

## EXECUTIVE SUMMARY

The *2004 Revision* is the nineteenth round of official United Nations population estimates and projections prepared by the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat. These are used throughout the United Nations system as the basis for activities requiring population information. The *2004 Revision* is the first to incorporate the full results of the 2000 round of national population censuses. It also takes into account the results of recent specialized surveys carried out in developing countries to provide both demographic and other information to assess the progress made in achieving the internationally agreed development goals, including the Millennium Development Goals (MDGs). The comprehensive review of past worldwide demographic trends and future prospects presented in the *2004 Revision* provides the population basis for the assessment of those goals.

The *2004 Revision* confirms the variety of demographic dynamics of our times. While the population at the global level continues to increase, that of the more developed regions as a whole is hardly changing and virtually all population growth is occurring in the less developed regions. Especially rapid population growth characterizes the group of 50 least developed countries.

Underlying these varied patterns of growth are distinct trends in fertility and mortality. Below-replacement fertility prevails in the more developed regions and is expected to continue to 2050. Fertility is still high in most least developed countries and, although it is expected to decline, it will remain higher than in the rest of the world. In the rest of the developing countries, fertility has declined markedly since the late 1960s and is expected to reach below-replacement levels by 2050 in most of these developing countries.

Mortality in the established market economies of the developed world is low and continues to decline, but it has been stagnant or even increasing in a number of countries with economies in transition, largely as a result of deteriorating social and economic conditions and, in some cases, because of the spread of HIV. Mortality is also decreasing in the majority of developing countries, but in those highly affected by the HIV/AIDS epidemic, mortality has been increasing. Given the ongoing efforts to provide antiretroviral treatment to 3 million AIDS patients by 2005 and the expectation of further expansion of that treatment thereafter, the *2004 Revision* assumes a longer average survivorship for people living with HIV than the *2002 Revision* did and therefore projects somewhat lower future mortality levels in HIV-affected countries than the previous *Revision*.

The HIV/AIDS epidemic continues to spread. The number of countries with a significant number of infected people in the *2004 Revision* is 60, up from 53 in the *2002 Revision*. Although HIV prevalence levels in some countries have been revised downward as better statistics become available. Nevertheless, the toll of the disease continues to be high and is expected to remain so, despite projected reductions in the prevalence of HIV/AIDS. Lower projected levels of HIV prevalence depend on the realization of the commitments made by Governments in the 2000 Millennium Declaration<sup>1</sup> and the 2001 United Nations Declaration of Commitment on HIV/AIDS<sup>2</sup>.

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<sup>1</sup> See General Assembly Resolution A/Res/55/2.

<sup>2</sup> See General Assembly Resolution A/Res/S-26/2.

The key findings from the *2004 Revision* can be summarized as follows:

