

# THE FUTURE OF FERTILITY IN INTERMEDIATE-FERTILITY COUNTRIES

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## **Abstract**

*This paper reviews the status of the fertility transition and the processes that have led to the nearly universal reductions of fertility achieved so far. The state of current knowledge, buttressed by the actual experience of a growing number of countries, suggests that lengthy periods of below-replacement fertility are likely to be common in the future. Revised guidelines for the United Nations 2002 Revision for the projection of fertility in today's intermediate-fertility countries are proposed based on the recognition that replacement-level fertility is not necessarily hard-wired in the evolution of populations. The proposed guidelines imply that, under the medium variant, approximately 80 per cent of the world population will be projected to have below-replacement fertility before mid-century.*

## INTRODUCTION

Since the late 1960s, when the baby-boom that had raised fertility levels in many parts of the developed world was rapidly turning into a baby-bust, very low fertility has prevailed in many of the countries that had embarked early on the demographic transition. Thus, fertility levels have remained consistently below 2.1 children per woman for at least 25 years in 20 European countries and Japan, and by 1995-2000 a further 44 countries were exhibiting below-replacement fertility. Although such low levels of fertility are mostly characteristic of European countries, they have not been confined to that major area. Several Caribbean islands (Barbados, Cuba, Guadeloupe, Martinique, Puerto Rico and Trinidad and Tobago) as well as a number of countries or areas in Eastern and South-Eastern Asia (China, the Democratic People's Republic of Korea, Hong Kong SAR, Macao SAR, the Republic of Korea and Singapore) are also part of the group and have the distinction of having joined it even though their fertility began to decline well after 1950. That is, for these countries, just as for the early starters, the decline of fertility has not stopped at replacement level and in this "post-transitional phase", fertility may not necessarily return to replacement level over the foreseeable future.

In its fifty years of preparing population estimates and projections for all countries and areas of the world, the United Nations Population Division has been concerned with the challenge of projecting the future fertility levels of countries with very low fertility. Already in the *1968 Revision*, the medium-variant projection for Japan kept its fertility levels slightly below replacement level for part of the projection period, and in the *1978 Revision*, China was projected to exhibit below-replacement fertility by 2000. However, until the late 1980s, when projections were being made with a time horizon that extended only to 2025, the number of countries whose fertility was projected to be or remain below replacement level for a good part of the projection period was small. In the 1990s, as the number of countries with very low fertility increased, a more systematic treatment of those countries became necessary. To review the guidelines for the projection of fertility in countries with below-replacement fertility, the Population Division convened in 1997 a meeting of experts to discuss the causes of the changes observed and the

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prospects for the maintenance of below-replacement fertility over the long run. The assumptions underlying the *1998 Revision* were the first to reflect the debates and conclusions reached during that meeting.

In 2001, a similar meeting of experts was convened to discuss prospects for countries where fertility had not yet begun to decline or where fertility declines were incipient. The importance of those countries was underscored by the results of the *2000 Revision* where their fertility was projected to decline more slowly than in the *1998 Revision*. As a result of such a change, the high-fertility countries contributed about a quarter of a billion additional persons to the world population in 2050, in spite of the substantial reductions in fertility projected under the medium variant. Were those reductions in fertility to be postponed further or to be less substantial than projected, the resulting population growth would have been even more marked.

Lastly, a further development that merits consideration is the discussion of future prospects for the decline of fertility to levels below replacement in the numerous countries that are already far advanced in the fertility transition. If, following the precedent set by their European counterparts, most of those countries were to progress to below-replacement levels as they complete the transition to low fertility and maintain such levels for prolonged periods, both the growth of their populations and the speed of population ageing would be affected. It is therefore the purpose of this meeting to discuss the array of factors that seem relevant in explaining the persistence of very low fertility and to assess their likely relevance and impact for countries that are still undergoing the transition from high to low fertility, most of which have reached intermediate fertility levels. The aim of such an assessment is to provide some guidance in the formulation of specific assumptions about future fertility levels for those countries. This paper presents a general approach to the formulation of projection assumptions and sets forth concrete proposals regarding the future path of fertility for the intermediate-fertility countries.

#### A. THE ISSUES

The prolonged prevalence of below-replacement fertility levels leads eventually to outright reductions of the population unless net migration gains are also sustained and sufficiently large to counterbalance the decline in the number of births. Furthermore, in the absence of migration, the lower the level of fertility attained and maintained, the more rapid the speed of population ageing, and when a population reaches advanced stages in population ageing and a steady decline of the proportion of persons in the reproductive ages sets in, the return of fertility to levels above replacement will not immediately halt the reduction of the overall population. That is, just as a prolonged regime of high fertility produces a population that keeps on growing for at least a generation after below-replacement fertility sets in, prolonged periods of below-replacement fertility create a population whose reproductive dynamics have an in-built momentum toward population decline. In brief, neither sustained fertility levels above replacement nor those below replacement lead to a steady state in terms of population growth. This fundamental principle in population dynamics has explicitly or implicitly guided thinking about long-term fertility trends among demographers in general and in the United Nations Population Division in particular.

Although our knowledge about the dynamics of populations throughout human history is sketchy, it is certain that the trends experienced during the twentieth century have been unique. Never before had the world's population grown so rapidly and for such a prolonged period as in second half of the twentieth century. And never before had global reductions in the growth rate been achieved by the sustained and expanding reduction of fertility among the peoples of the world. In the 1950s, when population dynamics in the developing world began to be measured systematically, demographers warned of the unsustainable nature of prolonged and rapid population growth. Population projections were a valuable tool in calling attention to the challenges that lay ahead. Perhaps remarkably, the United Nations Population Division

projected in the early 1960s that the population in 2000 would be close to 6.1 billion (medium variant), a figure very similar to that estimated in the *2000 Revision*. Even in the late 1950s and early 1960s, when there was a yet no conclusive evidence suggesting that fertility reductions were about to take place, these projections resulted from assumptions that foresaw important reductions in fertility in almost all regions. The necessity of those reductions to achieve eventually a steady state in which births and deaths would nearly balance each other was a clear, if perhaps unstated, premise guiding the assumptions made.

Today, when there is convincing evidence that reductions of fertility have started in almost all countries of the world, the focus has shifted to discussion about the “end of population growth”, a phrase increasingly used to evoke population declines.<sup>1</sup> The results of current population projections are interpreted as meaning that further reductions of fertility are inevitable in every population and scant attention is given to the fact that, even if those fertility reductions materialize as projected, the global population will continue to increase to unprecedented levels and, perhaps more importantly, that most of the population growth expected will be concentrated in specific regions, thus maintaining the heterogeneity of population dynamics at the regional, country and sub-national levels for many decades to come.

It is in this context that the key question posed by this meeting arises: should the attainment of the steady state in population dynamics during the next fifty years be the most realistic standard followed by the projections of countries that are far advanced in the transition to low fertility? Or, alternatively, if as suggested by the experience of developed countries, actual fertility reductions have no respect for the steady state and very often produce levels well below those needed to attain it, which below-replacement level or levels should be projected for the future and how rapidly should they be attained?

In answering these critical questions it will be useful to bear in mind the implications of different errors. Since no one is likely to predict the future accurately most of the time, errors will necessarily occur. If, for a given country, projected fertility levels over the long run turn out to be higher than those actually experienced by the country in question, the country will eventually have less people and an older population than originally expected but, other things being equal, will likely have more resources per capita than with a larger population. If, on the contrary, projected fertility over the long run turns out to be lower than actual fertility, the needs of larger numbers of people than expected will have to be accommodated. At the regional or world levels, the predominance of the first type of error will result in a higher population than the actual one and the reverse will be true if the second type of error predominates. In the history of the Population Division’s population projections, an *a posteriori* assessment suggests that the first type of error has tended to predominate. Thus, as several commentators have remarked before, the medium variant has tended to produce higher populations than actually attained at the world level (figure 1). Of course, that overall tendency has been the result of decisions made independently at the country level where, especially in a context of unprecedented fertility reductions, analysts have underestimated, on average, the actual rate of decline. In particular, because it is difficult to predict the onset of fertility reductions in countries where fertility has not yet shown any signs of change, projections have tended to miss the point of inflection. Thus, although by the early 1970s the population projections of the United Nations were already based on the assumption that fertility reductions would eventually occur in all regions, the timing of those reductions was uncertain and was not necessarily forecast accurately for every country. As it turned out, the *1973 Revision* was right in assessing that the last region to experience significant fertility reductions would be Africa, where fertility decline was projected to start toward the end of the 1980s, and that poor socio-economic prospects would generally be associated with slow reductions of fertility, as the experience of the least developed countries as a group exemplifies, despite the notable exceptions that have occurred among them.

