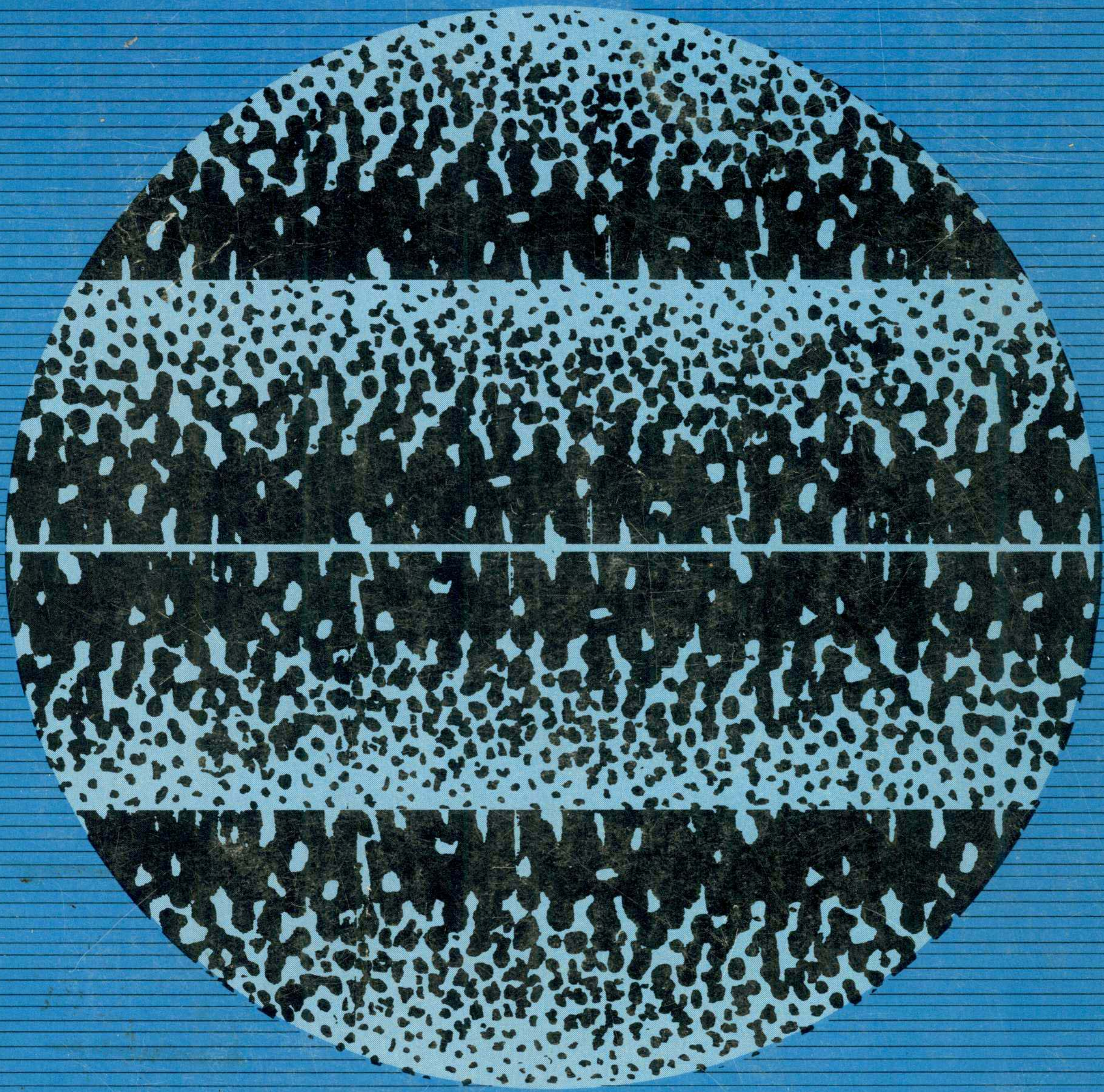
World Population Projections 1989–90 Edition

Short- and Long-Term Estimates

Rodolfo A. Bulatao, Eduard Bos, Patience W. Stephens, and My T. Vu



From the data files of The World Bank

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Foreword

Population projections for all countries are prepared annually by the Population and Human Resources Department of the World Bank. They are published first in summary form in the Bank's annual *World Development Report* and later in greater detail as technical notes or working papers and, in alternate years, as a book.

This set of projections, prepared for *World Development Report 1989,* is the fourth to be published in this form. The data are presented in generally the same format as in previous editions, and almost the same demographic indicators are provided.

The book is intended to be a convenient and up-to-date reference on the likely demographic future of each country. We hope it will make it easier to take population into account in development work.

ANTHONY R. MEASHAM
Chief
Population, Health, and Nutrition Division
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Acknowledgments

Several people provided information for this work or otherwise assisted in its preparation. The Estimates and Projections Section of the United Nations Population Division has been continually supportive in providing us with data, often even before their publication as U.N. assessments. Partly as a result, nonessential differences between these projections and the biennial U.N. assessments have been minimized. We are grateful to the former acting section chief, Shunichi Inoue, and to his accommodating staff, as well as to the former head of the division, Jean-Claude Chasteland. Close collaboration has continued under the new section chief, Larry Heligman, and the new head of the division, Mr. Inoue.

World Bank country economists, population specialists, and the few demographers in the Bank's operating divisions also provided recent population estimates, often alerting us to government reports we might not otherwise have seen.

This exercise was carried out using a personal computer program, ProjPC-II, written by Kenneth Hill of Johns Hopkins University.

Both the Population, Health, and Nutrition Division and the Population and Human Resources Department have been supportive of this work, despite the time required. We are grateful to the division chief, Dr. Anthony R. Measham, and the department director, Ann O. Hamilton.

We also wish to acknowledge the cooperation of the Bank's International Economics Socioeconomic Data Division (IECSE), which not only uses our figures—for such important Bank purposes as estimating per capita GNP—and incorporates them into the databases it maintains and the publications it distributes but also helps coordinate communications with country economists. Sulekha Patel of that division has been particularly helpful in the past year.

In producing the manuscript, Inge Schweiger was responsible for some of the typing and for coordinating the paper flow.

Introduction

This volume contains population projections for the world and its subdivisions—countries, regions, and income groups. The projection results, which are presented in the detailed tables that comprise the main section of the book, are explained, summarized, and interpreted in this introductory section. Also described in this introduction are the base data and the projection methodology, which has been revised since the last edition. Included in an appendix to this introduction are summary tables on population size and growth, age structure, and fertility and mortality rates; covered in separate tables are the world and the continents, geographic regions and income groups, World Bank regions, and individual countries. The tables on age structure cover broad age groups (0–14, 15–64, and 65 and over) and provide a more convenient summary than did previous editions.

