I. POPULATION SIZE, DISTRIBUTION AND GROWTH

Populations are dynamic entities. Over time they grow or decline, they become younger or older and their geographic distribution changes. Such changes are the cumulative effects of the events that people undergo during their lives, namely births, deaths and migrations. One of the concerns in demography is to trace out the consequence of changes in individual-level behaviour for aggregate processes (Preston, Heuveline and Guillot, 2001). The combination of these individual events shapes the population of each country, and, though partially predictable, the outcome is sometimes surprising. While no other century has witnessed such rapid and accelerating population growth as did the twentieth, population declines have been observed in several countries during the past decade or so. Such declines are foreseen to become the rule rather than the exception in some regions of the world, while in other regions the population will continue to grow, albeit at a more moderate pace.

A. POPULATION SIZE AND DISTRIBUTION

In the year 2005, the world population is estimated to have reached 6.5 billion, more than two and a half times the level in 1950; according to the medium-variant projection of the *2004 Revision*, it is expected to reach 9.1 billion in 2050 (table I.1). (See chapter VI for assumptions and methodology underlying the projections.) The less developed regions, with 5.3 billion people in 2005, account for the vast majority of the world population (81.3 per cent). The more developed regions have an estimated population of 1.2 billion, or 18.7 per cent of the world population. More and more of the world's inhabitants are coming to reside in the less developed regions, increasing from 67.7 per cent in 1950 to a projected 86.4 per cent in 2050. Within the less developed regions in 2005, the least developed countries account for about 0.8 billion and other less developed countries for 4.5 billion. The share of the least developed countries is projected to grow from 8.0 per cent in 1950 to 19.1 per cent in 2050.

Asia, with a population of 3.9 billion in 2005, is by far the most populous major area; its share of the world population stays fairly stable over time, rising and falling slightly in the neighborhood of 55-60 per cent between 1950 and 2050. The population shares of two other major areas, however, have shifted considerably since 1950, and this shifting is expected to continue. Europe's population represented 21.7 per cent of the world population in 1950, a figure that was reduced by almost half by 2005, to 11.3 per cent. Europe's

TABLE I.1. POPULATION, BY DEVELOPMENT GROUP AND MAJOR AREA, ESTIMATES AND MEDIUM VARIANT, 1950, 2005 AND 2050

	Population (millions)			*Percentage distribution*		
Development group or major area	*1950*	*2005*	*2050*	*1950*	*2005*	*2050*
World	2 519	6 465	9 076	100.0	100.0	100.0
More developed regions	813	1 211	1 236	32.3	18.7	13.6
Less developed regions	1 707	5 253	7 840	67.7	81.3	86.4
Least developed countries	201	759	1 735	8.0	11.7	19.1
Other less developed countries	1 506	4 494	6 104	59.8	69.5	67.3
Africa	224	906	1 937	8.9	14.0	21.3
Asia	1 396	3 905	5 217	55.4	60.4	57.5
Europe	547	728	653	21.7	11.3	7.2
Latin America and the Caribbean	167	561	783	6.6	8.7	8.6
Northern America	172	331	438	6.8	5.1	4.8
Oceania	13	33	48	0.5	0.5	0.5

share of the world population is projected to decline furthermore, to 7.2 per cent in 2050. At the same time, Africa's share of the world population has been increasing, from 8.9 per cent in 1950 to 14.0 per cent in 2005, and is projected to reach 21.3 per cent in 2050, close to Europe's share in 1950.

The social and economic disadvantages afflicting least developed countries are often vividly expressed in basic demographic indicators. In assessing the challenges to international development that are presented by these countries, it should be remembered that they account for a relatively small share of the world population: 11.7 per cent in 2005. The other less developed countries, which include China and India, the two most populous countries collectively account for 69.5 per cent of the world population.

Most of the world's population is found in a small set of very populous countries. A mere 4.8 per cent of all countries, that is, the 11 largest countries, each with an estimated population of 100 million or more in the year 2005, lay claim to 60.9 per cent of the world population (figure I.1). The vast majority of the world's countries are actually relatively small in terms of their population size—of all countries, 77.2 per cent have populations under 20 million (with almost one third of all countries having fewer than 1 million). Taken as a group, these small countries account for only 11.6 per cent of the world population, while countries with populations from 20 million to 100 million include 18.0 per cent of all countries and 27.5 per cent of all population.

Taken together, the 11 largest countries are home to more than 3.9 billion people. Jointly, China and India account for more than 37 per cent of the world population in 2005, with estimated populations of 1.3 billion and 1.1 billion, respectively (table I.2). A further 9 countries account for almost a quarter of the earth's population, namely, the United States of America, Indonesia, Brazil, Pakistan, the Russian Federation, Bangladesh, Nigeria, Japan and

Figure I.1. Distribution of countries and areas, by percentage in each population size class and by percentage share of world population in each population size class, 2005

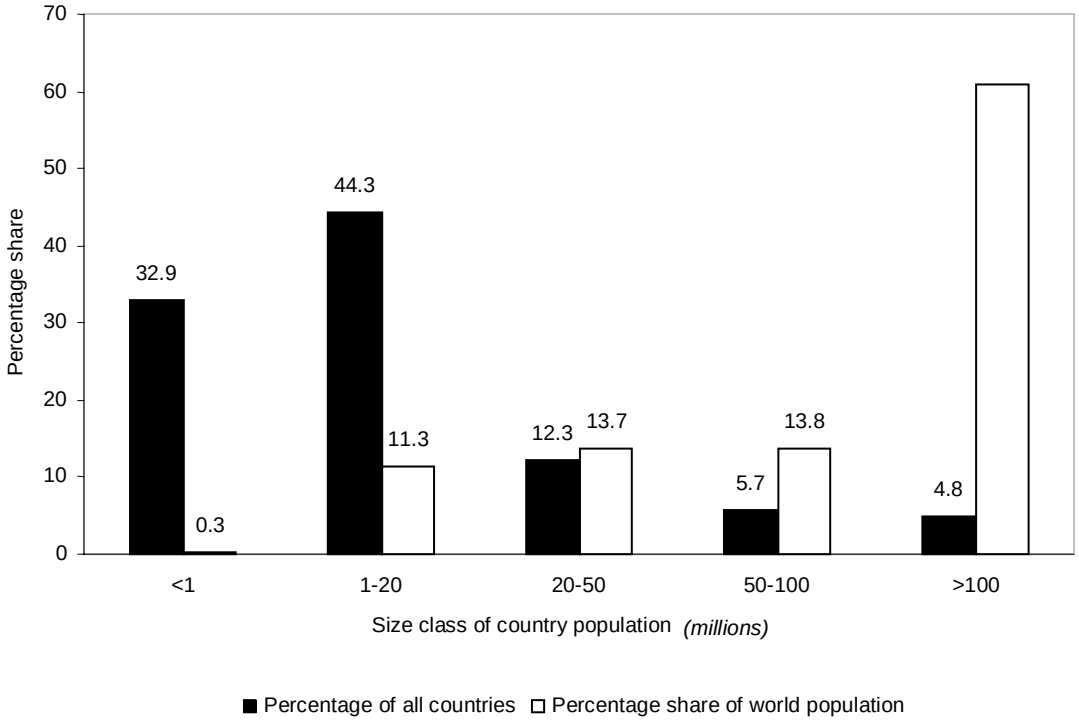


TABLE I.2. COUNTRIES AND AREAS ACCOUNTING FOR ABOUT 75 PER CENT OF THE WORLD POPULATION, ESTIMATES AND MEDIUM VARIANT, 1950, 2005 AND 2050

