POPULATION NETWORK NEWSLETTER

POPNET

Wolfgang Lutz, Editor

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In the view of the outside world, population projections are the single most important result of the work of demographers. Our projections are a key component of policy planning, in areas as diverse as pension reforms, school reforms, regional planning, or the macro-economic models of ECOFIN (EU Council of Economics and Finance Ministers) and the global assessments of IPCC (Intergovernmental Panel on Climate Change).

These users of demographic projections not only need a best-guess future population path. They increasingly request explicit information about the uncertainty involved in future demographic trends. This is because deviations may have massive financial implications such as an underestimation of the speed of aging for the financing of pay-as-you-go pension systems. Only truly probabilistic population projections can serve this purpose. The conventional high–medium–low variants (based on alternative fertility assumptions) can greatly underestimate the uncertainty in the future number of elderly because they disregard old-age mortality uncertainty. A larger set of scenarios also does not fully serve this purpose, if it makes no reference to a probability range.

But what should these assumptions be based on? Mechanistic trend or error extrapolations without substantive reasoning are not enough. Science-based projections require a better knowledge base. We need more hypotheses and theories with predictive power that also can be tested. This requires nothing less than a reorientation of the currently dominant demographic research agenda. *WL*

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IIASA publishes new world population projections to 2100

A World of Simultaneous Population Growth and Shrinking Unified by Accelerating Aging

In November 2007 IIASA organized a major international conference on "Global Development: Science and Policies for the Future" which discussed IIASA's research in the broad interdisciplinary scientific and political context. New probabilistic population projections were one of the many IIASA inputs. IIASA's magazine *Options* (Winter 2007) summarized key findings with respect to population growth for a broader audience (see article below) while a recent article in *Nature* focused on the implications of IIASA's projections for the future speed of population aging (reprinted on pages 4–7).

Article from IIASA's *Options* (Winter 2007)

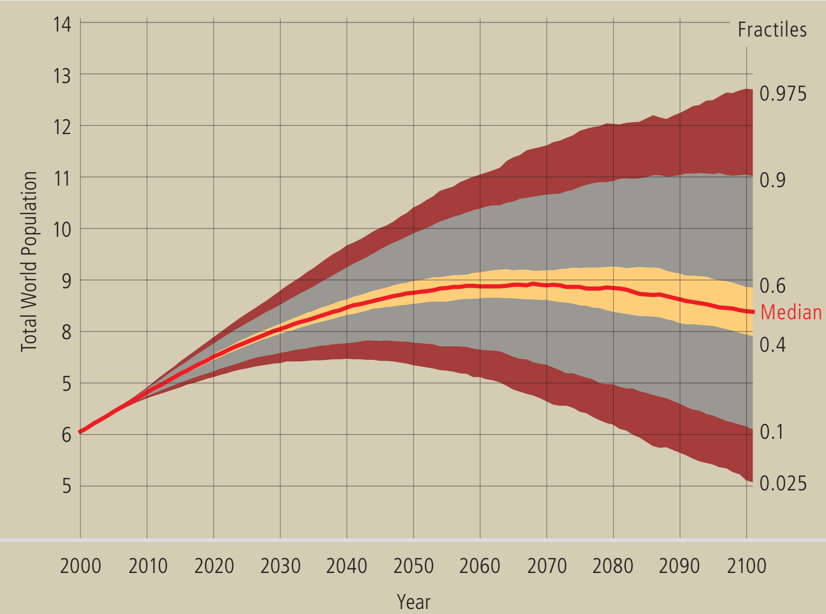

Figure 1. Uncertainty distribution of total world population to 2100, in billions.

The growing divergence in population trends and concerns

Not surprisingly, the global demographic landscape is difficult for many people to comprehend. In some parts of the world, rapid population growth continues to be a major source of concern, with populations likely to triple in some places over the course of this century. In some areas—predominantly Eastern Europe—the population has actually started to decline, causing great concern among governments and the public there.

2001 PROJECTIONS "The End of World Population Growth," the set of probabilistic world population projections published by IIASA's World Population Program (POP) in *Nature* in 2001, was generally greeted as good news for the planet. According to POP's research, the clearly unsustainable growth in human numbers in a finite environment would reach a benign end through voluntary family limitation rather than the often-predicted Malthusian check of increasing death rates. While the findings were cause for optimism at the global level, they were partly misinterpreted. In fact, some people believed that population concerns at the regional and national level were now no longer justified.

Nothing could be further from the truth. Indeed, for different reasons in different parts of the world, concern over population is rising. In Africa, there is mounting evidence that continuing "explosive" population growth is a key obstacle to the eradication of poverty and to improving education. At the same time, countries with rapidly aging and shrinking populations worry that their social security systems will be overburdened and that the welfare of their citizens is at risk. This bifurcation in terms of demographic trends and associated concerns has actually become more pronounced since 2001.

NEW PROJECTIONS In mid-2007 POP produced a new set of world population projections using the same long-term assumptions about the future levels of fertility, mortality, and migration as in the 2001 study, but incorporating all the new empirical evidence that has become available between 2001 and now.

Trajectories of population growth have a strong path dependence. Thus, an extra six years of empirical trends at the beginning of the century have the potential to greatly influence the range of likely outcomes by the end of it. The new results show that there are indeed significant changes in the outlook for certain regions, but as these go in opposing directions and partly offset each other, the aggregate results at the global level remain amazingly stable.

The probability that world population will peak during this century has increased marginally. The period during which the median of the projections reaches a peak (around 2070) and the level of this peak (around 9 billion people) remain virtually unchanged. As Figure 1 indicates, by the middle of the century, the 80 percent uncertainty range for world population is 7.8 to 9.9 billion. By 2100 it further broadens to 6.2–11.1 billion. In other words, there is a more than a 10 percent chance that the world population in 2100 will be smaller than it is today and an equal chance it could be more than 11 billion. However, a further doubling of world population from currently 6.6 to 13.2 billion is seen as extremely unlikely (a less than 2 percent chance) from today's perspective.

REGIONAL SHIFTS This global picture, however, hides several important regional shifts. Because of continued very low fertility or further fertility declines in some regions that already had low fertility, Eastern Europe and the China region are now shown by the POP research as having lower population growth than was projected in 2001. This is offset at the global level by higher anticipated population growth in sub-Saharan Africa.