Caution is appropriate with projections like these. They essentially involve working out the implications of assumptions about particular parameters of demographic levels and trends. None of the descriptions of results presented in this introduction should be taken as indicating certitude about the future. Instead, they should be read with the universal qualifier that population will follow the indicated path if the assumptions prove correct.

Projection Results

The projections cover the entire world for almost two centuries, from 1985 to 2150. With data available as of mid-1989, separate projections were prepared for 187 countries, economies, territories, and small-country groupings. The length of the projection period was chosen to allow populations to approach stability, which in some cases takes essentially the entire period.

Only one projection is reported per country, economy, territory, or group. Other forecasting exercises sometimes provide high and low options. Instead of alternative projections, we choose to give only our best estimate of the likely demographic future and to update this annually. Approaches to defining high and low options are described under "Data and Methods" below, however, for those interested in implementing them.

The detailed projection tables contain two pages for each country. The first page gives projection results for every five years between 1985 and 2030, with population figures for years ending in 0 or 5 and demographic indicators for the intervening quinquennia. The following information is provided:

- Population by sex and five-year age groups, in thousands
- Birth rate, death rate, and net migration rate per thousand
- Rate of natural increase and population growth rate in percent
- Total fertility rate (TFR) and net reproduction rate (NRR)
- Expectation of life at birth (e_0) and at age ten (e_{10}) in years [labeled e(0) and e(10) respectively in the tables]
- Infant mortality rate (IMR) per thousand, and probability of dying before age five (q_5) [labeled q(5) in the tables]
- Dependency ratio (for exact years rather than quinquennia).

The second page for each country adds results for every twenty-five years from 2000 to 2150 (as well as rates for the 1985–2000 period). This page provides fewer indexes: only population by age and sex; the birth, death, net migration, and growth rates; total fertility; life expectancy; and infant mortality.

Data and Methods

The key elements in these projections are base-year (mid-1985) total population estimates and age-sex structures; base-period (1985–90) mortality, fertility, and migration rates; and assumed trends in the rates. Each of these elements is described below. In addition, the revised methodology used for projecting vital rates is explained, and some of the relatively modest effects of the revision are shown. New data have been incorporated since the previous edition; Appendix A to this introduction lists the sources for all base-year or base-period estimates.

Total Population and Age-Sex Composition

Estimates of the total population in mid-1985 were obtained from the most recent reliable sources. Where possible, censuses were used, with appropriate adjustments made for underreporting and the results projected to mid-1985. In a number of cases, estimates by the United Nations (U.N.) Population Division (in *World Population Prospects 1988*) were adopted. (Prepublication versions of the estimates were generally used.) For countries with dated or unreliable census data, other official estimates were taken, often from the U.N. *Population and Vital Statistics Report* and occasionally from government publications. Other sources of estimates included Eurostat (1987) and the U.S. Bureau of the Census (1985 and Jamison, Johnson, and Engels 1987). The specific sources of information are listed by country in Appendix A.

The mid-1985 population of each country is distributed by age and sex using a percentage distribution obtained in most cases from *World Population Prospects 1988*. These distributions were estimated by the U.N. Population Division from census data adjusted for age misreporting, using techniques such as stable population analysis (that is, comparing census populations with age distributions generated by applying particular vital rates over long periods; see Coale and Demeny 1983). For most Sub-Saharan countries, World Bank estimates of current age-sex distribution were adopted instead.

Mortality Level and Trend

This section considers the sources of mortality data used for the base period and the manner in which future trends in mortality are defined. Future trends are specified through projections of life expectancy by sex, projections of infant mortality, and the choice of appropriate model life tables. Each of these elements is described below. Comparisons are also made with the previous method for projecting mortality.

No specific attempt is made to incorporate mortality due to infection with the human immunodeficiency virus (HIV). The HIV epidemic could have important effects on mortality in particular countries. However, data on this issue are still too scant, and projection models sufficiently controversial, to allow incorporation of demographic effects into worldwide projections. Mortality from HIV infection should be considered an extraneous factor so far neglected in this work.

DATA. Base-period mortality levels in the projections are represented by life expectancies by sex and infant mortality rates for both sexes combined. Life expectancies were obtained from a variety of sources. A preliminary version of the U.N.'s *World Population Prospects 1988* was a common source. Other figures are based on official or other estimates appearing in the U.N.'s *Population and Vital Statistics Report* or in government publications. A few figures were taken from the U.S. Bureau of the Census (1985 and Jamison, Johnson, and Engels 1987), Eurostat (1987), and Monnier (1988). These sources often report mortality levels for periods other than 1985–90, or give indexes other than life expectancies, or both. Some estimation or projection is then necessary to obtain the right index for the right period. In some cases a mortality estimate was made for an earlier period, and an estimate for 1985–90 was obtained by applying the projection methodology described below. Some World Bank sources are also cited in Appendix A: Bank sector reports, Bank assessments involving unpublished analyses of census or survey data, and Bank estimates or informed judgments for which no further source can be cited.

Infant mortality rates, like life expectancies, were commonly taken from the preliminary version of *World Population Prospects 1988*. Some, however, were drawn from *Population and Vital Statistics Report*, and still others were estimated from diverse data.

FUTURE TRENDS IN LIFE EXPECTANCY. Life expectancy is projected from year 0 to year t using a logistic function over time of the form

$$e_t = k_0 + k \,/\, \{1 + \exp\,[\text{logit}(e_0) + rt]\}$$

with

$$\text{logit}(e_0) = \log_e\,[(k_0 + k - e_0) \,/\, (e_0 - k_0)].$$

The logistic function is set to rise most rapidly from a level of 50 years or so and to rise increasingly slowly

Table 1. *Assumed Annual Increments to Life Expectancy*
(years)

Initial life expectancy	Males			Females		
	Minimum	Medium	Maximum	Minimum	Medium	Maximum
40	0.22	0.45	0.69	0.23	0.48	0.73
45	0.23	0.48	0.73	0.26	0.53	0.80
50	0.24	0.48	0.73	0.27	0.55	0.83
55	0.22	0.45	0.69	0.26	0.54	0.81
60	0.19	0.39	0.59	0.24	0.50	0.76
65	0.15	0.30	0.45	0.21	0.44	0.66
70	0.09	0.18	0.27	0.17	0.35	0.52
75	0.01	0.03	0.04	0.11	0.23	0.34
80	—	—	—	0.04	0.08	0.12

— Not applicable.

at higher levels. The minimum (k_0) for the logistic functions for both sexes is assumed to be 20 years, and the maxima ($k_0 + k$) are assumed to be 82.5 years for females and 75.8 years for males. The rate of change (r) for the logistic function is allowed to vary across countries and—for a given country—over time.