The question posed today involves similar challenges. Even if it is established with some certainty that most countries whose fertility is still well above replacement level are very likely to

experience long periods of below-replacement fertility in the future, the level of below-replacement fertility that each one of them would attain, the period when that level would be reached and the length of time over which below-replacement fertility would prevail are all uncertain and difficult to forecast. The experience of the current low-fertility countries is varied. In 1995-2000, their total fertility levels ranged from 1.12 children per woman to 2.06 children per woman, with a mean of 1.57 children per woman (table 1). However, for countries where below-replacement fertility has persisted for more than five years, the 1995-2000 value was generally the minimum attained. If the average level of fertility maintained over the period in which each low-fertility country experienced below-replacement levels were considered instead, that average ranged from a minimum of 1.38 children per woman to a maximum of 2.08 children per woman, having a mean of 1.76 children per woman. Further examination of the trends experienced since 1950 by the low-fertility countries indicates that many of them already were in the last stages of the transition to low fertility by 1950-1955, having reached total fertility levels below 3 children per woman. Since the majority of intermediate-fertility countries of today still have fertility levels above 3 children per woman and the group of low-fertility countries whose total fertility in 1950-1955 was above 3 children per woman includes most of the developing countries that have already seen their fertility drop to below-replacement levels, it is useful to compare the recent levels of fertility of the latter with those of all low-fertility countries. In terms of total fertility levels in 1995-2000, the group of low-fertility countries with high fertility in 1950-1955 had a slightly higher mean total fertility than that of all low-fertility countries (1.71 children per woman vs. 1.57 children per woman). In addition, in terms of average levels of total fertility experienced while below-replacement levels have prevailed, the low-fertility countries with high fertility in 1950-1955 have a higher mean than that all low-fertility countries (1.81 children per woman instead of 1.76 children per woman). From these comparisons and assuming that the past experience of low-fertility countries can provide some guidance about the future average levels of below-replacement fertility that today's intermediate-fertility countries might reach and maintain in the future, a rounded value of about 1.8 children per women seems to be a realistic starting point.

Turning now to the two other issues of concern in projecting below-replacement fertility for intermediate-fertility countries, namely the timing of the transition to below-replacement fertility and the length of the period over which it should prevail, past experience provides weak guidance on both points. Among the low-fertility countries of today, several experienced a relatively prolonged period of below-replacement fertility earlier in the twentieth century but in most cases fertility rebounded to levels well above replacement during the 1940s, 1950s and even into the 1960s. In most of the low-fertility countries that experienced very low levels of fertility in the 1920s and 1930s, that early transition to below-replacement fertility was not abrupt, but represented rather a continuation of long-term declining trends (Teitelbaum and Winter, 1985). In contrast, for the developing countries that have reached below-replacement fertility levels after 1950, the transition to below-replacement fertility has been less protracted. There is reason to expect, therefore, that if intermediate-fertility countries reach below-replacement fertility, they might do so relatively rapidly, that is, without maintaining low but above-replacement fertility levels for a long time.

There are examples, however, of developing countries where the transition to low fertility occurred fairly early but whose levels of fertility have not fallen as yet even to replacement level. Argentina and Uruguay are cases in point. In both, total fertility was already low by world standards in 1950-1955, at about 3 children per woman, but it has remained consistently above 2.1 children per woman over the next forty-five years, being still 2.6 children per women in Argentina and 2.4 in Uruguay in 1995-2000. Neither high inflation, recessions, war, high levels of education, nor relatively high levels of female labour force participation have produced below-replacement levels in Argentina. Whether both countries will continue to display such exceptional fertility trends in the future and whether they represent patterns that will repeat themselves in other countries, particularly those in South America, is a matter that will not be easily settled given current evidence.

Lastly, with respect to the persistence of below-replacement fertility, past evidence is not conclusive. As already mentioned, the baby-boom of 1945-1960 interrupted the below-replacement period for many developed countries and there is no guarantee that “baby-boomlets” might not occur in the future in other contexts. In fact, earlier *Revisions* of the population projections had generally opted to make the fertility of low-fertility countries return to replacement level, at least in the long run. However, starting with the *1998 Revision*, the return to replacement level by 2050 was no longer considered to be very likely and the total fertility of most low-fertility countries was maintained well below replacement level until 2045-2050. Partly because of that change in thinking, the issue of whether 2.1 is a realistic target level for future total fertility in most developing countries has been raised. If it is agreed that the target level should be changed to a lower number, it would seem appropriate to maintain that level constant until 2045-2050 since the evidence available today is unlikely to permit the forecast of long-term fluctuations in future total fertility. Furthermore, in contrast with the case of low-fertility developed countries, detailed information on fertility trends does not exist for many of the intermediate-fertility countries. Lack of data, therefore, would preclude the analysis of cohort fertility in relation to period fertility to try and ascertain, for instance, if postponement of births might depress period rates only temporarily and if a recuperation would be likely.

In sum, just as the analysts in charge of producing the population projections of the 1960s and early 1970s, those of today are faced with the task of considering whether a second momentous and largely unprecedented change in population dynamics will occur within the next fifty years. Will below-replacement fertility become the norm for the large majority of countries in the world before 2050? Will the period of below-replacement fertility be prolonged in most countries? Just as our predecessors, the main evidence guiding our decisions today is that provided by the experience of the developed countries and the few developing countries that have already blazed the trail toward very low fertility. Given the rapid fertility reductions already experienced by the majority of developing countries, it seems increasingly untenable that their fertility may eventually stabilize at a level considerably higher than the average experienced by developed countries. Despite the theoretical attractiveness of replacement level fertility, actual populations do not have replacement as an in-built goal, and long-term deviations from replacement level may turn out to be more the rule than the exception, especially if they remain within a narrow range of actual replacement level.

## B. GUIDANCE FROM THEORY

Recognizing the crucial importance and unprecedented nature of sustained reductions of fertility occurring in the absence of crisis, population specialists have been studying their causes for at least fifty years. The literature on the subject is rich and varied. However, assessments of the state of knowledge published recently conclude that we are still far from knowing exactly what factors were responsible for triggering and sustaining the marked fertility reductions that have taken place (Bulatao and Casterline, 2001; Casterline, 2001a). Cleland (2001a), for instance, qualifies as “bewildering” the variety of circumstances under which fertility decline has occurred: it has taken place when economic conditions have been improving and when they have deteriorated; it has occurred in populations with high standards of living and in those where standards of living are low; it has taken hold in countries with strong links to the global consumer culture and in those where those links are weak; and it has happened under a wide array of political regimes and policy settings. Although one combination of factors and circumstances may be able to explain the fertility reductions that have occurred in some cases, it cannot do so in other cases.

Casterline (2001b) notes that the earliest efforts to explain the decline in fertility linked it with the other major social and economic transformations that had occurred in the nineteenth and early twentieth century in the developed world, namely, industrialization and urbanization. These transformations were seen as increasing the costs of rearing children and decreasing the benefits that children conferred on

older generations (Thompson, 1929; Davis, 1945; Notestein 1945 and 1953). The importance of mortality decline as a precondition for fertility reductions was also recognized (Davis, 1963) and it was argued that changing notions about the family (Aries, 1962, 1980; Caldwell, 1982) and declining adherence to religious and ethical systems (i.e. the increasing “secularization” of populations) also played a part (Lesthaeghe, 1983).

However, when these ideas were put to the test, they did not prove conclusive. In the 1970s, two large projects to analyse the factors leading to fertility decline were started, namely, the Princeton European Project and the analysis of the World Fertility Survey (WFS) data. Both of them reached similar conclusions (Casterline, 2001b; Cleland, 2001b). The Princeton European Project focused on the analysis of aggregate demographic data for the provinces of Europe during the period of their transition to low fertility, namely 1880-1930 (Coale and Watkins, 1986). The study concluded that the timing of the onset of fertility reductions was only weakly linked to provincial levels of socio-economic modernization but unmistakably linked to language, ethnic or religious cleavages. Moreover, the decline of marital fertility in Europe did not seem to be fueled by changes in the value of children (Knodel and van de Walle, 1986).

Focusing on developing countries, many of which were just starting the transition to low fertility, the analysis of WFS data reached similar conclusions. As in the European project, socio-economic factors were only weakly linked to the reductions of fertility observed. Women’s labour force participation, for instance, was not a predictor of fertility levels in most countries (United Nations, 1985), and the shift from familial to non-familial modes of production did not have the expected effect on family size (Rodriguez and Cleland, 1981). The availability of more data and the expanding number of countries experiencing fertility reductions have not changed these conclusions. A recent study by Bongaarts and Watkins (1996) examined the relationships between the Human Development Index (HDI), the onset of fertility decline, and the subsequent pace of that decline in contemporary developing countries. Once more, the link between the HDI and the onset of fertility decline proved to be weak, since countries began the fertility transition at very varied levels of HDI. However, those that began the transition having reached relatively high levels of socio-economic development, generally maintained faster rates of fertility decline.

According to Casterline (2001b, p. 2), “confronted by the findings of the Princeton project, scholars turned to other explanations to augment, or even to supplant, the dominant theoretical framework in which the primary causal forces underlying fertility decline were mortality decline and the paradigmatic economic and social changes that occurred in Europe in the nineteenth and early twentieth centuries”. The alternatives proposed have been loosely collected under the label of “diffusion theories”. The Princeton European Project proved that the explanatory power of variables measuring industrialization, urbanization, state centralization, bureaucratization and other aspects of socio-economic status at the province level had at best modest effects in predicting the onset of fertility declines in conventional regression analysis. As a result, better models of how diffusion and resistance to diffusion may work in societies that are sharply divided along linguistic, ethnic or religious cleavages have been developed. In a sweeping review of the evidence, Cleland and Wilson (1987) suggest that no version of demand theory, that is, economic formulations invoking the need for structural changes in the position of individuals as a precondition for fertility reductions, can ultimately account for the onset, pace and geographic location of fertility reductions in the developing world. Instead, these reductions appear to be driven by ideational changes stemming from processes of diffusion. Similar conclusions had been reached earlier by Caldwell (1982), who suggested that ideational change (i.e. “Westernization”) precedes and is partially independent of changes in the forms of production and of population distribution. Bongaarts and Watkins (1996), after reviewing aggregate empirical evidence on the relation between socio-economic factors and the onset and pace of fertility decline, also conclude that much of the decline observed has been propelled by the transmission of information and ideas regarding fertility control. Their conceptualization of what is being transmitted includes both processes of diffusion among individuals and

families (at the level of local networks and peers) and at the level of communities or countries (global and national networks).