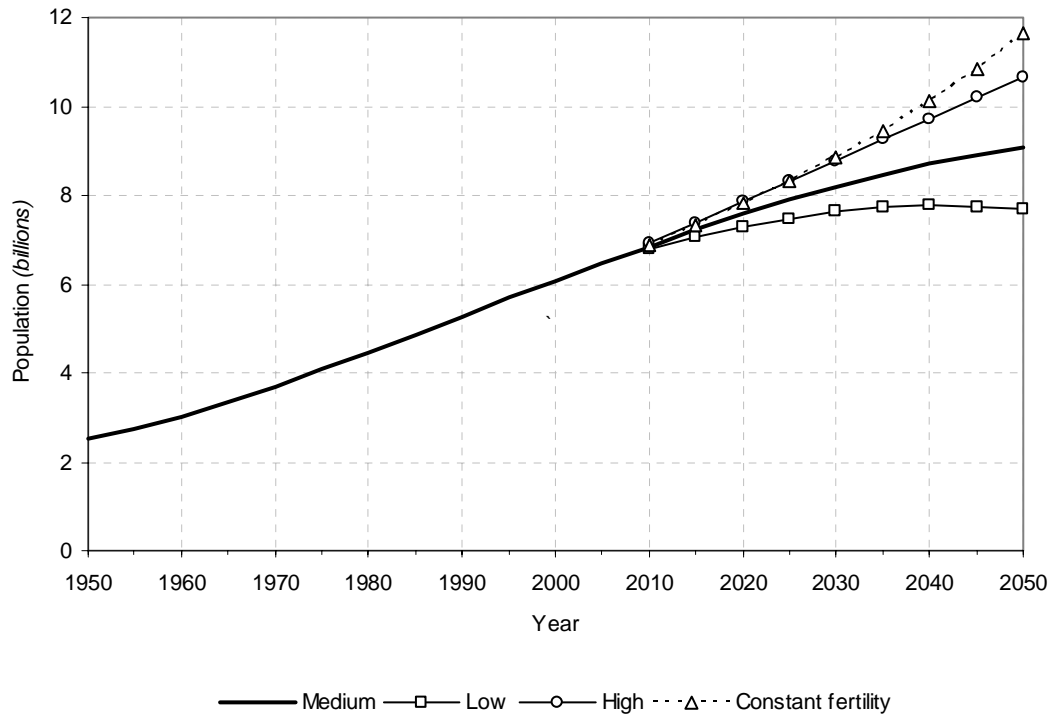
1. By July 2005, the world will have 6.5 billion inhabitants, 380 million more than in 2000 or a gain of 76 million annually. Despite the declining fertility levels projected over 2005-2050 the world population is expected to reach 9.1 billion according to the medium variant and will still be adding 34 million persons annually by mid-century.
2. Today, 95 per cent of all population growth is absorbed by the developing world and 5 per cent by the developed world. By 2050, according to the medium variant, the population of the more developed countries as a whole would be declining slowly by about 1 million persons a year and that of the developing world would be adding 35 million annually, 22 million of whom would be absorbed by the least developed countries.
3. Future population growth is highly dependent on the path that future fertility takes. In the medium variant, fertility is projected to decline from 2.6 children per woman today to slightly over 2 children per woman in 2050. If fertility were to remain about half a child above the levels projected in the medium variant, world population would reach 10.6 billion by 2050. A fertility path half a child below the medium would lead to a population of 7.6 billion by mid-century. That is, at the world level, continued population growth until 2050 is inevitable even if the decline of fertility accelerates.

TABLE 1. POPULATION OF THE WORLD, MAJOR DEVELOPMENT GROUPS AND MAJOR AREAS, 1950, 1975, 2005 AND 2050, BY PROJECTION VARIANTS

Major area	Population (millions)			Population in 2050 (millions)			
	1950	1975	2005	Low	Medium	High	Constant
World .....	2 519	4 074	6 465	7 680	9 076	10 646	11 658
More developed regions .....	813	1 047	1 211	1 057	1 236	1 440	1 195
Less developed regions.....	1 707	3 027	5 253	6 622	7 840	9 206	10 463
Least developed countries.....	201	356	759	1 497	1 735	1 994	2 744
Other less developed countries.....	1 506	2 671	4 494	5 126	6 104	7 213	7 719
Africa .....	224	416	906	1 666	1 937	2 228	3 100
Asia.....	1 396	2 395	3 905	4 388	5 217	6 161	6 487
Europe.....	547	676	728	557	653	764	606
Latin America and the Caribbean.....	167	322	561	653	783	930	957
Northern America .....	172	243	331	375	438	509	454
Oceania.....	13	21	33	41	48	55	55

Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat (2005). *World Population Prospects: The 2004 Revision. Highlights*. New York: United Nations.

**Figure 1. Population of the world, 1950-2050, by projection variants**



Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat (2005). *World Population Prospects: The 2004 Revision. Highlights*. New York: United Nations.

