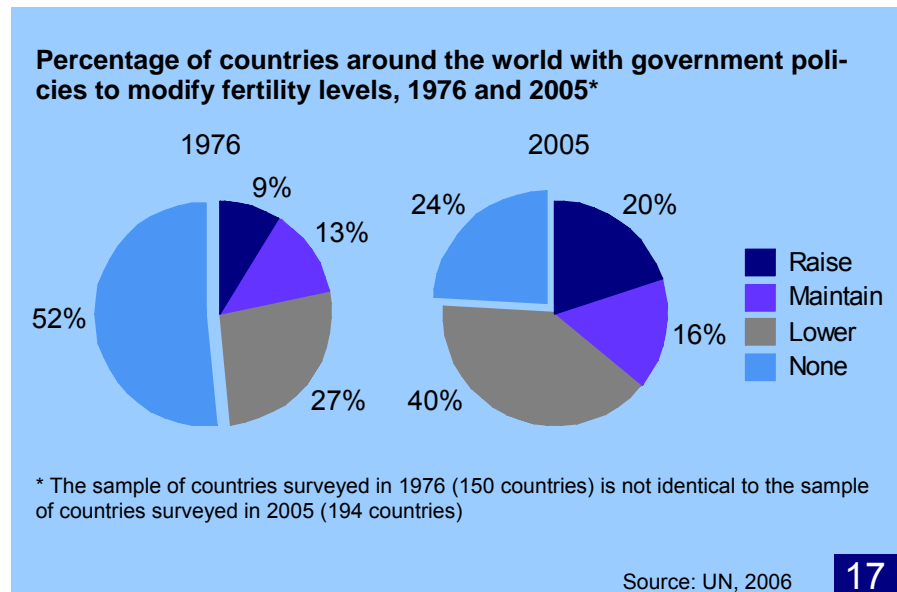


Despite the prevalence of small families and childlessness in many developed countries, Europeans are still interested in having children. A recent Eurobarometer survey which asked women aged 25-39 how many children they would want in their families reported an average of just over two (Testa 2006). The fact that actual fertility rates are lower than this everywhere in Europe is widely interpreted as evidence of the existence of institutional and/or economic barriers in the way of people achieving their 'fertility aspirations' (e.g. EU 2005) ■

► Population policies

Over the last three decades, a major shift in the views and actions of governments around the world on fertility levels has occurred. In 1976, more than half of all countries declared that the modification of existing fertility levels formed no part of their policy objectives. By 2005, more than three quarters of all countries wanted either to raise or lower the fertility of their populations. The proportion of the European governments who viewed their fertility levels as too low increased from one quarter to two thirds, and the proportion of the African governments who viewed their countries' fertility levels as too high increased from one third to three quarters (UN, 2006).

Today more than ever before governments round the world want to influence the fertility of their populations.



Notes

More developed regions comprise all regions of Europe plus Northern America, Australia/New Zealand and Japan (see definition of regions). *Less developed regions* comprise all regions of Africa, Asia (excluding Japan), Latin America and the Caribbean plus Melanesia, Micronesia and Polynesia (see definition of regions).

Least developed countries include 50 countries - Afghanistan, Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Cape Verde, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Kiribati, Lao People's Democratic Republic, Lesotho, Liberia, Madagascar, Malawi, Maldives, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, Samoa, São Tomé and Príncipe, Senegal, Sierra Leone, Solomon Islands, Somalia, Sudan, Timor-Leste, Togo, Tuvalu, Uganda, United Republic of Tanzania, Vanuatu, Yemen and Zambia. These countries are also included in the less developed regions. Full definitions of major areas and regions are available online at: <http://esa.un.org/unpp/>.