Rank	*Country or area*	*Population in 1950 (millions)*	*Cumulated percentage*	*Rank*	*Country or area*	*Population in 2005 (millions)*	*Cumulated percentage*	*Rank*	*Country or area*	*Population in 2050 (millions)*	*Cumulated percentage*
1	China	555	22.0	1	China	1 316	20.4	1	India	1 593	17.5
2	India	358	36.2	2	India	1 103	37.4	2	China	1 392	32.9
3	United States of America	158	42.5	3	United States of America	298	42.0	3	United States of America	395	37.2
4	Russian Federation	103	46.6	4	Indonesia	223	45.5	4	Pakistan	305	40.6
5	Japan	84	49.9	5	Brazil	186	48.4	5	Indonesia	285	43.7
6	Indonesia	80	53.0	6	Pakistan	158	50.8	6	Nigeria	258	46.6
7	Germany	68	55.7	7	Russian Federation	143	53.0	7	Brazil	253	49.4
8	Brazil	54	57.9	8	Bangladesh	142	55.2	8	Bangladesh	243	52.0
9	United Kingdom	50	59.9	9	Nigeria	132	57.3	9	Dem. Republic of the Congo	177	54.0
10	Italy	47	61.7	10	Japan	128	59.2	10	Ethiopia	170	55.9
11	France	42	63.4	11	Mexico	107	60.9	11	Mexico	139	57.4
12	Bangladesh	42	65.0	12	Viet Nam	84	62.2	12	Philippines	127	58.8
13	Ukraine	37	66.5	13	Philippines	83	63.5	13	Uganda	127	60.2
14	Pakistan	37	68.0	14	Germany	83	64.8	14	Egypt	126	61.6
15	Nigeria	33	69.3	15	Ethiopia	77	66.0	15	Viet Nam	117	62.9
16	Spain	28	70.4	16	Egypt	74	67.1	16	Japan	112	64.1
17	Mexico	28	71.5	17	Turkey	73	68.2	17	Russian Federation	112	65.3
18	Viet Nam	27	72.6	18	Iran (Islamic Republic of)	70	69.3	18	Iran (Islamic Republic of)	102	66.5
19	Poland	25	73.6	19	Thailand	64	70.3	19	Turkey	101	67.6
20	Egypt	22	74.4	20	France	60	71.2	20	Afghanistan	97	68.7
21	Turkey	21	75.3	21	United Kingdom	60	72.2	21	Kenya	83	69.6
				22	Italy	58	73.1	22	Germany	79	70.4
				23	Dem. Republic of the Congo	58	73.9	23	Thailand	75	71.3
				24	Myanmar	51	74.7	24	United Kingdom	67	72.0
								25	United Republic of Tanzania	67	72.7
								26	Sudan	67	73.5
								27	Colombia	66	74.2
								28	Iraq	64	74.9

NOTE: Countries are ranked by decreasing size of population.

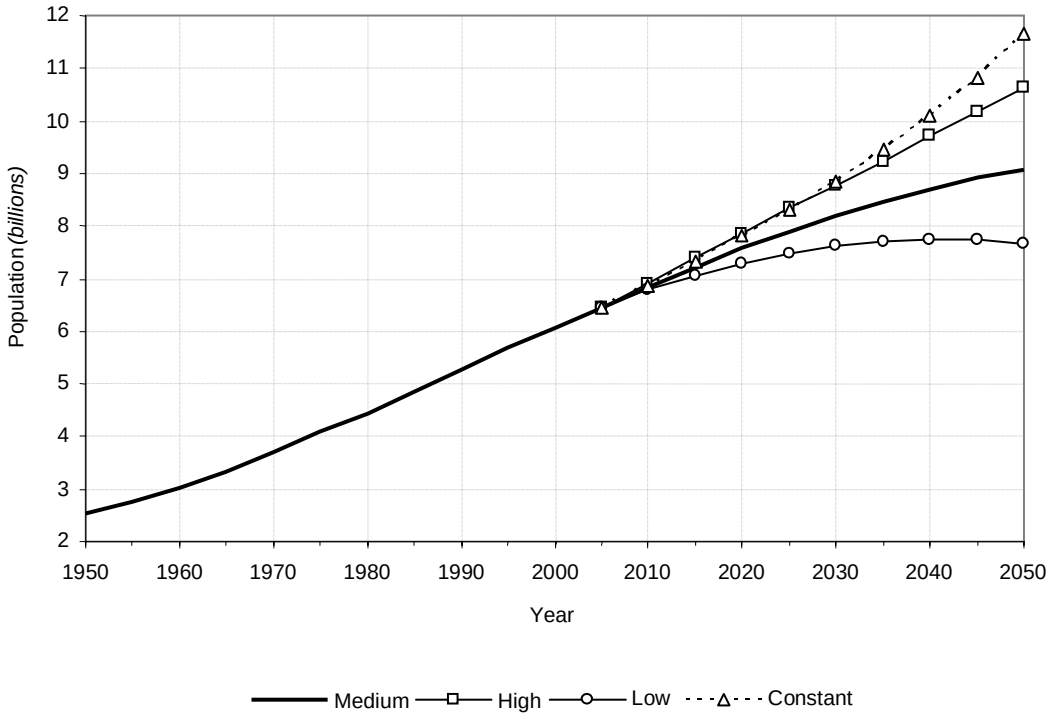
Mexico. Eight of the 11 most populous countries are considered to be less developed, leaving only 3 in the more developed regions (the United States of America, with a population of 298 million; the Russian Federation, with 143 million; and Japan, with 128 million). These large, more-developed countries account for almost 9 per cent of the world population, a considerable share but far below that of China and India.

The concentration of world population in large countries has been lessening, and this trend is projected to continue (table I.2). In 1950, the combined populations of some 21 countries accounted for three-quarters of the population of the globe, a number that increased to 24 countries in 2005. By 2050, according to the medium-variant projection, 28 countries will be needed to reach that same share. Inevitably, several countries are projected to change ranks over the next 45 years. India and China will likely trade places at the very top of the population rankings, Nigeria is expected to rise from 9th to 6th in rank, and the Russian Federation will likely fall from 7th to 17th. In addition, three least developed countries—Bangladesh, the Democratic Republic of the Congo and Ethiopia—will be among the ten most populous countries.

Population growth would be substantially greater in the absence of fertility decline (figure I.2). If fertility were to be held constant at its current level for every country, the world population would reach a total of 11.7 billion persons by the year 2050, almost doubling its present size. The extent of growth is all the more impressive when one considers that an assumed constant fertility fixes a number of countries at below-replacement fertility levels.

Alternatively, if total fertility were to adhere to the high-fertility variant (see chapter VI), usually half a child above what is assumed in the medium-variant projection but generally declining over time, the world total would reach 10.6 billion in 2050. Under the low-fertility assumption, by contrast, with total fertility rates usually set at half a child below the medium variant, world population would reach 7.7 billion, far lower but still representing an addition of 1.2 billion persons to the world's current total. Evidently, the pace and depth of fertility decline will continue to have

Figure I.2. World population, estimates and projection variants, 1950–2050



an important impact on world population levels and trends.

Anticipated mortality trends will also influence the overall population. The basic projection variants assume a single course of mortality change, usually a continuous decline, for each country. If mortality rates were held constant at their current levels, however, under the medium-fertility variant world population would rise to 8.1 billion persons in 2050, about 1 billion less than the projected levels. Although there are important differences across these projection variants, in one respect they all agree: an era of substantial world population growth lies ahead.

