

### III. FERTILITY

The birth of a child is a very private and personal event. At the same time, each individual birth contributes more than any other demographic event to population growth or decline. The history of the last two centuries has brought dramatic changes in family size and the number of children per woman, that has led in recent years an increasing number of countries to experience lower fertility.

Fertility refers in this report to the number of children procreated by a woman in her lifetime. Out of the different demographic components contributing the most to population growth, fertility has historically played the greatest role far exceeding the contributions played by migrations or increased survival. Until the advent of modern contraception and the increased recognition of individual reproductive rights, human reproduction among most populations remained largely determined by socio-cultural factors such as the proportion of persons married or living in unions (with the age at first marriage controlling the onset of exposure to socially accepted childbearing), the practice of induced abortions and the prevalence and duration of infertility post-partum (mostly related to breastfeeding behaviors and to a lesser extent to abstinence practices, both contributing to determine the length of the infertility interval after a birth) - Bongaarts and Potter (1983).

While the causal mechanisms responsible for the fertility decline remain elusive in most parts of the world (Montgomery and Cohen, 1998), increased infant and child survival, greater access to education and health services especially for women, expanded access and use of effective contraception methods combined with changes in individual and parental aspirations, increased women empowerment and participation into market economy have contributed to postpone childbearing, and to reduce family size.

It is in this historical context that the fertility transition occurred in the last decades through most countries still experiencing high fertility in 1950. This long-term decline of fertility from a high average number of children per woman (more than five)

to a low average number of children per woman has become today an almost universal phenomenon. In fact, in recent years fertility has fallen well below replacement (approximately 2.1 children per woman) to reach historically unprecedented low levels (1.3 children per woman and below) in most developed countries as well as in several less developed ones.

#### A. FERTILITY LEVELS IN 2000-2005

Total fertility (see box III.1) for the world was 2.65 children per woman in 2000-2005 (table III.4). This average masks substantial heterogeneity of fertility levels among countries. During the period, 65 countries (43 of them located in the more developed regions), with a total of 2.8 billion people and accounting for 42.8 per cent of the world's population, had fertility levels below 2.1 children per woman (table III.1). On the other hand, 127 countries (all but one in the less developed regions), with a total population of 3.6 billion persons and accounting for 57.2 per cent of the world's total, had total fertility levels at or above replacement level. Among the latter, 35 countries (30 of them in the least developed category) had total fertility levels at or above 5 children per woman.

Although in 2000-2005 most developing countries were already far advanced in the transition from high to low fertility, 12 least developed countries and 1 other less developed country still showed no sign of even beginning of the transition. The share of the 13 accounted for only 3 per cent of the world population, but most of the 188 million persons living in the 12 least developed countries with no sign of a transition lived in Africa and represented 24.7 per cent of the population living in least developed countries.

In 22 other less developed countries, some fertility decline had started by 2000-2005, although the average number of children per woman was still more than five. Such countries accounted for 8.8 per cent of the population of the less developed regions and 48.2 per cent of the population of Africa.

#### BOX III.1. FERTILITY DEFINITIONS

Total fertility (total fertility rate, TFR) In common usage and in this report, total fertility is interpreted as the number of children per woman. Technically it is defined as the average number of children a group (birth cohort) of women would have during their lifetimes if none died before the end of the childbearing years and if they experienced the age-specific birth rates of the period in question. Total fertility is calculated by summing the birth rates at each age (the age-specific birth rates, or ASFRs) for a particular period, e.g., a single year or, for this report, a 5-year period such as 2000-2005.

High fertility Total fertility levels above 5 children per woman.

Low fertility Total fertility levels in the range of 2 to 3 children per woman.

Replacement-level fertility Total fertility levels of about 2.1 children per woman. This corresponds to the average number of children a woman needs to have to produce one daughter who survives to childbearing age. If sustained over the long run, each generation will replace itself (disregarding migration). For most countries, replacement level is close to 2.1 children per woman, but the actual levels vary slightly from country to country, depending on mortality conditions up to the end of the childbearing ages.

Below-replacement fertility Total fertility levels below 2.1 children per woman.

Very low fertility Total fertility levels below 1.3 children per woman.

Overall, the bulk of the population of the developing world lived in 70 countries where total fertility levels ranged from 2.1 to 4 children per woman, countries that accounted for over 40 per cent of the world population. Already, however, 29.7 per cent of the population living in less developed regions experience below-replacement fertility levels similar to those in more developed regions. More than 42 per cent of the population living in Asia, nearly everyone in Europe and Northern America and three quarters of the population in Oceania also live in countries where fertility levels are below replacement level.

Patterns of fertility by age may throw some light on the sources of these differences between the more developed and the less developed regions (figure III.1). The least developed countries, which have a total fertility of 5.02 children per woman (table III.4), have fertility rates at all ages lying far above those seen in other less developed countries, which have a total fertility just over half that (2.58). The lowest fertility rates, especially for the younger ages, are for the more developed regions, where total fertility is only 1.56 children per woman.

Childbearing among adolescents remains high in least developed countries, with rates 2.4 times as high as those in other less developed countries and 4.7 times as high as in more developed regions. This problem is most severe in several regions still experiencing relatively high fertility (i.e., more than 5 children per woman on average), such as Middle, Western and Eastern Africa, where fertility rates for adolescents are, respectively, 3.6, 2.9 and 2.2 times as high as in other less developed countries. But high adolescent fertility also remains a serious issue in other regions, such as Latin America and the Caribbean, South-central Asia, and Southern Africa, where overall total fertility is relatively much lower (between 2 and 3 children per woman on average). In these countries, fertility rates among those less than 20 years old are 2.5 to 3 times as high as in more developed regions.

In more developed countries, where fertility is low, childbearing tends to be concentrated early in a woman's life (80 per cent of it occurring between age 20 and 35), and fertility rates at ages over 35 are low. In the least developed countries, however, fertility rates are relatively high in the older

TABLE III.1. STAGES OF THE FERTILITY TRANSITION, BY DEVELOPMENT GROUP AND MAJOR AREA, 2000-2005

| <i>Development group or major area</i>                 | <i>No transition</i> | <i>Incipient fertility decline<sup>1</sup></i> | <i>Decline to levels between 4 and 5 children per woman</i> | <i>Decline to levels between 3 and 4 children per woman</i> | <i>Decline to levels between replacement level<sup>2</sup> and 3 children per woman<sup>3</sup></i> | <i>Decline to levels at or below replacement level<sup>2</sup></i> | <i>Total</i> |
|--|----------------------|--|---|---|---|--|--------------|
| <i>A. Number of countries<sup>4</sup></i>              |                      |  |   |   |   |  |              |
| World .....  | 13                   | 22   | 21  | 26  | 45  | 65   | 192          |
| More developed regions.....                            | —                    | —  | —   | —   | 1   | 43   | 44           |
| Less developed regions.....                            | 13                   | 22   | 21  | 26  | 44  | 22   | 148          |
| Least developed countries .....                        | 12                   | 18   | 12  | 5   | 1   | —  | 48           |
| Other less developed countries .....                   | 1                    | 4  | 9   | 21  | 43  | 22   | 100          |
| Africa .....   | 12                   | 19   | 8   | 9   | 4   | 2  | 54           |
| Asia .....   | 1                    | 3  | 7   | 9   | 16  | 14   | 50           |
| Europe .....   | —                    | —  | —   | —   | 1   | 38   | 39           |
| Latin America and the Caribbean.....                   | —                    | —  | 1   | 7   | 20  | 7  | 35           |
| Northern America.....                                  | —                    | —  | —   | —   | —   | 2  | 2            |
| Oceania.....   | —                    | —  | 5   | 1   | 4   | 2  | 12           |
| <i>B. Population in 2005<sup>4</sup> (in millions)</i> |                      |  |   |   |   |  |              |
| World .....  | 192                  | 463  | 336   | 1 527   | 1 178   | 2 767  | 6 463        |
| More developed regions.....                            | —                    | —  | —   | —   | 3   | 1 208  | 1 211        |
| Less developed regions.....                            | 192                  | 463  | 336   | 1 527   | 1 175   | 1 560  | 5 252        |
| Least developed countries .....                        | 188                  | 275  | 66  | 180   | 51  | —  | 759          |
| Other less developed countries .....                   | 4                    | 188  | 270   | 1 348   | 1 124   | 1 560  | 4 493        |
| Africa .....   | 162                  | 437  | 83  | 100   | 113   | 11   | 906          |
| Asia .....   | 30                   | 26   | 234   | 1 390   | 584   | 1 643  | 3 905        |
| Europe .....   | —                    | —  | —   | —   | 3   | 725  | 728          |
| Latin America and the Caribbean.....                   | —                    | —  | 13  | 37  | 477   | 34   | 561          |
| Northern America.....                                  | —                    | —  | —   | —   | —   | 330  | 330          |
| Oceania.....   | —                    | —  | 7   | 0   | 2   | 24   | 33           |

TABLE III.1 (continued)

| <i>Development group or major area</i> | <i>No transition</i> | <i>Incipient fertility decline<sup>1</sup></i> | <i>Decline to levels between 4 and 5 children per woman</i> | <i>Decline to levels between 3 and 4 children per woman</i> | <i>Decline to levels between replacement level<sup>2</sup> and 3 children per woman<sup>3</sup></i> | <i>Decline to levels at or below replacement level<sup>2</sup></i> | <i>Total</i> |
|--|----------------------|--|---|---|---|--|--------------|
| <i>C. Percentage of population</i>     |                      |  |   |   |   |  |              |
| World .....                            | 3.0                  | 7.2  | 5.2   | 23.6  | 18.2  | 42.8   | 100.0        |
| More developed regions.....            | —                    | —  | —   | —   | 0.3   | 99.7   | 100.0        |
| Less developed regions.....            | 3.7                  | 8.8  | 6.4   | 29.1  | 22.4  | 29.7   | 100.0        |
| Least developed countries.....         | 24.7                 | 36.2   | 8.7   | 23.7  | 6.7   | —  | 100.0        |
| Other less developed countries.....    | 0.1                  | 4.2  | 6.0   | 30.0  | 25.0  | 34.7   | 100.0        |
| Africa .....                           | 17.9                 | 48.2   | 9.1   | 11.1  | 12.4  | 1.3  | 100.0        |
| Asia.....                              | 0.8                  | 0.7  | 6.0   | 35.6  | 14.9  | 42.1   | 100.0        |
| Europe .....                           | —                    | —  | —   | —   | 0.4   | 99.6   | 100.0        |
| Latin America and the Caribbean.....   | —                    | —  | 2.2   | 6.6   | 85.1  | 6.1  | 100.0        |
| Northern America.....                  | —                    | —  | —   | —   | —   | 100.0  | 100.0        |
| Oceania.....                           | —                    | —  | 21.0  | 0.3   | 4.6   | 74.0   | 100.0        |