For the first quinquennium (1985–90), the rate of change (r_1) is estimated from the rate of change in the previous quinquennium (r_0) and from the female secondary enrollment ratio (s_0), using the equations

$$r_1 = 0.00379 + 0.723\, r_0 - 0.000254\, s_0 \text{ for females}$$

and

$$r_1 = 0.01159 + 0.885\, r_0 - 0.000318\, s_0 \text{ for males.}$$

Percent urban was used with a different equation (see Bulatao and Bos 1989) in a few cases where secondary enrollment was not available. In fewer cases still, the rate of change in the previous decade was used instead of the rate of change in the previous quinquennium, when the latter appeared to have been affected by exceptional circumstances. Limits are imposed on the rate of change for the first quinquennium (and for all other quinquennia): it cannot be greater than -0.017 (which would give slow mortality decline) or less than -0.053 (which would give rapid mortality decline).

For the second quinquennium, the rate of change is estimated as a function of the rate of change for the first quinquennium:

$$r_2 = -0.007 + 0.8\, r_1.$$

The rate of change for the third quinquennium is estimated from the rate of change for the second quinquennium in the same manner. This equation allows rates of change to converge toward the uniform pattern imposed for subsequent quinquennia.

For these subsequent quinquennia for all countries, the rate of change in life expectancy is constant at -0.035 for both sexes. At this rate the annual increments to life expectancy vary by initial levels as indicated by the medium pattern in Table 1. The minimum and maximum increments shown correspond to the slow and rapid limits imposed on rates of change in the first three quinquennia.

FUTURE TRENDS IN INFANT MORTALITY. Infant mortality is projected using a similar logistic function. The rate of change for each of the first three quinquennia is obtained from the equation

$$r_t = 0.03 + 0.5\, r_{t-1}$$

with the restriction that this rate must be in the range [0.024, 0.130]. These limits provide schedules of minimum and maximum annual decrements to infant mortality, which vary by the initial rate, as shown in Table 2. This table also presents a set of medium decrements that represents the typical schedule of improvements toward which rates of change converge when the preceding equation is applied successively.

Table 2. *Assumed Annual Decrements to Infant Mortality Rate*
(per thousand)

Initial infant mortality rate	Schedule		
	Minimum	Medium	Maximum
150	0.90	2.26	4.97
140	1.00	2.51	5.52
130	1.08	2.71	5.92
120	1.13	2.83	6.17
110	1.16	2.90	6.29
100	1.16	2.90	6.28
90	1.14	2.85	6.13
80	1.10	2.73	5.85
70	1.03	2.55	5.45
60	0.93	2.31	4.92
50	0.81	2.01	4.27
40	0.67	1.65	3.49
30	0.50	1.23	2.60
20	0.31	0.76	1.60
10	0.09	0.23	0.48

SELECTION OF LIFE TABLES. The life tables used for the projections are those among the Coale-Demeny models (Coale and Demeny 1983) that provide the projected life expectancy and infant mortality rates for the first three quinquennia. First, a level of the life tables is chosen to give the desired infant mortality rate (interpolation is used if necessary). Mortality rates up to age 14 are taken from this life table. Rates for ages 15 and older are taken from a second level of the life tables, that which provides the desired level of life expectancy. Among the four Coale-Demeny families (North, South, East, and West), that family is chosen which minimizes the divergence between the two chosen levels. For subsequent quinquennia, only life expectancy is used in determining levels, and the West family is used consistently.

Survivorship ratios from these model life tables were specified for the first three quinquennia and for 2025–30, 2050–55, and 2100–05. The projection program used, ProjPC-II (Hill forthcoming), was allowed to interpolate linearly for intervening periods to facilitate a smooth transition across life table families.

COMPARISON WITH OTHER MORTALITY PROJECTIONS. The procedures for making projections depart from those used in the previous edition with regard to their rationale and their effects on projected mortality and population. The change in methodology produces generally minor, expected differences in results.

The current procedures were developed from an analysis of trends in life expectancy and infant mortality in available national data (Bulatao and Bos 1989). Logistic functions are used because they fit past trends best, country by country. The schedules of medium change in life expectancy and infant mortality reflect median trends across countries, and the schedules for minimum and maximum change reflect the 10th and 90th percentiles respectively when country trends are ranked from slowest to fastest. The equations to predict short-term trends in life expectancy and infant mortality were estimated using these data; other socioeconomic factors, such as per capita income, did not help predict trends.

The procedures used for projecting mortality in the previous edition were based on earlier data and involved two separate schedules of increments to life expectancy: one for countries with high and another for those with low female primary enrollment. Infant mortality was not projected separately, and life tables were chosen on the basis of life expectancies alone.

In Figure 1, the current schedule of medium increments to life expectancy is compared with the previous schedule for high-enrollment countries, as well as with the medium schedule used by the U.N. (1989). (Only female life expectancy is shown.) The three schedules are close to each other; they differ mainly at high levels of life expectancy, where the U.N. permits substantially more improvement. Given the long-run nature of these projections, the current schedule cannot permit rapid improvements at high levels without either higher maxima or an abrupt slowdown in improvements at some future point.

A similar comparison is made in Figure 2 of decrements to infant mortality. Neither the previous procedures nor the U.N. procedures are based on explicit schedules for infant mortality change. To allow comparison, actual decrements were calculated from country projections and curves were fitted to represent their dependence on the initial level of infant mortality. Figure 2 shows that the medium decrements are generally larger than those implicit in previous World Bank and current U.N. projections (although never by more than one per thousand); this result may reflect recent, more rapid improvements captured by the revision in methodology.

In addition to the new schedules, the current procedures involve some individualization of country trends. The effects of this are more difficult to assess. Bulatao and Bos (1989) report simulations for eight countries with widely varying mortality levels, and their findings provide some impression of the changes. For the eight countries, the new projected trends for life expectancy generally remain close to trends projected by the previous procedures, as well as to trends projected by the U.N. The main differences are in two areas. First, for countries such as Norway the current and previous procedures