In their reviews of diffusion processes and the fertility transition, Casterline (2001b) and Cleland (2001b) suggest that an overarching explanation for that transition probably needs to make use of a “blended theory” in which, as Cleland (2001b, p. 45) puts it: “the engine of demographic change is the structural transformation of societies, and diffusion is the lubricant”. One possible blended approach is that suggested by Lesthaegue and Vanderhoeft (2001) based on the three preconditions proposed by Coale (1973) for adaptation to a new mode of behaviour. According to Coale, fertility reductions would occur when couples were ready, willing and able to control family size. Lesthaegue and Vanderhoeft interpret readiness to mean that the new forms of behaviour must be advantageous to the actor involved, that is, their utility must be evident and outweigh their disutility. In this sense, readiness encompasses or is equivalent to the microeconomic cost-benefit calculus that actors use in making decisions. The notion of willingness refers to considerations of legitimacy and normative acceptability (that is, conformity with ethical, religious or other societal norms) of the new pattern of behaviour. To assess the level of willingness it is crucial to understand to what extent a new form of behaviour runs counter to established traditional beliefs or codes of conduct and whether the actor can overcome existing moral objections and fears. Lastly, ability involves access to new techniques that make the new forms of behaviour possible. In the case of fertility control, the notion of ability depends on the accessibility to adequate contraceptive methods mediated by the costs involved both in concrete and psychological terms.

Clearly, this formulation of Coale’s proposal merges the concerns of the economic and diffusion approaches. With respect to fertility reductions, diffusion can play a part in both increasing willingness and ability. Willingness is affected by the diffusion of ideas that transform the normative environment and legitimize the control of fertility. Such diffusion may be officially promoted through established programmes and focused interventions. Ability can also be enhanced by programmes that make modern contraceptive methods widely available and take steps to reduce not only the material costs associated with their use but also the psychological costs involved. Application of the models developed by Lesthaegue and Vanderhoeft clearly show how fertility reductions can be delayed or slowed if any of the three necessary conditions poses a barrier to the adoption of behaviours to limit family size.

In comparison to the state of theory regarding the transition from high to low fertility, the state of that regarding the achievement and maintenance of below-replacement fertility is less advanced. However, it is useful to review the history and state of the former because the latter is probably at the stage the theory of the fertility transition was in the early 1970s. The literature addressing the causes and persistence of below-replacement fertility has largely focused so far on the importance of socio-economic factors acting at the level of communities or countries. As Lesthaegue and Willems (1999) indicate, there are two dominant theoretical approaches cited to understand the persistence of below-replacement fertility. The first relies on economic theory and has two dominant versions: (a) the theory of increased female autonomy, proposed by Becker (1981) and other neoclassical economists; and (b) the theory of relative economic deprivation, advanced by Easterlin (1976) and colleagues. In both theories, rising female schooling and employment are crucial determinants of low fertility. According to Becker, rising education of women increases the opportunity costs of childbearing for women and therefore leads to postponement of marriage, motherhood and lower fertility. According to Easterlin and colleagues, high and rising consumption aspirations can be better satisfied in dual-earner families, a situation that leads to increased labour force participation of women, postponement of parenthood and lower fertility. Oppenheimer (1988) has further suggested that the increasing education of women raises women’s aspirations regarding the qualifications of a future spouse and therefore prolongs the search in the marriage market thus postponing marriage or even precluding it altogether if the appropriate partner is not found.

The second approach relates changes in value orientations to family building. For a number of European countries, Lesthaegue and Willems (1999, p. 224) report that “consistent statistical associations have been found between such value dimensions as secularization, weaker civil morality, accentuation of individual autonomy, “postmaterialism”, symmetric gender roles, female emancipation, and tolerance of new sexual groups on the one hand, and a preference for cohabitation over marriage, delayed parenthood, and lower overall fertility on the other hand”. These associations persist even when other socio-economic variables are controlled for, including female labour force participation, type of employment, and education.

Other authors who have tried to address the causes of prolonged periods of very low fertility have proposed arguments of a similar nature. Chesnais (2000) in identifying recent changes leading to post-modernity and the baby-bust, talks about “social atomization and related feminism”, indicating that high levels of education and the possibility of having their own independent identity allow women to forego marriage and focus on their personal achievement rather than on reproductive goals. He notes that the proportion of single women aged 25-29 in many European countries has reached unprecedented levels and that the proportion of one-person households, where women predominate, has also been rising as a result of both celibacy and divorce. Chesnais also argues that the availability of collective pension benefits has put a downward pressure in childbearing since it is no longer necessary to have several children to ensure old-age economic viability. In fact, the individual’s economic interest is better served by maximizing his or her career prospects since the number of children raised is not taken into account in computing pensions. Dorbritz and Hohn (2000) add that changes in the basic social institutions of marriage and the family have a major influence in reducing childbearing. In developed countries, people no longer marry and remain married until death. High divorce rates are common. Furthermore, married people often live apart for prolonged periods, in pursuing individual careers or other interests. Rising ages at marriage, increasing childlessness and celibacy, and high divorce rates seem to be the traits of the “post-modern” society.

However, analysis of trends in low-fertility countries reveals more variability than this discussion would lead one to expect (United Nations, 2000a; Lesthaegue and Willems, 1999). Age at marriage or age at first birth has increased dramatically in some countries but not in others; cohabitation before marriage is common in some countries and not in others; high levels of illegitimacy (births conceived outside marriage) are common in some countries and not in others; policy stances vary considerably among the low-fertility countries; in some countries there is clear evidence that the current very low levels of fertility are the result of postponement but in others the normal indicators of postponement play a small part in explaining below-replacement levels. This “bewildering” situation, to borrow Cleland’s adjective for the host of circumstances in which fertility declines have occurred, provides a weak basis for ascertaining which factors can indicate today whether a country whose current fertility has still an intermediate level will reach below-replacement levels twenty or thirty years from now.

That populations with quite different levels of socio-economic development and varied demographic trends regarding family formation have reached and maintained below-replacement levels of fertility for relatively prolonged periods suggests that some kind of diffusion process may be at work. What is diffused is not yet clear: values, attitudes, individualism, feminism, consumerism, secularization? But whatever it turns out to be, it may be as potent as the diffusion of ideas that has already taken place and that seems to be at the root of many of the transitions from high to low fertility that we have witnessed so far. This line of argument, which posits that the diffusion of ideas and values can be a powerful force leading to very small family sizes, would justify the revision of the guidelines regarding the projected fertility of intermediate-fertility countries.

Another important conclusion drawn from this discussion is that the search for lead indicators of fertility reductions likely to result in below-replacement levels as a precondition for the formulation of

revised projection guidelines would not be a fruitful endeavour. Not only is it unlikely that a few easily measurable factors would act as lead indicators but, in addition, it may be necessary to project their values in the future to try to ascertain if they warrant a future reduction of fertility to below-replacement levels. Such exercise will probably result in less reliable projections of fertility than those derived from current methods mainly because most economic, social or diffusion indicators are likely to be far more volatile than population trends. In this regard, it is of interest to recall the results of the report by the Panel on Population Projections of the National Research Council (Bongaarts and Bulatao, 2000). In assessing the adequacy of lead indicators to project total fertility from one five-year period to the next, the Panel found that, for countries in the middle of the transition to low fertility, the rate of fertility change in the period immediately preceding the reference period had the strongest predictive power for the rate of change in the reference period when compared with other socio-economic factors (i.e., infant mortality, female secondary school enrollment, and percentage urban). However, the predictive power of the rate of fertility change declined for periods further apart and it was virtually nil for trends more than ten years into the future. For countries very far advanced in the transition, the analysis did not find any useful predictor of future fertility trends, even over a five-year horizon.

Lastly, it is worth noting that one clear implication of the theories of fertility decline is that the availability of effective contraceptive methods is an important condition facilitating the maintenance of very low fertility levels. It is an empirical finding that most societies with below-replacement fertility levels has very high levels of contraceptive prevalence, normally surpassing 65 or 70 per cent of women of reproductive age and in some cases reaching levels as high as 85 per cent. If the intermediate-fertility countries of today are to reach below replacement fertility, their levels of contraception will have to rise significantly. The attainment and maintenance of below-replacement fertility (or even of fertility at about replacement level) will generally involve easy access to a modern contraceptive method for most women on a sustained basis.

### C. THE PARAMETERS OF THE PROBLEM

The issue of whether intermediate-fertility countries will reach and maintain below-replacement levels of fertility before 2050 needs to be addressed with respect to specific countries, namely those that are already far advanced in the transition to low fertility but where total fertility remains above 2.1 children per woman, with this value taken as the marker of below-replacement level. Before the transition to low fertility started, most of the 143 countries in the developing world had total fertility levels of 5 children per woman or higher. Today, only 49 countries still do. Among the rest, 73 had a total fertility ranging from 2.1 children per woman to just under 5 children per woman in 1995-2000, and 21 already had below-replacement fertility. In addition, one developed country, Albania, also had a total fertility in the range of 2.1 to 5 children per woman. Since fertility declines among developing countries have averaged about one child per decade during 1950-2000, it is feasible that most countries with total fertility levels below 5 children per woman in 1995-2000 may reach total fertility levels of 2 children per woman or less over the projection span (2000-2050) even if, as observed, the speed of fertility decline decelerates as lower levels of fertility are reached. Consequently, the set of countries considered as candidates to reach below-replacement fertility during the projection period includes all those whose total fertility in 1995-2000 was estimated to range from 2.1 children per women to just under 5 children per woman (table 2). The 74 countries in the group accounted for 43 per cent of the world population in 2000 and include such populous countries as India, Indonesia, Brazil, Bangladesh, Mexico, the Philippines, Viet Nam and Egypt, listed in order of decreasing population size.