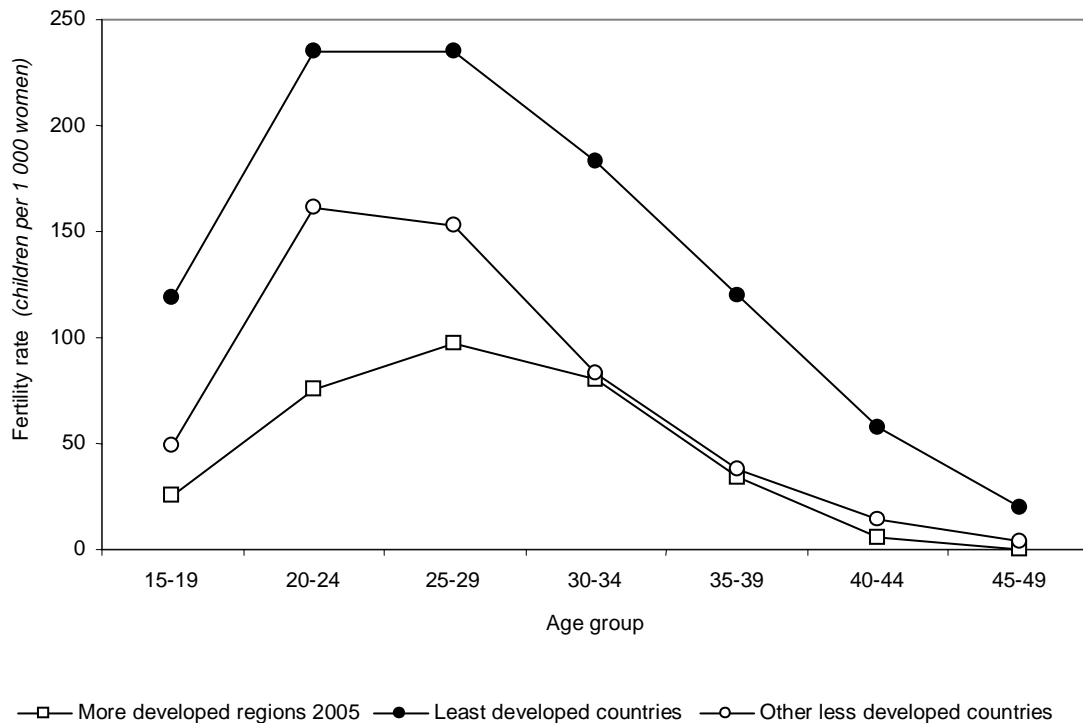
<sup>1</sup> Fertility has declined, but is still more than five children per woman.

<sup>2</sup> Replacement level assumed to be 2.1 children per woman.

<sup>3</sup> Including Argentina and Uruguay, which had experienced an early transition to low fertility but had not reached levels at or below replacement level by 2000-2005.

<sup>4</sup> Figures refer to the 192 countries for which information on fertility is available.

Figure III.1. Age-specific fertility rates, by development group, 2000-2005



reproductive ages, and rates for women aged 45-49 are almost as high as those for those age 15-19 in the more developed world.

In recent decades, however, the situation has improved in part of the developing world. Fertility rates at ages 30-34 and older, for instance, are already nearly as low in other less developed countries as in the more developed regions, and in both cases are very low at ages 40-44 and 45-49. In the least developed countries, however, it is not uncommon for women to give birth in their 40s, an age range in which women tend to face elevated risks in pregnancy, labor and delivery. Overall, 21.0 per cent of all births in these countries still happen at age 35 or older compared to 11.7 per cent in other less developed countries and 11.8 per cent in more developed regions.

#### B. LOW FERTILITY COUNTRIES AND BELOW-REPLACEMENT FERTILITY IN 2000-2005

As of 2000-2005, fertility had reached historically unprecedented low levels (below 1.3 children per woman) in 15 developed countries, all located in Southern and Eastern Europe. But very low fer-

tility is not limited to the more developed regions (box III.2). Of the 148 countries and territories in the less developed regions for which fertility data are available, some 22 have below-replacement fertility (table III.1). While a detailed examination of the main motivations for low fertility is beyond the scope of this chapter, further details about reproductive behaviour among populations with below-replacement fertility can be found in two recent United Nations reports (2000, 2003) and several demographic articles dedicated to this topic (Morgan, 2003; Goldstein, Lutz and Testa, 2003; Billari and Kohler, 2004).

#### C. HIGH FERTILITY COUNTRIES IN 2000-2005

Fertility has declined below 5 children per woman in 113 out of 148 less developed countries, but it remains above 5 in 35 (table III.1). In 22 of these 35 high fertility countries, however, fertility started to decline within the last 10-15 years, and in 17 of them total fertility is now between 5 and 6 children.

Five countries still had a total fertility above 7 children per woman in 2000-2005 (table III.2), and

BOX III.2. BELOW-REPLACEMENT FERTILITY BY DEVELOPMENT REGION

More developed regions In 2000-2005, the lowest total fertility levels in the more developed regions were found in Ukraine (1.12 children per woman) and in the Central and Southern European countries of Czech Republic (1.17), Slovakia (1.20) and Slovenia (1.22) (table III.2). At the other end of the scale, six more developed countries had fertility above 1.85 children per women. Countries with the highest fertility were Albania (2.29 children per woman), the United States of America (2.04), Iceland (1.97) and New Zealand (1.96).

Less developed regions The lowest total fertility levels were found in the Hong Kong and Macao Special Administrative Regions of China, respectively 0.84 and 0.94 child per woman, followed by the Republic of Korea (1.23) and Armenia (1.33). China, the world's most populous country in 2005, had below-replacement fertility of 1.70 children per woman in 2000-2005. However, the second most populous country, India, had fertility of 3.07 children per woman.

TABLE III.2. TEN COUNTRIES OR AREAS WITH THE HIGHEST AND TEN COUNTRIES AND AREAS WITH THE LOWEST TOTAL FERTILITY, BY LEVEL OF DEVELOPMENT, 2000-2005

| Rank              | Less developed country or area     | Total fertility (children per woman) | Rank | More developed country or area | Total fertility (children per woman) |
|-------------------|------------------------------------|--------------------------------------|------|--------------------------------|--------------------------------------|
| <i>A. Highest</i> |                                    |                                      |      |                                |                                      |
| 1                 | Niger                              | 7.91                                 | 1    | Albania                        | 2.29                                 |
| 2                 | Democratic Republic of Timor-Leste | 7.79                                 | 2    | United States of America       | 2.04                                 |
| 3                 | Afghanistan                        | 7.48                                 | 3    | Iceland                        | 1.97                                 |
| 4                 | Guinea-Bissau                      | 7.10                                 | 4    | New Zealand                    | 1.96                                 |
| 5                 | Uganda                             | 7.10                                 | 5    | Ireland                        | 1.94                                 |
| 6                 | Mali                               | 6.92                                 | 6    | France                         | 1.87                                 |
| 7                 | Burundi                            | 6.80                                 | 7    | Norway                         | 1.79                                 |
| 8                 | Liberia                            | 6.80                                 | 8    | Denmark                        | 1.75                                 |
| 9                 | Angola                             | 6.75                                 | 9    | Australia                      | 1.75                                 |
| 10                | Democratic Republic of the Congo   | 6.70                                 | 10   | Luxembourg                     | 1.73                                 |
| <i>B. Lowest</i>  |                                    |                                      |      |                                |                                      |
| 1                 | Macao, China SAR                   | 0.84                                 | 1    | Ukraine                        | 1.12                                 |
| 2                 | Hong Kong, China SAR               | 0.94                                 | 2    | Czech Republic                 | 1.17                                 |
| 3                 | Republic of Korea                  | 1.23                                 | 3    | Slovakia                       | 1.20                                 |
| 4                 | Armenia                            | 1.33                                 | 4    | Slovenia                       | 1.22                                 |
| 5                 | Singapore                          | 1.35                                 | 5    | Republic of Moldova            | 1.23                                 |
| 6                 | Georgia                            | 1.48                                 | 6    | Bulgaria                       | 1.24                                 |
| 7                 | Barbados                           | 1.50                                 | 7    | Belarus                        | 1.24                                 |
| 8                 | Trinidad and Tobago                | 1.61                                 | 8    | Greece                         | 1.25                                 |
| 9                 | Cuba                               | 1.61                                 | 9    | Poland                         | 1.26                                 |
| 10                | Cyprus                             | 1.63                                 | 10   | Latvia                         | 1.26                                 |

the average number of children per woman was still between 6 and 7 in 11 additional countries. The highest total fertility for 2000-2005 was for Niger (7.91 children per woman), followed by the Democratic Republic of Timor-Leste (7.79), Afghanistan (7.48), and several sub-Saharan African countries.

A review of fertility trends since 1950 shows that in 2000-2005, 13 countries (12 of them in Africa) showed little or no fertility decline (tables III.1 and III.3). While a 10 per cent decline has been commonly used as threshold to define the onset of fertility decline, several authors have recently proposed to use 5 per cent as a threshold to better

detect the early stage of the fertility transition (Bongaarts, 2002; Casterline, 2001). Use of this less stringent threshold would suggest that fertility started to decline in three high fertility countries (Angola, Mali and Afghanistan) within the last decade. Further evidence will be needed to confirm whether these countries have indeed started their fertility transition. In the other high fertility countries, recent evidence about fertility trends does not indicate that fertility started to decline in any substantial way. (In some countries, the lack of up-to-date reliable data precludes any firm conclusions.)

