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World Population to reach 10 billion by 2100 if Fertility in all Countries Converges to Replacement Level

UNITED NATIONS, 3 MAY – The current world population of close to 7 billion is projected to reach 10.1 billion in the next ninety years, reaching 9.3 billion by the middle of this century, according to the medium variant of the *2010 Revision* of *World Population Prospects*, the official United Nations population projections prepared by the Population Division of the Department of Economic and Social Affairs, which is being launched today. Much of this increase is projected to come from the high-fertility countries, which comprise 39 countries in Africa, nine in Asia, six in Oceania and four in Latin America.

Small variations in fertility can produce major differences in the size of populations over the long run. The high projection variant, whose fertility is just half a child above that in the medium variant, produces a world population of 10.6 billion in 2050 and 15.8 billion in 2100. The low variant, whose fertility remains half a child below that of the medium, produces a population that reaches 8.1 billion in 2050 and declines towards the second half of this century to reach 6.2 billion in 2100. For long-term trends the medium variant is taken as reference.

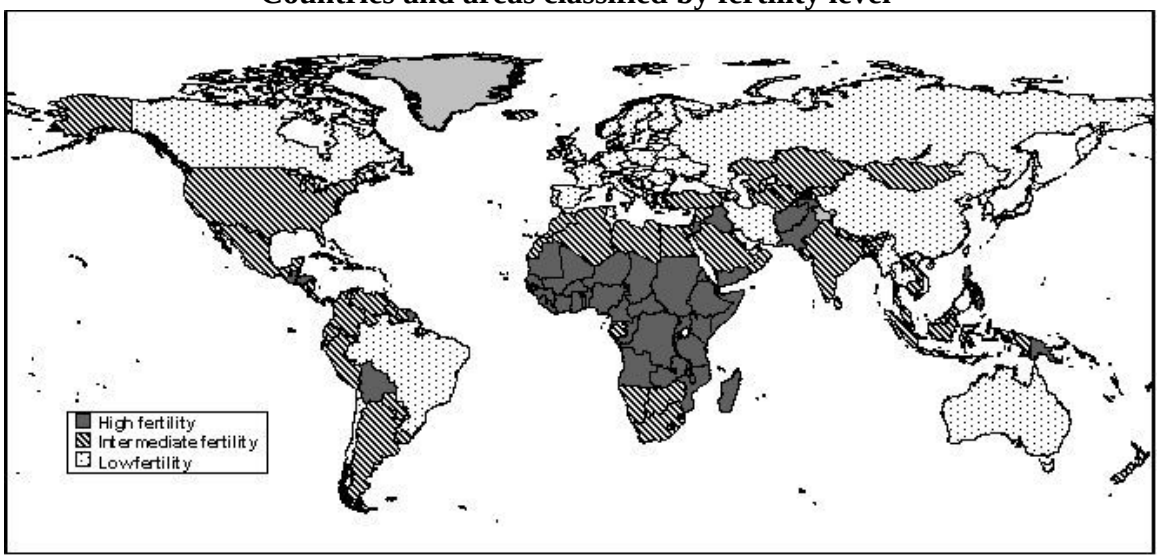
The medium-variant projection for 2050 is more certain than for 2100 because people who will be 40 years and older in 2050 are already born. According to the medium variant, it will take 13 years to add the eighth billion, 18 years to add the ninth billion and 40 years to reach the tenth billion. According to the high variant, an additional billion would be added every 10 or 11 years for the rest of this century.

Current fertility levels vary markedly among countries. Today, 42 per cent of the world's population lives in low-fertility countries, that is, countries where women are not having enough children to ensure that, on average, each woman is replaced by a daughter who survives to the age of procreation. Another 40 per cent lives in intermediate-fertility countries where each woman is having, on average, between 1 and 1.5 daughters, and the remaining 18 per cent lives in high-fertility countries where the average woman has more than 1.5 daughters (see map).

High-fertility countries are mostly concentrated in Africa (39 out of the 55 countries in the continent have high fertility), but there are also nine in Asia, six in Oceania and four in Latin America. Low-fertility countries include all countries in Europe except Iceland

and Ireland, 19 out of the 51 in Asia, 14 out of the 39 in the Americas, two in Africa (Mauritius and Tunisia) and one in Oceania (Australia).