The estimated and projected world population levels are the product of divergent trends across the more developed and less developed regions. For the more developed regions, it seems that an era of population decline may not be too far into the future. According to the medium-variant projection, the aggregate population of this region will rise from the year 2005 estimate of 1.21 billion persons to a peak of 1.25 billion around 2030, and will then fall to 1.24 billion by the end of the projection period, yielding a net addition of only about 25 million (figure I.3A). Only the high fertility variant suggests continued growth in the populations of the more developed regions. Note that if current levels of fertility were to be maintained, as assumed in the constant fertility variant, the populations of the more developed regions would fall below the medium-variant projection. The anticipation of some fertility increases in the medium variant for the very low fertility countries accounts for this result.

For the less developed regions, the expected trajectories all involve substantial further population growth. For example, the medium-variant projection shows an increase from 5.3 billion in 2005 to 7.8 billion in 2050 (table I.1). The least developed countries, with populations totaling 759 million in 2005, will witness continued increases under all fertility variants, attaining a total of more than 1.7 billion persons by 2050 in the medium variant (figure I.3B). With continued current levels of fertility, that total would surpass 2.7 billion, and if fertility rates were to follow the high variant, the total population in the year 2050 would still reach close to 2 billion persons. Hence, the course for fertility decline remains of critical importance to the populations of the least developed countries (box I.1).

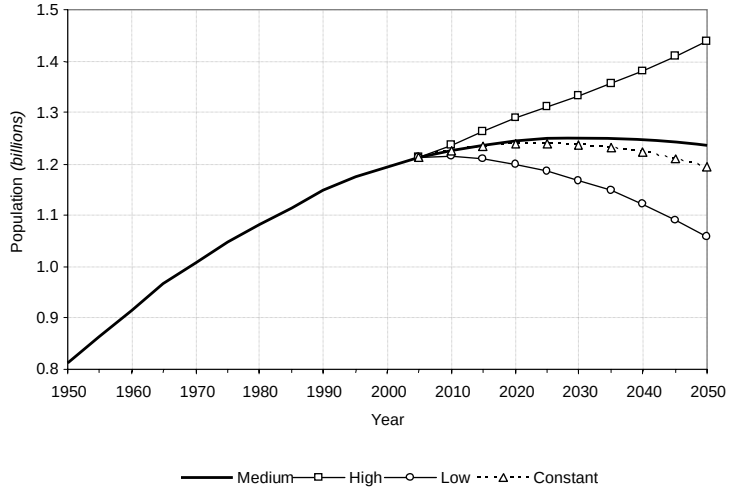
Likewise, the path of fertility decline will make an important difference to the futures of the other less developed countries, a group that includes China, India, Indonesia, Brazil, Pakistan and other populous nations. The medium-variant projection for these countries indicates continued population growth, with their total rising from 4.5 billion persons in 2005 to 6.1 billion in 2050 (figure I.3C). Continuation of current fertility rates would add an expected 1.6 billion persons to the total population of these countries (relative to the medium variant), whereas the expected total would be only 632 million above the current population if the low fertility variant were to prevail. To sum up, for all less developed regions combined, constant fertility would imply total populations of 10.5 billion in 2050, well above the 7.8 billion produced by the medium variant.

Under most projection scenarios, population decline will occur in the more developed regions at some point in the projection period (figure I.3A). The anticipated trend at the aggregate level, however, masks differences at the national and regional level. Some developed countries are expected to continue to grow, but others may experience population declines. Overall, among all countries with a population of at least 100,000 in the year 2000, according to the results of the medium variant, 44 countries are expected to experience a reduction in population between 2005 and 2050, the majority of them located in the more developed regions.

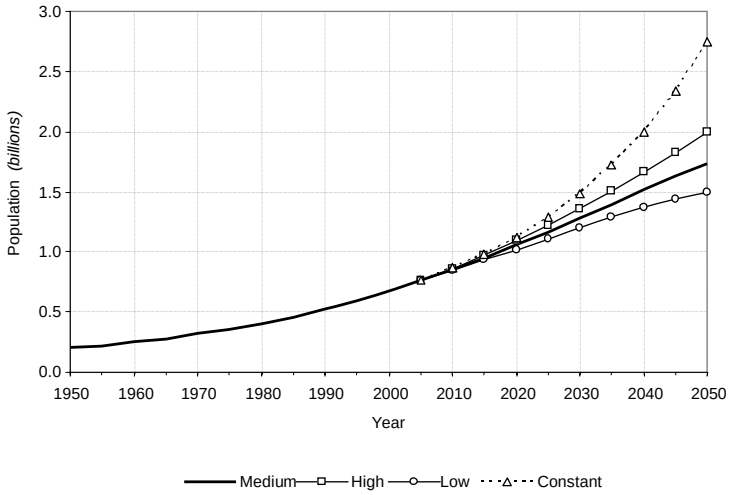
The prospects for population decline in selected countries and regions of the more developed world are quite striking (figure I.4). The most substantial population decline relative to present levels is likely to occur in Eastern Europe, which is projected to lose about 25 per cent of its current total population by 2050. The Russian Federation, which constitutes approximately 48 per cent of Eastern Europe's population in 2005, is projected to decline by some 22 per cent. Other Eastern European countries, such as Ukraine, Belarus and Bulgaria, are also expected to experience a substantial decline in their population size.

Figure I.3. Population, by development group, estimates and projection variants, 1950–2050

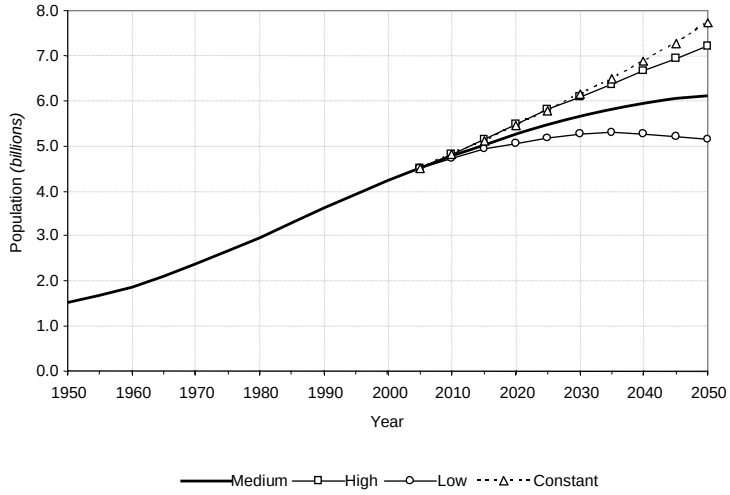
A. More developed regions



B. Least developed countries



C. Other less developed countries



BOX I.1. THE LEAST DEVELOPED COUNTRIES: ON THE RIGHT PATH, BUT STILL A WORLD APART

The least developed countries comprise 50 countries that are located mainly in Africa and Asia, plus small island developing States[1] from Oceania and the Caribbean. Jointly, these countries have recorded relatively higher fertility and mortality levels than the more developed regions and the other less developed countries, a trend that is expected to continue in the coming decades. Since the 1970s, the least developed countries have experienced, on average, the highest population growth rates in the world. Even though they represent a relatively small share of the world population, just under 12 per cent in 2005, it is expected that the overall population increment in those countries will account for 37 per cent of all world population growth during the period 2005-2050. Though fertility has been declining in most countries of this group, averaging on the whole about 5 children per woman in 2000-2005, mortality trends have not shown encouraging signs since the late 1980s. Continued population growth in already fragile economies will exacerbate problems of resource allocation for education and health care.