With the sole exception of the Congo, the 10 countries where fertility in 2000-2005 had declined by less than 5 per cent from its maximum observed value—Burundi, Chad, Congo, Democratic Republic of the Congo, Equatorial Guinea, Guinea-Bissau, Liberia, Niger, Sierra Leone, Uganda—are all least developed countries, and several are highly affected by the HIV/AIDS epidemic. Moreover, a number of them have been experiencing civil strife and political instability in recent years, factors that militate against the provision of basic services. The

continuation of rapid population growth poses an additional serious challenge to their future development.

#### D. PACE OF FERTILITY DECLINE SINCE THE 1970S

Fertility was high almost everywhere in the less developed regions in the early 1970s: 110 out of the 148 less developed countries had on average more than 5 children per woman. In the 30 years since the first World Population Conference was held in Bucharest, Romania in 1974, however, fertility has declined by 20 per cent or more in 121 less developed countries; in 49 of them the decline exceeded 50 per cent. Today women in those countries have on average half the number of children their mothers had. But the pace of fertility decline has varied substantially across regions and countries (table III.4, figure III.2).

In the least developed countries, total fertility declined by an average of 0.80 per cent annually (from 6.61 to 5.02 children per woman) between 1970-1975 and 2000-2005. Even more remarkable was the change in other less developed countries,

TABLE III.3. COUNTRIES AND AREAS WHERE THE FERTILITY TRANSITION HAD NOT BEGUN BY 2000-2005

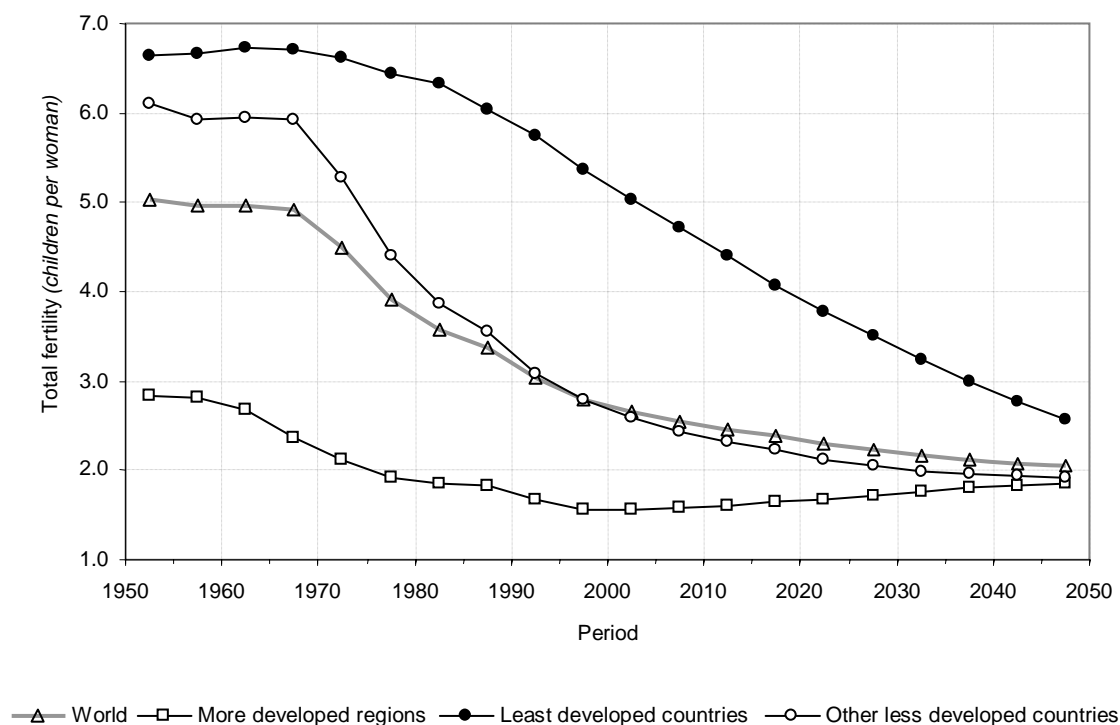
| <i>Major area or country</i>    | <i>Total fertility (children per woman)</i> |                  |                  |                                       |  |  |
|---------------------------------|---|------------------|------------------|---------------------------------------|--|--|
|                                 | <i>Population in 2005 (thousands)</i>       | <i>1950-1955</i> | <i>2000-2005</i> | <i>Maximum level during 1950-2005</i> | <i>2000-2005 per cent decline from maximum</i> | <i>Reference period of maximum level</i> |
| <b>Africa</b>                   |   |                  |                  |                                       |  |  |
| Niger .....                     | 13 957                                      | 7.70             | 7.91             | 8.20                                  | 3.6  | 1975-2000                                |
| Uganda .....                    | 28 816                                      | 6.90             | 7.10             | 7.10                                  | —  | 1965-2005                                |
| Guinea-Bissau.....              | 1 586                                       | 5.58             | 7.10             | 7.10                                  | —  | 1970-2005                                |
| Mali.....                       | 13 518                                      | 7.11             | 6.92             | 7.56                                  | 8.4  | 1970-1985                                |
| Burundi.....                    | 7 548                                       | 6.80             | 6.80             | 6.80                                  | —  | 1950-2005                                |
| Liberia.....                    | 3 283                                       | 6.45             | 6.80             | 6.90                                  | 1.4  | 1965-1995                                |
| Angola.....                     | 15 941                                      | 7.00             | 6.75             | 7.40                                  | 8.8  | 1960-1970                                |
| Dem. Republic of the Congo..... | 57 549                                      | 6.00             | 6.70             | 6.70                                  | —  | 1980-2005                                |
| Chad.....                       | 9 749                                       | 5.77             | 6.65             | 6.66                                  | 0.1  | 1970-2005                                |
| Sierra Leone.....               | 5 525                                       | 6.09             | 6.50             | 6.50                                  | —  | 1975-2005                                |
| Congo.....                      | 3 999                                       | 5.68             | 6.29             | 6.29                                  | —  | 1970-2005                                |
| Equatorial Guinea .....         | 504   | 5.50             | 5.89             | 5.89                                  | —  | 1985-2005                                |
| <b>Asia</b>                     |   |                  |                  |                                       |  |  |
| Afghanistan.....                | 29 863                                      | 7.70             | 7.48             | 8.00                                  | 6.5  | 1990-2000                                |

NOTE: Countries are ordered by total fertility in 2000-2005 and, where that is equal, by total fertility in 1950-1955.

TABLE III.4. TOTAL FERTILITY AND PERIOD CHANGE IN TOTAL FERTILITY FOR THE WORLD AND BY DEVELOPMENT GROUP AND MAJOR AREA, 1950-1955, 1970-1975 AND 2000-2005

| Development group or major area      | Estimates   |           |           | Average annual per cent change by period |                        |
|--------------------------------------|-------------|-----------|-----------|--|------------------------|
|                                      | 1950-1955   | 1970-1975 | 2000-2005 | 1950-1955 to 1970-1975                   | 1970-1975 to 2000-2005 |
|                                      | World ..... | 5.02      | 4.49      | 2.65                                     | -10.6                  |
| More developed regions .....         | 2.84        | 2.12      | 1.56      | -25.4                                    | -26.4                  |
| Less developed regions .....         | 6.17        | 5.44      | 2.90      | -11.8                                    | -46.7                  |
| Least developed countries.....       | 6.64        | 6.61      | 5.02      | -0.5                                     | -24.1                  |
| Other less developed countries.....  | 6.11        | 5.28      | 2.58      | -13.6                                    | -51.1                  |
| Africa.....                          | 6.72        | 6.72      | 4.97      | —  | -26.0                  |
| Asia.....                            | 5.89        | 5.08      | 2.47      | -13.8                                    | -51.4                  |
| Europe.....                          | 2.66        | 2.16      | 1.40      | -18.8                                    | -35.2                  |
| Latin America and the Caribbean..... | 5.89        | 5.05      | 2.55      | -14.3                                    | -49.5                  |
| Northern America.....                | 3.47        | 2.01      | 1.99      | -42.1                                    | -1.0                   |
| Oceania.....                         | 3.87        | 3.23      | 2.32      | -16.5                                    | -28.2                  |

Figure III.2. Total fertility for the world and by development group, estimates and medium variant, 1950-1955 to 2045-2050



where total fertility dropped by an average of 1.70 per cent per year (from 5.28 to 2.58) during the same period (box III.3). This exceptionally fast decline occurred first in Asia and in Latin America and the Caribbean, where total fertility fell from about 5 children to about 2.5 children per woman

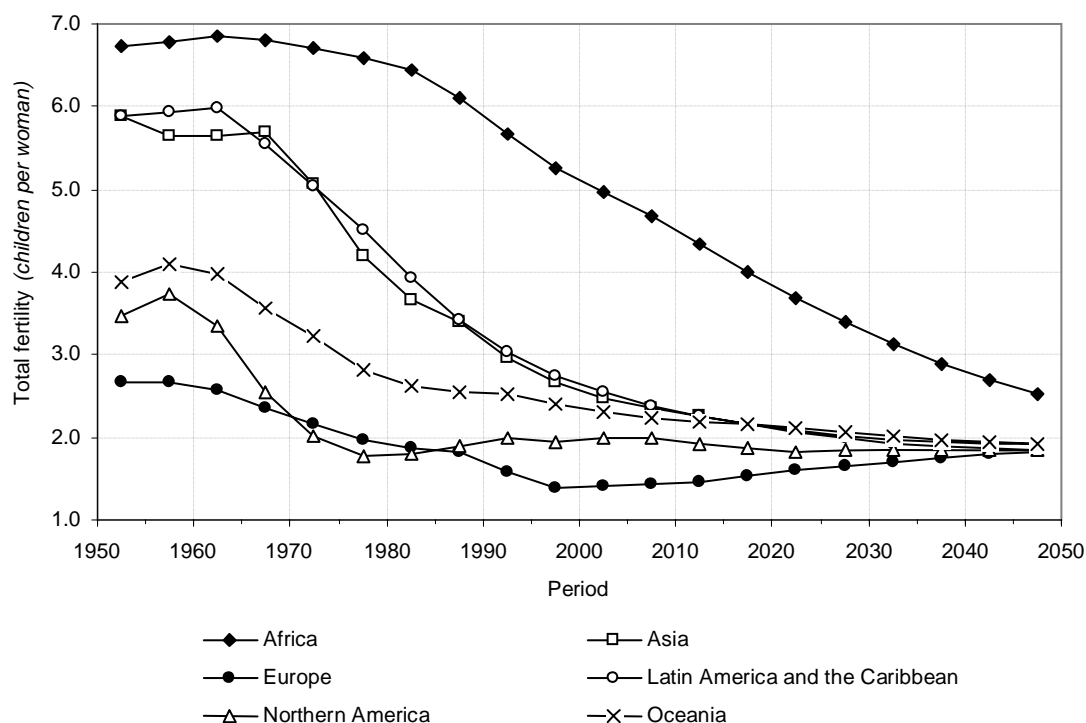
during the three decades (figure III.3). These two regions started their fertility transitions with similar fertility levels and have followed similar trajectories. This contrasts with the situation in Africa, where there was essentially no fertility decline before 1975.