Table 2 shows selected indicators of past fertility trends for the set of 74 countries that will be identified from here on as the “intermediate-fertility countries”. Based on the estimated levels of total fertility for every five-year period from 1950-1955 to 1995-2000, table 2 indicates the maximum and the minimum total fertility reached during 1950-2000 as well as an estimate of the average decline per decade

implied by the maximum and minimum values of total fertility and an estimate of average declines (or increases) per decade between 1975-1980 and 1995-2000. On the basis of such indicators, it is clear that for the vast majority of the intermediate-fertility countries the highest fertility levels were reached early in the 1950-2000 period and that the lowest levels correspond to those estimated for 1995-2000. That is, fertility reductions started about 40 to 45 years ago in this group of countries and have generally continued unabated up to 1995-2000. However, some exceptions to this general trend are evident. French Guiana and Guam, for instance, experienced an increase in total fertility between 1975-1980 and 1995-2000.

Furthermore, the speed of the decline of fertility for each particular country has varied over time. Countries whose fertility declined significantly early on are more likely to have reached low levels of total fertility and, given the time elapsed since the start of the decline, could have already attained below-replacement fertility if they were prone to do so. To detect countries where the decline of fertility may have decelerated sufficiently so as to cast doubts about whether they might be ready to proceed to below-replacement levels in the near future, a comparison of the average declines per decade calculated for the whole period of decline and that calculated since 1975 is made. When the average decline for 1975-2000 is lower than that estimated as of the start of fertility reductions, a slowdown of the rate of decline has occurred. Slowdowns have been fairly common, but they generally involve just a small difference between the average rates of decline for the two periods considered. However, important differences are noticeable in the cases of Réunion in Africa; East Timor and Malaysia in Asia; Bahamas, Chile, Costa Rica and Guyana, and to a lesser extent Jamaica and Venezuela in Latin America and the Caribbean; and in Fiji and Samoa in Oceania. Further examination of fertility trends indicates that in East Timor an increase of fertility occurred after 1975; that fertility in Chile and Réunion has been below 3 children per woman since 1980 but reductions since then have been very slow; and that fertility remains high in Samoa where it has changed little since 1980.

Other countries with strikingly slow declines of fertility during 1950-2000 are Argentina, Israel and Uruguay, all of which attained relatively low fertility levels early on and have not shown signs of reaching even replacement level, let alone levels below that. The identification of countries such as these, where the long-term decline of fertility has not automatically led to levels below replacement is important because, in reviewing the guidelines for the projection of future fertility declines, it will be necessary to justify that their fertility will eventually reach below-replacement levels or, alternatively, to treat them as exceptional cases if their fertility is not projected to dip below replacement level.

Table 3 presents another view of the current status of the intermediate-fertility countries. It displays, for comparison purposes, the most recent data on contraceptive prevalence in terms of the proportion of women of reproductive age using some method of contraception and the proportion of women of reproductive age using modern methods, together with a measure of the average change per decade in the proportion of women using some method. In addition, the table shows the total fertility estimates for 1995-2000 derived from the *2000 Revision*, the estimated rate of change per decade of total fertility between 1975-1980 and 1995-2000, an estimate of actual replacement level fertility for each country in 2045-2050, the lowest value of total fertility projected according to the medium variant of the *2000 Revision* (also called the target level), and the beginning year of the five-year period in which that target level will be reached according to the medium variant of the *2000 Revision*. These data highlight the fact that in the *2000 Revision* the vast majority of the intermediate-fertility countries were projected to reach a total fertility of 2.1 children per woman long before 2045-2050 and, consequently, their projected fertility remained constant at 2.1 children per woman for lengthy periods (30 years or more). If recent history is any guide to the future, no population has achieved as yet such a perfect match of actual fertility levels with replacement level. Especially over lengthy periods, fluctuations in trends may be expected, and the possibility of surpassing replacement level or falling below it over lengthy stretches cannot be discarded. The expectation so far has been that, on average, the fertility of actual population will

eventually fluctuate around replacement level and therefore the constancy of that level in the long run is appropriate. The change of assumptions being considered now implies that a level below-replacement will be reached by most intermediate-fertility countries before 2050. Once a target level below-replacement is adopted, projections will be prepared following the same strategy as heretofore, that is, by establishing the target period when the target level will be reached and then keeping that level constant until the end of the projection period. Because of the size and importance of many of the intermediate-fertility countries, this strategy will reduce considerably the total fertility of the world as a whole and will likely reduce to below-replacement levels the total fertility of the world starting in 2040 or earlier. The crucial importance of this outcome cannot be overemphasized.

A comparison of recent fertility estimates with the available data on reported levels of contraceptive prevalence indicates that there are marked discrepancies between the two for a number of countries. Sudan, for example, has very low levels of contraceptive prevalence and, although its total fertility is estimated at nearly 5 children per woman, its level may have been underestimated. In the case of Lesotho, the lack of recent data on contraceptive prevalence does not allow a similar check. Possible discrepancies between contraceptive prevalence and the estimated levels of total fertility may also exist in the cases of Guyana, the Libyan Arab Jamahiriya, Myanmar and the United Arab Emirates. In preparing new estimates, the reasons for these discrepancies will need to be analysed further.

However, assuming that all the data are correct, significant reductions of fertility achieved without marked increases in contraceptive prevalence could only have come about by major changes in the other proximate determinants of fertility (i.e., the timing of marriage or the start of exposure to the risk of childbearing, changes in fecundability associated with postpartum abstinence, amenorrhea, and breastfeeding, and foetal loss whether natural or induced) and are unlikely to maintain their momentum for long. Analyses of the relation between contraceptive prevalence and fertility levels indicates that below-replacement levels are usually not attained with contraceptive prevalence lower than 50 per cent (barring cases in which abortion levels are high) and, in fact, contraceptive levels above 70 per cent are more common among populations with very low fertility (United Nations, 2000b). Consequently, assuming that fertility will eventually reach below-replacement levels in all intermediate-fertility countries can be considered equivalent to assuming that their populations will reach very high levels of use of effective contraceptive methods. The likelihood of that change may need to be taken into account in deciding if some intermediate-fertility countries will be more likely than others to reach below-replacement fertility.

Lastly, in discussing assumptions about future fertility levels, the Population Division has long used a total fertility of 2.1 children per woman as equivalent to replacement level. In fact, the actual level of fertility that would produce perfect population replacement over the long run varies according to the level of mortality to which the population is subject. Since the projections prepared by the Population Division have generally incorporated changing levels of mortality over the projection period, actual replacement-level fertility changes over that period. However, because in the pre-AIDS era projected levels of mortality for all countries were assumed to decrease consistently in the future, by the end of the projection period they were generally low enough to ensure that actual replacement level fertility was close to 2.1 children per woman. Since 1990, when the impact of HIV/AIDS began to be explicitly incorporated into the projections of certain countries, mortality decreases have ceased to be the rule, especially as the number of countries significantly affected by the epidemic continues to grow. In the *2000 Revision* the populations of 45 countries had to be projected taking account of HIV/AIDS and in all of them some increases in mortality were projected, at least over the short and medium-term. Some of these countries are among the intermediate-fertility countries and it is appropriate to note, therefore, that for them a total fertility of 2.1 children per woman may already be below actual replacement level (see table 4). This fact may need to be considered in proposing assumptions on future fertility trends for these countries.

In sum, the task of revising the assumptions made about the future of fertility in the intermediate-fertility countries involves at least five decisions:

1. The selection of a target level of fertility that all (or most) of the intermediate-fertility countries will reach before 2050 in the medium variant.
2. The determination, for each country, of the period in which the target level will be reached in the medium variant.
3. Determining whether that level will be maintained or not to the end of the projection period.
4. Establishing the target levels for the low and high variants, and modifying the target period if necessary.
5. Determining if certain countries need to be treated as exceptions on the basis of explicit criteria.

Before proceeding to present the proposed revised assumptions for the intermediate-fertility countries, it is useful to review the assumptions adopted to project fertility in the *2000 Revision*.

#### D. ASSUMPTIONS ON THE FUTURE OF FERTILITY UNDERLYING THE *2000 REVISION*

The *2000 Revision* includes six projection variants. Four differ among themselves with respect to the assumptions made regarding the future course of fertility. To describe them, countries are divided first into three groups:

1. *High-fertility countries*: Countries that until 2000 had no fertility reduction or only an incipient decline;
2. *Medium-fertility countries*: Countries where fertility has been declining but whose level is still above replacement level (2.1 children per woman in 1995-2000);
3. *Low-fertility countries*: Those with fertility at or below replacement level (2.1 children per woman in 1995-2000) plus a few with levels very close to replacement-level fertility that are judged ready to drop below replacement level in the near future (2000-2005).

##### ***Medium-fertility assumption:***

1. Fertility in high-fertility countries is generally assumed to decline at an average pace of nearly 1 child per decade starting in 2005 or later. Consequently, some of these countries do not reach replacement level by 2050.
2. Fertility in medium-fertility countries is assumed to reach replacement level before 2050.
3. Fertility in low-fertility countries is generally assumed to remain below the replacement level during the projection period, reaching by 2045-2050 the fertility of the cohort of women born in the early 1960s or, if that information is lacking, reaching 1.7 children per woman if current fertility is below 1.5 children per woman or 1.9 children per woman if current fertility is equal or higher than 1.5 children per woman.