Southern Europe and Japan will likely see declines of about 7 and 12 per cent, respectively, by 2050. Little change is anticipated in the total populations of Western Europe, while an increase in the order of 10 per cent is projected for Northern Europe, even though some countries within that region will experience substantial declines (e.g., Latvia, Lithuania and Estonia). In both Northern and Western Europe, immigration is likely to play an important role in maintaining or slightly increasing the population size.

Population declines or only slight increases are also projected between 2005 and 2050 in some less developed countries, for example, those in the Southern Africa region, which are among the countries most highly affected by the HIV/AIDS epidemic (figure I.5). Among these countries, only Namibia is thought likely to experience substantial continued population growth, mainly because of its relatively high fertility. South Africa's population, which is by far the largest in the region, will increase slightly by about 3 per

Figure I.4. Projected population trends in European regions and selected countries, medium variant, 2005–2050

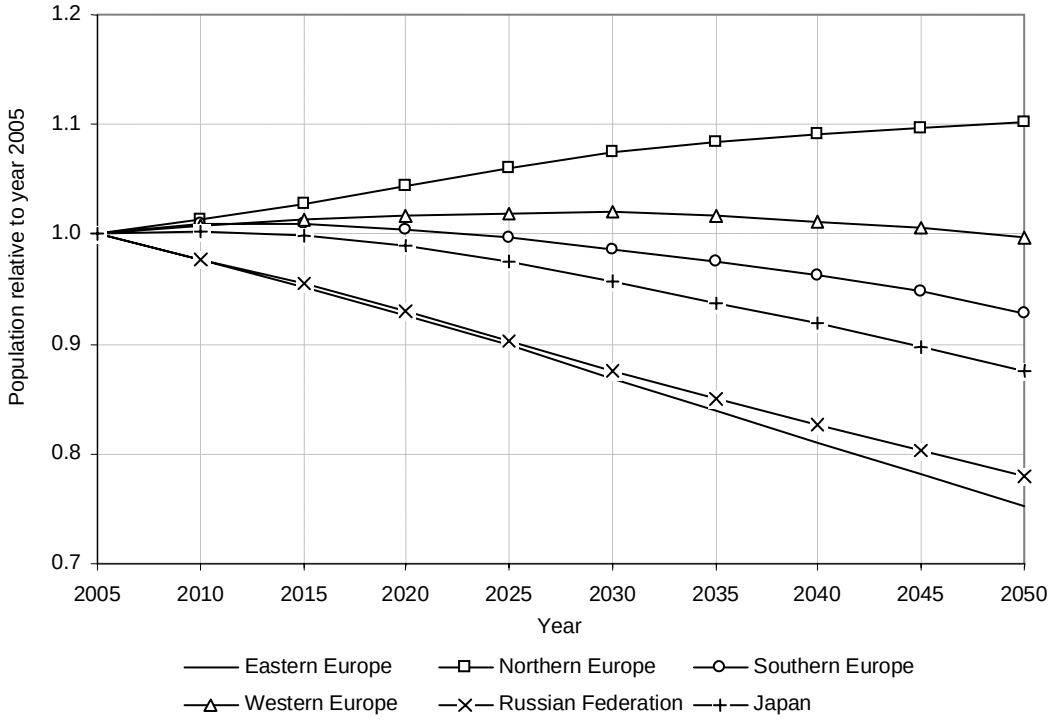
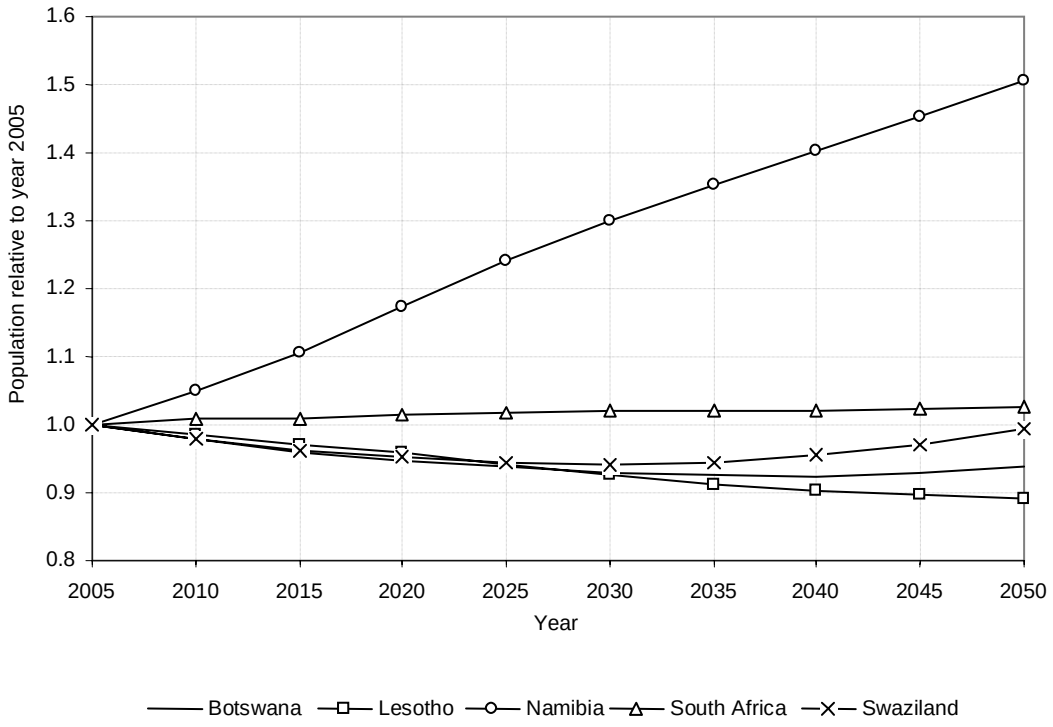


Figure I.5. Projected population trends in countries of Southern Africa, medium variant, 2005–2050



cent relative to the level in 2005, while Swaziland, following a decline until 2030, should almost regain its 2005 population level by the middle of the century. Botswana is expected to experience a population loss of about 6 per cent, and for Lesotho, the expected loss is even greater, at about 11 per cent.