**BOX III.3. FASTEST FERTILITY DECLINES SINCE 1970-1975 IN LESS DEVELOPED REGIONS**

Among least developed countries, the fastest fertility declines within the last 30 years are mostly in Asia (-57.2 per cent in Myanmar, -47.3 per cent in Bangladesh, -35.9 per cent in Nepal), in insular nation-states like Cape Verde (-46.1 per cent), Solomon Islands (-40.1 per cent), Maldives (-38.1 per cent), São Tomé and Príncipe (-37.7 per cent), and Vanuatu (-32.1 per cent), and in Lesotho (-36.4 per cent) and Sudan (-33.4 per cent) (table III.5, panel B). In most of these countries women on average have 2-3 fewer children than their mothers were having in 1970-1975. Fertility was nevertheless still around 4 children per woman in 2000-2005, except for countries that have experienced the fastest decline, such as Myanmar and Bangladesh, where total fertility is around 3 or below.

While the achievements of least developed countries are impressive, fertility declined even faster in other less developed countries. In ten of them it dropped by 65 per cent or more (table III.5, panel C). Most of these ten are in Asia (Macao SAR, the Republic of Korea, Hong Kong SAR, Iran, Mongolia, Kuwait, Viet Nam, China), but also included are Algeria and Tunisia in Northern Africa. Within a generation, women in Macao and Hong Kong came to have only one child or less in 2000-2005, or on average about 2 children less than their mothers in 1970-1975. In some less developing countries, the absolute declines have been staggering. In six countries women were having 4 to 5 fewer children on average in 2000-2005 than 30 years ago. In these countries, women have today on average 2.5 children or less while a generation ago their mothers had 6 or more.

**Figure III.3. Total fertility, by major area, estimates and medium variant, 1950-1955 to 2045-2050**



Rapid change has not been limited to the developing world. In the more developed regions, fertility fell at an annual rate of 1.27 per cent between 1950-1955 and 1970-1975 (from 2.84 to 2.12 children per woman) (table III.4). The decline slowed somewhat over the last 30 years, leading to an average of 1.56 children per woman in 2000-2005.

Overall, fertility levels in more developed regions, and especially in Europe, have generally declined since the 1970s to below-replacement level. While in 1970-1975, 18 countries out of the 44 developed countries in the world already had below-replacement fertility, 25 years later all but one (Albania) had below-replacement fertility levels.

The 10 largest fertility declines in more developed regions in the past 30 years all occurred in countries with fertility above replacement levels in 1970-1975 (table III.5, panel C). In these countries, the average number of children per woman, which varied from 2 to well over 4 in 1970-1975, decreased by more than 47 per cent. Today women in these countries have about half the number of children their mothers had. The largest declines between 1970-1975 and 2000-2005 happened in the two Western European countries of Spain (-55.6 per cent) and Ireland (-49.0 per cent), and in Eastern European countries such as Slovakia (-52.2 per cent), the Republic of Moldova (-52.0 per cent), Romania (-51.9 per cent), and Albania (-50.9 per cent).

#### E. FASTEST FERTILITY DECLINES FROM 1995-2000 TO 2000-2005

During the last decade, large fertility changes have occurred in both the other less developed countries and several least developed ones (table III.6, panels B and C). With the exception of the Democratic Republic of Timor-Leste, where fertility increased over the past decade (as discussed in the next section), a number of least developed countries in Asia and Africa experienced fertility declines of 10 per cent or more between 1995-2000 and 2000-2005.

Most of the large fertility declines between 1995-2000 and 2000-2005, however, happened in the other less developed countries: first among higher fertility countries (i.e., 4 children or more per woman on average in 1995-2000) in Western Asia (Oman, Jordan and Saudi Arabia) and Africa (Namibia), secondly in Asian countries with low but above-replacement fertility (United Arab Emirates, Iran and Azerbaijan), and third among countries already experiencing below replacement fertility in 1995-2000 (Macao, China SAR; Armenia and Republic of Korea) (table III.6, panel C). Fertility in all ten other less developed countries declined during the last decade by 15 per cent or more, and in the third group it decreased by more than 19 per cent, leading to some of the lowest fertility recorded in the world.

Despite already low below-replacement fertility levels at the start of the period, a number of more developed countries in Eastern, Southern and Northern Europe also experienced substantial per cent declines (table III.6, panel A). The largest declines occurred in the Republic of Moldova (21.2 per cent) and Malta (18.9 per cent). Except for Malta and TFYR Macedonia, where women had on average about 1.5 children in 2000-2005, fertility in these countries reached historically unprecedented low levels (below 1.3 children per woman).

The *2004 Revision* reveals that the pace of fertility decline between 1995-2000 and 2000-2005 was faster than anticipated in the *2002 Revision* for eleven Asian countries and one African country (Namibia) (table III.7). In the *2002 Revision*, fertility was expected to have declined in all these countries by 5 per cent or more within the period, the observed decline was almost three times as fast in Oman and Lebanon and more than twice as fast in Maldives, Iran, Pakistan and Yemen. Except for Yemen, where fertility declined by 9.8 per cent between 1995-2000 and 2000-2005, the average number of children per woman decreased by 14 per cent or more in all other countries listed in the table.

TABLE III.5. TEN COUNTRIES AND AREAS WITH LARGEST PER CENT DECLINES IN TOTAL FERTILITY,  
BY DEVELOPMENT GROUP, 1970-1975 TO 2000-2005

| Rank                                     | Country or area                 | Total fertility<br>(children per woman) |           | Change 1970-1975<br>to 2000-2005 |          |
|--|---------------------------------|---|-----------|----------------------------------|----------|
|  |                                 | 1970-1975                               | 2000-2005 | Difference                       | Per cent |
| <i>A. More developed countries</i>       |                                 |   |           |                                  |          |
| 1  | Spain .....                     | 2.86                                    | 1.27      | -1.59                            | -55.6    |
| 2  | Slovakia.....                   | 2.51                                    | 1.20      | -1.31                            | -52.2    |
| 3  | Republic of Moldova.....        | 2.56                                    | 1.23      | -1.33                            | -52.0    |
| 4  | Romania .....                   | 2.62                                    | 1.26      | -1.36                            | -51.9    |
| 5  | Albania.....                    | 4.66                                    | 2.29      | -2.37                            | -50.9    |
| 6  | Bosnia and Herzegovina.....     | 2.63                                    | 1.32      | -1.31                            | -49.8    |
| 7  | Ireland .....                   | 3.82                                    | 1.94      | -1.87                            | -49.0    |
| 8  | TFYR Macedonia.....             | 2.96                                    | 1.53      | -1.43                            | -48.3    |
| 9  | Ukraine.....                    | 2.16                                    | 1.12      | -1.04                            | -48.1    |
| 10                                       | Czech Republic.....             | 2.21                                    | 1.17      | -1.04                            | -47.1    |
| <i>B. Least developed countries</i>      |                                 |   |           |                                  |          |
| 1  | Myanmar .....                   | 5.75                                    | 2.46      | -3.29                            | -57.2    |
| 2  | Bangladesh .....                | 6.15                                    | 3.25      | -2.91                            | -47.3    |
| 3  | Cape Verde.....                 | 7.00                                    | 3.77      | -3.23                            | -46.1    |
| 4  | Solomon Islands.....            | 7.23                                    | 4.33      | -2.90                            | -40.1    |
| 5  | Maldives.....                   | 7.00                                    | 4.33      | -2.67                            | -38.1    |
| 6  | São Tomé and Príncipe.....      | 6.52                                    | 4.06      | -2.46                            | -37.7    |
| 7  | Lesotho.....                    | 5.74                                    | 3.65      | -2.09                            | -36.4    |
| 8  | Nepal.....                      | 5.79                                    | 3.71      | -2.08                            | -35.9    |
| 9  | Sudan .....                     | 6.67                                    | 4.45      | -2.23                            | -33.4    |
| 10                                       | Vanuatu.....                    | 6.11                                    | 4.15      | -1.96                            | -32.1    |
| <i>C. Other less developed countries</i> |                                 |   |           |                                  |          |
| 1  | Macao, China SAR .....          | 3.20                                    | 0.84      | -2.36                            | -73.8    |
| 2  | Republic of Korea.....          | 4.28                                    | 1.23      | -3.06                            | -71.5    |
| 3  | Tunisia.....                    | 6.21                                    | 2.00      | -4.21                            | -67.8    |
| 4  | Hong Kong, China SAR.....       | 2.89                                    | 0.94      | -1.95                            | -67.5    |
| 5  | Iran (Islamic Republic of)..... | 6.40                                    | 2.12      | -4.28                            | -66.9    |
| 6  | Mongolia .....                  | 7.33                                    | 2.45      | -4.89                            | -66.7    |
| 7  | Algeria.....                    | 7.38                                    | 2.53      | -4.85                            | -65.7    |
| 8  | Kuwait.....                     | 6.90                                    | 2.38      | -4.52                            | -65.5    |
| 9  | Viet Nam.....                   | 6.70                                    | 2.32      | -4.37                            | -65.2    |
| 10                                       | China.....                      | 4.86                                    | 1.70      | -3.16                            | -65.0    |

NOTE: Countries are ordered by per cent change.