Figure 1. *Annual Increments to Female Life Expectancy by Initial Level*

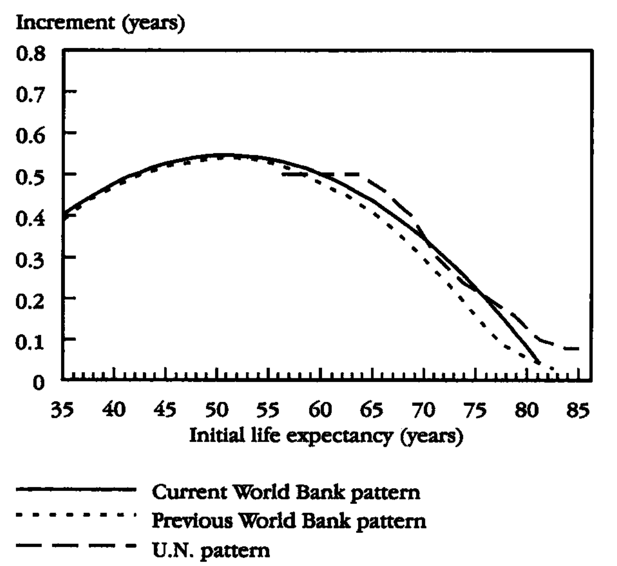
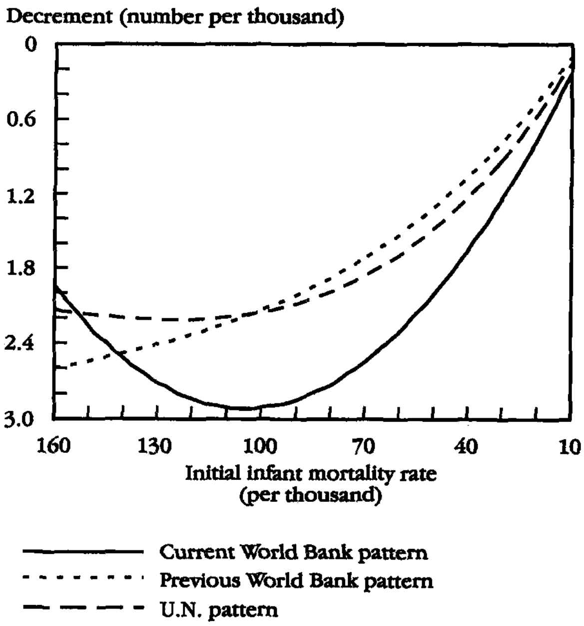


Figure 2. *Annual Decrements to the Infant Mortality Rate by Initial Rate*



agree, but the U.N. projects faster improvements, following the U.N. pattern shown in Figure 1. Second, for countries such as Ghana and Bolivia, the slowness of past improvements in life expectancy is reflected in projected levels that, after two or three decades, are as much as but no more than 4–5 percent lower than those previously projected.

Infant mortality trends differ more than life expectancies from those previously produced, because the earlier procedures relied on models to give infant mortality levels. The new estimates of future infant mortality are sometimes lower and sometimes higher than the previous estimates; there is no consistent pattern.

The simulations showed that the crude death rate is affected by these changes, rising or falling by as much as 10 percent relative to previous estimates for specific periods. However, total population is affected much less, varying from previous estimates for future periods by 2.5 percent at most.

Fertility Level and Trend

After briefly describing the sources of fertility data, this section explains how future trends in fertility are determined and compares the procedures with those used previously.

DATA. Base-period total fertility rates (TFRs) are derived from the same mix of sources as mortality rates, including *World Population Prospects 1988;* official sources, as cited in *Population and Vital Statistics Report* or in government publications; the U.S. Bureau of the Census (1985 and Jamison, Johnson, and Engels 1987); and Monnier (1988). Various surveys were also used, especially Demographic and Health Surveys, which were available for two dozen countries. Often these sources give fertility estimates for a different period or in terms of the crude birth rate, and appropriate total fertility rates were obtained by projecting earlier estimates or were approximated using available data on age-sex composition and age-specific fertility. Appendix A lists the specific source for each country and indicates cases in which an informal Bank estimate was made in the absence of reliable data.

FUTURE TRENDS. Future fertility trends are specified by quinquennial total fertility and by a year when the net reproduction rate reaches unity—that is, the year in which the average woman's fertility results in exactly replacing herself (referred to here as the replacement year). Separate procedures are applied for three stages of the fertility transition: the pretransition stage, when fertility is high and sustained fertility decline has not started; the transition stage, when fertility is high to medium and sustained fertility decline is in progress; and the late-transition and posttransition stage. Procedures for determining total fertility in each stage are discussed below, followed by an explanation of the age-specific patterns of fertility applied.

For current purposes, a fertility transition is assumed to have started if a country has experienced a drop in total fertility of at least 0.5 points over any five-year period, or if total fertility is already below 4.5 after a more gradual decline (Bulatao and Elwan 1985). The pretransition stage is the stage before any such decline is evident. The late-transition and posttransition stage is defined by a total fertility rate of one point above replacement level (about 3.15) or lower.

Countries in the pretransition stage are assumed to start a fertility transition in the quinquennium after combined male and female life expectancy reaches 50 years, but in no case later than 2005. The life expectancy threshold is slightly lower than the threshold of 53 years previously shown to be a universal precondition, although not a sufficient condition, for the start of fertility transition (Bulatao and Elwan 1985). Until a transition starts, total fertility is assumed to be constant. The one exception is where sterility is a significant factor; sterility is then assumed to decline linearly to 6 percent over three quinquennia, with each percentage point drop in sterility raising total fertility by 0.11 points (Frank 1983).

In the transition stage, the rate of fertility decline is based on the rate in the preceding quinquennium if it is assumed transition had already started in that period. With previous annual change represented by D_{TFR}, annual change during the transition is set at $(-0.05 + 0.5\ D_{TFR})$. However, limits are set on this change: it must be at least -0.073 points and at most -0.210 points, and these may be taken to define, respectively, slow and rapid fertility decline. (Previous analysis in Bulatao and Elwan 1985 defined rapid decline as an annual total fertility change of -0.2164 points, which is consistent.) If the formula does not apply because transition has just started, an average annual decline in total fertility of 0.102 points is imposed. Figure 3 shows the patterns of fertility decline implied by this average and by the slow and rapid limits. In the early part of the transition stage, the sterility adjustment is applied if appropriate to raise total fertility slightly.

In the late-transition and posttransition stage, fertility approaches replacement level, either from slightly above or slightly below it. Four alternative patterns, represented in Figure 4, are applied in this stage.

- Generally, a geometric function is imposed on total fertility decline from one point above replacement level to replacement level, with this decline assumed to take fifteen years.
- Where total fertility has shown unusually slow decline, it is assumed to take twenty rather than fifteen years for total fertility to fall one point to replacement.
- Where, toward the end of a fertility transition, total fertility is still recording rapid declines even though it is close to or even below replacement level (2.25 to 1.75), it is assumed to fall further for one period, generally going below replacement, to stay constant in the next period, and then to return to replacement.
- Where the transition has been completed and total fertility is below replacement, it is assumed to stay at the current level for two quinquennia and then to return gradually to replacement, along a linear path, by 2030.

In applying late-transition procedures, the level of total fertility that provides replacement is approximated by a quadratic formula based on female life expectancy, $e_{(f)}$, in the replacement year:

$$TFR_{NRR=1} = 6.702 - 0.1107\ e_{(f)} + 0.0006592\ e_{(f)}^2.$$

The replacement year is first approximated to determine life expectancy and then calculated using this formula and whichever pattern of fertility change above is appropriate.