##### ***High-fertility assumption:***

1. Fertility in high and medium-fertility countries remains above the fertility in the medium-fertility assumption and eventually reaches a value 0.5 children above that reached by the medium-fertility assumption in 2045-2050.

2. For low-fertility countries, total fertility eventually reaches a value 0.4 children per woman above that reached by the medium-fertility assumption in 2045-2050.

***Low-fertility assumption:***

1. Fertility in high and medium-fertility countries remains below the fertility in the medium-fertility assumption and eventually reaches a value 0.5 children below that reached by the medium-fertility assumption in 2045-2050.
2. For low-fertility countries, total fertility eventually reaches a value 0.4 children per woman below that reached by the medium-fertility assumption in 2045-2050.

***Constant-fertility assumption:***

For each country, fertility remains constant at the level estimated for 1995-2000.

E. PROPOSED ASSUMPTIONS FOR THE 2002 REVISION

Before setting the proposed assumptions for the 2002 Revision in a manner paralleling those for the 2000 Revision, we address the different decisions that are to be made.

*The target level of fertility for the medium variant:* If intermediate-fertility countries are to attain some level of fertility that is below 2.1 children per woman, the proposed target level is 1.85 children per woman. That value is exactly halfway in between the target levels for the low and the medium variants of previous Revisions, including the 2000 Revision. In addition, it is very close to the average level of total fertility projected for the low-fertility countries in 2045-2050 according to the 2000 Revision (1.88 children per woman) and not too far above the average level of fertility experienced over recent periods by countries with below-replacement fertility (see table 1). If, as in previous Revisions, target levels for the high and the low variants are set so as to encompass a range of about 0.8 of a child or one child around the target level of the medium variant, the target level for the high variant would be 2.25 to 2.35 children per woman, a value well above replacement level, and that for the low variant would be 1.35 to 1.45 children per woman, closer to the average level of total fertility that low-fertility countries display today (1.5 children per woman). That is, the range of 1.35 to 2.35 children per woman (or the alternative, 1.45 to 2.25 children per woman), would seem sufficiently wide to cover the cases in which below-replacement fertility fails to materialize and fertility remains above replacement level as well as those in which fertility drops even further in the below-replacement range.

*Determination of the target period:* The target period for each country will be determined in a manner consistent with target periods already used in the medium variant of the 2000 Revision. That is, unless revised estimates of past fertility trends change considerably, the general guideline will be to select a target period for the attainment of below-replacement fertility that is later than the current target period for the attainment of replacement level.

*Maintaining the level of below-replacement fertility until the end of the projection period:* The new target level will be treated in the same way as replacement level has been treated in previous Revisions. Once the target level is reached, it will be maintained to the end of the projection period.

*Target levels for the high and low variants:* It is proposed that for the intermediate fertility countries the target levels for the high and low variants remain half a child above and below that of the medium fertility variant. Given the greater uncertainty surrounding the attainment of below-replacement fertility by many

intermediate-fertility countries, a narrowing of the range for the high and low variants does not seem advisable at this time.

*Determining exceptions:* Just as in other *Revisions*, the target level may need to be modified for certain intermediate-fertility countries in light of past trends or other relevant information. It is suggested that such determination be based on consideration of at least the following: past fertility trends and evidence of stagnation of fertility levels; very low levels of contraceptive prevalence that may cast doubt about the sustainability of rapid fertility declines; the impact of HIV/AIDS and its implications for actual replacement level; and the characteristics of population policies and programmes.

In a manner parallel to the *2000 Revision*, the proposed assumptions for the *2002 Revisions* are presented in terms of three groups of countries:

1. *High-fertility countries:* Countries that until 2000 had no fertility reduction or only an incipient decline (generally, those with total fertility in 1995-2000 at or above 5 children per woman);
2. *Intermediate-fertility countries:* Countries where fertility has been declining but whose level is still above replacement level (higher than 2.1 children per woman in 1995-2000);
3. *Low-fertility countries:* Those with fertility at or below replacement level (2.1 children per woman in 1995-2000).

***Medium-fertility assumption:***

1. Fertility in high-fertility countries is assumed to decline at an average pace of at most one child per decade. The pace of decline will be set taking into account the socio-economic and related conditions of each country. Owing to their continued high fertility, the countries in this group will not necessarily have a total fertility below replacement level by the end of the projection period.
2. Fertility in intermediate-fertility countries is assumed to reach 1.85 children per women before 2050. Once that level is reached, total fertility remains unchanged at that level until the end of the projection period.
3. Fertility in low-fertility countries is generally assumed to remain below the replacement level during the projection period, reaching by 2045-2050 the fertility of the cohort of women born in the early 1960s or, if that information is lacking, reaching 1.7 children per woman if current fertility is below 1.5 children per woman or 1.9 children per woman if current fertility is equal or higher than 1.5 children per woman.

***High-fertility assumption:***

1. Fertility in high and intermediate-fertility countries remains above the fertility in the medium-fertility assumption and eventually reaches a value 0.5 children above that reached by the medium-fertility assumption in 2045-2050.
2. For low-fertility countries, total fertility eventually reaches a value 0.4 children per woman above that reached by the medium-fertility assumption in 2045-2050.

***Low-fertility assumption:***

1. Fertility in high and intermediate-fertility countries remains below the fertility in the medium-fertility assumption and eventually reaches a value 0.5 children below that reached by the medium-fertility assumption in 2045-2050.
2. For low-fertility countries, total fertility eventually reaches a value 0.4 children per woman below that reached by the medium-fertility assumption in 2045-2050.

***Constant-fertility assumption:***

For each country, fertility remains constant at the level estimated for 1995-2000.

## F. THE IMPLICATIONS

The implications of the proposed guidelines for future fertility in the *2002 Revision* are momentous. The expectation that the intermediate-fertility countries will have below replacement fertility contrasts markedly with the current assumption that their fertility will stabilize at replacement level. The implementation of the proposed fertility assumptions, in the medium variant, means that before 2050, approximately 80 per cent of world population will be projected to have below-replacement fertility.

Even with the proposed fertility assumptions, world population will still be growing by mid-century. However, the rates of population growth will be much lower than currently projected. In such a case, the somewhat hyperbolic claim that the “end of population growth” is near will be slightly closer to the truth than it has been heretofore.

The state of current knowledge does not provide elements to affirm with certainty that below-replacement fertility levels are inevitable. However, that knowledge, buttressed by the actual experience of a growing number of countries, suggests that lengthy periods of below-replacement fertility are likely to be common in the future. In addition, the attainment of below-replacement fertility seems likely because there has been so much success in reducing fertility from levels of 5, 6 or 7 children per woman to 2, 3 or 4 children per woman. Today, the intermediate-fertility countries still have moderately high fertility levels and it is the speed at which those levels have been falling that suggests that reductions of fertility will not necessarily stop at exactly the replacement level.

In sum, the proposed guidelines for the projection of fertility in intermediate-fertility countries are based on the scientifically sound recognition that replacement level fertility is not necessarily hard-wired in the evolution of populations. In the past, analysts of the United Nations Population Division showed foresight in projecting population. In the late 1940s, for example, they anticipated future rapid rates of population growth. In the 1960s and early 1970s, they projected major reductions of fertility when there was still scant evidence suggesting that such reductions were to occur. Today, the Population Division foresees the continuation of unprecedented changes in the dynamics of population growth. Given the experience of today’s low-fertility countries and the insights gained in understanding the processes leading to the virtually universal transition from high to low fertility, it seems likely that below-replacement fertility will be common in the future. The fertility level proposed, 1.85 children per woman, represents only a modest, but significant deviation from the replacement level. If attained and maintained, below replacement fertility will lead first to the slowing of population growth rates and then to slow reductions in the size of world population.

TABLE 1. INDICATORS OF THE DISTRIBUTION OF SELECTED GROUPS OF LOW-FERTILITY COUNTRIES<sup>a</sup> ACCORDING TO TOTAL FERTILITY

	<i>Total fertility in 1995-2000</i>	<i>Average for period of below- replacement fertility prior to 2000</i>	<i>Projected for 2045-2050 (medium variant)</i>
<b>All low-fertility countries</b>			
Minimum	1.12	1.38	1.61
Lower quartile	1.34	1.65	1.82
Median	1.55	1.74	1.90
Upper quartile	1.77	1.86	1.97
Maximum	2.06	2.08	2.10
Mean	1.57	1.76	1.88
<b>Countries with TF &gt; 3 in 1950-1955</b>			
Minimum	1.15	1.38	--
Lower quartile	1.52	1.69	--
Median	1.76	1.83	--
Upper quartile	1.96	1.96	--
Maximum	2.06	2.08	--
Mean	1.71	1.81	

<sup>a</sup>Refers to countries with below-replacement fertility in 1995-2000.