In the latter, two interesting recent developments have critically changed the earlier assumptions made by all international forecasting agencies. First of all, the fertility decline seems to have

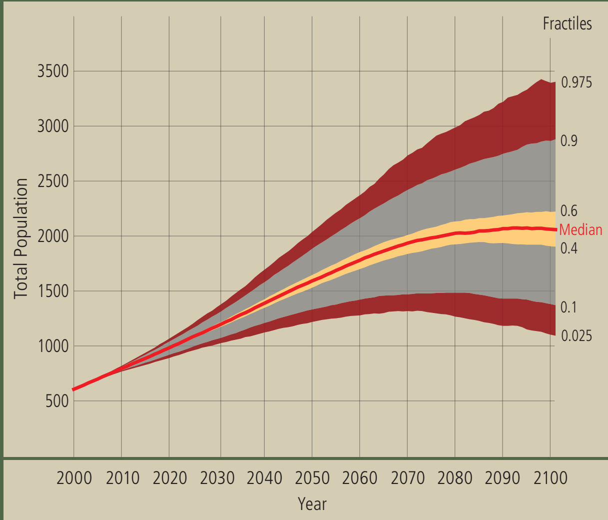

Figure 2. Sub-Saharan Africa population, in millions.

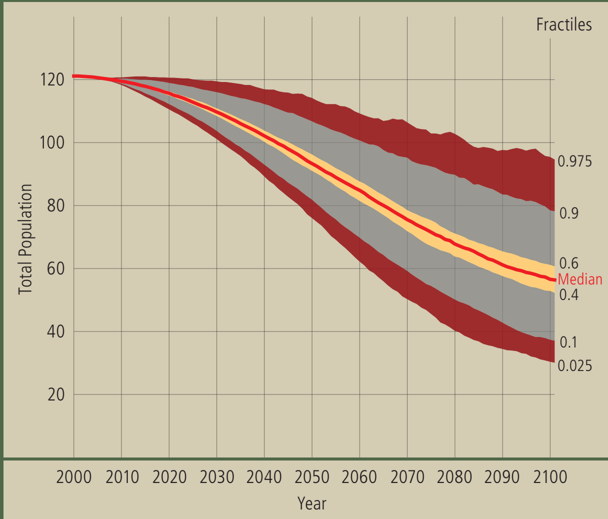

Figure 3. Eastern European population, in millions.

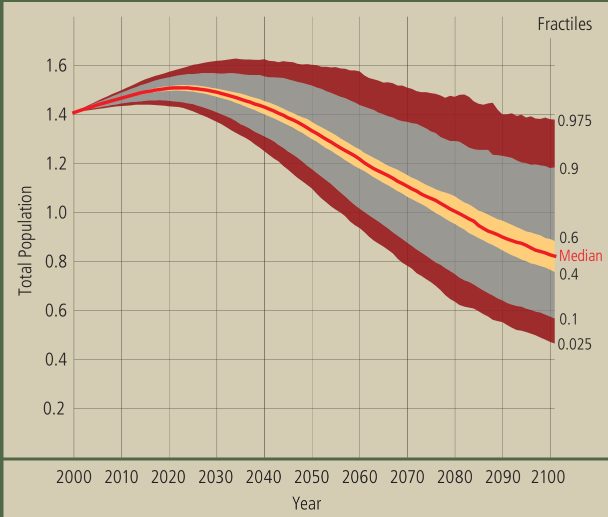

Figure 4. Population of China and Cambodia, Hong Kong, Laos, Mongolia, North Korea, Taiwan, Vietnam, in billions.

stalled in a number of important African countries. This coincides with an actual decline in the level of schooling of young adults and worsening health care and family planning services. Second, fewer people than anticipated are dying of AIDS. This has less to do with the rapid spread of anti-retroviral treatment in parts of the continent than with a significant downward correction of the estimates made by UNAIDS of the numbers of people infected with the virus. Put together, a higher starting level of fertility plus a lower level of mortality result in higher population growth, even when the long-term assumptions are left unchanged.

AFRICA'S POPULATION TO DOUBLE As Figure 2 shows, Africa's population will almost certainly more than double from its current level of around 740 million. Because of the great longer-term uncertainties surrounding the future speed of fertility decline and the possible new health crises under the very poor development conditions anticipated, the 95 percent range by the end of the century is very broad, from a low 1.1 billion to a very high 3.3 billion. The central 20 percent range is 1.9–2.2 billion by 2100. Two factors will in all likelihood keep Africa at the bottom of world development unless some trends change radically in the near future: continued very rapid population growth together with stagnant or declining educational attainment levels (partly as a consequence of rapidly increasing numbers of children), and the additional environmental and agricultural problems likely to be caused by climate change.

EASTERN EUROPE'S POPULATION SHRINKING Eastern Europe and the European part of the former Soviet Union lie at the other extreme. The political changes that took place in 1990 triggered a precipitous fertility decline, together with some mortality increase, particularly among men. However, these regions already had a fairly old age structure. In 2001 it was assumed that these extremely low levels of fertility (in some cases close to half the replacement level) were only a temporary distortion. Since then, there has been continued low fertility (together with significant out-migration in most of the countries). This has distorted the age structure to such an extent that even in the unlikely event of a return to replacement-level fertility, there would be a population decline because fewer and fewer women are entering reproductive age. In 2001 we were already projecting a significant shrinkage for these regions. However, as is evident from Figure 3, the shrinking is faster and more dramatic. A reduction over the coming decades is a near certainty, and the population size is likely to decline to less than half its current level by the end of the century.

CHINA: FIRST GROWTH THEN SHRINKAGE Finally, China as a region is a very interesting case. It combines near certain population growth in the next decades with almost certain population decline in the longer run. As shown in Figure 4, the history of quite high fertility followed by a very steep fertility decline has resulted in an age structure where age groups of people of reproductive age are still increasing. Currently, this implies some further population growth to around 1.5 billion in the 2020s before a lasting population decline will begin.

The population outlook for China is made more uncertain because there is no consensus among experts as to what the current level of fertility is. In 2001 the general agreement was that the total fertility rate was around 1.9. Since then, there has been mounting evidence that even at the time of the 2000 census it was already much lower—somewhere in the 1.2 to 1.8 range, with the best guess at around 1.5.

To cope with this uncertainty regarding the world's most populous country, POP chose to expand the probabilistic approach to include not only uncertain future paths but also uncertain starting conditions above the range just indicated. But as the median of this range is still 0.4 children lower than the earlier assumptions, the new outlook for China shows more rapid population aging and shrinkage than just a few years ago, again under the same long-term assumptions. As Figure 4 shows, after an initial increase China's population is likely to be back down to its 2000 level during the 2040s and then, by the end of the century, possibly almost down to half the 2000 level.

Population projections have traditionally assumed that all countries of the world, after passing through the demographic transition, will converge demographically. This has been most obvious in the long-held United Nations assumptions that all countries would converge to replacement-level fertility and eventually even to the same level of life expectancy; moreover, as a result, demographic differentials around the world would disappear.