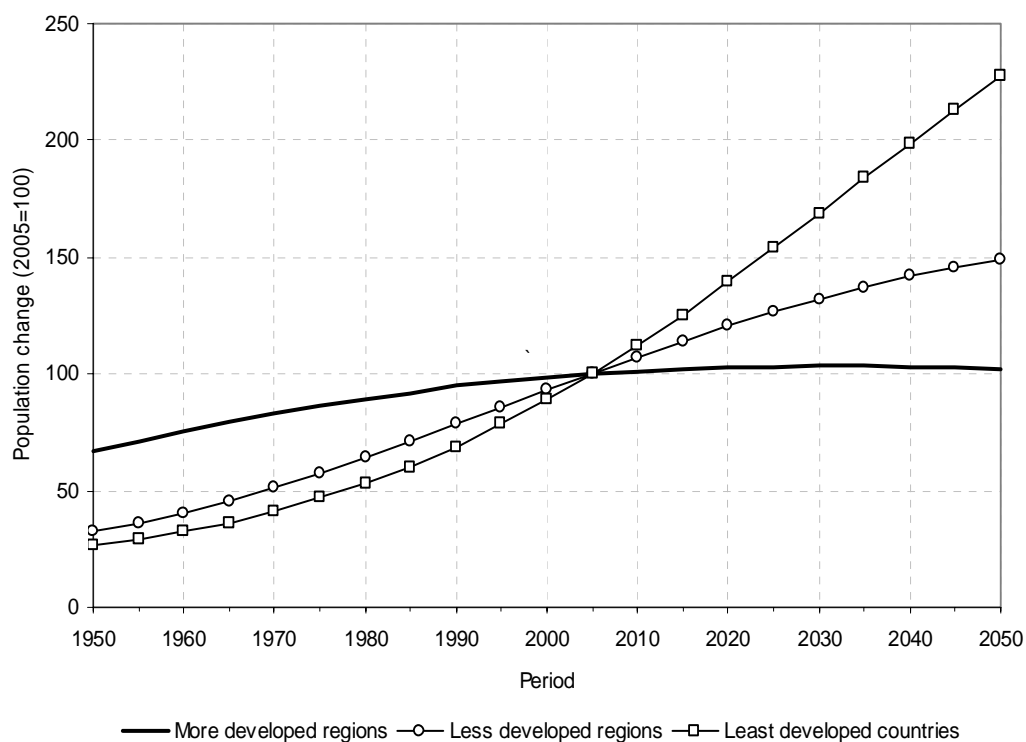
4. Because of its low and declining rate of growth, the population of developed countries as a whole is expected to remain virtually unchanged between 2005 and 2050, at about 1.2 billion. In contrast, the population of the 50 least developed countries is projected to more than double, passing from 0.8 billion in 2005 to 1.7 billion in 2050. Growth in the rest of the developing world is also projected to be robust, though less rapid, with its population rising from 4.5 billion to 6.1 billion between 2005 and 2050.
5. Very rapid population growth is expected to prevail in a number of developing countries, the majority of which are least developed. Between 2005 and 2050, the population is projected to at least triple in Afghanistan, Burkina Faso, Burundi, Chad, Congo, the Democratic Republic of Congo, the Democratic Republic of Timor-Leste, Guinea-Bissau, Liberia, Mali, Niger and Uganda.
6. The population of 51 countries or areas, including Germany, Italy, Japan, the Baltic States and most of the successor states of the former Soviet Union, is expected to be lower in 2050 than in 2005.
7. During 2005-2050, nine countries are expected to account for half of the world's projected population increase: India, Pakistan, Nigeria, the Democratic Republic of Congo, Bangladesh, Uganda, the United States of America, Ethiopia and China, listed according to the size of their contribution to population growth during that period.

TABLE 2. AVERAGE ANNUAL RATE OF CHANGE OF THE TOTAL POPULATION AND THE POPULATION IN BROAD AGE GROUPS, BY MAJOR AREA, 2005-2050 (MEDIUM VARIANT)

Major area	0-14	15-59	60+	80+	Total population
World .....	0.01	0.63	2.39	3.37	0.75
More developed regions .....	-0.14	-0.38	1.10	2.13	0.05
Less developed regions.....	0.03	0.82	2.88	4.19	0.89
Least developed countries.....	1.02	2.15	3.32	4.03	1.84
Other less developed countries.....	-0.29	0.54	2.84	4.21	0.68
Africa .....	0.87	2.00	3.12	3.86	1.69
Asia.....	-0.29	0.47	2.70	4.04	0.64
Europe.....	-0.36	-0.75	0.90	1.98	-0.24
Latin America and the Caribbean.....	-0.38	0.61	2.98	3.99	0.74
Northern America .....	0.23	0.37	1.67	2.30	0.62
Oceania.....	0.09	0.65	2.11	2.89	0.81

Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat (2005). *World Population Prospects: The 2004 Revision. Highlights*. New York: United Nations.