TABLE 2. LIST OF INTERMEDIATE FERTILITY COUNTRIES ACCORDING TO TOTAL FERTILITY LEVEL IN 1995-2000  
AND INDICATORS OF THE SPEED OF FERTILITY DECLINE

Major area or country	Total fertility									Population (in millions)		
	1950- 1955	1975- 1980	1995- 2000	Maximum	Minimum	Period in which maximum is reached	Period in which minimum is reached	Decline per decade from maximum to minimum	Decline from 1975-1980 to 1995-2000	Indication of slowdown of pace of decline	2000	2050
	World	5.01	3.90	2.82	5.01	2.82	1950-1955	1995-2000	0.5	0.5		6 056.7
Africa	6.71	6.56	5.27	6.84	5.27	1960-1965	1995-2000	0.4	0.6		793.6	2 000.4
1 Réunion	5.65	3.28	2.30	5.85	2.30	1955-1960	1995-2000	0.9	0.5	Slowdown	0.7	1.0
2 Tunisia	6.93	5.69	2.31	7.25	2.31	1960-1965	1995-2000	1.4	1.7	--	9.5	14.1
3 South Africa	6.50	5.00	3.10	6.50	3.10	1950-1955	1995-2000	0.8	1.0	--	43.3	47.3
4 Algeria	7.28	7.18	3.25	7.38	3.25	1960-1965	1995-2000	1.2	2.0	--	30.3	51.2
5 Egypt	6.56	5.27	3.40	7.07	3.40	1960-1965	1995-2000	1.0	0.9	Slowdown	67.9	113.8
6 Morocco	7.18	5.90	3.40	7.18	3.40	1950-1955	1995-2000	0.8	1.3	--	29.9	50.4
7 Cape Verde	6.60	6.70	3.56	7.00	3.56	1960-1965	1995-2000	1.0	1.6	--	0.4	0.8
8 Libyan Arab Jamahiriya	6.87	7.38	3.80	7.59	3.80	1970-1975	1995-2000	1.5	1.8	--	5.3	10.0
9 Botswana	6.50	6.37	4.35	6.90	4.35	1960-1965	1995-2000	0.7	1.0	--	1.5	2.1
10 Western Sahara	6.53	6.05	4.40	6.53	4.40	1950-1955	1995-2000	0.5	0.8	--	0.3	0.6
11 Ghana	6.90	6.90	4.60	6.90	4.60	1950-1955	1995-2000	0.5	1.2	--	19.3	40.1
12 Kenya	7.51	7.90	4.60	8.12	4.60	1960-1965	1995-2000	1.0	1.7	--	30.7	55.4
13 Lesotho	5.84	5.74	4.75	5.86	4.75	1955-1960	1995-2000	0.3	0.5	--	2.0	2.5
14 Swaziland	6.50	6.49	4.80	6.50	4.80	1950-1955	1995-2000	0.4	0.8	--	0.9	1.4
15 Sudan	6.50	6.30	4.90	6.67	4.90	1955-1960	1995-2000	0.4	0.7	--	31.1	63.5
Asia	5.88	4.17	2.70	5.88	2.70	1950-1955	1995-2000	0.7	0.7		3 672.3	5 428.2
1 Lebanon	5.74	4.31	2.29	6.36	2.29	1960-1965	1995-2000	1.2	1.0	Slowdown	3.5	5.0
2 Viet Nam	5.75	5.89	2.50	7.25	2.50	1960-1965	1995-2000	1.4	1.7	--	78.1	123.8
3 Indonesia	5.49	4.73	2.60	5.67	2.60	1955-1960	1995-2000	0.8	1.1	--	212.1	311.3
4 Bahrain	6.97	5.23	2.63	7.18	2.63	1960-1965	1995-2000	1.3	1.3	--	0.6	1.0
5 Mongolia	6.00	6.65	2.70	7.33	2.70	1970-1975	1995-2000	1.9	2.0	--	2.5	4.1
6 Turkey	6.90	4.65	2.70	6.90	2.70	1950-1955	1995-2000	0.9	1.0	--	66.7	98.8
7 Brunei Darussalam	7.00	4.40	2.80	7.00	2.80	1950-1955	1995-2000	0.9	0.8	Slowdown	0.3	0.6
8 Uzbekistan	5.97	5.58	2.85	6.80	2.85	1960-1965	1995-2000	1.1	1.4	--	24.9	40.5

TABLE 2 (continued)

Major area or country		Total fertility									Population (in millions)		
		1950- 1955	1975- 1980	1995- 2000	Maximum	Minimum	Period in which maximum is reached	Period in which minimum is reached	Decline per decade from maximum to minimum	Decline from 1975-1980 to 1995-2000	Indication of slowdown of pace of decline	2000	2050
9	Kuwait	7.21	5.89	2.89	7.41	2.89	1965-1970	1995-2000	1.5	1.5	Slowdown	1.9	4.0
10	Kyrgyzstan	4.51	4.05	2.89	5.39	2.89	1960-1965	1995-2000	0.7	0.6	Slowdown	4.9	7.5
11	Israel	4.16	3.41	2.93	4.16	2.93	1950-1955	1990-1995	0.3	0.2	Slowdown	6.0	10.1
12	United Arab Emirates	6.97	5.66	3.17	6.97	3.17	1950-1955	1995-2000	0.8	1.2	--	2.6	3.7
13	Iran (Islamic Republic of)	7.00	6.00	3.20	7.00	3.20	1950-1955	1995-2000	0.8	1.4	--	70.3	121.4
14	Malaysia	6.83	4.16	3.26	6.94	3.26	1955-1960	1995-2000	0.9	0.5	Slowdown	22.2	37.8
15	Myanmar	6.00	5.30	3.30	6.00	3.30	1950-1955	1995-2000	0.6	1.0	--	47.7	68.5
16	India	5.97	4.83	3.32	5.97	3.32	1950-1955	1995-2000	0.6	0.8	--	1 008.9	1 572.1
17	Turkmenistan	6.00	5.32	3.60	6.75	3.60	1960-1965	1995-2000	0.9	0.9	Slowdown	4.7	8.4
18	Philippines	7.29	5.50	3.64	7.29	3.64	1950-1955	1995-2000	0.8	0.9	--	75.7	128.4
19	Qatar	6.97	6.11	3.70	6.97	3.70	1950-1955	1995-2000	0.7	1.2	--	0.6	0.8
20	Tajikistan	6.00	5.90	3.72	6.83	3.72	1970-1975	1995-2000	1.2	1.1	Slowdown	6.1	9.8
21	Bangladesh	6.70	5.70	3.80	7.10	3.80	1960-1965	1995-2000	0.9	1.0	--	137.4	265.4
22	Syrian Arab Republic	7.09	7.44	4.00	7.79	4.00	1965-1970	1995-2000	1.3	1.7	--	16.2	36.3
23	East Timor	6.44	4.31	4.35	6.44	4.31	1950-1955	1975-1980	0.9	0.0	Slowdown	0.7	1.4
24	Jordan	7.38	7.38	4.69	8.00	4.69	1960-1965	1995-2000	0.9	1.3	--	4.9	11.7
25	Nepal	5.75	5.65	4.83	6.06	4.83	1960-1965	1995-2000	0.4	0.4	--	23.0	52.4
	Europe	2.66	1.97	1.41	2.66	1.41	1950-1955	1995-2000	0.3	0.3		727.3	603.3
1	Albania	5.60	4.20	2.60	5.98	2.60	1955-1960	1995-2000	0.8	0.8	Slowdown	3.1	3.9
	Latin America and the Caribbean	5.89	4.49	2.69	5.97	2.69	1960-1965	1995-2000	0.9	0.9		518.8	805.6
1	Suriname	6.56	4.20	2.21	6.56	2.21	1950-1955	1995-2000	1.0	1.0	--	0.4	0.4
2	Brazil	6.15	4.31	2.27	6.15	2.27	1950-1955	1995-2000	0.9	1.0	--	170.4	247.2
3	Uruguay	2.73	2.89	2.40	3.00	2.40	1970-1975	1995-2000	0.2	0.2	No change	3.3	4.2
4	Bahamas	4.05	3.22	2.40	4.50	2.40	1960-1965	1995-2000	0.6	0.4	Slowdown	0.3	0.4
5	Chile	4.95	2.95	2.44	5.33	2.44	1955-1960	1995-2000	0.7	0.3	Slowdown	15.2	22.2
6	Guyana	6.68	3.94	2.45	6.77	2.45	1955-1960	1995-2000	1.1	0.7	Slowdown	0.8	0.5
7	Jamaica	4.22	4.00	2.50	5.78	2.50	1965-1970	1995-2000	1.1	0.8	Slowdown	2.6	3.8

TABLE 2 (continued)