Countries and areas classified by fertility level

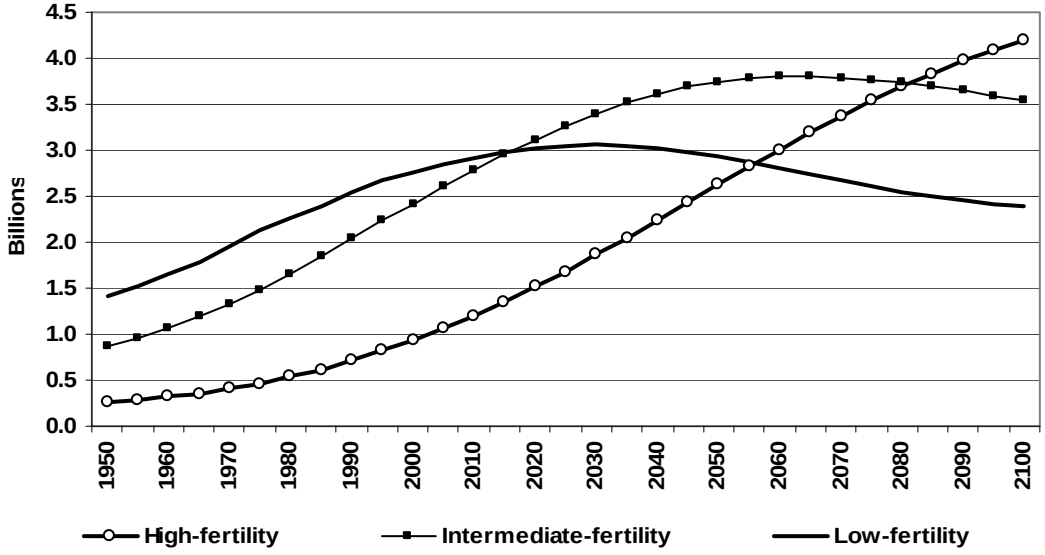


Note: The boundaries shown on this map do not imply official endorsement or acceptance by the United Nations.

Countries as varied as China, Brazil, the Russian Federation, Japan, Viet Nam, Germany, the Islamic Republic of Iran, Thailand and France, in order of population size, account for 75 per cent of the population living in low-fertility countries. Three-quarters of the population living in the intermediate-fertility countries is located in India, the United States of America, Indonesia, Bangladesh, Mexico and Egypt, in order of population size; and Pakistan, Nigeria, the Philippines, Ethiopia, the Democratic Republic of the Congo, the United Republic of Tanzania, Sudan, Kenya, Uganda, Iraq, Afghanistan, Ghana, Yemen, Mozambique and Madagascar, in order of population size, account for 75 per cent of the population of high-fertility countries.

The highest potential for future population growth is in high-fertility countries. Between 2011 and 2100, the medium variant projects that the population of the high-fertility countries would more than triple, passing from 1.2 billion to 4.2 billion. During the same period, the population of the intermediate-fertility countries would increase by just 26 per cent, from 2.8 billion to 3.5 billion, while that of the low-fertility countries would decline by about 20 per cent, from 2.9 billion to 2.4 billion (figure I).

Figure I. Population for countries grouped by fertility level, medium variant, 1950-2100



Whereas the populations of both the low-fertility countries and the intermediate-fertility countries are projected to peak before the end of the century, that of the high-fertility countries would continue to increase during the whole period. According to the medium variant, the population of the low-fertility countries would reach a maximum around 2030 at 3.1 billion and that of the intermediate-fertility countries would peak around 2065 at 3.8 billion. Among the low-fertility countries, China is expected to see its population reach a maximum around 2030 at 1.4 billion and that of low-fertility Europe is projected to peak around 2020 at 0.74 billion. Among the intermediate-fertility countries, India's population would peak around 2060 at 1.7 billion.