Figure 2. Population dynamics by development groups, 1950-2050



Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat (2005). *World Population Prospects: The 2004 Revision. Highlights*. New York: United Nations.

TABLE 3. TOTAL FERTILITY FOR THE WORLD, MAJOR DEVELOPMENT GROUPS AND MAJOR AREAS, 1970-1975, 2000-2005 AND 2045-2050, BY PROJECTION VARIANTS

Major area	Total fertility (children per woman)					
	1970-1975	2000-2005	2045-2050			
			Low	Medium	High	Constant
World .....	4.49	2.65	1.56	2.05	2.53	3.50
More developed regions .....	2.12	1.56	1.34	1.84	2.34	1.67
Less developed regions.....	5.44	2.90	1.59	2.07	2.56	3.69
Least developed countries.....	6.61	5.02	2.08	2.57	3.05	5.56
Other less developed countries.....	5.28	2.58	1.42	1.92	2.41	3.06
Africa .....	6.72	4.97	2.03	2.52	3.00	5.50
Asia.....	5.08	2.47	1.42	1.91	2.41	2.98
Europe.....	2.16	1.40	1.33	1.83	2.33	1.45
Latin America and the Caribbean.....	5.05	2.55	1.36	1.86	2.36	2.69
Northern America .....	2.01	1.99	1.35	1.85	2.35	1.99
Oceania.....	3.23	2.32	1.42	1.92	2.42	2.72

Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat (2005). *World Population Prospects: The 2004 Revision. Highlights*. New York: United Nations.

8. In 2000-2005, fertility at the world level stood at 2.65 children per woman, about half the level it had in 1950-1955 (5 children per women). In the medium variant, global fertility is projected to decline further to 2.05 children per woman by 2045-2050. Average world levels result from quite different trends by major development group. In developed countries as a whole fertility is currently 1.56 children per woman and is projected to increase slowly to 1.84 children per woman in 2045-2050. In the least developed countries, fertility is 5 children per woman and is expected to drop by about half, to 2.57 children per woman by 2045-2050. In the rest of the developing world, fertility is already moderately low at 2.58 children per woman and is expected to decline further to 1.92 children per woman by mid-century, thus nearly converging to the fertility levels by then typical of the developed world. Realization of the fertility declines projected is contingent on access to family planning, especially in the least developed countries.
9. In 2000-2005, fertility remains above 5 children per woman in 35 of the 148 developing countries, 30 of which are least developed countries, while the pace of decline in several countries of sub-Saharan Africa and South-central Asia has been slower than anticipated. Overall, the countries with high fertility account for 10 per cent of the world population. In contrast, fertility has reached below-replacement levels in 23 developing countries accounting for 25 per cent of the world population. This group includes China whose fertility during 2000-2005 is estimated at 1.7 children per woman.
10. Fertility levels in the 44 developed countries, which account for 19 per cent of the world population, are currently very low. All except Albania have fertility below replacement level and 15, mostly located in Southern and Eastern Europe, have reached levels of fertility unprecedented in human history (below 1.3 children per woman). Since 1990-1995, fertility decline has been the rule among most developed countries. The few increases recorded, such as those in Belgium, France, Germany, the Netherlands and the United States, have been small.

TABLE 4. LIFE EXPECTANCY AT BIRTH FOR THE WORLD, MAJOR DEVELOPMENT GROUPS AND MAJOR AREAS, 2000-2005 AND 2045-2050

<i>Major area</i>	<i>2000-2005</i>	<i>2045-2050</i>
World .....	65.4	75.1
More developed regions.....	75.6	82.1
Less developed regions.....	63.4	74.0
Least developed countries .....	51.0	66.5
Other less developed countries .....	66.1	76.3
Africa.....	49.1	65.4
Asia .....	67.3	77.2
Europe .....	73.7	80.6
Latin America and Caribbean .....	71.5	79.5
Northern America.....	77.6	82.7
Oceania .....	74.0	81.2

*Source:* Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat (2005). *World Population Prospects: The 2004 Revision. Highlights*. New York: United Nations.