For all stages of fertility transition, the age pattern of fertility is determined in the same fashion, depending on the level of total fertility (Figure 5). Two basic schedules of age-specific fertility are defined: for total fertility levels of six and above and for total fertility levels of three and below. In between, age patterns are obtained by interpolation between the two schedules. At a total fertility level of six, a greater proportion of

Figure 3. *Assumed Trends in Total Fertility during the Fertility Transition*

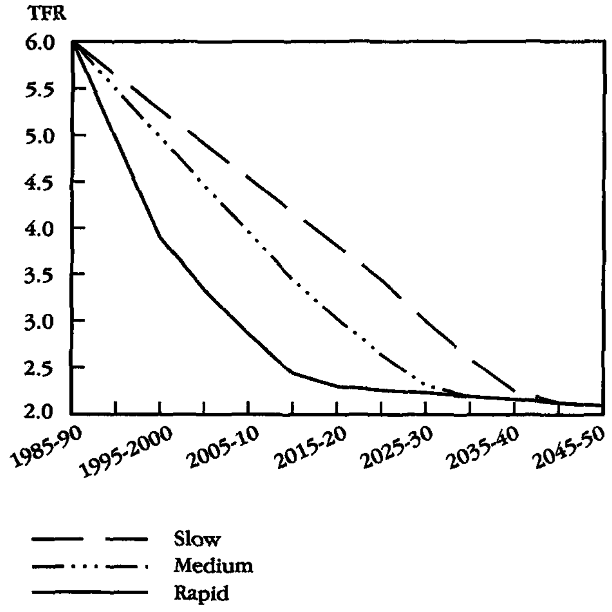


Figure 4. *Assumed Trends in Total Fertility during the Late-Transition and Posttransition Stage*

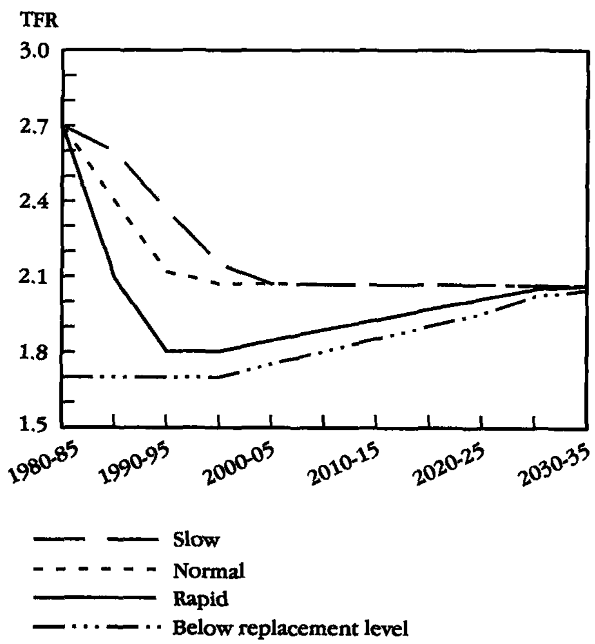
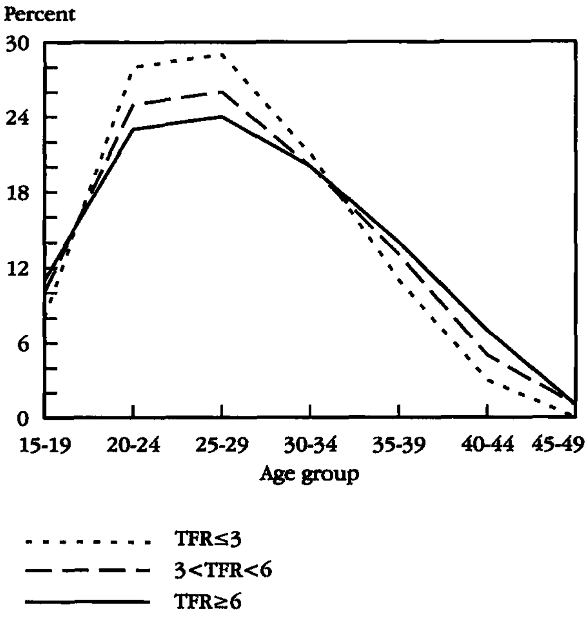


Figure 5. *Percentage of Total Fertility Assigned to Different Age Groups by Level of Total Fertility*



births are at younger and older ages of the reproductive span and the mean age of childbearing is 28.9 years. At a total fertility level of three, births are concentrated in a narrower band of ages and the mean age of childbearing is 28.0.

COMPARISON WITH OTHER FERTILITY PROJECTIONS. These procedures contrast with the procedures previously used, which depended essentially on subjective judgments of the replacement year for each country. The current procedures were developed from an analysis of total fertility trends in cross-national data (Bos and Bulatao 1990). In the pretransition stage, countries showed mostly stable fertility. The transition stage was more interesting. Across forty-two countries that started fertility transition between 1955 and 1983, the average annual decline in total fertility ranged from 0.06 to 0.25 points. Countries that initially had sharp declines in fertility tended to continue declining rapidly, whereas those that started with more gradual declines continued along the same path. Both rapid and slow declines were found in all regions. The rate of decline was predicted best by the rate in preceding periods; socioeconomic factors added little to this prediction. Other than the mortality threshold, socioeconomic factors also failed to predict the start of fertility transition.

The previous procedures involved a regression equation for the replacement year, derived after initial subjective judgments of this year. Reverse geometric and geometric curves were then fitted between current fertility and replacement level. By contrast, the current procedures focus on the pace of change in total fertility and thus determine the replacement year as the outcome rather than the first step in the process.

Comparisons of results are provided for selected countries in Bos and Bulatao (1990). Overall, the new procedures have only slight effects on the projected future course of fertility and on projected population. Relative to the previous procedures, however, they do delay the start of fertility transition in countries with high mortality levels. They also tend to slow fertility decline in Africa, which under the previous procedures was faster than has generally been experienced by countries passing through the fertility transition. These changes have a lasting effect on projected population for the affected countries, which tends to be somewhat higher in the long run. Other smaller effects also exist. For instance, the provision that allows some countries to continue fertility decline below replacement level leads to projections of slightly lower fertility in some parts of East Asia.

Migration Level and Trend

Estimates of net international migrants in the base period, by sex, were made from a review of international migration statistics published by national immigration agencies, statistical organizations, and other official and unofficial sources; from country population estimates and projections produced by international and regional agencies, national census and statistics offices, other government organizations, interagency task forces, and research institutions; and from discussions with experts on the subject (Arnold 1989). These estimates constitute a substantial revision of estimates used in the previous edition and involve somewhat higher levels of net migration (Table 3).