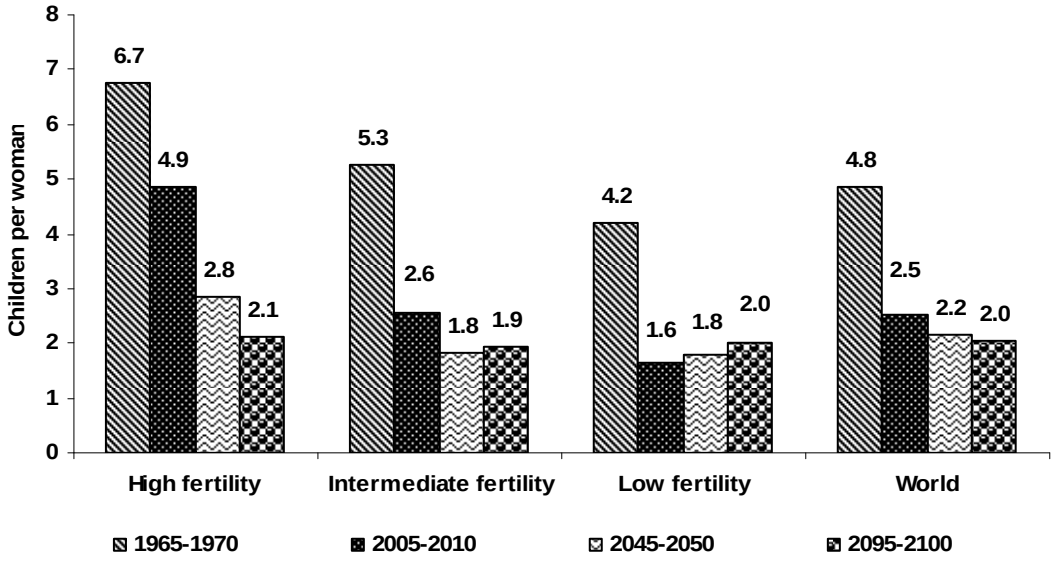
By the turn of the century, only the population of high-fertility countries would still be increasing. According to the medium variant, in 2095-2100, the populations of both the low-fertility countries and the intermediate-fertility countries would be declining at a rate of approximately 0.3 per cent per year. In sharp contrast, the population of the high-fertility countries would still be increasing at a rate of 0.5 per cent per year.

These projections hinge on the assumptions made about the future evolution of fertility. In the *2010 Revision*, a probabilistic model was used to derive the future path of fertility in the medium variant. The model assumes an initial distribution of its stochastic component, which is modified later on the basis of information on past fertility trends. In this process, account is taken of past fertility trends in a given country, the past experience of all other countries in the same region, and that of all countries in the world in such a way that regional experience has greater impact on the model's output than global experience. The model was used to generate 100,000 trajectories for future fertility for each country and the median values of those trajectories determined the fertility path

used in the medium variant. The model incorporated the additional assumption that, over the long run, replacement-level fertility would be reached (a level which, in low-mortality countries is close to 2.1 per children per woman).

The future fertility paths in the medium variant differ markedly among the groups of countries classified by fertility level (figure II). For high-fertility countries, future fertility in the medium variant drops from 4.9 children per woman in 2005-2010 to 2.8 in 2045-2050 and reaches 2.1 children per woman in 2095-2100, implying that fertility remains above replacement level for the whole projection period. For intermediate-fertility countries, average fertility drops from 2.6 children per woman in 2005-2010 to 1.8 in 2045-2050, reaches a minimum around 2060 and then recuperates slowly to reach 1.9 children per woman in 2095-2100. For low-fertility countries, fertility increases over the projection period rising from 1.6 children per woman in 2005-2010 to 1.8 in 2045-2050 and to 2.0 in 2095-2100. Despite this increase, average fertility in the low-fertility countries remains below replacement level over the whole projection period.

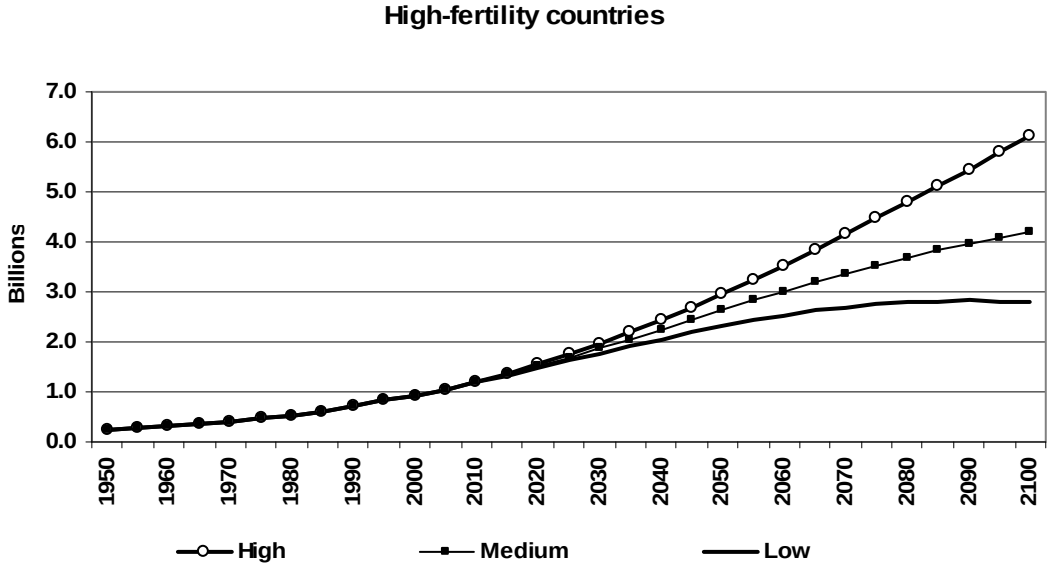
Figure II. Total fertility for countries grouped by fertility level, medium variant, selected periods