But on a global level the demographic trends have seen little convergence over the past decades. In fact, over the past few years there has been outright divergence. Regions with already low fertility have seen further declines, and regions with high fertility have shown lower than expected declines. The high level of path dependency inherent in population growth has already produced a more heterogeneous demographic picture for the twenty-first century. Based on these trends one may also have to rethink, among other things, some of the longer term socio-economic scenarios used for the analysis of climate change. A world where there is little international cooperation may not necessarily be a world with a higher population; it may be a world with rapid population shrinkages in some areas and explosive growth in others. ■

Further information IIASA's World Population Program at www.iiasa.ac.at/Research/POP

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LETTERS

The coming acceleration of global population ageing

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The future paths of population ageing result from specific combinations of declining fertility and increasing life expectancies in different parts of the world[1]. Here we measure the speed of population ageing by using conventional measures and new ones that take changes in longevity into account for the world as a whole and for 13 major regions. We report on future levels of indicators of ageing and the speed at which they change. We show how these depend on whether changes in life expectancy are taken into account. We also show that the speed of ageing is likely to increase over the coming decades and to decelerate in most regions by mid-century. All our measures indicate a continuous ageing of the world's population throughout the century. The median age of the world's population increases from 26.6 years in 2000 to 37.3 years in 2050 and then to 45.6 years in 2100, when it is not adjusted for longevity increase. When increases in life expectancy are taken into account[2,3], the adjusted median age rises from 26.6 in 2000 to 31.1 in 2050 and only to 32.9 in 2100, slightly less than what it was in the China region in 2005. There are large differences in the regional patterns of ageing. In North America, the median age adjusted for life expectancy change falls throughout almost the entire century, whereas the conventional median age increases significantly. Our assessment of trends in ageing is based on new probabilistic population forecasts. The probability that growth in the world's population will end during this century is 88%, somewhat higher than previously assessed[4]. After mid-century, lower rates of population growth are likely to coincide with slower rates of ageing.

Conventional measures of ageing are based on chronological age. They assume that a 60-year-old person in 1900 was just as old as a 60-year-old person in 2000 because each has lived the same number of years. However, would we say that the two have aged at the same rate? After all, the 60-year-old in 2000 would, on average, have many more remaining years of life. Population ageing is not only about there being more old people (by today's definition of what is old): it is also about people living longer lives[5]. To capture this important impact of increasing life expectancy on our lives, and on the definitions of what is age and what is old, we introduce and quantify three new indicators of age that explicitly take changes in the remaining life expectancy into account. Although traditional age still greatly matters for institutional arrangements such as pension systems in most countries, the alternative measures tell us more about the changing human condition in which more people can plan for a longer and healthier life with consequences for their behaviour.

The conventional measures considered here are the proportion of the population aged 60+ (Prop. 60+), the median age of the population (MA) and its average age (Aver. Age). The alternative approach to measuring the proportion of elderly people in the population does not depend on a fixed age boundary but, rather, on a fixed remaining life expectancy. We define Prop. RLE 15− as the proportion of the population in age groups that have a remaining life expectancy of 15 years or less (see ref. 6 for the suggestion of a similar measure). If longevity increases, the minimum age of people included in Prop. RLE 15− increases. The adjusted version of the median age is called standardized or prospective median age (PMA)[2,3]. It is the age of a person in the year 2000 who has the same remaining life expectancy as a person at the median age in the year under consideration. The change in the prospective median age over some time period is roughly the change in the median age minus the change in life expectancy at the median age.

The adjusted version of the average age is the population average remaining years of life (PARYL). It is the weighted average of age-specific remaining life expectancies, where the weights are the proportions of the population at each age[7,8]. PARYL gives us the average remaining years of life of population members. Unlike the other measures, PARYL goes down as a population ages. We intuitively think of populations being younger when, on average, its members have more years left to live and PARYL is higher.

Figure 1 shows four of these measures of ageing as they evolve over time for the global population. All six measures are listed in Table 1 for selected regions and dates (information for all regions is given in Supplementary Table 2). All of them indicate that ageing will continue throughout the century. The two most rapidly increasing indicators, the proportion of the population 60+ years old and the median age of the population, are based on the traditional definition of age, hence suggesting the need for institutional adjustments to cope with these expected increases. The proportion of the global population 60+ years old increases from 10.0% in 2000 to 21.8% in 2050 and then to 32.2% in 2100. The three measures that are adjusted for longevity change show a slower pace of change.

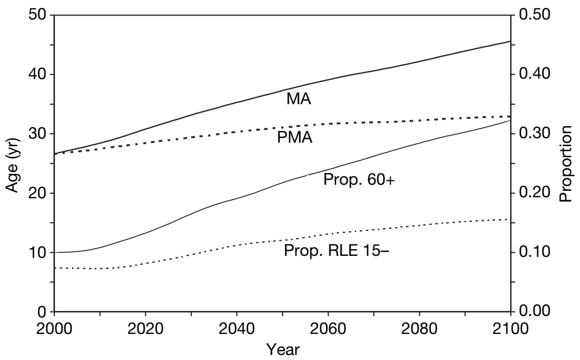

Figure 1 | Projected changes in the level of ageing for the world population over the course of the century for four indicators of ageing as defined in the text.

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Table 1 | Indicators of ageing