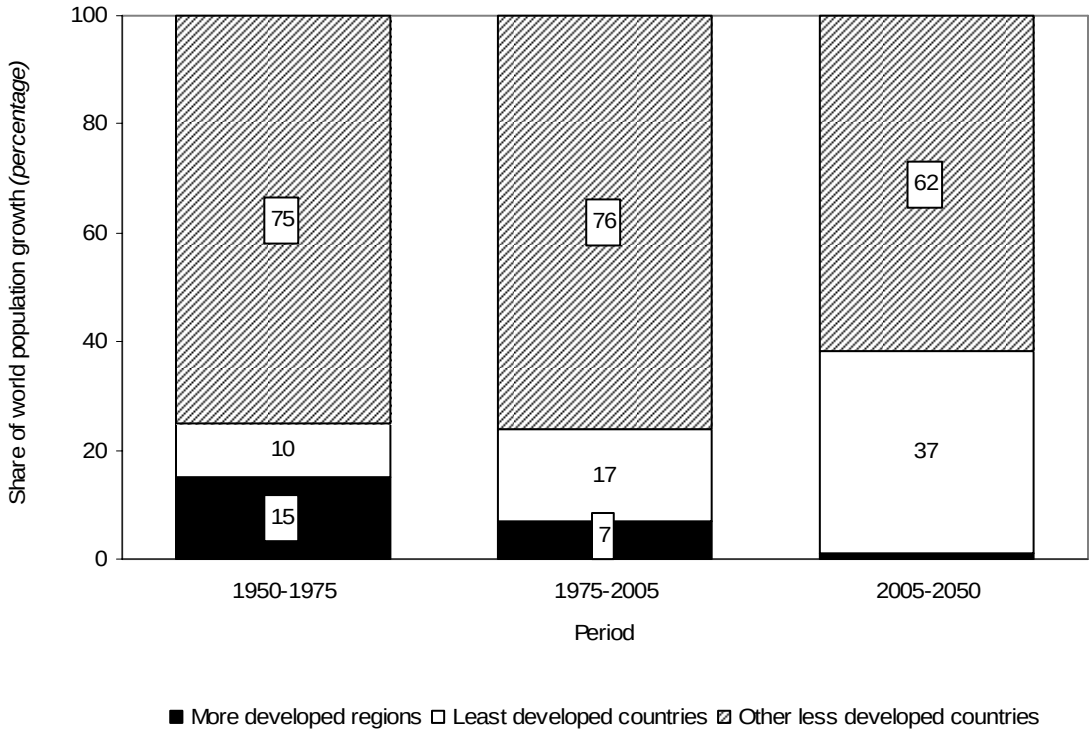
During the period 2000-2005, the estimates show that 16 countries across the world experienced a reduction in population of more than 5,000 persons, ranging from 37 thousand in Estonia to close to more than 3 million in the Russian Federation (table I.3). Except for Serbia and Montenegro, all countries included in this group are located in Eastern and Northern Europe or are successor States of the former USSR. Losses will be greater and more widespread by 2045-2050. During the last five years of the projection period, 31 countries are expected to experience population declines of 100,000 persons or more (up from 9 countries in 2000-2005), with an additional 15 countries losing more than 25,000 persons or more. Comparing 2000-2005 with 2045-2050, countries newly experiencing declines in 2045-2050 are located in Asia, Southern and Western Europe and also include Cuba and Mexico. Among the five countries that are expected to lose the largest absolute amount of population in 2045-2050, three are from Eastern Asia: China, Japan and the Republic of Korea. As in 2000-2005, the Russian Federation and Ukraine are expected to be among the countries with the biggest declines.

The different paths of future population growth or decline will result in changes in the shares of world population growth taken by the more developed regions and the least developed and other less developed countries. Of all population growth anticipated during the period 2005–2050 in the medium variant, the less developed regions will take in most of it (roughly 99 per cent) (figure I.6). Total growth for the more developed regions—projected at 25 million—is barely perceptible in relation to total population growth over the period, amounting to less than 1 per cent. This is a marked departure from what occurred in the last half-century, when population growth in the more developed regions accounted for a considerably larger share of the world growth (some 15 per cent in 1950-1975 and about 7 per

TABLE I.3. COUNTRIES AND AREAS EXPERIENCING POPULATION DECLINES OF MORE THAN 5,000 PERSONS IN 2000-2005 OR OF MORE THAN 100,000 PERSONS IN 2045-2050, ESTIMATES AND MEDIUM VARIANT

Rank	*Country or area*	*Population in 2000*	*Population in 2005*	*Population decrement in 2000-2005*	*Rank*	*Country or area*	*Population in 2045*	*Population in 2050*	*Population decrement in 2045-2050*
		(thousands)					*(thousands)*		
1	Russian Federation	146 560	143 202	-3 358	1	China	1 416 926	1 392 307	-24 619
2	Ukraine	49 116	46 481	-2 635	2	Russian Federation	115 098	111 752	-3 346
3	Romania	22 117	21 711	-406	3	Japan	114 983	112 198	-2 785
4	Belarus	10 029	9 755	-274	4	Ukraine	28 481	26 393	-2 088
5	Bulgaria	7 997	7 726	-271	5	Republic of Korea	46 111	44 629	-1 482
6	Georgia	4 720	4 474	-246	6	Italy	52 256	50 912	-1 344
7	Kazakhstan	15 033	14 825	-208	7	Poland	33 053	31 916	-1 137
8	Hungary	10 226	10 098	-128	8	Germany	79 455	78 765	-690
9	Poland	38 649	38 530	-120	9	Romania	17 425	16 757	-668
10	Republic of Moldova	4 275	4 206	-69	10	Spain	43 185	42 541	-643
11	Lithuania	3 500	3 431	-69	11	Cuba	10 212	9 749	-463
12	Latvia	2 373	2 307	-66	12	Kazakhstan	13 543	13 086	-458
13	Armenia	3 082	3 016	-66	13	France	63 523	63 116	-407
14	Czech Republic	10 267	10 220	-48	14	Thailand	74 935	74 594	-341
15	Serbia and Montenegro	10 545	10 503	-42	15	Belarus	7 342	7 017	-325
16	Estonia	1 367	1 330	-37	16	Bulgaria	5 349	5 065	-284
					17	Czech Republic	8 718	8 452	-266
					18	Hungary	8 499	8 262	-237
					19	Sri Lanka	23 779	23 554	-225
					20	Georgia	3 186	2 985	-202
					21	Serbia and Montenegro	9 621	9 426	-195
					22	Slovakia	4 772	4 612	-160
					23	Republic of Moldova	3 456	3 312	-144
					24	Greece	10 868	10 742	-127
					25	Dem. People's Rep. of Korea	24 318	24 192	-126
					26	Croatia	3 806	3 686	-120
					27	Bosnia and Herzegovina	3 289	3 170	-118
					28	Lithuania	2 682	2 565	-118
					29	Portugal	10 832	10 723	-109
					30	Mexico	139 123	139 015	-108
					31	Netherlands	17 243	17 139	-104

Figure I.6. Share of world population growth, by development group, estimates and medium variant, 1950–2050



cent in 1975-2005). By contrast, the least developed countries will account for some 37 per cent of all population growth in the next 45 years, up from about 10 per cent during the 1950-1975 period. The other less developed countries, which accounted for about three-quarters of the world population growth during the past 55 years, are expected to see their share reduced to close to 62 per cent during the period 2005-2050.

At present, some 76 million people are added annually to the world population; about 95 per cent of that growth occurs in less developed regions. Seven countries account for over half (51.1 per cent) of that net addition: India (21.7 per cent); China (11.0 per cent); Pakistan (4.0 per cent); and from 3.7 to 3.4 per cent each, the United States of America, Nigeria, Indonesia and Bangladesh. In the next 45 years, nine countries are expected to absorb about half (51.6 per cent) of the world's projected population increase. Listed in order of their expected additions, these are India, Pakistan, Nigeria, the Democratic Republic of Congo, Bangladesh, Uganda, the United States of America, Ethiopia and China. India alone is expected to add some 489 million people over the next 45 years, while China, although currently more populous, adds only 76 million people by virtue of its lower expected fertility rates. (China will actually be losing population by 2045-2050.) Pakistan will see its population increase by 147 million people, according to the medium projection, while Nigeria will grow by 127 million. Of the countries in this list, the only one in the more developed regions is the United States of America, which is expected to add 97 million people to its population by 2050. The population dynamics of these countries will substantially influence world population dynamics in the coming decades.

B. POPULATION GROWTH RATES

Throughout the course of human history, and partially as a consequence of high mortality levels, population growth rates were on average quite low. It was probably not until the seventeenth and eighteenth centuries that annual growth rates as high as 0.5 per cent were being sustained. From then until the dawn of the twentieth century, annual population growth at the rate of half a percentage point was the norm. But

improvements in sanitary measures as well as access to antibiotics during the twentieth century, among other factors, led to a reduction in mortality levels. Consequently, population growth accelerated to historically unprecedented rates, reaching levels of around 2 per cent annually in 1965–1970. Since that historic peak, world population growth has greatly decelerated, and if the medium projections made in the *2004 Revision* come to pass, the world will be returning to the 0.5 per cent rate of growth. The rapid growth of the twentieth century may come to be seen as an extraordinary but historically isolated phenomenon.