TABLE III.6. TEN COUNTRIES AND AREAS WITH LARGEST PER CENT DECLINES IN TOTAL FERTILITY,  
BY DEVELOPMENT GROUP, 1995-2000 TO 2000-2005

| Rank                                     | Country or area                   | Total fertility<br>(children per woman) |           | Change 1995-2000<br>to 2000-2005 |          |
|--|-----------------------------------|---|-----------|----------------------------------|----------|
|  |                                   | 1995-2000                               | 2000-2005 | Difference                       | Per cent |
| <i>A. More developed countries</i>       |                                   |   |           |                                  |          |
| 1  | Republic of Moldova.....          | 1.56                                    | 1.23      | -0.33                            | -21.2    |
| 2  | Malta.....                        | 1.85                                    | 1.50      | -0.35                            | -18.9    |
| 3  | Poland.....                       | 1.48                                    | 1.26      | -0.22                            | -14.9    |
| 4  | Slovakia.....                     | 1.40                                    | 1.20      | -0.20                            | -14.3    |
| 5  | Bosnia and Herzegovina.....       | 1.54                                    | 1.32      | -0.22                            | -14.3    |
| 6  | Lithuania.....                    | 1.47                                    | 1.28      | -0.20                            | -13.6    |
| 7  | Croatia.....                      | 1.54                                    | 1.35      | -0.19                            | -12.3    |
| 8  | TFYR Macedonia.....               | 1.74                                    | 1.53      | -0.21                            | -12.1    |
| 9  | Ukraine.....                      | 1.22                                    | 1.12      | -0.10                            | -8.2     |
| 10                                       | Hungary.....                      | 1.38                                    | 1.30      | -0.09                            | -6.5     |
| <i>B. Least developed countries</i>      |                                   |   |           |                                  |          |
| 1  | Dem. Republic of Timor-Leste..... | 4.92                                    | 7.79      | 2.88                             | 58.5     |
| 2  | Myanmar.....                      | 3.00                                    | 2.46      | -0.54                            | -18.0    |
| 3  | Maldives.....                     | 5.24                                    | 4.33      | -0.91                            | -17.4    |
| 4  | Nepal.....                        | 4.37                                    | 3.71      | -0.66                            | -15.1    |
| 5  | Bhutan.....                       | 5.02                                    | 4.40      | -0.62                            | -12.4    |
| 6  | Lesotho.....                      | 4.11                                    | 3.65      | -0.46                            | -11.2    |
| 7  | São Tomé and Príncipe.....        | 4.54                                    | 4.06      | -0.48                            | -10.6    |
| 8  | Solomon Islands.....              | 4.82                                    | 4.33      | -0.50                            | -10.4    |
| 9  | Yemen.....                        | 6.88                                    | 6.20      | -0.68                            | -9.9     |
| 10                                       | Senegal.....                      | 5.60                                    | 5.05      | -0.55                            | -9.8     |
| <i>C. Other less developed countries</i> |                                   |   |           |                                  |          |
| 1  | Oman.....                         | 5.10                                    | 3.78      | -1.32                            | -25.9    |
| 2  | Macao, China SAR.....             | 1.12                                    | 0.84      | -0.28                            | -25.0    |
| 3  | Armenia.....                      | 1.75                                    | 1.33      | -0.42                            | -24.0    |
| 4  | Republic of Korea.....            | 1.51                                    | 1.23      | -0.29                            | -19.2    |
| 5  | Jordan.....                       | 4.32                                    | 3.53      | -0.79                            | -18.3    |
| 6  | Namibia.....                      | 4.80                                    | 3.95      | -0.85                            | -17.7    |
| 7  | United Arab Emirates.....         | 3.07                                    | 2.53      | -0.53                            | -17.3    |
| 8  | Iran (Islamic Republic of).....   | 2.53                                    | 2.12      | -0.41                            | -16.2    |
| 9  | Saudi Arabia.....                 | 4.86                                    | 4.09      | -0.77                            | -15.8    |
| 10                                       | Azerbaijan.....                   | 2.20                                    | 1.85      | -0.35                            | -15.9    |

TABLE III.7. SELECTED COUNTRIES AND AREAS WITH FASTER DECLINES IN TOTAL FERTILITY BETWEEN 1995-2000 AND 2000-2005 THAN ANTICIPATED IN 2002 REVISION

| Rank | Country or area                  | Total fertility<br>(children per woman) |           | Per cent change<br>1995-2000 to 2000-2005 |                                | Ratio of<br>observed to<br>anticipated<br>(per cent) |
|------|----------------------------------|---|-----------|---|--------------------------------|--|
|      |                                  | 1995-2000                               | 2000-2005 | 2004 Revision<br>(observed)               | 2002 Revision<br>(anticipated) |  |
| 1    | Oman .....                       | 5.10                                    | 3.78      | -25.9                                     | -8.8                           | 294.3  |
| 2    | Lebanon .....                    | 2.70                                    | 2.32      | -14.0                                     | -4.8                           | 291.7  |
| 3    | Yemen .....                      | 6.88                                    | 6.20      | -9.8                                      | -4.0                           | 245.0  |
| 4    | Maldives .....                   | 5.24                                    | 4.33      | -17.4                                     | -8.1                           | 214.8  |
| 5    | Iran (Islamic Republic of) ..... | 2.53                                    | 2.12      | -16.2                                     | -7.8                           | 207.7  |
| 6    | Pakistan.....                    | 5.00                                    | 4.27      | -14.6                                     | -7.3                           | 200.0  |
| 7    | Nepal .....                      | 4.37                                    | 3.71      | -15.1                                     | -8.3                           | 181.9  |
| 8    | Namibia .....                    | 4.80                                    | 3.95      | -17.7                                     | -11.4                          | 155.3  |
| 9    | United Arab Emirates .....       | 3.07                                    | 2.53      | -17.3                                     | -11.2                          | 154.5  |
| 10   | Saudi Arabia.....                | 4.86                                    | 4.09      | -15.9                                     | -11.0                          | 144.5  |
| 11   | Jordan .....                     | 4.32                                    | 3.53      | -18.2                                     | -13.2                          | 137.9  |
| 12   | Myanmar.....                     | 3.00                                    | 2.46      | -18.0                                     | -13.5                          | 133.3  |

NOTE: Ranked in descending order of ratio of observed to expected per cent change in fertility.

#### F. SLOW FERTILITY DECLINES FROM 1995-2000 TO 2000-2005

While many countries have experienced a rapid fertility decline in the last decade, and in some of them the pace of change was faster than the 2002 Revision anticipated, in other high fertility countries the anticipated rapid declines did not materialize (table III.8, panel A). In the Federated States of Micronesia, for example, the observed decline was only 32.5 per cent of the expected decline. In addition, fertility in the Democratic Republic of Timor-Leste actually increased substantially over the past decade (indicated in the table by a negative sign). For this country, the recent increase of fertility, from about 5 children per woman to almost 8, is likely to be temporary, associated as it has been with the political changes that have occurred since the referendum in 1999 and independence in 2002.

The slower than expected fertility decline was not limited to high fertility countries; some low-fertility countries have even experienced unexpected reversals in fertility trends within the last decade. Between 1995-2000 and 2000-2005, fertility declined by 3 per cent or more in 21 developed countries, but it increased by 3 per cent or more in 10 developed countries.

The decline in average number of children per woman anticipated in the 2002 Revision did not materialize for nine developed countries already experiencing very low fertility (below 1.4 children per woman) in 1995-2000 (table III.8, panel B). The 2004 Revision reveals that fertility increased, if moderately, during this period in six countries and decreased more slowly than expected in three others. In Italy, where a small increase was expected, fertility increased more rapidly.

These recent changes favor the hypothesis that the contemporary fertility decline in many more developed countries might have reached a plateau. While this could be only a temporary slowdown or pause before further decline, it could also represent a potential reversal toward replacement fertility levels. These recent trends are still too short lived and too small to infer with confidence whether they will be sustained in the near future.

#### G. FERTILITY PROJECTIONS

Given the current status of countries with respect to the fertility transition and the rapid reductions of fertility that many countries in the developing world have experienced, the 2004 Revision assumes that fertility levels will continue to drop and then

TABLE III.8. SELECTED COUNTRIES AND AREAS WITH SLOWER DECLINES IN TOTAL FERTILITY BETWEEN 1995-2000 AND 2000-2005 THAN ANTICIPATED IN 2002 REVISION, BY LEVEL OF FERTILITY