Region	Indicator	2000	2005	2010	2020	2030	2040	2050	2075	2100
North America	Aver. Age	36.5	37.0	37.7	39.5	41.3	42.6	43.6	46.5	49.5
	Prop. 60+	0.16	0.17	0.18	0.23	0.27	0.28	0.30	0.35	0.39
	PARYL	43.0	43.3	43.4	43.5	43.6	44.1	45.0	46.3	48.4
	MA	35.9	36.7	37.2	38.4	40.3	41.9	43.0	47.0	50.0
	Prop. RLE 15−	0.11	0.10	0.10	0.11	0.13	0.15	0.14	0.15	0.15
	PMA	35.9	35.8	35.4	34.7	34.8	34.6	33.7	33.0	30.9
Middle East	Aver. Age	24.2	25.1	26.0	28.3	31.4	34.4	37.1	42.6	46.6
	Prop. 60+	0.06	0.06	0.06	0.08	0.10	0.14	0.19	0.28	0.34
	PARYL	48.8	48.8	48.7	48.3	47.0	45.8	44.9	43.5	43.7
	MA	19.9	21.2	22.6	25.5	28.7	32.3	35.9	42.4	47.4
	Prop. RLE 15−	0.04	0.04	0.04	0.05	0.06	0.07	0.09	0.13	0.16
	PMA	19.9	20.3	20.9	22.0	23.5	25.5	27.6	30.0	30.6
South Asia	Aver. Age	26.5	27.1	27.8	29.8	32.2	34.6	37.0	42.4	47.3
	Prop. 60+	0.07	0.07	0.08	0.09	0.12	0.14	0.17	0.26	0.35
	PARYL	44.1	44.1	43.9	43.2	42.1	41.2	40.4	38.6	37.6
	MA	22.7	23.4	24.5	26.9	29.6	32.8	35.9	42.6	48.5
	Prop. RLE 15−	0.06	0.06	0.06	0.07	0.08	0.10	0.11	0.16	0.19
	PMA	22.7	22.9	23.4	24.7	26.3	28.3	30.2	33.7	36.2
China region	Aver. Age	31.2	33.2	35.1	38.6	42.3	45.5	47.7	50.7	51.2
	Prop. 60+	0.10	0.11	0.12	0.17	0.24	0.30	0.35	0.41	0.42
	PARYL	43.4	42.1	41.0	39.0	36.9	35.5	35.0	36.1	39.3
	MA	29.6	32.3	34.7	38.5	43.0	47.5	50.7	53.7	54.0
	Prop. RLE 15−	0.07	0.08	0.08	0.11	0.14	0.19	0.21	0.24	0.22
	PMA	29.6	31.7	33.5	36.0	39.3	42.3	44.1	43.0	38.6
Pacific Asia	Aver. Age	28.2	29.3	30.5	33.0	35.4	37.6	39.5	43.2	47.5
	Prop. 60+	0.08	0.08	0.09	0.12	0.16	0.20	0.23	0.29	0.36
	PARYL	44.7	44.4	43.9	42.9	42.1	41.5	41.2	41.2	41.1
	MA	25.3	26.9	28.4	31.4	34.0	36.4	38.6	43.3	48.7
	Prop. RLE 15−	0.06	0.06	0.07	0.08	0.10	0.12	0.14	0.15	0.17
	PMA	25.3	26.2	27.1	28.7	29.9	30.9	31.6	32.4	33.7
Japan/Oceania	Aver. Age	40.4	41.6	43.0	45.7	47.9	49.7	51.3	54.1	57.7
	Prop. 60+	0.22	0.24	0.27	0.31	0.35	0.40	0.42	0.47	0.51
	PARYL	41.3	41.0	40.6	39.7	39.5	39.5	39.6	41.1	43.0
	MA	40.0	41.3	42.8	46.7	49.9	52.1	53.9	57.6	61.1
	Prop. RLE 15−	0.13	0.13	0.14	0.17	0.18	0.18	0.20	0.21	0.21
	PMA	40.0	40.3	40.9	42.9	44.3	44.6	44.5	43.3	41.7
Western Europe	Aver. Age	38.3	39.1	40.1	42.4	44.7	46.8	48.4	51.0	53.5
	Prop. 60+	0.20	0.20	0.21	0.25	0.31	0.34	0.37	0.42	0.46
	PARYL	41.0	41.0	40.8	40.3	39.8	39.6	39.7	41.4	43.5
	MA	36.8	38.3	40.0	43.1	45.8	48.2	50.2	53.5	56.5
	Prop. RLE 15−	0.13	0.13	0.13	0.14	0.15	0.18	0.19	0.20	0.19
	PMA	36.8	37.5	38.3	39.6	40.5	41.1	41.3	39.8	37.7
Eastern Europe	Aver. Age	37.0	38.4	39.8	42.7	45.6	48.2	50.3	52.4	52.4
	Prop. 60+	0.18	0.18	0.20	0.25	0.29	0.36	0.42	0.44	0.44
	PARYL	39.7	39.1	38.5	37.3	36.0	35.3	34.9	36.9	40.6
	MA	35.6	37.1	38.9	42.9	47.3	51.3	54.0	55.7	55.7
	Prop. RLE 15−	0.13	0.13	0.13	0.15	0.18	0.19	0.22	0.24	0.21
	PMA	35.6	36.4	37.4	39.9	42.8	45.2	46.3	43.5	38.6
World	Aver. Age	29.7	30.4	31.3	33.1	35.2	37.1	38.8	42.3	45.5
	Prop. 60+	0.10	0.10	0.11	0.13	0.17	0.19	0.22	0.27	0.32
	PARYL	43.8	43.6	43.3	42.8	42.1	41.6	41.3	41.0	41.2
	MA	26.6	27.5	28.4	30.8	33.2	35.3	37.3	41.4	45.6
	Prop. RLE 15−	0.07	0.07	0.07	0.08	0.10	0.11	0.12	0.14	0.16
	PMA	26.6	27.0	27.5	28.5	29.4	30.4	31.1	32.1	32.9

Prop. RLE 15− goes from 7.4% in 2000 to 12.0% in 2050, and then to 15.6% in 2100. As to regional differentials, Table 1 shows that Japan/Oceania is the oldest region today and is likely to keep this position throughout the century with its median age likely to increase to above 60 years. It is closely followed by the European regions. North America shows much slower ageing and is likely to be surpassed by China for every indicator of ageing by 2030–40.

Figure 2 shows the accelerating and then decelerating speed of ageing at the global level. It plots decadal changes in the level of the indicator divided by the maximum increase (speed) projected over the century. For all indicators, the speed accelerates over the coming years reaching the highest rate of increase before 2035. After that, the speed of ageing is expected to decelerate although there will be further increases in the level of ageing throughout the century. This analysis clearly shows that, even under widely differing definitions of ageing, the world is expected to experience a significant acceleration in the speed of population ageing over the coming years.

How certain are these projected future trends in ageing? Is the expected rapid increase in ageing in many parts of the world a near

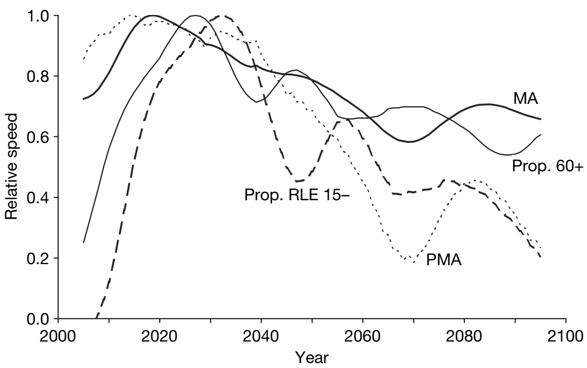

Figure 2 | The changing speed of increase in selected indicators of ageing. This is calculated as increases per decade in the level of the indicator divided by the maximum increase projected over the century; on the time axis, values are allocated to the middle of the decade considered.

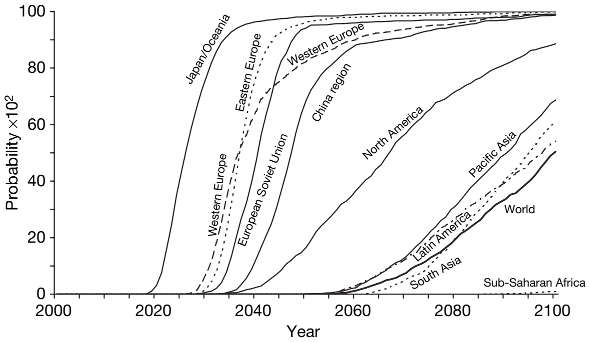

Figure 3 | Cumulative probabilities of reaching a proportion 60+ of one-third or more for the world and selected world regions by calendar year.