The annual population growth rate[2] of the world is now estimated at 1.21 per cent. For the projections, assumptions about the trajectory of fertility rates play a major role in determining the rates of growth (figure I.7). As was the case with projected population sizes (shown earlier), the constant fertility assumption generally produces the highest rate of world population growth, followed by the high-fertility variant, the medium variant and the low variant. Indeed, under the assumption of constant fertility rates, world population growth rates would be above 1.0 per cent and rising by the end of the projection period.

Because fertility decline has not occurred simultaneously in all countries (see chapter III), the pace of population growth differs considerably among development groups (figure I.8). At present, the growth rate of the more developed regions stands at 0.30 per cent per annum—about half of the norm in the eighteenth and nineteenth centuries—whereas the growth rate for the least developed countries is 2.40 per cent, far above the historical norm. The other less developed countries have an intermediate position with a growth rate of 1.27 per cent. Growth rates in all three regions are projected to decline over time under the medium-variant projection, but only the more developed regions are thought likely to enter an era of population decline during the projection period. By 2050, the combined population of the more developed regions will have been declining in absolute terms for 20 years, whereas the least developed countries will still be growing at a rate of 1.30 per cent annually.

Figure I.7. Average annual rate of change of world population, estimates and projection variants, 1950-1955 to 2045–2050

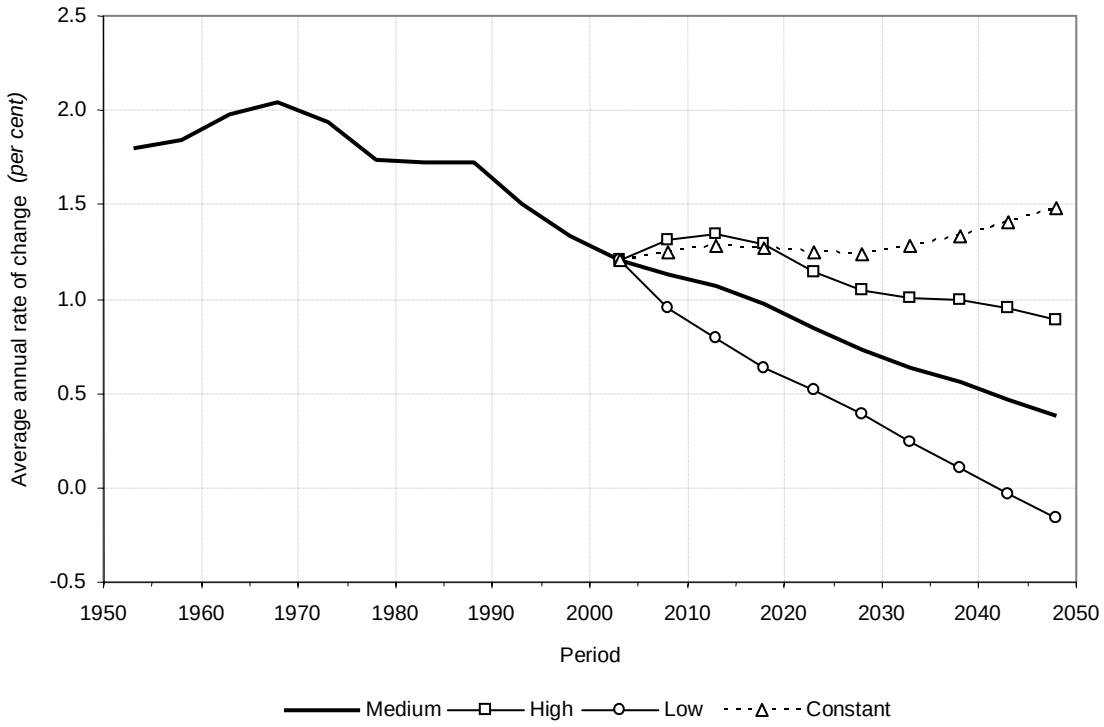
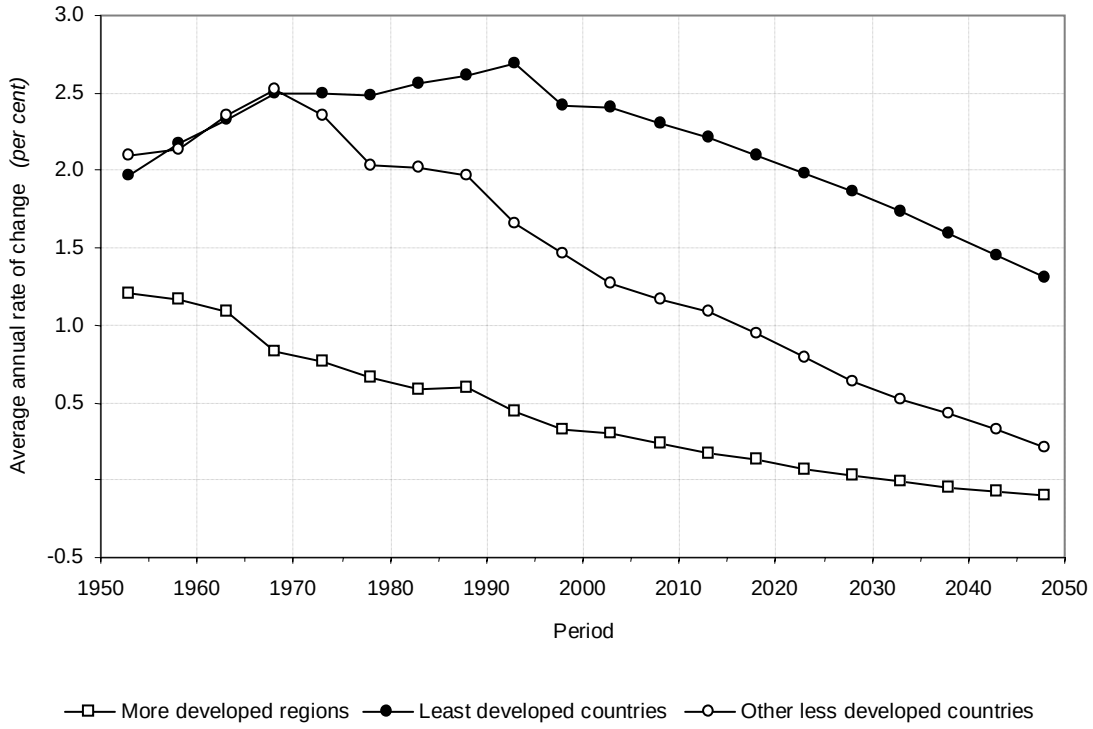


Figure I.8. Average annual rate of population change, by development group, estimates and medium variant, 1950-1955 to 2045-2050



An inspection of growth rate trajectories for the major areas of the world (table I.4 and figure I.9) shows that two will be sharply distinguishable from the others. Population growth rates in Africa are expected to be the highest throughout the projection period, falling to 1.21 per cent in 2045–2050, while those for Europe are projected to be the lowest, reaching -0.37 per cent by the end of the projection period. Growth rates of the other major areas—Asia, Latin America and the Caribbean, Northern America and Oceania—are expected to converge to between 0.19 and 0.45 per cent in 2045-2050. Noticeably, most of the convergence in terms of growth rates between these major areas actually occurred between 1950 and 2005, while growth rates from Africa and Europe actually diverged from those of the rest of the world.