Major area or country		Total fertility									Population (in millions)		
		1950- 1955	1975- 1980	1995- 2000	Maximum	Minimum	Period in which maximum is reached	Period in which minimum is reached	Decline per decade from maximum to minimum	Decline from 1975-1980 to 1995-2000	Indication of slowdown of pace of decline	2000	2050
8	Argentina	3.15	3.44	2.62	3.44	2.62	1975-1980	1995-2000	0.4	0.4	No change	37.0	54.5
9	Panama	5.68	4.05	2.63	5.92	2.63	1960-1965	1995-2000	0.9	0.7	Slowdown	2.9	4.3
10	Saint Lucia	6.00	5.20	2.70	6.94	2.70	1955-1960	1995-2000	1.1	1.3	--	0.1	0.2
11	Mexico	6.87	5.30	2.75	6.96	2.75	1955-1960	1995-2000	1.1	1.3	--	98.9	146.7
12	Colombia	6.76	4.34	2.80	6.76	2.80	1950-1955	1995-2000	0.9	0.8	Slowdown	42.1	70.9
13	Costa Rica	6.72	3.89	2.83	7.11	2.83	1955-1960	1995-2000	1.1	0.5	Slowdown	4.0	7.2
14	Dominican Republic	7.40	4.70	2.88	7.40	2.88	1950-1955	1995-2000	1.0	0.9	Slowdown	8.4	12.0
15	Peru	6.85	5.38	2.98	6.85	2.98	1950-1955	1995-2000	0.9	1.2	--	25.7	42.1
16	Venezuela	6.46	4.47	2.98	6.66	2.98	1960-1965	1995-2000	1.0	0.7	Slowdown	24.2	42.2
17	Ecuador	6.70	5.40	3.10	6.70	3.10	1950-1955	1995-2000	0.8	1.2	--	12.6	21.2
18	El Salvador	6.46	5.60	3.17	6.85	3.17	1960-1965	1995-2000	1.1	1.2	--	6.3	10.9
19	Belize	6.65	6.20	3.41	6.65	3.41	1950-1955	1995-2000	0.7	1.4	--	0.2	0.4
20	French Guiana	5.00	3.30	4.05	5.02	3.30	1960-1965	1975-1980	1.1	-0.4	Increase	0.2	0.5
21	Paraguay	6.50	5.15	4.17	6.55	4.17	1960-1965	1995-2000	0.7	0.5	Slowdown	5.5	12.6
22	Honduras	7.50	6.60	4.30	7.50	4.30	1950-1955	1995-2000	0.7	1.1	--	6.4	12.8
23	Nicaragua	7.33	6.40	4.32	7.33	4.32	1950-1955	1995-2000	0.7	1.0	--	5.1	11.5
24	Bolivia	6.75	5.80	4.36	6.75	4.36	1950-1955	1995-2000	0.5	0.7	--	8.3	17.0
25	Haiti	6.30	5.96	4.38	6.30	4.38	1950-1955	1995-2000	0.4	0.8	--	8.1	14.0
26	Guatemala	7.09	6.40	4.93	7.09	4.93	1950-1955	1995-2000	0.5	0.7	--	11.4	26.6
	Oceania	3.87	2.78	2.41	4.10	2.41	1955-1960	1995-2000	0.4	0.2		30.5	47.2
1	French Polynesia	6.00	4.23	2.60	6.50	2.60	1960-1965	1995-2000	1.1	0.8	Slowdown	0.2	0.4
2	New Caledonia	5.00	3.90	2.60	5.30	2.60	1960-1965	1995-2000	0.8	0.7	Slowdown	0.2	0.4
3	Fiji	6.63	4.00	3.20	6.79	3.20	1955-1960	1995-2000	0.9	0.4	Slowdown	0.8	0.9
4	Guam	5.53	3.52	3.95	6.03	3.08	1960-1965	1980-1985	1.5	-0.2	Increase	0.2	0.3
5	Samoa	7.30	4.89	4.51	7.30	4.51	1950-1955	1995-2000	0.6	0.2	Slowdown	0.2	0.2
6	Vanuatu	7.60	5.75	4.59	7.60	4.59	1950-1955	1995-2000	0.7	0.6	Slowdown	0.2	0.5
7	Papua New Guinea	6.24	5.87	4.60	6.29	4.60	1960-1965	1995-2000	0.5	0.6	--	4.8	11.0

TABLE 3. MEASURES OF CONTRACEPTIVE USE AND INDICATORS OF PAST AND FUTURE FERTILITY TRENDS FOR THE INTERMEDIATE-FERTILITY COUNTRIES ACCORDING TO THE 2000 REVISION

Country or area	Population in 2000 (millions)	Contraceptive prevalence				2000 Revision (medium variant)				
		Reference date	Percentage of women using a method (all methods included)	Percentage of women using modern methods	Average change per decade in percentage of women using all methods	Total fertility in 1995-2000	Average change per decade in total fertility from 1975-1980 to 1995-2000	Actual replacement level in 2045-2050	Target level	Target date
<b>Total fertility below 2.5</b>										
Brazil	170.4	1996	76.7	70.3	10.9	2.27	1.02	2.08	2.10	2005
Viet Nam	78.1	1997	75.3	55.8	24.6	2.50	1.69	2.09	2.10	2005
Réunion	0.7	1990	66.6	61.7	--	2.30	0.49	2.03	1.90	2010
Jamaica	2.6	1997	65.9	62.6	12.5	2.50	0.75	2.08	2.10	2010
Bahamas	0.3	1988	61.7	60.1	--	2.40	0.41	2.09	2.10	2010
Lebanon	3.5	1996	61.0	37.0	3.2	2.29	1.01	2.08	1.90	2015
Tunisia	9.5	1994	60.0	51.0	17.9	2.31	1.69	2.10	2.10	2000
Guyana	0.8	1975	31.4	28.3	--	2.45	0.75	2.16	2.10	2010
Suriname	0.4	--	--	--	--	2.21	1.00	2.08	1.70	2010
Uruguay	3.3	--	--	--	--	2.40	0.25	2.07	2.10	2015
Chile	15.2	--	--	--	--	2.44	0.26	2.06	2.10	2020
<b>Total fertility between 2.5 and 3</b>										
Colombia	42.1	2000	76.9	64.0	18.2	2.80	0.77	2.09	2.10	2030
Costa Rica	4.0	1992	75.0	64.6	6.6	2.83	0.53	2.07	2.10	2030
Mexico	98.9	1995	66.5	57.5	19.1	2.75	1.28	2.09	2.10	2020
Peru	25.7	1996	64.2	41.3	14.1	2.98	1.20	2.11	2.10	2020
Turkey	66.7	1998	63.9	37.7	12.0	2.70	0.98	2.08	2.10	2005
Dominican Republic	8.4	1996	63.7	59.2	15.2	2.88	0.91	2.13	2.10	2025
Bahrain	0.6	1995	61.8	30.6	14.0	2.63	1.30	2.07	2.10	2005
Mongolia	2.5	1998	59.9	45.7	--	2.70	1.97	2.10	2.10	2005
Kyrgyzstan	4.9	1997	59.5	48.9		2.89	0.58	2.07	2.10	2005
Panama	2.9	1984	58.2	54.2	5.1	2.63	0.71	2.08	2.10	2015
Indonesia	212.1	1997	57.4	54.7	20.3	2.60	1.07	2.08	2.10	2005
Kuwait	1.9	1996	50.2	40.9	17.3	2.89	1.50	2.05	2.10	2015
Venezuela	24.2	1977	49.3	37.7	--	2.98	0.74	2.08	2.10	2020
Saint Lucia	0.1	1988	47.3	46.1	6.6	2.70	1.25	2.10	2.10	2015

TABLE 3 (continued)

Country or area	Population in 2000 (millions)	Contraceptive prevalence				2000 Revision (medium variant)				
		Reference date	Percentage of women using a method (all methods included)	Percentage of women using modern methods	Average change per decade in percentage of women using all methods	Total fertility in 1995-2000	Average change per decade in total fertility from 1975-1980 to 1995-2000	Actual replacement level in 2045-2050	Target level	Target date
Albania	3.1	--	--	--	--	2.60	0.80	2.10	2.10	2005
French Polynesia	0.2	--	--	--	--	2.60	0.81	2.07	2.10	2015
New Caledonia	0.2	--	--	--	--	2.60	0.65	2.07	2.10	2015
Argentina	37.0	--	--	--	--	2.62	0.41	2.06	2.10	2015
Brunei Darussalam	0.3	--	--	--	--	2.80	0.80	2.07	2.10	2010
Uzbekistan	24.9	--	--	--	--	2.85	1.37	2.09	2.10	2005
Israel	6.0	--	--	--	--	2.93	0.24	2.08	2.10	2015
<b>Total fertility between 3 and 3.5</b>										
Iran (Islamic Republic of)	70.3	1997	72.9	56.0	17.6	3.20	1.40	2.08	2.10	2010
Ecuador	12.6	1999	65.8	50.1	16.1	3.10	1.15	2.10	2.10	2020
El Salvador	6.3	1998	59.7	54.1	12.7	3.17	1.22	2.09	2.10	2025
South Africa	43.3	1998	56.3	55.1	8.4	3.10	0.95	2.21	2.10	2015
Egypt	67.9	2000	56.1	53.9	12.0	3.40	0.93	2.08	2.10	2010
Malaysia	22.2	1994	54.5	29.8	16.4	3.26	0.45	2.08	2.10	2015
Morocco	29.9	1995	50.3	42.4	20.4	3.40	1.25	2.08	2.10	2015
India	1,008.9	1998	48.2	42.8	12.7	3.32	0.75	2.13	2.10	2015
Algeria	30.3	1992	46.7	42.9	18.7	3.25	1.96	2.09	2.10	2010
Belize	0.2	1991	46.7	41.8	--	3.41	1.40	2.07	2.10	2010
Fiji	0.8	1974	41.0	35.1	--	3.20	0.40	2.09	2.10	2020
Myanmar	47.7	1997	32.7	28.4	31.8	3.30	1.00	2.16	2.10	2010
United Arab Emirates	2.6	1995	27.5	23.6	--	3.17	1.24	2.07	2.10	2015
<b>Total fertility between 3.5 and 4</b>										
Turkmenistan	4.7	2000	61.8	53.1	--	3.60	0.86	2.10	2.10	2015
Bangladesh	137.4	1999	53.8	43.4	16.7	3.80	0.95	2.09	2.10	2025
Cape Verde	0.4	1998	52.9	46.0	--	3.56	1.57	2.08	2.10	2020
Philippines	75.7	1998	46.5	28.2	10.6	3.64	0.93	2.09	2.10	2015
Qatar	0.6	1998	43.2	32.3	9.9	3.70	1.20	2.07	2.10	2020
Libyan Arab Jamahiriya	5.3	1995	39.7	25.6	--	3.80	1.79	2.08	2.10	2015
Tajikistan	6.1	--	--	--	--	3.72	1.09	2.11	2.10	2025