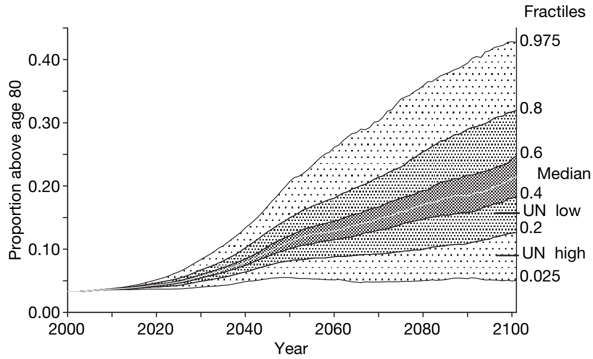

Figure 4 | Fractiles of the projected uncertainty distribution of the proportion of the population above age 80 in Western Europe. Straight lines in 2100 indicate the values given by the high and low variants of the United Nations (UN) long-term population projections.

certainty or just one out of several possible scenarios? The probabilistic nature of our population projections explicitly addresses this issue. Figure 3 shows the cumulative probabilities that different world regions reach one-third of their population 60+ years old (Prop. 60+) over the course of the century. By mid-century, the chance of having passed this specific ageing threshold is 98% in Japan/Oceania, 82% in Western Europe and even 69% in the China region. Uncertainty is so low in these regions because past fertility and mortality declines have already altered the age structures significantly. North America has a 50% chance of crossing this threshold in the 2060s owing to its currently still younger age structure and anticipated future migration gains. For sub-Saharan Africa, which still has an extremely young population with 44% of the population below age 15, the chance of Prop. 60+ being more than a third of the population is close to zero, even by the end of the century. For all other regions the chances start to increase over the 2060s and 2070s and reach around 50% by the end of the century. For the world as a whole, the cumulative probability turns out to be exactly 50% in 2100.

Figure 4 demonstrates another advantage of studying ageing from a probabilistic viewpoint. It shows predicted distributions of the proportion above age 80 for Western Europe (see Supplementary Table 1 for data on all regions). The proportion 80+ is almost certain to increase significantly over the coming decades. The projected increase in this indicator is very sensitive to the assumptions about future trends in old-age mortality where our assumed uncertainty ranges reflect tremendous disagreement among scientists[9–16]. Figure 4 shows that the 95% prediction interval is 5.5–20.7% by 2050 and 5.0–42.8% by 2100. The small lines inserted in 2100 give the results from the high and low variants of the most recent United Nations long-range projections[17]. These only reflect alternative fertility levels because the United Nations does not publish variants considering mortality uncertainty. That approach leads to a gross underestimation of the uncertainty of the future proportions of elderly.

Population ageing has many dimensions that will affect individuals and societies alike. When we supplement the conventional measures of ageing with ones that incorporate longevity change, we obtain a more complete understanding of how these dimensions are expected to evolve. In addition to changes in its level, the speed of ageing matters because, generally, the difficulties of adaptation to demographic change increase with the speed of change. In this respect, the world as a whole and the low fertility countries in particular face the challenge of an accelerating speed of ageing over the coming decades with the prospect of a slower speed of ageing at a higher level towards the second half of the century.

METHODS SUMMARY

The population forecasts presented here are an update of earlier probabilistic forecasts published in 2001[4]. A fuller list of the results of this update is given in Supplementary Table 1. Although the methodology and the longer-term assumptions have not changed, the new forecasts reflect empirical trends and new data available up to 2006. One methodological innovation lies in the consideration of uncertainty ranges for starting conditions in certain regions of the world with unreliable information. This was particularly relevant for the assumed level of current fertility in China, where published total fertility rates range from 1.2 to 1.8. After a review of 18 different estimates[18], we assumed a median total fertility rate of 1.5 and an 80% uncertainty range from 1.3 to 1.7 as starting conditions. This change causes a downward shift in the projected long-term global population size, which is offset by the effects of the observed slower decline of fertility in sub-Saharan Africa, leaving forecasted world population sizes largely unaffected. Sensitivity analyses showed that the main findings about the coming acceleration of global ageing hold, even if China is excluded from the simulations. The proportion of our simulations that show a peak in the world's population some time during the century increases from 86% in our previous forecasts to 88% in our current ones (see Supplementary Figure 1). The forecasting methodology is described in ref. 4 and all the long-term assumptions are described and justified in detail in ref. 19. New short- and medium-term fertility assumptions are given in Supplementary Table 3. The mortality and migration assumptions were unchanged. The list of countries in each region appears in ref. 19.

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Supplementary Table 1: Results of the 2007 probabilistic population forecast.
Figures in each cell are median values of 1000 simulations. Figures in parentheses show 80 percent prediction intervals.
(Figures for total population are in millions except for the World, the China region and South Asia, where it is in billions.)