11. Global life expectancy at birth, which is estimated to have risen from 47 years in 1950-1955 to 65 years in 2000-2005, is expected to keep on rising to reach 75 years in 2045-2050. In the more developed regions, the projected increase is from 76 years today to 82 years by mid-century. Among the least developed countries, where life expectancy today is 51 years, it is expected to be 67 years in 2045-2050. Because many of these countries are highly affected by the HIV/AIDS epidemic, the projected increase in life expectancy is dependent on the implementation of effective programmes to prevent and treat HIV infection. In the rest of the developing world, under similar conditionalities, life expectancy is projected to rise from 66 years today to 76 years by mid-century.
12. Mortality in Eastern Europe has been increasing since the late 1980s. In 2000-2005 life expectancy in the region, at 67.9 years, was lower than it had been in 1960-1965 (68.6 years). The Russian Federation and the Ukraine are particularly affected by rises in mortality resulting partly from the spread of HIV.
13. Twenty-five years into the HIV/AIDS epidemic, the impact of the disease is evident in terms of increased morbidity and mortality and slower population growth. In Southern Africa, the region with the highest HIV/AIDS prevalence of the disease, life expectancy has fallen from 62 years in 1990-1995 to 48 years in 2000-2005, and is projected to decrease further to 43 years over the next decade before a slow recovery starts. As a consequence, population growth in the region is expected to stall between 2005 and 2020. In Botswana, Lesotho and Swaziland, the population is projected to decrease as deaths outnumber births. In most of the other developing countries affected by the epidemic, population growth will continue to be positive because their moderate or high fertility more than counterbalances the rise in mortality.
14. The primary consequence of fertility decline, especially if combined with increases in life expectancy, is population ageing, whereby the share of older persons in a population grows relative to that of younger persons. Globally, the number of persons aged 60 years or over is expected almost to triple, increasing from 672 million in 2005 to nearly 1.9 billion by 2050. Whereas 6 out of every 10 of those older persons live today in developing countries, by 2050, 8 out of every 10 will do so. An even more

marked increase is expected in the number of the oldest-old (persons aged 80 years or over): from 86 million in 2005 to 394 million in 2050. In developing countries, the rise will be from 42 million to 278 million, implying that by 2050 most oldest-old will live in the developing world.

15. In developed countries, 20 per cent of today's population is aged 60 years or over and by 2050 that proportion is projected to be 32 per cent. The elderly population in developed countries has already surpassed the number of children (persons aged 0-14) and by 2050 there will be 2 elderly persons for every child. In the developing world, the proportion of the population aged 60 or over is expected to rise from 8 per cent in 2005 to close to 20 per cent by 2050.
16. Increases in the median age, the age at which 50 per cent of the population is older and 50 per cent younger than that age, are indicative of population ageing. Today, just 11 developed countries have a median age above 40 years. By 2050, there will be 89 countries in that group, 45 in the developing world. Population aging, which is becoming a pervasive reality in developed countries, is also inevitable in the developing world and will occur faster in developing countries.
17. Countries where fertility remains high and has declined only moderately will experience the slowest population ageing. By 2050, about one in five countries is still projected to have a median age equal or less than 30 years. The youngest populations will be found in least developed countries, 11 of which are projected to have median ages equal to or less than 23 years in 2050, including Afghanistan, Angola, Burundi, Chad, the Democratic Republic of Congo, Equatorial Guinea, Guinea-Bissau, Liberia, Mali, Niger and Uganda.
18. During 2005-2050, the net number of international migrants to more developed regions is projected to be 98 million or an average of 2.2 million annually. The same number will leave the less developed regions. For the developed world, such a level of net migration will largely offset the expected excess of deaths over births during 2005-2050, which amounts to a loss of 73 million people. For the developing world, the 98 million emigrants represent scarcely less than 4 per cent of expected population growth.
19. Over the period 2000-2005, 74 countries were net receivers of migrants. In 64 of these countries, the net migration projected reinforces population growth and in 7 countries, it reverses the trend of population decline (Austria, Croatia, Germany, Greece, Italy, Slovakia and Slovenia). In three countries, the migration slows down population decline but does not reverse it (Czech Republic, Hungary and the Russian Federation).
20. In terms of annual averages for the period 2005-2050, the major net receivers of international migrants are projected to be the United States (1.1 million annually), Germany (202,000), Canada (200,000), the United Kingdom (130,000), Italy (120,000) and Australia (100,000). The major countries of net emigration are projected to be China (-327,000 annually), Mexico (-293,000), India (-241,000), the Philippines (-180,000), Indonesia (-164,000), Pakistan (-154,000) and the Ukraine (-100,000).