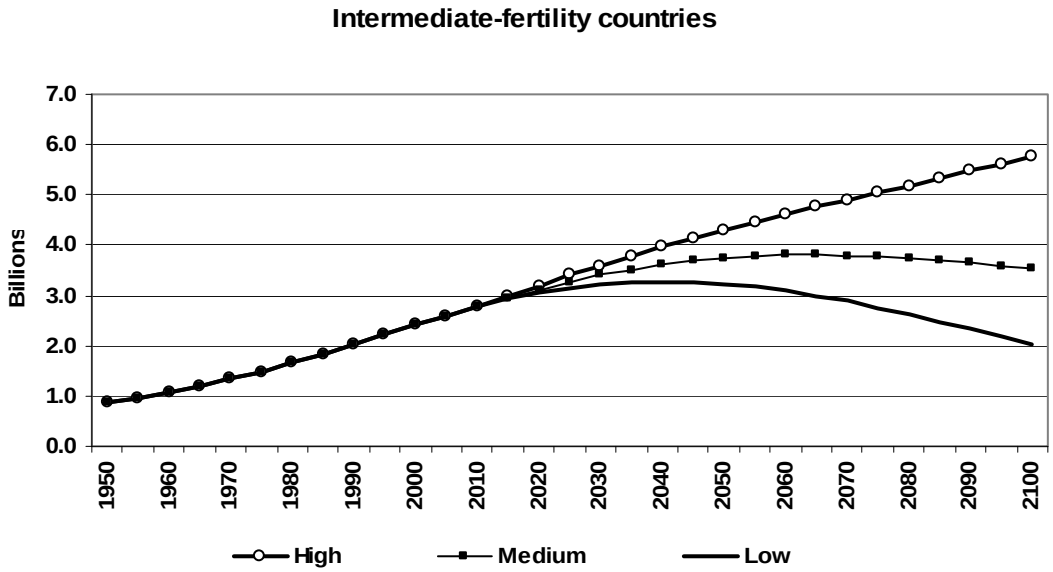


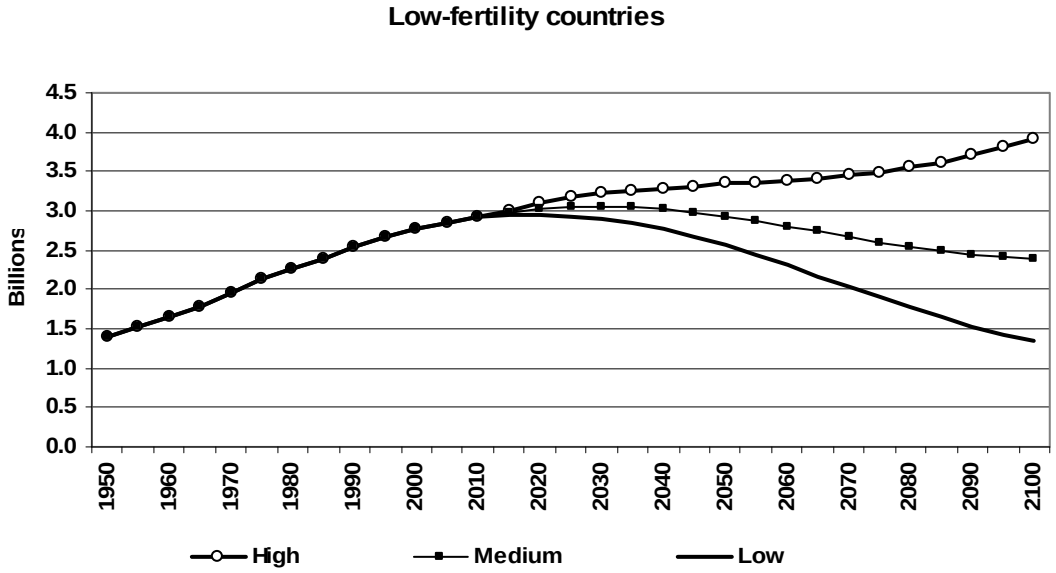
Small differences in fertility levels sustained over long periods have a major impact on the future population. The low and high projection variants differ from the medium variant in that their fertility remains half a child below and half a child above that of the medium variant during 2010-2100. As a result, they produce smaller and larger projected populations than the medium variant and the difference between the two increases over time (figure III). In 2050, for instance, the difference between the population projected by the high and low variants for the high-fertility countries amounts to 0.6 billion (2.96 billion vs. 2.32 billion), but by 2100 that difference expands to 3.3 billion (6.1 billion vs.