| Rank  | Country or area                  | Total fertility<br>(children per woman) |           | Per cent change 1995-2000 to 2000-2005 |                                |   |
|---|----------------------------------|---|-----------|--|--------------------------------|---|
|   |                                  | 1995-2000                               | 2000-2005 | 2004 Revision<br>(observed)            | 2002 Revision<br>(anticipated) | Ratio of observed<br>to anticipated<br>(per cent) |
| <i>A. High fertility countries or areas</i> |                                  |   |           |  |                                |   |
| 1   | Dem. Republic of Timor-Leste.... | 4.92                                    | 7.79      | 58.5                                   | -11.6                          | -504.3  |
| 2   | Micronesia (Fed. States of)..... | 4.53                                    | 4.35      | -3.8                                   | -11.7                          | 32.5  |
| 3   | South Africa.....                | 2.95                                    | 2.80      | -5.1                                   | -9.9                           | 51.5  |
| 4   | Indonesia.....                   | 2.50                                    | 2.37      | -5.3                                   | -9.5                           | 55.8  |
| 5   | Uzbekistan.....                  | 3.01                                    | 2.74      | -9.0                                   | -15.5                          | 58.1  |
| 6   | Samoa.....                       | 4.66                                    | 4.42      | -5.2                                   | -8.7                           | 59.8  |
| 7   | Cape Verde.....                  | 4.10                                    | 3.77      | -8.0                                   | -13.1                          | 61.1  |
| 8   | Tajikistan.....                  | 4.29                                    | 3.81      | -11.3                                  | -17.8                          | 63.5  |
| 9   | Bangladesh.....                  | 3.55                                    | 3.25      | -8.5                                   | -12.5                          | 68.0  |
| 10  | Kenya.....                       | 5.00                                    | 5.00      | -                                      | -13.0                          | -   |
| <i>B. Low fertility countries or areas</i>  |                                  |   |           |  |                                |   |
| 1   | Spain.....                       | 1.18                                    | 1.27      | 7.5                                    | -3.4                           | -220.6  |
| 2   | Latvia.....                      | 1.16                                    | 1.26      | 8.7                                    | -6.0                           | -145.0  |
| 3   | Bulgaria.....                    | 1.19                                    | 1.24      | 4.3                                    | -3.5                           | -122.9  |
| 4   | Russian Federation.....          | 1.24                                    | 1.33      | 7.0                                    | -8.8                           | -79.5   |
| 5   | Estonia.....                     | 1.34                                    | 1.37      | 2.8                                    | -4.7                           | -59.6   |
| 6   | Austria.....                     | 1.36                                    | 1.39      | 2.2                                    | -6.5                           | -33.8   |
| 7   | Slovenia.....                    | 1.25                                    | 1.22      | -2.7                                   | -8.8                           | 30.7  |
| 8   | United Kingdom.....              | 1.70                                    | 1.66      | -2.1                                   | -5.9                           | 35.6  |
| 9   | Hungary.....                     | 1.38                                    | 1.30      | -6.2                                   | -13.0                          | 47.7  |
| 10  | Italy.....                       | 1.21                                    | 1.28      | 5.6                                    | 1.9                            | 294.7   |

NOTE: Ranked according to ascending ratio of observed to expected per cent change in total fertility.

converge toward replacement level by 2045-2050 (figures III.2 and III.3). This convergence combines two different trends. The more developed regions are anticipated to undergo a fertility increase, especially in Europe, where fertility is assumed to increase by 30.7 per cent from 1.40 to 1.83 children per woman according to the medium variant during this period. Elsewhere, the trend is expected to be downward, albeit from different levels by development group and major world region (table III.9). The assumptions that lie behind the trajectories for the different groups are described in more detail in chapter VII.

The most substantial fertility decline will occur in least developed countries, where fertility is still high. Fertility in these countries will decrease by 48.8 per cent by 2045-2050, according to the medium-variant projection. In Africa, where fertility is

distinctively high, the average number of children is expected to decrease by almost half during the projection period. Latin America and Asia, which have become nearly indistinguishable in their fertility levels, are expected to undergo similar fertility decreases within the next 45 years (by 27.1 per cent in Latin America and 22.7 per cent in Asia). Such regional averages, however, hide a wide range of fertility levels at the national level and more diverse trends within each region.

With respect to the 13 high fertility countries that, as of 2000-2005, had not yet exhibited clear signs of fertility decline (table III.3), the 2004 Revision projects that their fertility will decline at a pace of about one child per decade, although none of these countries is expected to reach 2.1 children per woman by 2045-2050 in the medium variant. As a result of these trends, their population is ex-

TABLE III.9. TOTAL FERTILITY, BY DEVELOPMENT GROUP AND MAJOR AREA AND BY FERTILITY VARIANT, 2000-2005 AND 2045-2050

| Development group or major area       | Projected total fertility |           |           |           | Per cent change 2000-2005 to 2045-2050 |        |       |
|---------------------------------------|---------------------------|-----------|-----------|-----------|--|--------|-------|
|                                       | Estimates                 | Low       | Medium    | High      | Low                                    | Medium | High  |
|                                       | 2000-2005                 | 2045-2050 | 2045-2050 | 2045-2050 |  |        |       |
| World .....                           | 2.65                      | 1.56      | 2.05      | 2.53      | -41.1                                  | -22.6  | -4.5  |
| More developed regions.....           | 1.56                      | 1.34      | 1.84      | 2.34      | -14.1                                  | 17.9   | 50.0  |
| Less developed regions.....           | 2.90                      | 1.59      | 2.07      | 2.56      | -45.2                                  | -28.6  | -11.7 |
| Least developed countries .....       | 5.02                      | 2.08      | 2.57      | 3.05      | -58.6                                  | -48.8  | -39.2 |
| Other less developed countries .....  | 2.58                      | 1.42      | 1.92      | 2.41      | -45.0                                  | -25.6  | -6.6  |
| Africa .....                          | 4.97                      | 2.03      | 2.52      | 3.00      | -59.2                                  | -49.3  | -39.6 |
| Asia .....                            | 2.47                      | 1.42      | 1.91      | 2.41      | -42.5                                  | -22.7  | -2.4  |
| Europe .....                          | 1.40                      | 1.33      | 1.83      | 2.33      | -5.0                                   | 30.7   | 66.4  |
| Latin America and the Caribbean ..... | 2.55                      | 1.36      | 1.86      | 2.36      | -46.7                                  | -27.1  | -7.5  |
| Northern America.....                 | 1.99                      | 1.35      | 1.85      | 2.35      | -32.2                                  | -7.0   | 18.1  |
| Oceania.....                          | 2.32                      | 1.42      | 1.92      | 2.42      | -38.8                                  | -17.2  | 4.3   |

pected to rise from 192 million in 2005 to 639 million in 2050. Whether the projected fertility decline for these countries will actually be observed is, of course, impossible to know. In any case, in 2005 this set of high fertility countries accounted for such a small share of world population (less than 3 per cent) that any continued resistance to fertility decline on their part should not greatly affect the world population projections. Even by 2050, according to the medium variant, they are expected to account for only 7 per cent of the world's population.

In the rest of the developing world, and especially in countries where the average number of children ranged from 2.1 to 4 per woman in 2000-2005, total fertility is generally projected to decline below 2.1 children per woman by 2050. But if the total fertility projected for a country falls to 1.85 children per woman before 2050, the projections hold total fertility constant at that level for the remainder of the projection period. Although 20 countries whose fertility in 2000-2005 was in the range of 2.1 to 4 children per woman do not reach the floor level of 1.85 children per woman, most of such countries do. Thus, for the first time, fertility levels in the less developed regions will likely fall below 2.1 children per woman at some point in the twenty-first century. By 2045-2050, the medium variant projects that 3 out of every 4 countries in the less developed regions will be experiencing below-replacement fertility. Taken as a group, the

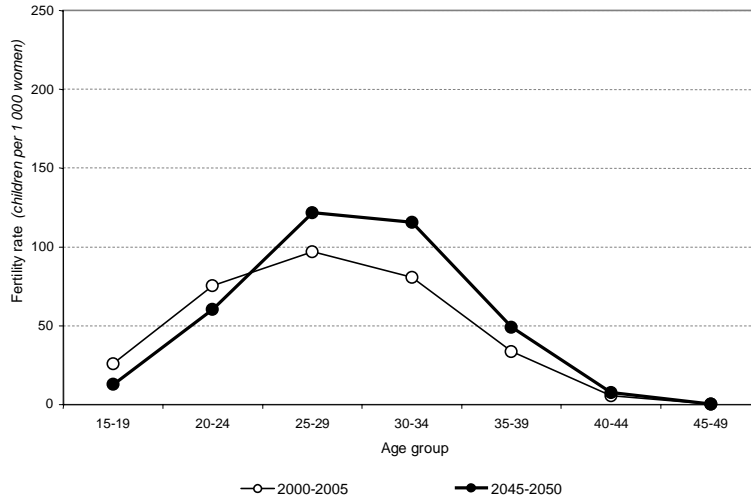
less developed regions are expected to reach replacement level fertility by mid-century.

Changes in total fertility within the next 50 years obey two different dynamics with regard to age patterns (figure III.4). In more developed regions (panel A), the assumed fertility increase toward replacement level comes from a combination of slight decreases in rates at younger ages, slight increases at ages 35-40 and relatively large increases at ages 25-34. In the other less developed regions (panel C), the fertility decline is expected to happen at all ages. The most substantial changes in age-specific fertility rates are anticipated to occur in least developed countries (panel B), where substantial decreases are expected at all ages and the fertility schedule is expected to converge toward the age-specific fertility pattern observed today for other less developed countries.

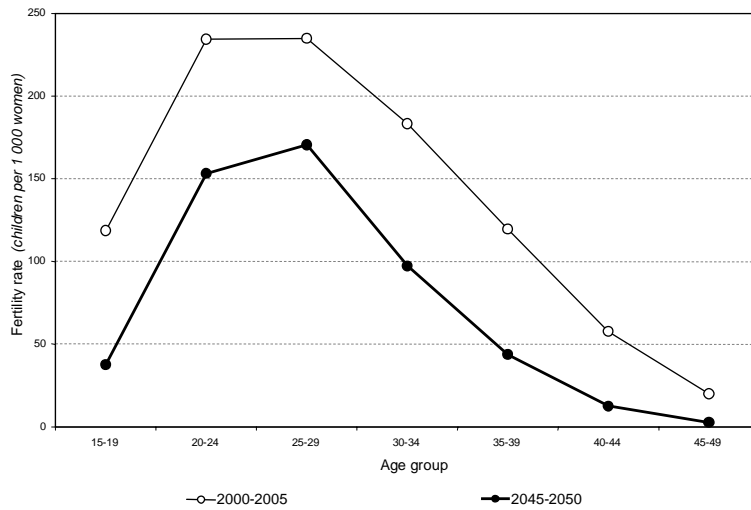
At the world level, total fertility in 2045-2050 is expected to be 2.05 children per woman, according to the medium variant (table III.9), with 1.84 children per woman in the more developed regions and 2.07 children per woman in the less developed regions. That is, although the difference in total fertility between the more and the less developed regions narrows considerably by mid-century, the less developed regions as whole are still expected to have a higher total fertility than the more developed regions. That difference persists in all projection variants. Total fertility in the low variant is

**Figure III.4. Age-specific fertility rates, by development group, estimates and medium variant, 2000-2005 and 2045-2050**

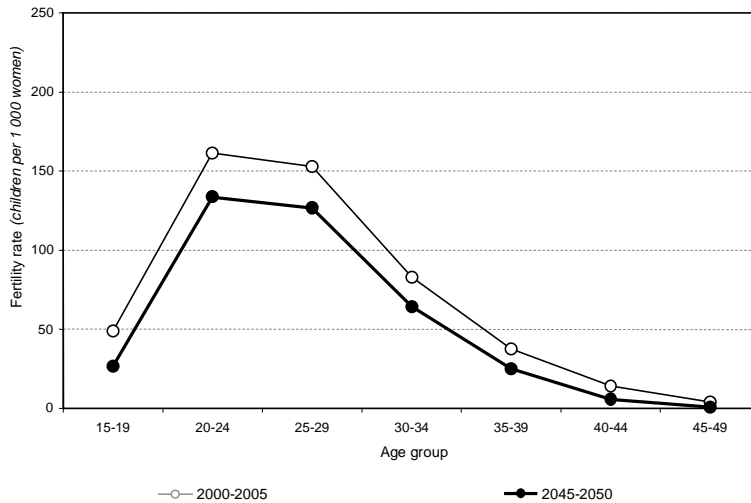
*A. More developed regions*



*B. Least developed countries*



*C. Other less developed countries*



expected to be 1.34 children per woman in the more developed regions and 1.59 in the less developed regions. In the high variant, total fertility is projected to be 2.34 in the more developed regions and 2.56 in the less developed regions.