## ASSUMPTIONS UNDERLYING THE 2004 REVISION

To project population until 2050, the United Nations Population Division applies assumptions regarding future trends in fertility, mortality, and migration. Because future trends cannot be known with certainty, a number of projection variants are produced. The Highlights focus on the medium variant of the *2004 Revision*. The assumptions of the medium variant are outlined in detail in section A of this chapter.

The *2004 Revision* includes five additional variants: the high, low, constant-fertility, constant-mortality, and zero-migration variants. The assumptions that differentiate these variants from the medium variant are described in section B. Detailed results of these variants will be made available in forthcoming publications.

The future population of each country is projected from an estimated population for 1 July 2005. Because actual population data for 2005 are not yet available, the 2005 estimate is based upon the most recent population data available for each country, derived usually from a census or population register, updated to 2005 using all available data on fertility, mortality and international migration. In cases where very recent data are not available, estimated demographic trends are short term projections from the most recent available data. Population data from all sources are evaluated for completeness, accuracy and consistency, and adjusted where necessary.<sup>3</sup>

### A. ASSUMPTIONS OF THE MEDIUM VARIANT

#### *1. Fertility assumptions: Convergence toward total fertility below replacement*

Total fertility in all countries is assumed to converge eventually toward a level of 1.85 children per woman. However, not all countries reach this level during the projection period, that is, by 2050. The basic principle of fertility projection is the same for all countries, but projection procedures are slightly different depending on whether countries had a total fertility above or below 1.85 children per woman in 2000-2005.

For those countries with total fertility above 1.85 children per woman, fertility is assumed to follow a path derived from models of fertility decline established by the United Nations Population Division on the basis of the past experience of all countries with declining fertility during 1950-2000. The models relate the level of total fertility during a period to the average expected decline in total fertility during the next period. If the total fertility projected by a model for a country falls to 1.85 children per woman before 2050, total fertility is held constant at that level for the remainder of the projection period (that is, until 2050).

In all cases, the projected fertility paths yielded by the models are checked against recent trends in fertility for each country. When a country's recent fertility trends deviate considerably from those consistent with the models, fertility is projected over an initial period of 5 or 10 years in such a way that it follows recent experience. The model projection takes over after that transition period. For instance, in countries where fertility has stalled or where there is no evidence of fertility decline, fertility is projected to remain constant for several more years before a declining path sets in.

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<sup>3</sup> For a general description of the procedures used in revising estimates of population dynamics, see *World Population Prospects: The 2002 Revision, Volume III: Analytical Report*, pp. 180-182.

For countries where total fertility was below 1.85 children per woman in 2000-2005, it is assumed that over the first 5 or 10 years of the projection period fertility will follow the recently observed trends in each country. After that transition period, fertility is assumed to increase linearly at a rate of 0.07 children per woman per quinquennium. Thus, countries whose fertility is currently very low need not reach a level of 1.85 children per woman by 2050.

## *2. Mortality assumptions: Increasing life expectancy except when affected by HIV/AIDS*

### *a. Normal mortality assumptions*

Mortality is projected on the basis of models of change of life expectancy produced by the United Nations Population Division. These models produce smaller gains the higher the life expectancy already reached. The selection of a model for each country is based on recent trends in life expectancy by sex. For countries highly affected by the HIV/AIDS epidemic, the model incorporating a slow pace of mortality decline has generally been used to project the reduction of general mortality risks not related to HIV/AIDS.