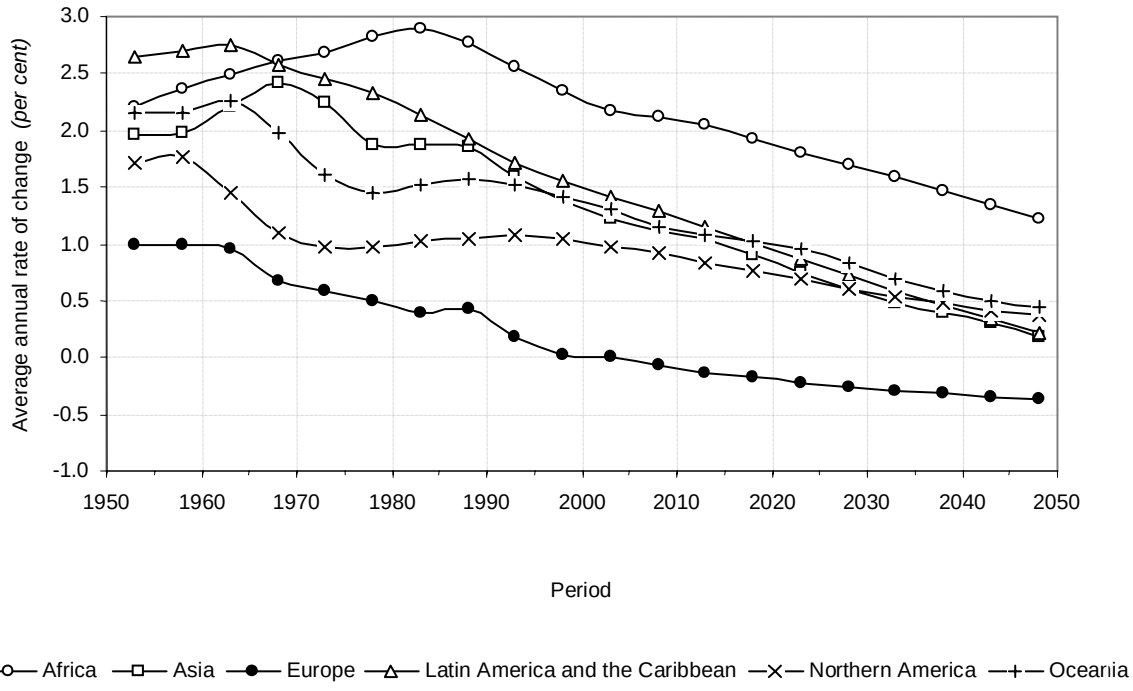
At the country level, among the ten countries with the highest population growth rates in 2000-2005, five are from Africa and five from Asia, with values ranging from around 3.40 per cent in Niger, Uganda and Chad to 6.51 per cent in the United Arab Emirates (table 1.5). Most countries included in the list have relatively high fertility levels, the main cause of such growth, but the soaring growth rates in the countries from the Arabic Peninsula (United Arab Emirates, Qatar and Kuwait) are largely due to international migration. By 2045-2050, all countries with the highest projected growth rates are in Africa, except for Afghanistan. Nevertheless, the anticipated growth rates are much lower than current ones, ranging from 1.75 per cent in Burkina Faso to 2.39 per cent in Uganda.

At the other end of the spectrum, the countries with the lowest rates of population change in 2000-2005 (i.e., fastest rates of decline) are all from Eastern and Northern Europe or are successor States of the former USSR. Estimates of growth rates range from about -0.4 per cent in Romania, Lithuania and Armenia to about -1.10 per cent in Georgia and Ukraine. A few of these countries will continue to have some of the lowest rates of change in the world by 2045-2050, joined mainly by members of the small island developing States[1].

TABLE I.4. AVERAGE ANNUAL RATE OF POPULATION CHANGE , BY DEVELOPMENT GROUP AND MAJOR AREA, ESTIMATES AND MEDIUM VARIANT, 1950-1955, 2000-2005 AND 2045-2050

Development group or major area	*Average annual rate of change (per cent)*		
	1950-1955	*2000-2005*	*2045-2050*
World	1.81	1.21	0.38
More developed regions	1.20	0.30	-0.10
Less developed regions	2.09	1.43	0.45
Least developed countries	1.97	2.40	1.30
Other less developed countries	2.10	1.27	0.22
Africa	2.21	2.18	1.21
Asia	1.96	1.21	0.19
Europe	0.99	0.00	-0.37
Latin America and the Caribbean	2.65	1.42	0.22
Northern America	1.71	0.97	0.38
Oceania	2.15	1.32	0.45

Figure I.9. Average annual rate of population change, by major area, estimates and medium variant, 1950-1955 to 2045-2050



C. CRUDE RATES AND POPULATION MOMENTUM

Population growth rates are general indicators. They provide insights on overall trends but can sometimes conceal the driving forces exerted by age-specific schedules of fertility and mortality, whose net effects on growth can be expressed in what are referred to as intrinsic growth rates. Before emerging in the form of population growth rates, the forces of age-specific fertility and mortality must be filtered through the population's age structure. The influence of age structure is such that populations with an intrinsic tendency to decline (because of low age-specific fertility rates and/or high mortality) may sometimes grow, and those with an intrinsic tendency to grow (because

TABLE I.5. TEN COUNTRIES AND AREAS WITH THE HIGHEST AND TEN COUNTRIES AND AREAS WITH THE LOWEST AVERAGE ANNUAL RATE OF CHANGE, ESTIMATES AND MEDIUM VARIANT, 2000-2005 AND 2045-2050

2000-2005			2045-2050		
Rank	*Country or area*[1]	*Average annual rate of change (per cent)*	*Rank*	*Country or area*[1]	*Average annual rate of change (per cent)*
		A. Highest rate of change			
1	United Arab Emirates	6.51	1	Uganda	2.39
2	Qatar	5.86	2	Niger	2.12
3	Dem. Republic of Timor-Leste	5.42	3	Burundi	2.10
4	Afghanistan	4.59	4	Liberia	2.08
5	Eritrea	4.26	5	Congo	2.07
6	Sierra Leone	4.07	6	Guinea-Bissau	2.05
7	Kuwait	3.73	7	Chad	2.03
8	Chad	3.42	8	Mali	1.84
9	Uganda	3.40	9	Afghanistan	1.83
10	Niger	3.39	10	Burkina Faso	1.75
		B. Lowest rate of change			
1	Ukraine	-1.10	1	Guyana	-2.25
2	Georgia	-1.07	2	Tonga	-1.96
3	Bulgaria	-0.69	3	Samoa	-1.54
4	Latvia	-0.57	4	Ukraine	-1.52
5	Belarus	-0.55	5	United States Virgin Islands	-1.34
6	Estonia	-0.55	6	Georgia	-1.31
7	Russian Federation	-0.46	7	Micronesia (Fed. States of)	-1.19
8	Armenia	-0.43	8	St. Vincent and the Grenadines	-1.19
9	Lithuania	-0.40	9	Bulgaria	-1.09
10	Romania	-0.37	10	Cuba	-0.93
	WORLD	1.21		WORLD	0.38

[1] Countries and areas with 100,000 persons or more in 2000.

of high age-specific fertility rates and/or low mortality) may sometimes decline. The situation is further complicated by international migration. Chapters II to V will address some of these issues; to close this chapter only a preview is given here.

A country's age structure is the legacy of its demographic history and can influence its population dynamics for decades to come. Countries that have experienced rapid population growth in the past will tend to have large and increasing cohorts of potential parents. Even if these potential parents decide to have fewer offspring than did their forebears—indeed, even if they attain fertility levels that are insufficient for generational replacement—the sheer size of such parental cohorts can bring about continued, positive population growth. When lower age-specific fertility rates are ushered in against a history of rapid growth, they may need to be sustained for a considerable period of time before any reductions in population growth become evident. According to some estimates (National Research Council, 2000), the population momentum attributable to such age structure effects may account for over half of world population growth over the next half-century.