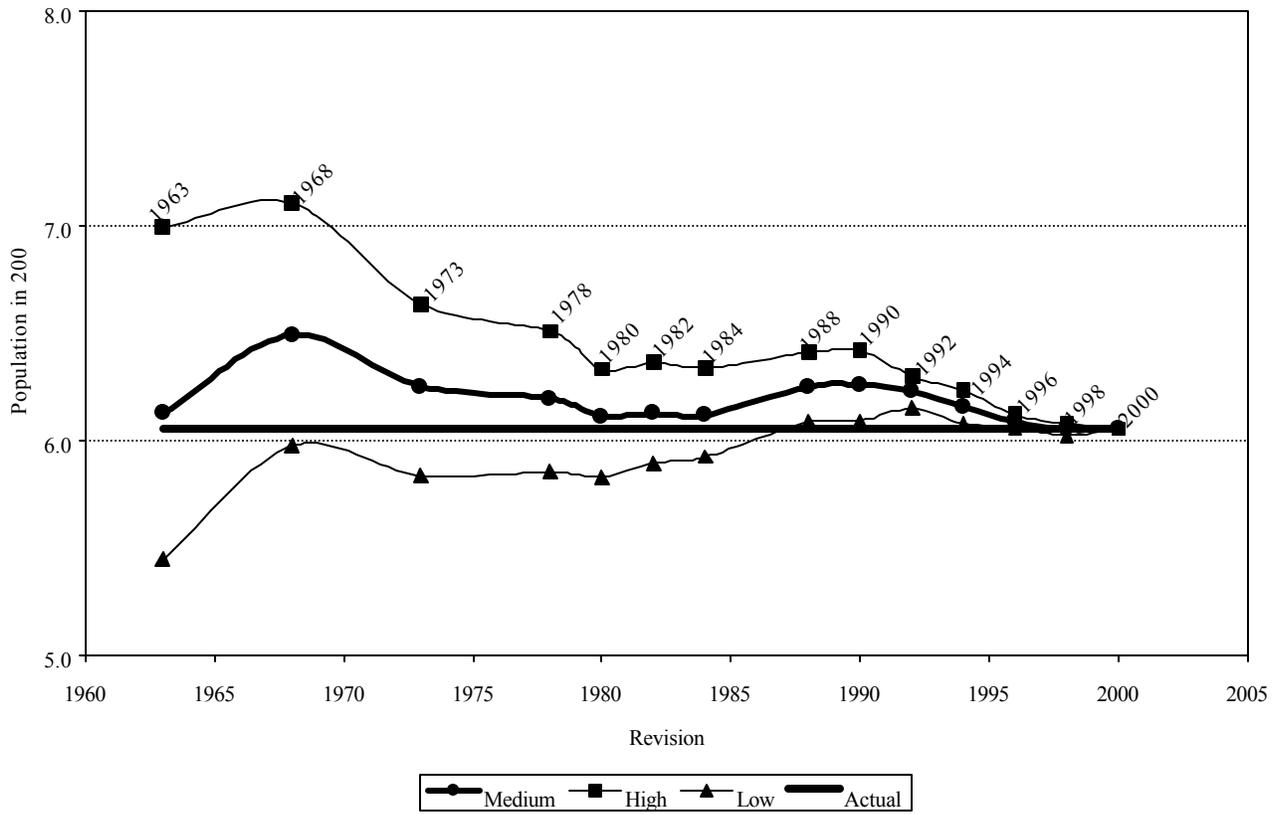
TABLE 3 (continued)

Country or area	Population in 2000 (millions)	Contraceptive prevalence				2000 Revision (medium variant)				
		Reference date	Percentage of women using a method (all methods included)	Percentage of women using modern methods	Average change per decade in percentage of women using all methods	Total fertility in 1995-2000	Average change per decade in total fertility from 1975-1980 to 1995-2000	Actual replacement level in 2045-2050	Target level	Target date
Guam	0.2	--	--	--	--	3.95	-0.22	2.08	2.10	2025
<b>Total fertility between greater than 4</b>										
Nicaragua	5.1	1998	60.3	57.4	19.6	4.32	1.04	2.10	2.10	2030
Paraguay	5.5	1998	57.4	47.7	13.7	4.17	0.49	2.10	2.10	2035
Jordan	4.9	1997	52.6	37.7	12.1	4.69	1.35	2.08	2.10	2030
Honduras	6.4	1996	50.0	41.0	15.4	4.30	1.15	2.13	2.10	2030
Bolivia	8.3	1998	48.3	25.2	14.9	4.36	0.72	2.13	2.10	2030
Kenya	30.7	1998	39.0	31.5	15.4	4.60	1.65	2.21	2.10	2025
Guatemala	11.4	1998	38.2	30.9	10.1	4.93	0.74	2.11	2.10	2035
Syrian Arab Republic	16.2	1998	36.1	28.3	8.2	4.00	1.72	2.08	2.10	2025
Botswana	1.5	1988	33.0	31.7	13.0	4.35	1.01	2.34	2.10	2025
Nepal	23.0	1996	28.5	26.0	13.0	4.83	0.41	2.10	2.10	2035
Haiti	8.1	2000	28.1	22.3	4.0	4.38	0.79	2.21	2.10	2040
Papua New Guinea	4.8	1996	25.9	19.6	--	4.60	0.64	2.14	2.10	2040
Ghana	19.3	1998	22.0	13.3	6.6	4.60	1.15	2.14	2.10	2030
Swaziland	0.9	1988	19.9	17.2	--	4.80	0.85	2.27	2.10	2035
Sudan	31.1	1992	8.3	6.9	2.6	4.90	0.70	2.14	2.10	2030
Lesotho	2.0	1977	5.3	2.4	--	4.75	0.50	2.27	2.10	2035
French Guiana	0.2	--	--	--	--	4.05	-0.38	2.08	2.10	2045
East Timor	0.7	--	--	--	--	4.35	-0.02	2.15	2.10	2020
Western Sahara	0.3	--	--	--	--	4.40	0.83	2.08	2.10	2030
Samoa	0.2	--	--	--	--	4.51	0.19	2.09	2.10	2035
Vanuatu	0.2	--	--	--	--	4.59	0.58	2.12	2.10	2035

TABLE 4. ACTUAL REPLACEMENT -LEVEL TOTAL FERTILITY FOR INTERMEDIATE-FERTILITY COUNTRIES THAT ARE HIGHLY AFFECTED BY HIV/AIDS

<i>Country</i>	<i>2000-2005</i>	<i>2005-2010</i>	<i>2010-2015</i>	<i>2015-2020</i>	<i>2020-2025</i>	<i>2025-2030</i>	<i>2030-2035</i>	<i>2035-2040</i>	<i>2040-2045</i>	<i>2045-2050</i>
<i>Africa</i>										
Botswana	3.36	3.10	2.82	2.66	2.56	2.50	2.46	2.42	2.39	2.34
Ghana	2.48	2.41	2.34	2.29	2.24	2.20	2.18	2.16	2.15	2.14
Kenya	2.64	2.58	2.49	2.43	2.37	2.33	2.30	2.27	2.24	2.21
Lesotho	3.30	3.48	3.29	3.04	2.84	2.68	2.55	2.44	2.35	2.27
South Africa	2.69	2.83	2.80	2.70	2.61	2.51	2.42	2.35	2.27	2.21
Sudan	2.55	2.48	2.42	2.36	2.31	2.26	2.21	2.18	2.16	2.14
Swaziland	3.39	3.43	3.04	2.73	2.55	2.44	2.37	2.33	2.30	2.27
Zimbabwe	2.82	2.64	2.50	2.41	2.35	2.31	2.28	2.26	2.24	2.22
<i>Asia</i>										
India	2.35	2.30	2.25	2.22	2.20	2.18	2.16	2.15	2.14	2.13
Myanmar	2.52	2.44	2.36	2.30	2.26	2.22	2.20	2.18	2.17	2.16
Thailand	2.11	2.10	2.09	2.08	2.08	2.07	2.07	2.07	2.07	2.07
<i>Latin America and the Caribbean</i>										
Bahamas	2.14	2.13	2.11	2.10	2.10	2.10	2.10	2.09	2.09	2.09
Brazil	2.16	2.15	2.14	2.13	2.12	2.11	2.10	2.09	2.09	2.08
Dominican Republic	2.21	2.20	2.19	2.18	2.16	2.18	2.16	2.15	2.14	2.13
Guyana	2.26	2.26	2.26	2.26	2.25	2.24	2.22	2.20	2.18	2.16
Haiti	2.53	2.47	2.42	2.38	2.34	2.31	2.28	2.26	2.23	2.21
Honduras	2.24	2.22	2.20	2.19	2.17	2.16	2.15	2.14	2.14	2.13

Figure 1. Population in 2000 according to different Revisions



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#### NOTE

<sup>1</sup> In fact, the possibility of the end of population growth and population decline has been addressed by many authors over the years. In the 1930s, Spengler (1930) and Stuart (1939) wrote articles entitled “When population ceases to grow” and “Population going down”, respectively. In 1970, Kingsley Davis (1970) discussed the prospects for the end of population growth in a piece entitled “The climax of population growth: past and future perspectives”. In the 1980s, Ben Wattenberg coined the phrase “birth dearth” and published a book with that title focusing on the prospects for countries with fertility below-replacement level (Wattenberg, 1987). More recently, Lutz, Sanderson and Scherbov highlighted the issue in an article entitled “The end of world population growth” where they stated that “[human population] growth is likely to come to an end in the foreseeable future” (Lutz, Sanderson and Scherbov, 2001, p. 543).