For purposes of these estimates, migrants are individuals who have resided for at least a year in countries other than their previous residence. An exception is made for refugees living in officially designated camps; they continue to be counted in their country of origin regardless of period of residence. Only net estimates by quinquennium were made; immigration and emigration were not estimated separately, and single-year figures were not assessed.

Estimates of future net migrants by quinquennium to the year 2000 were also made as part of the same examination of data and sources (Arnold 1989). These estimates are strongly affected by official policies and plans in the major receiving countries. The figures were designed to total zero in each quinquennium for the whole world. After the year 2000, the number of

Table 3. *Assumed Net International Migration by Sex, 1985–90* (thousands)

Country or economy	*Males*	*Females*	*Total*
Afghanistan	-13	-12	-25
Albania	0	0	0
Algeria	0	0	0
Angola	0	0	0
Antigua and Barbuda	1	1	2
Argentina	0	0	0
Australia	306	305	611
Austria	0	0	0
Bahamas	1	1	2
Bahrain	12	4	16
Bangladesh	-20	-15	-35
Barbados	-4	-4	-8
Belgium	8	7	15
Belize	-1.5	-1.5	-3
Benin	-3	-2	-5
Bhutan	0	0	0
Bolivia	-26	-14	-40
Botswana	0	0	0
Brazil	-5	-5	-10
Brunei	9	4	13
Bulgaria	0	0	0
Burkina Faso	-62	-28	-90
Burundi	-8	-7	-15
Cameroon	0	0	0
Canada	175	195	370
Cape Verde	-6.6	-4.4	-11
Central African Rep.	0	0	0
Chad	0	0	0
Channel Islands	0	0	0
Chile	-6	-6	-12
China (excluding Taiwan)	-166	-108	-274
Colombia	-115	-85	-200
Comoros	0	0	0
Congo, People's Rep. of the	0	0	0
Costa Rica	0	0	0
Côte d'Ivoire	191	105.7	296.7
Cuba	-26	-24	-50
Cyprus	-1.2	-0.8	-2
Czechoslovakia	-2.5	-2.5	-5
Denmark	0	0	0
Djibouti	13.6	4	17.6
Dominica	-1	-1	-2
Dominican Rep.	-60	-50	-110
Ecuador	-10	-10	-20
Egypt, Arab Rep. of	-60	-40	-100
El Salvador	-122	-90	-212
Equatorial Guinea	0	0	0
Ethiopia	-120.6	-60	-180.6
Fiji	-13	-13	-26
Finland	7.5	7.5	15
France	57.8	46.9	104.7
French Polynesia	2.5	2.5	5
Gabon	0	0	0
Gambia, The	8	7	15
Gaza Strip	-12	-8	-20
German Dem. Rep.	-4	-3	-7
Germany, Federal Rep. of	27	23	50
Ghana	-1	-1	-2
Greece	10	10	20
Grenada	-1	-1	-2
Guadeloupe	-9	-7	-16
Guam	0	0	0
Guatemala	-69	-61	-130
Guinea	4	7	11
Guinea-Bissau	-3	-2	-5
Guyana	-35	-35	-70
Haiti	-60	-50	-110
Honduras	-11	-9	-20
Hong Kong	49	26	75
Hungary	-3	-3	-6
Iceland	0	0	0
India	-133	-117	-250
Indonesia	-14	-11	-25
Iran, Islamic Rep. of	-27	-14	-41
Iraq	0	0	0
Ireland	-25	-25	-50
Israel	17	10	27
Italy	0	0	0
Jamaica	-60	-50	-110
Japan	-8	-7	-15
Jordan	0	0	0
Kampuchea, Dem.	0	0	0
Kenya	6	4	10
Kiribati	-0.6	-0.7	-1.3
Korea, Dem. People's Rep. of	0	0	0
Korea, Rep. of	-79	-96	-175
Kuwait	50	22	72
Lao People's Dem. Rep.	-3	-2	-5
Lebanon	-160	-115	-275
Lesotho	-7	-3	-10
Liberia	3	2	5
Libya	30	10	40
Luxembourg	0	0	0
Macao	32	16	48
Madagascar	0	0	0
Malawi	-17	-5	-22
Malaysia	-8	-7	-15
Maldives	0	0	0
Mali	-87	-54.7	-141.7
Malta	-5	-5	-10
Martinique	-8	-6	-14
Mauritania	-20	-10	-30
Mauritius	-6	-4	-10
Mexico	-445	-305	-750
Mongolia	0	0	0
Montserrat	-0.3	-0.3	-0.6
Morocco	-21	-14	-35
Mozambique	-6	-4	-10
Myanmar	-5	-5	-10
Namibia	0	0	0
Nepal	0	0	0
Netherlands	30	20	50
Netherlands Antilles	-4	-3	-7
New Caledonia	-1.8	-1.2	-3
New Zealand	0	0	0
Nicaragua	-10	-10	-20
Niger	0	0	0
Nigeria	0	0	0
Norway	12	8	20
Oman	33	12	45

(Table continues on the following page.)

Table 3 *(continued)*

Country or economy	Males	Females	Total
Other Europe[a]	4	4	8
Other Latin America and the Caribbean[a]	1	1	2
Other Micronesia[a]	0	0	0
Other North Africa[a]	0	0	0
Other North America[a]	0	0	0
Other Polynesia[a]	-1.5	-1.5	-3
Other West Africa[a]	0	0	0
Pacific Islands	-2.3	-1.7	-4
Pakistan	-153	-103	-256
Panama	-15	-15	-30
Papua New Guinea	0	0	0
Paraguay	12	8	20
Peru	-10	-10	-20
Philippines	-130	-160	-290
Poland	-29	-36	-65
Portugal	-27	-23	-50
Puerto Rico	-25	-33	-58
Qatar	35	10	45
Réunion	0	0	0
Romania	-15	-15	-30
Rwanda	-6	-4	-10
Saõ Tomé and Principe	0	0	0
Saudi Arabia	245	80	325
Senegal	35	15	50
Seychelles	-1.5	-1.5	-3
Sierra Leone	0	0	0
Singapore	-6	-4	-10
Solomon Islands	0	0	0
Somalia	19.6	6.5	26.1
South Africa	11	9	20
Spain	19	16	35
Sri Lanka	-120	-70	-190
St. Kitts and Nevis	-3	-3	-6
St. Lucia	-1.5	-1.5	-3
St. Vincent and the Grenadines	-1	-1	-2
Sudan	15.4	9.5	24.9
Suriname	-3	-2	-5
Swaziland	0	0	0
Sweden	17.5	17.5	35
Switzerland	0	0	0
Syrian Arab Rep.	-54	-36	-90
Taiwan, China	-50	-50	-100
Tanzania	6	4	10
Thailand	-15	-15	-30
Togo	0	0	0
Tonga	-2.2	-2.2	-4.4
Trinidad and Tobago	-12	-8	-20
Tunisia	0	0	0
Turkey	-36	-31	-67
Uganda	-25	-20	-45
United Arab Emirates	75	25	100
United Kingdom	-75	-75	-150
United States of America	1,537	1,363	2,900
Uruguay	-9	-7	-16
U.S.S.R.	-20	-20	-40
Vanuatu	-1.5	-1.5	-3
Venezuela	45	30	75
Viet Nam	-57	-43	-100
Virgin Islands (U.S.)	-1.3	-1.1	-2.4
Western Samoa	-7	-7	-14
Yemen, People's Dem. Rep. of	-16	-5	-21
Yemen Arab Rep.	-11	-4	-15
Yugoslavia	-13	-12	-25
Zaire	3	2	5
Zambia	0	0	0
Zimbabwe	0	0	0

a. For a listing of countries and economies in the "other" categories, see Table B-10.
Source: Arnold 1989.