In 2005, the countries with below-replacement fertility (under 2.1 children) accounted for 42.8 per cent of the world's population. Those with total fertility in the range from 2.1 to less than 4 children accounted for another 41.9 per cent (table III.10). Finally, 15.3 per cent of world's population with total fertility greater or equal to 4 children per woman. By the end of the projection period, under the assumptions of the medium-fertility variant, the world's distribution of fertility is expected to be much more concentrated at the lower end (figure III.5).

By 2050, the medium variant projects that 77.1 per cent of the world's population will live in

countries with a total fertility below replacement. A total of 148 countries will be in that group, among which 22 are projected to have a total fertility equal or lower to 1.85 children per woman in 2045-2050 (table III.10). The remaining 44 countries are projected to have total fertility levels between 2.1 and 4.0 in 2045-2050, and according to the projection, no country will have total fertility levels in excess of 4 children per woman.

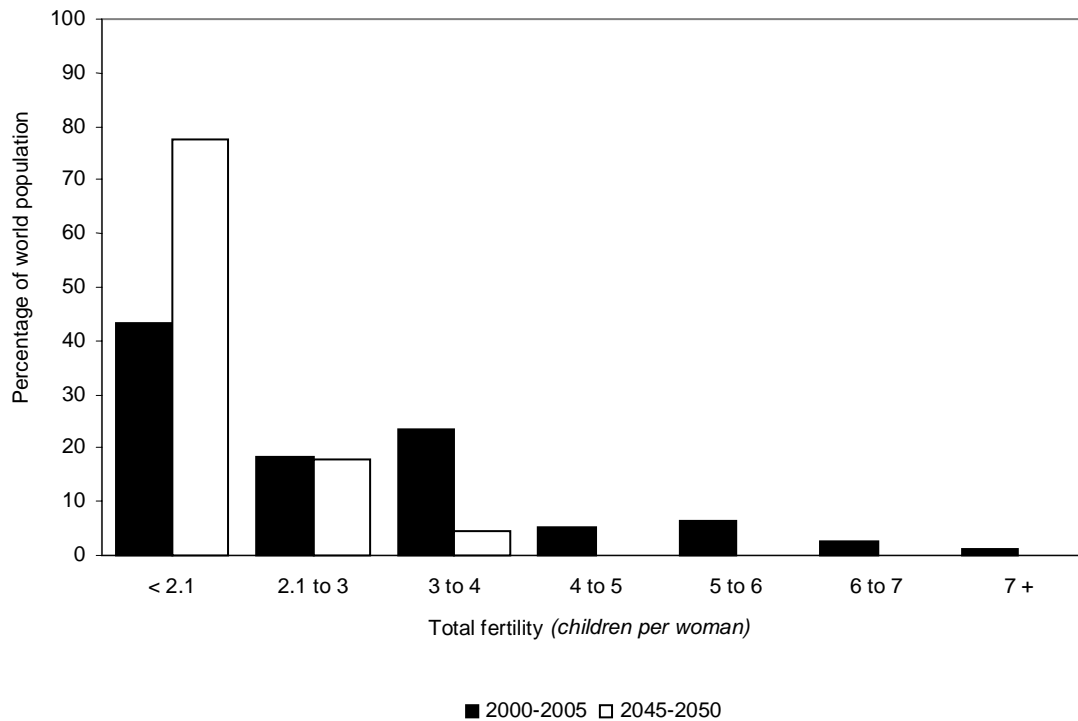
Because of their low fertility and the expectation that it will not rise markedly in the future, the countries with below-replacement fertility today are projected to have only a slightly larger population in 2050 than today (2.9 billion people instead of 2.8). In contrast, the countries whose fertility is currently above replacement level are expected to experience a marked population increase, reaching 6.2 billion by 2050 (compared to 3.7 billion in 2005) and accounting for 68.2 per cent of the global population.

TABLE III.10. POPULATION AND NUMBER OF COUNTRIES AND AREAS, 1955, 1975, 2005 AND 2050, BY TOTAL FERTILITY, 1950-1955, 1970-1975, 2000-2005 AND 2045-2050, ESTIMATES AND MEDIUM VARIANT

| <i>Total fertility</i>               | <i>Population (millions)</i> |             |             |             | <i>Number of countries and areas</i> |             |             |             |
|--------------------------------------|------------------------------|-------------|-------------|-------------|--------------------------------------|-------------|-------------|-------------|
|                                      | <i>1950</i>                  | <i>1975</i> | <i>2005</i> | <i>2050</i> | <i>1950</i>                          | <i>1975</i> | <i>2005</i> | <i>2050</i> |
| Greater or equal to 7.....           | 131                          | 151         | 75          | —           | 32                                   | 28          | 5           | —           |
| Between 6 and less than 7.....       | 990                          | 342         | 172         | —           | 69                                   | 36          | 12          | —           |
| Between 5 and less than 6.....       | 524                          | 423         | 407         | —           | 32                                   | 31          | 18          | —           |
| Between 4 and less than 5.....       | 32                           | 981         | 336         | —           | 14                                   | 22          | 21          | —           |
| Between 3 and less than 4.....       | 273                          | 1 042       | 1 527       | 417         | 16                                   | 18          | 26          | 10          |
| Between 2.1 and less than 3.....     | 558                          | 260         | 1 178       | 1 662       | 24                                   | 30          | 45          | 34          |
| Between 1.85 and less than 2.1 ..... | 10                           | 325         | 530         | 6 714       | 5                                    | 12          | 16          | 126         |
| Between 1.50 and less than 1.85 ...  | —                            | 549         | 1 506       | 280         | —                                    | 15          | 18          | 21          |
| Less than 1.50.....                  | —                            | —           | 731         | 1           | —                                    | —           | 31          | 1           |
| TOTAL                                | 2 519                        | 4 073       | 6 463       | 9 074       | 192                                  | 192         | 192         | 192         |
|                                      | <i>Percentage</i>            |             |             |             |                                      |             |             |             |
| Greater or equal to 7.....           | 5.2                          | 3.7         | 1.2         | —           | 16.7                                 | 14.6        | 2.6         | —           |
| Between 6 and less than 7.....       | 39.3                         | 8.4         | 2.7         | —           | 35.9                                 | 18.8        | 6.3         | —           |
| Between 5 and less than 6.....       | 20.8                         | 10.4        | 6.3         | —           | 16.7                                 | 16.1        | 9.4         | —           |
| Between 4 and less than 5.....       | 1.3                          | 24.1        | 5.2         | —           | 7.3                                  | 11.5        | 10.9        | —           |
| Between 3 and less than 4.....       | 10.8                         | 25.6        | 23.6        | 4.6         | 8.3                                  | 9.4         | 13.5        | 5.2         |
| Between 2.1 and less than 3.....     | 22.2                         | 6.4         | 18.2        | 18.3        | 12.5                                 | 15.6        | 23.4        | 17.7        |
| Between 1.85 and less than 2.1 ..... | 0.4                          | 8.0         | 8.2         | 74.0        | 2.6                                  | 6.3         | 8.3         | 65.6        |
| Between 1.50 and less than 1.85 ...  | —                            | 13.5        | 23.3        | 3.1         | —                                    | 7.8         | 9.4         | 10.9        |
| Less than 1.50.....                  | —                            | —           | 11.3        | 0.0         | —                                    | —           | 16.1        | 0.5         |

NOTE: Countries or areas with 100,000 persons or more in 2000.

**Figure III.5. Percentage distribution of world population, by total fertility, estimates and medium variant, 2000–2005 and 2045–2050**



Total population will continue to increase until at least 2050 in almost all regions of the world (table III.11). The only exception is Europe where, even with an increase in fertility to 1.85 children per woman by 2045-2050, the total population is expected to decline by 0.24 per cent annually during the coming period. In all other areas, the continuous fertility decline toward replacement level (or a floor of about 1.85 children per woman) assumed in the low, medium and high projection variants slows down population growth but does not reverse it within the next 45 years.

This slower but nevertheless continuous population growth results from a well-documented demographic phenomenon called “population momentum” (chapter III.C; Preston, Heuveline and Guillot, 2001; Bongaarts, 1998). This can be illustrated by assuming that all countries would experience, beginning in 2000-2005, an instant-replacement fertility level. Population growth would still continue, because the large cohorts born earlier during periods of higher fertility will be moving through their reproductive years and producing a large number of children. This accumulated potential for population growth is so perva-

sive that all regions and areas would still be experiencing positive growth by 2050.

#### H. DIFFERENCES BETWEEN PERIOD AND COHORT FERTILITY RATES

Total fertility, as used in this report, is a period rate, constructed by summing the age-specific fertility rates in effect for a given time period (usually five years, e.g., 2000-2005) (box III.1). It can be interpreted as the number of children that a hypothetical cohort of women would bear over the course of their reproductive years, assuming that they all survived to age 50 and that they experienced the particular period age-specific fertility rates at each age. No real cohort will experience these exact rates, however, because period fertility rates change over time. Thus, total fertility for any short period of time during a real cohort’s lifetime will usually not be equal to the actual mean number of children born to women of that cohort (a cohort rate).