References

- AARP (2007) Interview with Hon. Mrs. Sheilabai Bappoo Minister of Social Security, National Solidarity & Senior Citizen Welfare and Reform Institutions, Republic of Mauritius. American Association of Retired Persons International News. Available online at: http://www.aarp.org/research/international/news/apr_07_newsmaker.html.
- Crossette, B. (2002) Experts Scale Back Estimates of World Population Growth, The New York Times, 20.8.2002. Available online at: <http://www.nytimes.com/2002/08/20/science/earth/20POPU.html>.
- EU (2005) Confronting demographic change: a new solidarity between the generations. Brussels: European Union. Available online at: http://ec.europa.eu/employment_social/news/2005/mar/comm2005-94_en.pdf.
- IIASA (2001) Probabilistic Population Projections by 13 World Regions. Laxenburg: International Institute for Applied Systems Analysis. Available online at: <http://www.iiasa.ac.at/Research/POP/proj01/results.html>.
- IIASA (2006) Tempo Effect and Adjusted TFR. Laxenburg: International Institute for Applied Systems Analysis. Available online at: <http://www.oeaw.ac.at/vid/popeurope/tempoeffect.shtml>.
- Keilman, N. (1998) How Accurate Are the United Nations World Population Projections? *Population and Development Review*, Vol. 24, Supplement: Frontiers of Population Forecasting, pp. 15-41.
- Kuczynski, R.R. (1949) Demographic Survey of the British Colonial Empire: Volume II. London: Oxford University Press.
- Lee, R. and Mason, A. (2006) What Is the Demographic Dividend? *Finance & Development*, 43(3). Available online at: <http://www.imf.org/external/pubs/ft/fandd/2006/09/basics.htm>.
- Lutz, W. (ed.) (1996) The future population of the world: what can we assume today? London: Earthscan.
- Lutz, W., and Sanderson, W.C. (2004) Introduction. In: Lutz, W. et al. (eds.) (2004) *The End of World Population Growth in the 21st Century: New Challenges for Human Capital Formation and Sustainable Development*. London: Earthscan.
- Lutz, W., Sanderson, W.C., and Scherbov, S. (2004) The End of World Population Growth. In: Lutz, W., Sanderson, W.C., and Scherbov, S. (eds.) (2004) *The End of World Population Growth in the 21st Century: New Challenges for Human Capital Formation and Sustainable Development*. London: Earthscan.
- Lutz, W., Skirbekk, V., and Testa, M.R. (2006) The Low Fertility Trap Hypothesis: Forces that may lead to further postponement and fewer births in Europe. International Institute for Applied Systems Analysis Interim Report IR-06-017. Laxenburg: IIASA. Available online at: http://www.oeaw.ac.at/vid/download/edrp_4_05.pdf.
- Mauritius Central Statistics Office (2007) Vital statistics rates – Island of Mauritius, 1921 - 2004. Available online at: <http://www.gov.mu/portal/sites/ncb/cso/hs/demo/hs.htm>.
- ONS (2007) UK fertility highest since 1980. London: Office for National Statistics. Available online at: <http://www.statistics.gov.uk/CCI/nugget.asp?ID=951&Pos=1&ColRank=2&Rank=176>
- Sanderson, W.C., Scherbov, S., Lutz, W., and O'Neil, B.C. (2004) Applications of Probabilistic Population Forecasting. In: Lutz, W., Sanderson, W.C., and Scherbov, S. (eds.) (2004) *The End of World Population Growth in the 21st Century: New Challenges for Human Capital Formation and Sustainable Development*. London: Earthscan.
- Sobotka, T. (2003) Tempo-quantum and period-cohort interplay in fertility changes in Europe. Evidence from the Czech Republic, Italy, the Netherlands and Sweden, *Demographic Research*, 8 (6). Available online at: <http://www.demographic-research.org/Volumes/Vol8/6/8-6.pdf>.
- Sobotka, T. (2004) Postponement of childbearing and low fertility in Europe. Amsterdam: Dutch University Press.
- Statistics Sweden (2007) Population and Population Changes 1749- 2006. Available online at: www.scb.se/BE0101-EN.
- Testa, M.R. (2006) Childbearing Preferences and Family Issues in Europe. Results of the Special Eurobarometer 253/Wave 65.1. Vienna: Vienna Institute of Demography. Available online at: <http://www.oeaw.ac.at/vid/download/ReportESEMPLAgeingandFertility20061027.pdf>.
- UN (1977) World Population Prospects as Assessed in 1973. New York: Department of Economic and Social Affairs.
- UN (1995) World Population Prospects: The 1994 Revision. New York: Population Division.
- UN (2003) Partnership and reproductive behaviour in low fertility countries. Population Division. New York. Available at <http://www.un.org/esa/population/publications/reprobehavior/partrepro.pdf>.
- UN (2004a) World population, estimates and three scenarios: 1700-2300. Population Division. Available online at: <http://www.un.org/esa/population/publications/longrange2/WorldPop2300final.pdf>.
- UN (2004b) World Fertility Report 2003. Population Division. Available online at: http://www.un.org/esa/population/publications/worldfertility/World_Fertility_Report.htm.
- UN (2005a) World Fertility and Marriage Data 2003, POP/DB/Fert/Rev.2004, July 2005. Population Division. Available online at: http://www.un.org/esa/population/publications/worldfertility/World_Fertility_Report.htm.
- UN (2005b) Living Arrangements of Older Persons Around the World. Department of Economic Affairs, Population Division. Available online at: <http://www.un.org/esa/population/publications/livingarrangement/report.htm>.
- UN (2006) World Population Policies 2005. Population Division, New York. Available at http://www.un.org/esa/population/publications/WPP2005/Publication_index.htm.
- UN (2007) World Population Prospects: The 2006 Revision. Population Database. United Nations Populations Division. Available online at: <http://esa.un.org/unpp>.