net migrants is assumed to approach zero linearly in each country, at the estimated rate of change in their number from the period 1990–95 to the period 1995–2000, or at a rate that would make their number zero by 2025–30, whichever rate is faster. For these later periods, a zero total for worldwide net international migration was obtained by adjusting initial estimates of net migrants in three major receiving countries—the United States, Australia, and Canada—upward or downward as necessary by a proportion constant across these countries but varying by quinquennium. These adjustments were of 1 or 2 percent for the earlier periods, which is negligible compared with the volume of migration assumed for these countries, but were up to 10 percent for later periods.

The age-sex distributions of migrants are determined from alternative models based on their sex ratios. If migration is heavily male, migrants are assumed to be concentrated in the age group 15–30, which includes few children or elderly. If migration is more balanced between males and females, proportionately more migrants are assumed to be children and elderly (Hill forthcoming).

The revised migration estimates are higher than the previous estimates, particularly for the near future. In the base period, annual total net moves (that is, not counting any moves that are balanced by moves in the opposite direction) were 900,000 in the previous estimates and are 1.1 million in the revised estimates. For the following two quinquennia, the changes are larger, going from 630,000 net moves to 990,000 and from 380,000 net moves to 890,000. Nevertheless, even the largest of these figures is only 1 percent of annual world growth, or the equivalent of the annual increase in a single moderate-fertility country such as Turkey.

The estimates assign to the United States more net immigrants in 1985–90 than to all other countries of the world combined. Other major destination countries are Australia, Saudi Arabia, Canada, and Côte d'Ivoire. Mexico has by far the largest net emigration, and its dominance in this area is expected to increase in the 1990s.

Summary of Results

The following brief discussion of projection results focuses, first, on the population of the world and the continents; second, on the population of subcontinental geographic regions and of countries grouped by income; third, on the population in World Bank regions, which differ from the U.N. geographic regions; and, finally, on the population of particular countries or economies.

Table 4. *Total Population, Annual Increase, and Growth Rates for the World and Less Developed and More Developed Countries, 1985–2025*

Year or period	World	Country group: Less developed	Country group: More developed
		A. Population (millions)	
1985	4,844	3,666	1,179
1990	5,285	4,074	1,211
1995	5,744	4,504	1,240
2000	6,204	4,939	1,265
2005	6,663	5,376	1,287
2010	7,112	5,808	1,304
2015	7,556	6,237	1,319
2020	7,993	6,663	1,330
2025	8,415	7,078	1,336
		B. Annual increase (millions)	
1985–1990	88.2	81.7	6.5
1990–1995	91.7	85.9	5.8
1995–2000	92.1	87.0	5.1
2000–2005	91.7	87.4	4.3
2005–2010	89.9	86.4	3.5
2010–2015	88.7	85.7	2.9
2015–2020	87.5	85.3	2.1
2020–2025	84.4	83.0	1.4
		C. Growth rate (percent)	
1985–1990	1.74	2.11	0.54
1990–1995	1.66	2.00	0.47
1995–2000	1.54	1.84	0.41
2000–2005	1.43	1.70	0.34
2005–2010	1.31	1.55	0.27
2010–2015	1.21	1.42	0.22
2015–2020	1.13	1.32	0.16
2020–2025	1.03	1.21	0.10

Note: "More developed" comprises Europe, U.S.S.R., Northern America (United States and Canada), Australia, New Zealand, and Japan. "Less developed" comprises the rest of the world.

World and Continents

For the world and the continents, the following estimates are considered: population totals and medium-term growth; long-run growth; age structure and dependency; and the fertility and mortality rates underlying the projections.

WORLD POPULATION. The population of the world is estimated at 4.84 billion for 1985. It surpassed 5.0 billion in mid-1987 and is projected to reach 5.3 billion in 1990 (Table 4). The annual rate of growth in 1985–90 has been 1.74 percent. This rate is projected to decline to 1.66 percent in the first half of the 1990s and to continue dropping to 1.54 percent toward 2000. In spite of this, the annual net increase in the number of people will be larger each year until the late 1990s, averaging close to 92 million people annually, with a projected all-time-high increase of more than 92 million around 1998. The projections show that it will take only eleven years to add another billion to the 5 billion people of 1987. Despite a declining trend in fertility, population growth in the short term will clearly be very high.

After the turn of the century, population will continue to grow, although at a somewhat slower rate. The 7 billion mark will be reached before the end of the year 2010. By 2025, because of differences in growth rates between less developed and more developed countries, 84.1 percent of the world's population will be living in what are currently less developed countries, up from 75.7 percent in 1985.

These projections differ only slightly from U.N. (1989) and previous World Bank projections (Zachariah and Vu 1988). Figure 6 shows that the estimate of the population in less developed countries by 2025 is 0.5 percent lower than the U.N. estimate and 3.0 percent higher than the previous World Bank estimate. Figure 7 shows that the estimate of the population in more developed countries by 2025 is 1.0 percent lower than the U.N. estimate and identical to the previous World Bank estimate. The differences are due not only to differences in procedures for projecting vital rates but also to slightly different estimates of current population and vital rates.

CONTINENTS. Current and projected population and growth rates by continent are shown in Table 5. In these geographic groupings, North and South America are considered together, the U.S.S.R. is combined with Europe, and Australia is combined with the Pacific under Oceania. (The population of Antarctica is insignificant.) The percentage distribution of world population by continent is represented for 1985, 2000, and 2025 in Figure 8.