In Japan and some regions of Europe, the recent past has left a very different legacy. Here, in some cases, current age structures are such that not even an immediate rise in age-specific fertility to generational replacement levels (roughly 2.1 children per woman) would be enough to stop population decline, which would continue for

some years into the future (National Research Council, 2000). In other words, part of tomorrow's population growth dynamic is already encrypted in today's population age structure.

Graphs aid understanding the difference between the intrinsic growth tendencies established by age-specific fertility and mortality rates and the actual natural growth that results from the interaction of these rates with population age structure (figure I.10). In the graphs, the intrinsic tendencies are expressed in terms of the net reproduction rate (NRR), which may be understood as a measure of generational replacement. The NRR is the average number of daughters a hypothetical cohort of women would have at the end of their reproductive period if they were subject during their whole lives to the age-specific fertility and mortality rates of a given period. It is expressed as number of daughters per woman. The NRR is also interpretable in the following terms. Consider a newly-born girl. The NRR is the average number of surviving daughters she would bear over the course of her own lifetime. The measure takes account of female mortality risks through the end of the reproductive span, although it is insensitive to mortality risks at more advanced ages.

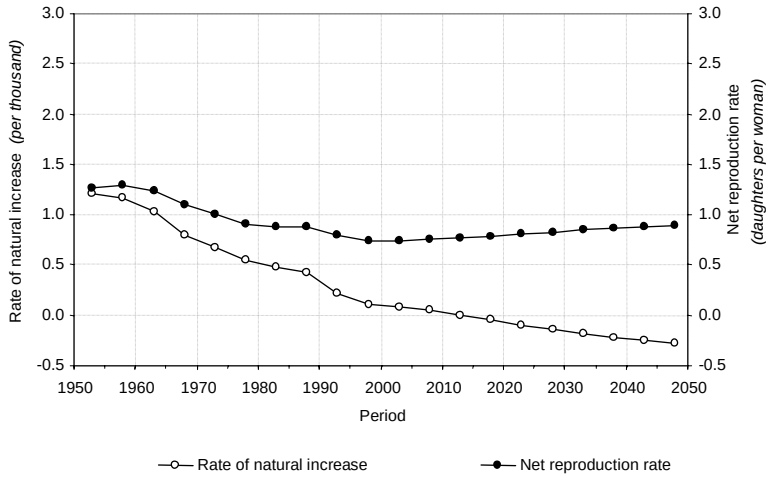
When the NRR is larger than 1.0, one newly-born girl will on average produce more than one daughter, and, in this way, will replace more than herself in a generational sense. Hence, a NRR larger than 1.0 establishes an intrinsic tendency for the population to grow. A value of NRR below 1.0 indicates insufficient fertility for generational replacement to occur and an intrinsic tendency for the population to decline. Generational replacement—no intrinsic tendency for population to either grow or decline—is indicated when NRR equals 1.0.

Natural growth rates are defined as the difference between crude birth rates and crude death rates, and can of course sometimes be negative. (For the purposes of these figures, the international migration component has been separated out.) If a population were to reach an NRR of 1.0 and continue at that level for a long period of time, natural growth (or decline) would eventually reach zero and the natural growth rate would be 0.00 per cent.

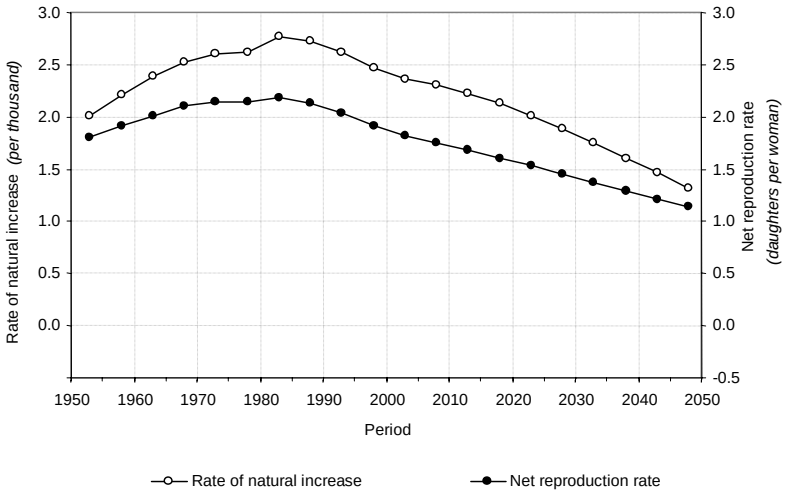
Net reproduction rates in the more developed regions fell below 1.0 in the 1970s, and an intrinsic tendency for population decline was thus established early (figure I.10A). But because of the effect of age structure, natural rates of population growth have not yet turned negative, although they are expected to do so in the coming decades. Interestingly, over the latter part of the projection period, the natural rates are projected to grow ever more negative even as the net reproduction rates turn upward—again, the effect of age structure. The least developed countries, considered as a group, are not expected to reach replacement fertility by 2050, and their time paths of intrinsic and natural population growth are roughly synchronous over the projection (figure I.10B). However, the NRR for these countries in 2045-2050 is near replacement, at 1.15 daughters per woman, whereas the rate of natural population growth will still be a robustly positive 1.32 per cent. In the other less developed countries, replacement levels of fertility are anticipated in the next few decades, mainly due to the low fertility rates expected for China. Net reproduction rates are likely to fall below 1.0 in 2020-2025. Even so, natural rates of growth are likely to remain positive throughout the projection period (figure I.10C).

Figure I.10. Rate of natural increase and net reproduction rate, by development group, estimates and medium variant, 1950-1955 to 2045-2050

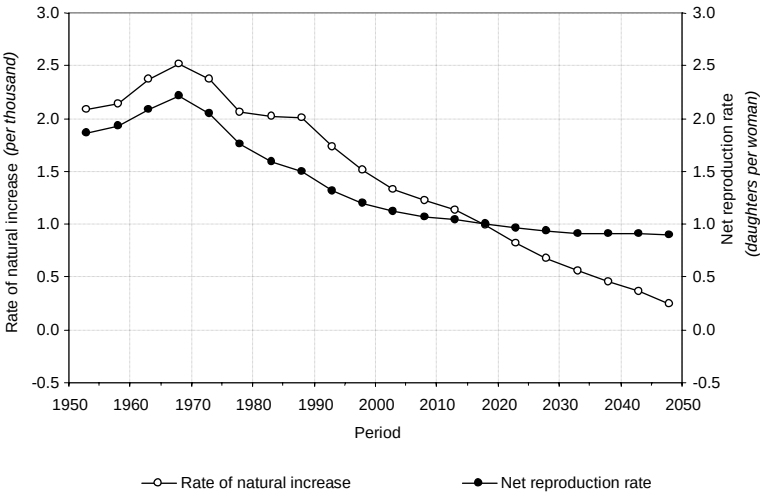
A. More developed regions



B. Least developed countries



C. Other less developed countries



NOTES

[1] Currently, fifty-one small island developing States and territories are included in the list used by the United Nations Department of Economic and Social Affairs in monitoring the progress in the implementation of the Barbados Programme of Action (United Nations, n.d.).

[2] For convenience, the terminology growth rate is sometimes used in this report, although the precise term should be the rate of change, because populations can also decline. Similarly, the natural growth rate and the NRR can also refer to population decline. In this report, rates of growth (and decline) are calculated using the exponential growth rate formula, $r = \ln(P_t/P_0)/t$.