2.8 billion). These results imply that, if the high-fertility countries of today do not achieve the reductions of fertility projected in the medium variant, they may well see their overall population increase four or five-fold by the turn of the century instead of just tripling. Even with the reductions of fertility projected in the medium variant, the population of 34 of the 58 high-fertility countries would triple by 2100.

Figure III. Population for countries grouped by fertility level, low, medium and high variants, 1950-2100







The difference between the population produced by the high and low variants is also large for the intermediate-fertility countries. It amounts to 1.1 billion in 2050 (4.3 billion in the high variant vs. 3.2 billion in the low variant) and grows to 3.8 billion in 2100 (5.8 billion vs. 2.0 billion). Although the fertility of the intermediate-fertility countries has dropped markedly since the late 1960s (from 5.3 children per woman to 2.6 children per woman in 2005-2010), there is considerable uncertainty about whether all of them will continue to reduce their fertility to below-replacement level, as projected in the medium variant. If fertility for this group of countries remains above replacement level, they might still experience a doubling of their population by 2100 as projected in the high variant. The reduction of population projected by the low variant would result from very deep reductions of fertility, to well below 1.5 children per woman.

For the low-fertility countries, the projected increase in fertility in the medium variant is based on the experience of low-fertility countries whose fertility has begun to rise, albeit slowly. The range of variation of the population in the low and high variants for this group of countries is from 2.6 billion to 3.3 billion in 2050 and from 1.3 billion to 3.9 billion in 2100. The values projected by the high variant would be reached if fertility rose above replacement level while remaining generally below 2.5 children per woman. The values projected by the low variant would result from maintaining fertility well below 1.6 children per woman from 2010 to 2100. The persistence of very low levels of fertility in this group of countries would speed up population decline and population ageing, outcomes that may not be beyond the realm of possibility.

Life expectancy is projected to increase in the three groups of countries considered. In 2005-2010, average life expectancy at birth was lowest among the high-fertility countries, at 56 years, mainly because many of them have generalized HIV/AIDS epidemics. Nevertheless, given the advances made in reducing the spread of the disease and the expansion of antiretroviral treatment, the projections assume a continued decline in mortality rates from HIV/AIDS as well as from other major causes of death. Therefore,

the expectation of life among high-fertility countries rises to 69 years in 2045-2050 and to 77 in 2095-2100.

Among intermediate-fertility countries, average life expectancy was 68 years in 2005-2010 and is projected to rise to 77 years in 2045-2050 and 82 in 2095-2010. Low-fertility countries tend to have, as a group, higher average life expectancy. It was estimated at 74 years in 2005-2010 and is projected to rise to 80 years in 2045-2050 and to 86 years in 2095-2100. Globally, life expectancy is projected to increase from 68 years in 2005-2010 to 81 in 2095-2100.

Because declining fertility and increasing longevity lead to population ageing, population ageing is fastest in the low-fertility countries. Today, 11 per cent of the population of low-fertility countries is aged 65 years or over and just 34 per cent is under age 25. By 2050, according to the medium variant, 26 per cent of their population will be aged 65 or over and just 24 per cent will be below age 25. However, because fertility is projected to increase over the projection period, by 2100 the proportion under 25 increases to 27 per cent and that of those aged 65 or over rises minimally to 28 per cent.

Population ageing is slower among the intermediate-fertility countries, but results in a 2100 population similar in age structure as that of the low-fertility countries. The proportion of the population under age 25 passes from 47 per cent in 2010 to 26 per cent in 2100 and that aged 65 or over rises from 6 per cent in 2010 to 26 per cent in 2100.

Population ageing is slowest among the high-fertility countries, which have still a very young population. In 2010, 62 per cent of their population was under age 25 and that proportion is projected to decline markedly to 48 per cent in 2050 and 35 per cent in 2100. At the same time, the proportion aged 65 or over is projected to rise from just over 3 per cent in 2010 to 6 per cent in 2050 and to 16 per cent in 2100.

For the results of *World Population Prospects: The 2010 Revision*, visit www.unpopulation.org or contact Ms. Hania Zlotnik, Director, Population Division, UN Department of Economic and Social Affairs, tel.: +1-212-963-3179, fax: +1-212- 963-2147; Mr. Vikram Sura, UN Department of Public Information, tel.: +1-212-963-8274; email: sura@un.org.