Figure 6. *Projected Population in Less Developed Countries, 1985–2025*

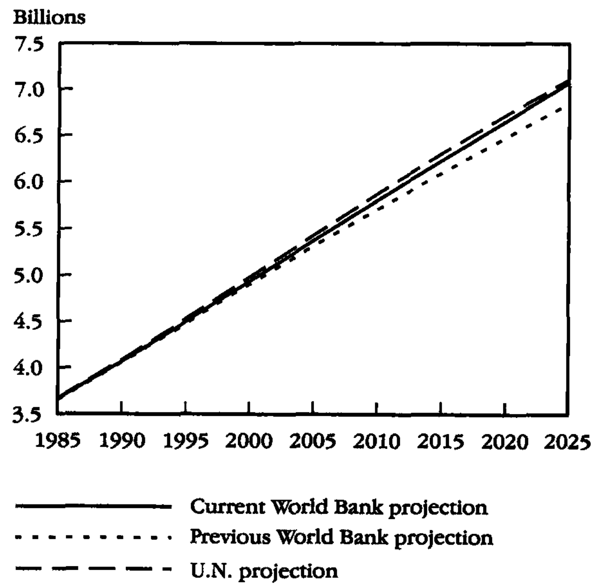
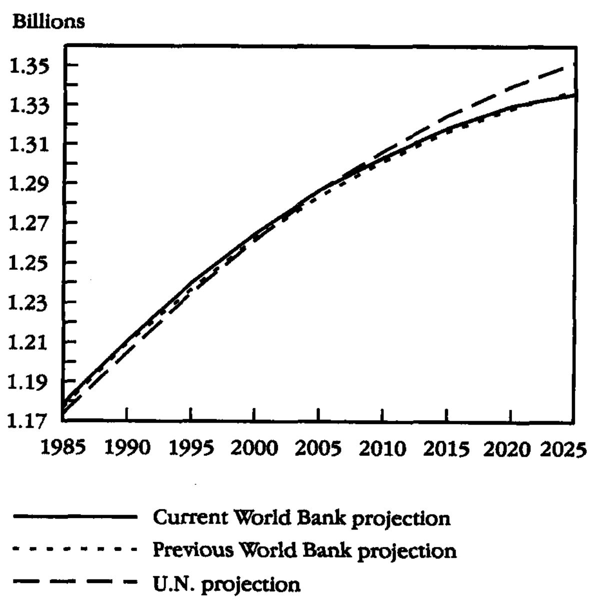


Figure 7. *Projected Population in More Developed Countries, 1985–2025*



Asia, with the two most populous countries in the world, accounts for 58 percent of the world's population and currently contributes 63 percent of the annual increase, or about 55 million people. By 2025, Asia will still be adding about 45 million people annually. However, by that year, the proportion of the world's population in Asia is expected to be no different from the 1985 proportion, despite a projected 74 percent increase in the Asian population from 1985 to 2025.

Table 5. *Total Population, Annual Increase, and Growth Rates for Continents, 1985–2025*

Year or period	*Africa*	*America*[a]	*Asia*	*Europe, U.S.S.R.*	*Oceania*
		A. Population (millions)			
1985	559	667	2,823	771	25
1990	651	721	3,100	787	27
1995	753	775	3,385	801	29
2000	870	826	3,664	813	31
2005	1,000	873	3,934	823	33
2010	1,139	918	4,190	831	35
2015	1,285	962	4,434	838	36
2020	1,435	1,003	4,673	844	38
2025	1,587	1,040	4,901	848	39
		B. Annual increase (millions)			
1985–1990	18.2	10.9	55.4	3.3	0.4
1990–1995	20.5	10.9	57.1	2.7	0.4
1995–2000	23.3	10.2	55.7	2.4	0.4
2000–2005	26.0	9.4	53.9	2.0	0.4
2005–2010	27.8	9.0	51.1	1.6	0.4
2010–2015	29.2	8.8	48.9	1.4	0.3
2015–2020	30.1	8.3	47.8	1.1	0.3
2020–2025	30.4	7.2	45.6	0.8	0.2
		C. Growth rate (percent)			
1985–1990	3.02	1.57	1.87	0.42	1.63
1990–1995	2.93	1.45	1.76	0.34	1.59
1995–2000	2.88	1.27	1.58	0.30	1.40
2000–2005	2.79	1.10	1.42	0.25	1.21
2005–2010	2.60	1.00	1.26	0.20	1.04
2010–2015	2.41	0.94	1.14	0.17	0.89
2015–2020	2.21	0.84	1.05	0.13	0.72
2020–2025	2.02	0.71	0.95	0.10	0.59

a. America comprises both North and South America.

Africa is growing much faster, at more than 3.0 percent annually as opposed to only 1.9 percent for Asia. Africa currently has a smaller population than Asia, Europe and the U.S.S.R., and North and South America, but by the year 2000 Africa will be second in size only to Asia. Annual growth rates in Africa are projected to stay above 2 percent at least until 2025, by which year the continental population will have almost tripled.

America, with 14 percent of the world's population, includes both more developed and less developed countries and is growing as a whole more slowly than Africa and Asia. By 2025, its population will have increased by half, but its share of the world's population will have fallen to 12 percent. The small Oceania group is projected to experience growth essentially similar to that of America.

Europe and the U.S.S.R., now second in size to Asia, will be only fourth among these continents by 2025. Its share of the world's population will shrink from 16 percent to 10 percent. This projection assumes that fertility, currently below replacement level for the group and for many countries within the group, will rise to replacement level by 2030. Should this not happen, the projected 10 percent increase in the population by 2025 could be smaller, or could even become a decrease.

LONG-RUN TRENDS. The long-run implications of the projection assumptions are illustrated in Table 6, which shows projections up to 2100 as well as other indicators. If every country and economy reaches replacement-level fertility by or before 2060, the world's population will be more than 11 billion by the end of the next century. Another 300 million will be added before the population becomes stationary, that is, before the growth rate falls to zero.

Table 6 shows two ratios, that of the projected stationary population to the 1985 population, and that for population momentum. The latter is the ratio to the 1985 population of the eventual stationary population under the special assumptions that fertility drops to replacement level immediately, mortality stays constant at current levels, and no migration takes place. (Previous estimates of momentum in *World Development Report* have allowed mortality to decline.) It is effectively an indicator of the amount of future population growth that can be attributed solely to the current age structure of a population. An illustration of the importance of momentum is the fact that more than 1 billion of the stationary world population will be added because of momentum after replacement fertility is achieved.

Population momentum is considerably lower for more developed than for less developed countries. For more developed countries, only 10 percent growth can be expected because of the age structure. Nevertheless, this will still be the main source of growth for these countries, as indicated by the stationary population being only 10 percent larger than the current population.

Across continents, population momentum is highest for Africa at 1.6, but it is clearly only a small part of future growth. The projected stationary African population is more than five times its 1985 population.

AGE STRUCTURE. Of the 4.84 billion people in 1985, 60 percent were of working age, that is, aged 15–64; this gives a dependency ratio (of those younger and older combined per hundred members of this group) of 67. By 2025 the world dependency ratio is projected

Figure 8. *Percentage Distribution of World Population by Continent, 1985, 2000, and 2025*