Region/Indicator	2000	2005	2010	2020	2030	2040	2050	2075	2100
North Africa									
Aver. Age	25.5 (25.5-25.5)	26.4 (26.4-26.4)	27.3 (27.1-27.6)	29.7 (28.6-30.8)	32.5 (31.2-34.0)	35.2 (33.4-37.0)	37.5 (35.2-39.8)	41.7 (38.8-45.7)	44.6 (40.3-51.0)
Prop. 60+	0.06 (0.06-0.06)	0.06 (0.06-0.06)	0.07 (0.07-0.07)	0.09 (0.09-0.09)	0.12 (0.11-0.13)	0.15 (0.13-0.17)	0.19 (0.16-0.22)	0.27 (0.22-0.34)	0.31 (0.24-0.42)
Prop. 80+	0.005 (0.005-0.005)	0.005 (0.005-0.005)	0.006 (0.006-0.006)	0.008 (0.007-0.008)	0.010 (0.009-0.012)	0.017 (0.014-0.023)	0.024 (0.018-0.036)	0.053 (0.030-0.102)	0.090 (0.043-0.195)
Total Population	173.3 (173.3-173.3)	190.2 (189.6-190.8)	207.6 (205.3-210.1)	239.8 (228.2-250.8)	265.6 (247.4-283.8)	287.0 (260.1-316.4)	304.6 (267.3-346.2)	326.6 (261.1-399.7)	322.7 (236.4-432.9)
Sub Saharan Africa									
Aver. Age	22.1 (22.1-22.1)	21.6 (21.5-21.8)	21.6 (21.2-22.0)	22.2 (21.4-23.2)	23.7 (22.5-25.0)	25.4 (23.8-27.2)	27.3 (25.5-29.7)	32.9 (30.6-35.7)	38.0 (35.4-41.7)
Prop. 60+	0.05 (0.05-0.05)	0.04 (0.04-0.04)	0.04 (0.04-0.04)	0.05 (0.04-0.05)	0.05 (0.05-0.05)	0.05 (0.05-0.06)	0.07 (0.06-0.08)	0.13 (0.11-0.17)	0.20 (0.16-0.25)
Prop. 80+	0.003 (0.003-0.003)	0.003 (0.003-0.003)	0.003 (0.003-0.003)	0.003 (0.003-0.003)	0.003 (0.003-0.003)	0.004 (0.003-0.004)	0.005 (0.004-0.006)	0.010 (0.007-0.015)	0.024 (0.015-0.054)
Total Population	611.2 (611.2-611.2)	704.6 (698.3-710.6)	799.7 (781.3-815.5)	989.2 (924.9-1044.6)	1186.1 (1069.1-1297.5)	1394.0 (1216.2-1587.6)	1597.4 (1337.2-1892.7)	1989.6 (1485.5-2531.3)	2068.4 (1386.1-2874.3)
North America									
Aver. Age	36.5 (36.5-36.5)	37.0 (36.9-37.2)	37.7 (37.4-38.1)	39.5 (38.4-40.5)	41.3 (39.5-43.0)	42.6 (40.0-45.1)	43.6 (40.1-47.0)	46.5 (41.4-51.6)	49.5 (42.2-57.1)
Prop. 60+	0.16 (0.16-0.16)	0.17 (0.16-0.17)	0.18 (0.18-0.18)	0.23 (0.22-0.24)	0.27 (0.24-0.29)	0.28 (0.24-0.32)	0.30 (0.24-0.35)	0.35 (0.26-0.42)	0.39 (0.28-0.49)
Prop. 80+	0.032 (0.032-0.032)	0.030 (0.030-0.031)	0.030 (0.029-0.030)	0.031 (0.028-0.035)	0.048 (0.038-0.061)	0.073 (0.052-0.105)	0.087 (0.051-0.136)	0.125 (0.057-0.205)	0.180 (0.068-0.294)
Total Population	313.7 (313.7-313.7)	325.3 (322.3-328.5)	338.4 (332.0-345.0)	366.3 (350.5-383.5)	391.9 (365.5-419.2)	412.5 (370.4-453.8)	425.3 (372.8-484.0)	446.7 (362.2-538.5)	460.3 (336.8-598.5)
Latin America									
Aver. Age	27.8 (27.8-27.8)	28.8 (28.7-28.8)	29.8 (29.6-30.0)	32.2 (31.3-33.2)	34.7 (33.3-36.2)	37.0 (35.1-39.0)	38.9 (36.4-41.9)	42.3 (38.5-46.8)	44.7 (39.6-51.7)
Prop. 60+	0.08 (0.08-0.08)	0.08 (0.08-0.08)	0.09 (0.09-0.09)	0.11 (0.11-0.12)	0.15 (0.14-0.16)	0.19 (0.17-0.21)	0.22 (0.19-0.26)	0.28 (0.22-0.35)	0.32 (0.23-0.42)
Prop. 80+	0.009 (0.009-0.009)	0.009 (0.009-0.009)	0.010 (0.009-0.010)	0.011 (0.011-0.012)	0.016 (0.013-0.019)	0.025 (0.019-0.035)	0.037 (0.025-0.060)	0.069 (0.035-0.132)	0.104 (0.043-0.214)
Total Population	515.3 (515.3-515.3)	555.8 (554.5-557.1)	595.3 (589.9-600.8)	669.3 (644.3-694.9)	732.6 (691.8-779.1)	786.6 (721.5-860.4)	830.9 (734.3-933.2)	893.9 (719.7-1094.9)	935.5 (672.7-1228.5)
Central Asia									
Aver. Age	26.9 (26.9-26.9)	27.8 (27.8-27.8)	28.7 (28.5-28.9)	30.7 (29.8-31.8)	33.4 (32.0-34.8)	35.7 (33.9-37.8)	37.9 (35.5-40.5)	42.4 (38.8-46.8)	46.0 (40.9-52.1)
Prop. 60+	0.08 (0.08-0.08)	0.08 (0.08-0.08)	0.08 (0.08-0.08)	0.10 (0.10-0.11)	0.13 (0.12-0.14)	0.16 (0.14-0.18)	0.20 (0.17-0.24)	0.28 (0.22-0.35)	0.33 (0.25-0.43)
Prop. 80+	0.008 (0.008-0.008)	0.008 (0.008-0.008)	0.010 (0.010-0.010)	0.012 (0.011-0.013)	0.011 (0.010-0.013)	0.021 (0.017-0.030)	0.029 (0.020-0.046)	0.064 (0.034-0.121)	0.104 (0.046-0.206)
Total Population	55.9 (55.9-55.9)	60.3 (60.3-60.4)	65.3 (64.7-65.8)	74.9 (71.8-78.0)	82.9 (77.8-88.6)	90.1 (81.9-98.9)	95.4 (84.0-107.6)	102.6 (81.6-124.8)	100.9 (72.3-133.1)
Middle East									
Aver. Age	24.2 (24.2-24.2)	25.1 (25.1-25.1)	26.0 (25.8-26.3)	28.3 (27.2-29.4)	31.4 (30.1-32.9)	34.4 (32.7-36.2)	37.1 (34.9-39.5)	42.6 (39.2-46.9)	46.6 (41.2-53.0)
Prop. 60+	0.06 (0.06-0.06)	0.06 (0.06-0.06)	0.06 (0.06-0.06)	0.08 (0.07-0.08)	0.10 (0.09-0.11)	0.14 (0.12-0.16)	0.19 (0.16-0.22)	0.28 (0.22-0.35)	0.34 (0.25-0.44)
Prop. 80+	0.005 (0.005-0.005)	0.005 (0.005-0.005)	0.006 (0.006-0.006)	0.007 (0.006-0.007)	0.009 (0.008-0.011)	0.016 (0.012-0.022)	0.024 (0.016-0.038)	0.064 (0.032-0.120)	0.112 (0.049-0.224)
Total Population	172.1 (172.1-172.1)	192.4 (192.4-192.5)	214.4 (212.2-216.7)	257.8 (245.7-271.6)	294.3 (274.6-316.0)	327.4 (298.7-361.1)	356.7 (314.4-402.2)	391.5 (314.6-473.8)	388.5 (291.2-509.7)
South Asia									
Aver. Age	26.5 (26.5-26.5)	27.1 (26.9-27.2)	27.8 (27.5-28.2)	29.8 (28.7-31.0)	32.2 (30.7-33.7)	34.6 (32.7-36.6)	37.0 (34.6-39.6)	42.4 (39.5-46.4)	47.3 (43.1-53.0)
Prop. 60+	0.07 (0.07-0.07)	0.07 (0.07-0.07)	0.08 (0.07-0.08)	0.09 (0.09-0.10)	0.12 (0.11-0.13)	0.14 (0.12-0.16)	0.17 (0.15-0.21)	0.26 (0.22-0.33)	0.35 (0.27-0.44)
Prop. 80+	0.006 (0.006-0.006)	0.006 (0.006-0.006)	0.007 (0.007-0.007)	0.008 (0.007-0.008)	0.010 (0.009-0.011)	0.014 (0.012-0.018)	0.020 (0.015-0.029)	0.043 (0.026-0.082)	0.083 (0.042-0.183)
Total Population	1.4 (1.4-1.4)	1.5 (1.5-1.5)	1.6 (1.6-1.7)	1.9 (1.8-1.9)	2.0 (1.9-2.2)	2.2 (2.0-2.4)	2.3 (2.0-2.6)	2.3 (1.8-2.8)	2.0 (1.4-2.7)