### *b. The impact of HIV/AIDS on mortality*

For the 60 countries highly affected by the HIV/AIDS epidemic (listed in table VIII.21), estimates of the impact of HIV/AIDS are made by explicitly modelling the course of the epidemic and by projecting the yearly incidence of HIV infection. The model developed by the UNAIDS Reference Group on Estimates, Modelling and Projections<sup>4</sup> is used to fit past estimates of HIV prevalence provided by UNAIDS so as to derive the parameters determining the past dynamics of the epidemic. For most countries, the model is fitted assuming that the relevant parameters have remained constant in the past. Beginning in 2005, the parameter PHI, which reflects the rate of recruitment of new individuals into the high-risk or susceptible group, is projected to decline by half every thirty years. The parameter R, which represents the force of infection, is projected to decline in the same manner. The reduction in R reflects the assumption that changes in behaviour among those subject to the risk of infection, along with increases in access to treatment for those infected, will reduce the chances of transmitting the virus. The rate of mother-to-child transmission is projected to decline at varying rates, depending on each country's progress in increasing access to treatment. In addition, the component of the Reference Group model relative to the survivorship of infected children has been updated: in the *2004 Revision* it is assumed that 50 per cent of children infected through mother-to-child transmission will survive to age two.

The *2004 Revision* incorporates for the first time a longer survival for persons receiving treatment with highly active antiretroviral therapy (ART). The proportion of the HIV-positive population receiving treatment in each country is consistent with estimates prepared by the World Health Organization for the end of 2004<sup>5</sup>. Coverage is projected to reach between 40 percent and 85 per cent by 2015, depending on the current level of coverage. It is assumed that, on average, annual survival probabilities increase to at least 80 per cent for individuals receiving ART. Under this assumption, mean survival from the initiation of therapy is 3.1 years (median 4.5 years). In contrast, in the absence of treatment mean survival after progression to AIDS is assumed to be just one year.

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<sup>4</sup> Improved methods and assumptions for estimation of the HIV/AIDS epidemic and its impact: Recommendations of the UNAIDS Reference Group on Estimates, Modelling and Projections. AIDS, vol. 16, pp. W1-W14 (UNAIDS Reference Group on Estimates, Modelling and Projections, 2002).

<sup>5</sup> World Health Organization. "3 by 5" Progress Report, December 2004/WHO and UNAIDS.

### 3. *International migration assumptions*

The future path of international migration is set on the basis of past international migration estimates and an assessment of the policy stance of countries with regard to future international migration flows.

#### B. PROJECTION VARIANTS

The *2004 Revision* includes five projection variants in addition to the medium variant. Three variants—high, low and constant-fertility—differ from the medium variant only in the projected level of total fertility. In the high variant, total fertility is projected to remain 0.5 children above the total fertility in the medium variant over most of the projection period. For example, countries reaching a total fertility of 1.85 in the medium variant reach a total fertility of 2.35 in the high variant. In the low variant, total fertility is projected to remain 0.5 children below the total fertility in the medium variant. In the constant-fertility variant, total fertility remains constant at the level estimated for 2000-2005.

A constant-mortality variant and a zero-migration variant have also been prepared. They both have the same fertility assumption as the medium variant. Furthermore, the constant-mortality variant has the same international migration assumption as the medium variant. Consequently, the results of the constant-mortality variant can be compared with those of the medium variant to assess the effect that changing mortality has on other demographic parameters. Similarly, the zero-migration variant differs from the medium variant only with respect to the underlying assumption regarding international migration. Therefore, the zero-migration variant allows an assessment of the effect that non-zero migration has on other demographic parameters.

#### C. METHODOLOGICAL CHANGES MADE FOR THE *2004 REVISION*

- In the medium variant, the fertility of countries with a total fertility below 1.85 children per woman in 2000-2005 is projected first by continuing recent trends and then by increasing fertility linearly at a rate of 0.07 children per woman per quinquennium. These countries do not necessarily reach a level of 1.85 children per woman by 2050.
- In the *2004 Revision*, additional models of mortality change have been used to capture the diversity of historical experience in the rise of life expectancy. Specifically, very slow and very fast models of change have been developed and added to the previously existing slow, medium and fast models.
- The impact of HIV/AIDS on mortality is modelled explicitly for all countries that had adult HIV prevalence of one per cent or greater in 2003.
- Treatment with antiretroviral therapy is explicitly incorporated into the projection of HIV/AIDS for affected countries. In addition, the rate of mother-to-child transmission of HIV is projected to decline at a rate consistent with projected progress in expanding access to treatment.