The detailed calculations and projections made for the *2004 Revision* permit a comparison between total fertility estimated or projected for given time

TABLE III.11. TOTAL POPULATION, BY DEVELOPMENT GROUP AND MAJOR AREA  
AND BY FERTILITY VARIANT, 2000 AND 2050

| <i>Development group or major area</i> | <i>Population according to projected fertility variant from 2005 to 2050 (millions)</i> |                            |             |               |             | <i>Average annual rate of change for 2005-2050 (per cent)</i> |            |               |             |
|--|---|----------------------------|-------------|---------------|-------------|---|------------|---------------|-------------|
|  | <i>Estimates</i>  | <i>Instant-replacement</i> | <i>Low</i>  | <i>Medium</i> | <i>High</i> | <i>Instant-replacement</i>                                    | <i>Low</i> | <i>Medium</i> | <i>High</i> |
|  | <i>2005</i>   | <i>2050</i>                | <i>2050</i> | <i>2050</i>   | <i>2050</i> |   |            |               |             |
| World .....                            | 6 465   | 8 773                      | 7 680       | 9 076         | 10 646      | 0.68  | 0.38       | 0.76          | 1.11        |
| More developed regions.....            | 1 211   | 1 419                      | 1 057       | 1 236         | 1 440       | 0.35  | -0.30      | 0.05          | 0.38        |
| Less developed regions.....            | 5 253   | 7 354                      | 6 622       | 7 840         | 9 206       | 0.75  | 0.52       | 0.89          | 1.25        |
| Least developed countries.....         | 759   | 1 166                      | 1 497       | 1 735         | 1 994       | 0.96  | 1.52       | 1.85          | 2.17        |
| Other less developed countries .....   | 4 494   | 6 188                      | 5 126       | 6 104         | 7 213       | 0.71  | 0.29       | 0.68          | 1.06        |
| Africa .....                           | 906   | 1 341                      | 1 666       | 1 937         | 2 228       | 0.87  | 1.36       | 1.70          | 2.02        |
| Asia.....                              | 3 905   | 5 343                      | 4 388       | 5 217         | 6 161       | 0.70  | 0.26       | 0.65          | 1.02        |
| Europe .....                           | 728   | 784                        | 557         | 653           | 764         | 0.16  | -0.60      | -0.24         | 0.11        |
| Latin America and the Caribbean.....   | 561   | 789                        | 653         | 783           | 930         | 0.76  | 0.34       | 0.74          | 1.13        |
| Northern America.....                  | 331   | 468                        | 375         | 438           | 509         | 0.77  | 0.28       | 0.63          | 0.96        |
| Oceania.....                           | 33  | 48                         | 41          | 48            | 55          | 0.84  | 0.48       | 0.81          | 1.14        |

periods, which are the figures presented in this report, and the estimated or projected experiences of birth cohorts over their reproductive lifetimes. The differences can be illustrated by considering the case of Eastern Europe, a region whose total fertility in 2000-2005 was the lowest recorded worldwide—1.27 children per woman on average. As of 2000-2005, little variation existed within the 10 countries in the region; total fertility varied from 1.12 for Ukraine to 1.33 for the Russian Federation.

A simple way to show how period and cohort rates may differ is to explore the estimated and projected experience of the Eastern European birth cohort of 1985-1990, women who reached their 15th birthdays and were just beginning their childbearing years during the period 2000-2005. Is 1.27, the period total fertility for 2000-2005, a reasonable estimate of eventual completed cohort fertility for these Eastern European women, who will not complete their childbearing years until 2035-2040?

If the women in question, as they passed through their childbearing years, were at each age to adhere to the changing age-specific period fertility rates assumed by the medium-variant projection, they would end their childbearing years having had not 1.27 children per woman but rather 1.46. The difference arises from the assumption applied in the projection: that fertility rates in countries now below replacement, including those in Eastern Europe, will rise and converge to an assumed long-run total fertility of 1.85 children. That is, if the projections are accurate, the 1985-1990 cohort of Eastern European women will live through (and contribute to) a period of rising age-specific and total fertility.

Several authors interpret the very low period fertility rates found today in Europe and elsewhere as the result of a temporary postponement of childbearing and the consequent increasing average age at motherhood (Bongaarts and Feeney, 1998; Philipov and Kohler, 2001; Kohler, Billari and Ortega, 2002; Sobotka, 2004). That is, the age-specific fertility rates for the period 2000-2005 combined relatively low rates at the older ages (because these women had had their children fairly early) with relatively low rates at the younger ages (because these women were getting married later and postponing their childbearing). The projection

assumes that these younger women will make up for their postponed births at older ages and that their fertility rates at older ages will be higher than the rates for the same ages in 2000-2005. If the medium-variant projection proves accurate, completed fertility for the Eastern European cohort of 1985-1990 will thus exceed what was suggested by 2000-2005 total fertility.

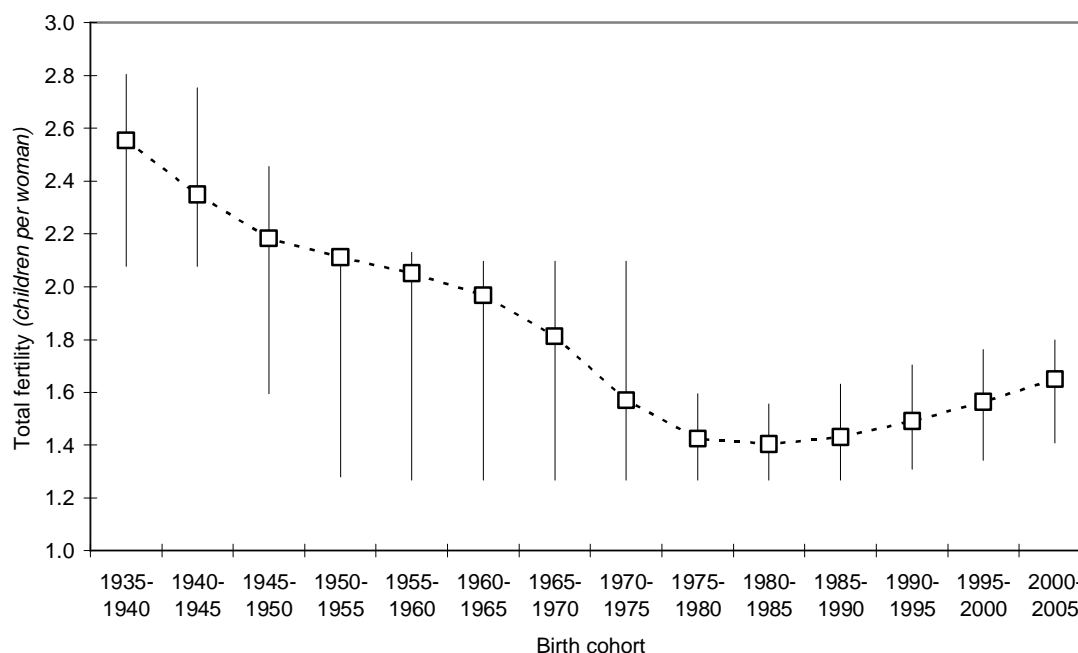
The situation for Eastern Europe can be illustrated by comparing estimates and projections of period fertility with estimates and projections of completed cohort fertility for cohorts born between 1935-1940 and 2000-2005, based on the medium variant of *2004 Revision* (figure III.6).

A box indicates the estimated or projected value of completed fertility for each birth cohort, with a dashed line connecting these estimates or predictions across cohorts. (For example, the fourth box from the right represents the 1985-1990 cohort discussed above). The vertical lines depict the range of period total fertility that was (or is projected to be) in effect at some time during the cohort's reproductive span. The 1985-1990 birth cohort, for example, will be bearing its children during the period of some 40 years following the year 2000; during these 40 years, period total fertility is projected to range from a low of 1.27 children per woman to a high of 1.63; as already noted, the cohort will end its reproductive span with a projected average of 1.46 children per woman.

As another example, the birth cohort of 2000-2005 is expected to see period total fertility varying from 1.41 to 1.80 children per woman during the years 2020-2050, but its own completed cohort fertility is projected to be 1.65 children. The projection assumption that period total fertility reaches a value of 1.85 children per woman draws cohort fertility toward that same level over the course of the projection, but the convergence of cohort fertility and period fertility will not be completed by the projection's endpoint.

The situation becomes less certain when the other fertility variants are considered. The Eastern Europe birth cohort of 2000-2005 could pass through periods when total fertility ranges from 0.91 children per woman (2015-2020, low-variant projection) to 2.30 children per woman

**Figure III.6. Projected cohort fertility and range of period total fertility, Eastern Europe birth cohorts of 1935-1940 to 2000-2005, estimates and medium variant**



(2045-2050, high-variant projection). Its own completed cohort fertility is projected to fall between 1.15 and 2.20 children per woman.

While some uncertainty exists about the future fertility of low-fertility countries, in the countries still experiencing above-replacement fertility, the general trend toward lower fertility is rather clear. Under the medium-fertility assumption, by 2050 more than three quarters of the world's population is expected to live in countries with total fertility levels below 2.1 children per woman.

Another fairly safe conclusion is that the world's population will continue to grow in the next half-century and beyond, in spite of fertility assumptions in the *2004 Revision* that assume a decline in total fertility at the world level. This expected population growth results from the population momentum built in the last fifty years through high

fertility levels in many parts of the world. The fertility decline in most countries has been critical in slowing population growth worldwide, and the continuous decline toward replacement level assumed in the *2004 Revision* is expected to slow this growth even more.

Finally, it is important to note that while the *2004 Revision* takes into account the fact that the fertility transition is well advanced in most parts of the world, the fertility decline in the medium variant assumes that progress in reproductive health and services made since the 1994 Conference on Population and Development (ICPD) in Cairo will continue unabated and will extend to high fertility countries. Failures in continuous commitment toward child and maternal health and toward expanded access to basic reproductive health care and services could keep countries from reaching the goals of the ICPD Programme of Action.