China Region									
Aver. Age	31.2 (31.2-31.2)	33.2 (33.0-33.5)	35.1 (34.7-35.6)	38.6 (37.7-39.6)	42.3 (40.8-43.9)	45.5 (43.3-47.9)	47.7 (44.7-51.3)	50.7 (45.2-56.9)	51.2 (44.6-60.3)
Prop. 60+	0.10 (0.10-0.10)	0.11 (0.11-0.11)	0.12 (0.12-0.12)	0.17 (0.16-0.17)	0.24 (0.23-0.26)	0.30 (0.27-0.34)	0.35 (0.30-0.41)	0.41 (0.32-0.52)	0.42 (0.31-0.55)
Prop. 80+	0.009 (0.009-0.009)	0.011 (0.011-0.011)	0.013 (0.013-0.013)	0.017 (0.016-0.019)	0.025 (0.021-0.030)	0.042 (0.033-0.058)	0.073 (0.051-0.109)	0.130 (0.069-0.237)	0.161 (0.071-0.325)
Total Population	1.4 (1.4-1.4)	1.4 (1.4-1.5)	1.5 (1.4-1.5)	1.5 (1.5-1.6)	1.5 (1.4-1.6)	1.4 (1.3-1.6)	1.3 (1.2-1.5)	1.1 (0.8-1.3)	0.8 (0.6-1.2)
Pacific Asia									
Aver. Age	28.2 (28.2-28.2)	29.3 (29.3-29.3)	30.5 (30.3-30.7)	33.0 (32.1-33.9)	35.4 (34.1-36.8)	37.6 (35.8-39.6)	39.5 (37.1-42.0)	43.2 (39.8-47.7)	47.5 (42.6-54.4)
Prop. 60+	0.08 (0.08-0.08)	0.08 (0.08-0.08)	0.09 (0.09-0.09)	0.12 (0.11-0.12)	0.16 (0.15-0.17)	0.20 (0.18-0.22)	0.23 (0.19-0.27)	0.29 (0.23-0.36)	0.36 (0.27-0.46)
Prop. 80+	0.006 (0.006-0.006)	0.007 (0.007-0.007)	0.008 (0.008-0.008)	0.011 (0.010-0.012)	0.014 (0.013-0.017)	0.024 (0.019-0.032)	0.035 (0.026-0.054)	0.062 (0.035-0.124)	0.104 (0.046-0.220)
Total Population	476.4 (476.4-476.4)	510.1 (509.2-511.0)	541.8 (537.3-546.0)	598.3 (577.1-619.2)	643.3 (608.0-681.9)	675.5 (621.3-739.9)	697.4 (619.5-786.7)	695.7 (562.1-841.4)	637.9 (477.8-869.4)
Japan/Oceania									
Aver. Age	40.4 (40.4-40.4)	41.6 (41.6-41.7)	43.0 (42.8-43.3)	45.7 (44.6-46.8)	47.9 (45.9-49.9)	49.7 (46.8-52.8)	51.3 (47.3-55.7)	54.1 (47.4-62.0)	57.7 (48.4-67.6)
Prop. 60+	0.22 (0.22-0.22)	0.24 (0.24-0.24)	0.27 (0.27-0.28)	0.31 (0.30-0.33)	0.35 (0.32-0.38)	0.40 (0.35-0.44)	0.42 (0.36-0.49)	0.47 (0.36-0.57)	0.51 (0.37-0.62)
Prop. 80+	0.035 (0.035-0.035)	0.038 (0.038-0.038)	0.046 (0.045-0.047)	0.064 (0.057-0.073)	0.097 (0.077-0.123)	0.114 (0.078-0.164)	0.138 (0.084-0.212)	0.202 (0.094-0.335)	0.272 (0.111-0.422)
Total Population	149.9 (149.9-149.9)	151.2 (150.6-151.7)	151.5 (150.3-152.9)	150.3 (145.5-155.0)	147.5 (138.8-156.4)	142.3 (129.6-156.9)	135.4 (118.3-154.6)	114.4 (88.9-143.8)	98.9 (68.3-130.2)
Western Europe									
Aver. Age	38.3 (38.3-38.3)	39.1 (39.0-39.1)	40.1 (39.9-40.3)	42.4 (41.4-43.4)	44.7 (42.8-46.4)	46.8 (44.1-49.4)	48.4 (44.7-52.4)	51.0 (44.8-57.7)	53.5 (45.9-63.2)
Prop. 60+	0.20 (0.20-0.20)	0.20 (0.20-0.20)	0.21 (0.21-0.22)	0.25 (0.24-0.26)	0.31 (0.28-0.33)	0.34 (0.30-0.39)	0.37 (0.31-0.43)	0.42 (0.32-0.51)	0.46 (0.34-0.57)
Prop. 80+	0.033 (0.033-0.033)	0.034 (0.034-0.034)	0.037 (0.036-0.037)	0.043 (0.039-0.049)	0.057 (0.046-0.073)	0.079 (0.057-0.117)	0.112 (0.069-0.174)	0.159 (0.075-0.268)	0.212 (0.088-0.366)
Total Population	455.6 (455.6-455.6)	459.6 (458.1-461.2)	462.3 (458.3-466.0)	466.1 (451.8-480.4)	466.7 (441.6-494.1)	459.4 (423.0-504.3)	446.6 (391.9-507.9)	389.4 (311.3-489.3)	350.1 (246.9-462.2)
Eastern Europe									
Aver. Age	37.0 (37.0-37.0)	38.4 (38.4-38.5)	39.8 (39.6-40.1)	42.7 (41.7-43.7)	45.6 (44.0-47.4)	48.2 (45.6-51.0)	50.3 (46.7-54.1)	52.4 (46.4-59.8)	52.4 (45.3-62.5)
Prop. 60+	0.18 (0.18-0.18)	0.18 (0.18-0.18)	0.20 (0.20-0.20)	0.25 (0.24-0.26)	0.29 (0.27-0.32)	0.36 (0.32-0.40)	0.42 (0.36-0.48)	0.44 (0.34-0.56)	0.44 (0.32-0.58)
Prop. 80+	0.019 (0.019-0.019)	0.025 (0.025-0.025)	0.031 (0.030-0.031)	0.037 (0.034-0.041)	0.049 (0.041-0.061)	0.076 (0.057-0.107)	0.091 (0.061-0.140)	0.164 (0.086-0.296)	0.185 (0.081-0.356)
Total Population	121.2 (121.2-121.2)	120.6 (120.4-120.9)	119.5 (118.7-120.3)	115.6 (112.2-118.9)	109.8 (103.8-116.0)	102.2 (93.1-112.2)	93.4 (81.9-106.7)	71.5 (54.5-92.4)	56.6 (37.4-78.5)
European Soviet Union									
Aver. Age	37.2 (37.2-37.2)	38.5 (38.5-38.5)	39.7 (39.5-39.9)	42.3 (41.5-43.3)	45.1 (43.7-46.8)	47.4 (45.0-50.1)	49.1 (45.6-52.8)	50.1 (44.2-56.7)	48.6 (42.5-57.8)
Prop. 60+	0.19 (0.19-0.19)	0.18 (0.18-0.18)	0.19 (0.19-0.19)	0.24 (0.24-0.25)	0.29 (0.27-0.31)	0.33 (0.30-0.37)	0.40 (0.34-0.46)	0.41 (0.31-0.52)	0.39 (0.28-0.51)
Prop. 80+	0.020 (0.020-0.020)	0.023 (0.023-0.023)	0.031 (0.030-0.031)	0.038 (0.035-0.041)	0.040 (0.034-0.047)	0.068 (0.053-0.091)	0.079 (0.055-0.122)	0.141 (0.072-0.247)	0.143 (0.063-0.292)
Total Population	235.6 (235.6-235.6)	231.5 (231.1-231.8)	227.6 (226.1-228.9)	216.7 (210.4-222.8)	203.0 (191.9-214.5)	186.7 (170.7-205.0)	168.2 (146.6-192.0)	129.4 (96.9-165.8)	107.6 (68.1-149.5)
World									
Aver. Age	29.7 (29.7-29.7)	30.4 (30.3-30.5)	31.3 (31.0-31.5)	33.1 (32.2-34.0)	35.2 (33.9-36.7)	37.1 (35.3-39.1)	38.8 (36.4-41.4)	42.3 (38.8-46.4)	45.5 (41.1-51.4)
Prop. 60+	0.10 (0.10-0.10)	0.10 (0.10-0.10)	0.11 (0.11-0.11)	0.13 (0.13-0.14)	0.17 (0.15-0.18)	0.19 (0.17-0.21)	0.22 (0.19-0.26)	0.27 (0.22-0.34)	0.32 (0.25-0.41)
Prop. 80+	0.011 (0.011-0.011)	0.012 (0.012-0.012)	0.013 (0.013-0.013)	0.015 (0.014-0.017)	0.020 (0.017-0.024)	0.029 (0.022-0.040)	0.040 (0.028-0.060)	0.066 (0.036-0.116)	0.096 (0.048-0.190)
Total Population	6.1 (6.1-6.1)	6.4 (6.4-6.5)	6.8 (6.7-6.9)	7.5 (7.2-7.8)	8.1 (7.6-8.5)	8.5 (7.8-9.2)	8.8 (7.8-9.9)	8.9 (7.1-10.8)	8.4 (6.2-11.1)

IIASA Conference '07

Global Development: Science and Policies for the Future

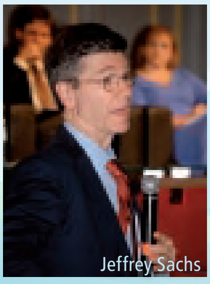
On the Occasion of IIASA's Thirty-Fifth Anniversary

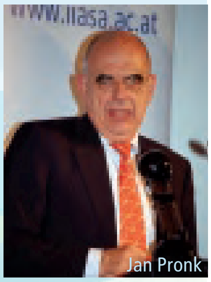
Human and Social Capital for Global Development

At its thirty-fifth anniversary, in November 2007, IIASA brought together a star-studded cast of scientists, policymakers and thinkers to discuss Global Development: Science and Policies for the Future. The aim was a wide-ranging discussion of what a sustainable and equitable future might look like, and how to get there. Foremost in everybody's minds were research priorities and how an interdisciplinary institution dedicated to systems analysis on a global scale might contribute.

Of particular interest to demographers was the second conference session: Human and Social Capital for Global Development. Paradoxically, people are both part of the problem and part of the solution for global development. The world's growing population will put even greater pressure on resources from water to healthcare. Yet human ingenuity and good government policy can overcome these emerging challenges.


Anne Goujon


Jeffrey Sachs


Jan Pronk

Watch and read summaries of IIASA's Thirty-Fifth Anniversary Conference at www.iiasa.ac.at/iiasa35

Session 2: Human and Social Capital for Global Development

Can Low-Income Countries Develop without Their Own Scientific Community?
Dr. Berit Olsson, Director, Department for Research Cooperation, Swedish International Development Cooperation Agency, Sweden

Laws, Institutions, Social Capital and Economic Development
Dr. Linda Yueh, Fellow in Economics, University of Oxford and Visiting Professor, London Business School, UK

Human Capital as the Key to Development
Dr. Anne Goujon, Research Scholar, World Population Program, IIASA

Health and Global Development: Trends and Uncertainties; Challenges and Responses
Dr. Landis MacKellar, Leader, Health and Global Change Project, IIASA

Managing Climate Risks for Security and Development
Dr. Anthony Patt, Research Scholar, Risk and Vulnerability Program, IIASA

Mobilization of the World's Extremely Poor People into Entrepreneurship and Job Creation
Dr. Percy Barnevik, Chairman, Hand in Hand International, UK

What Will It Take for the Developing World to Extricate Itself from Under-Development?
Dr. Khotso Mokhele, former President, National Research Foundation, South Africa

Wellbeing and Its Challenges to International Development
Dr. J. Allister McGregor, Director, ESRC Research Group on Wellbeing in Developing Countries, University of Bath, UK

Synthesis Report
Prof. Wolfgang Lutz, Leader, World Population Program, IIASA

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