



# Population Dynamics and Climate Change

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# Does Population Matter for Climate Change?

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## Introduction

The interrelationships between population and climate change are far from straightforward. Although, at a basic level, the human population and its activities produce the greenhouse gases that are responsible for climate change, establishing the extent to which population growth, changes in the spatial distribution of populations or changes in age or household composition have significant effects on greenhouse-gas emissions net of other factors is difficult, given the association currently observed between standards of living and population growth, with the populations of richer countries generally growing slowly if at all and those of lower-income countries still growing rapidly.

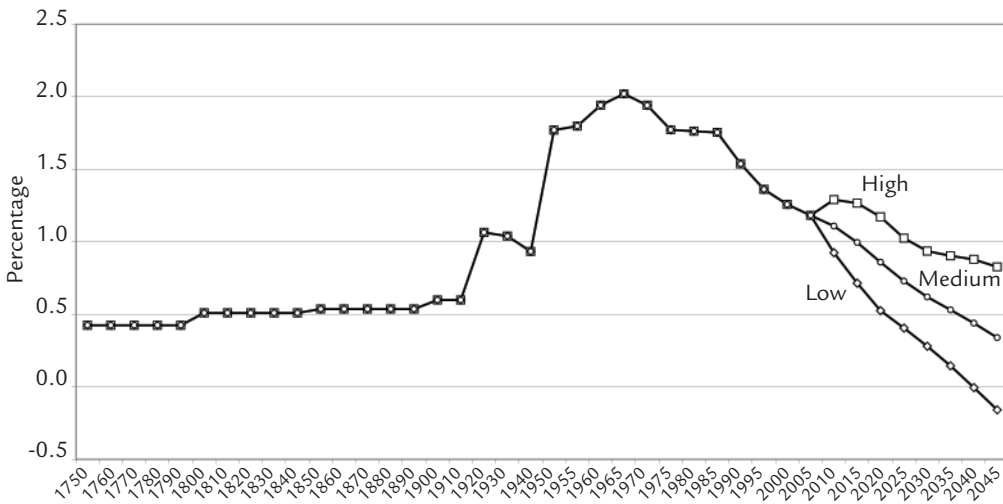
This chapter reviews global population trends and future prospects that must be borne in mind in assessing their implications for environmental sustainability, in general, and climate change, in particular. It then considers to what extent population growth per se has been seen as having an impact on climate change and reviews the long history of the inclusion of population factors and, especially, population growth in the intergovernmental consideration of environmental sustainability in United Nations processes. This review indicates that the disregard of population factors in the current negotiations on climate change is an anomaly. However, as the last section argues, there are a number of reasons for that anomaly, which are likely to keep population factors largely absent from the current climate change debate. Nevertheless, the future growth of world population is too relevant for the sustainability of development and as a factor in the mitigation of climate change for the international community to continue to ignore it. It is essential to take into account the lessons learned from four decades of population policy and active government engagement in enabling people to choose freely and responsibly the number and spacing of their children and providing them with access to the information and means to do so. A serious effort is therefore needed to make the commitments entered into at the International Conference on Population and Development (IPCD), held Cairo in 1994, a reality.

## Population Growth: Past and Future

Over the past 200 years, world population has increased from 1 billion to nearly 7 billion. This unprecedented increase resulted mainly from the acceleration of

the population growth rate after 1920. As Figure 2.1 shows, the rate of growth hovered around 0.5 per cent per year during the 19<sup>th</sup> and early 20<sup>th</sup> centuries and then doubled to about 1 per cent per year during 1920-1940. During the 1940s, the disastrous effects of the Second World War caused the population growth rate to decline to 0.9 per cent annually, but it increased in the 1950s to an annual average of 1.8 per cent and peaked in the late 1960s at 2 per cent per year, a level that, if sustained, would have led to a doubling of the population in just 30 years.

**Figure 2.1. Average Annual Rate of Change of World Population, 1760-2050**



Source: United Nations, 2009c.

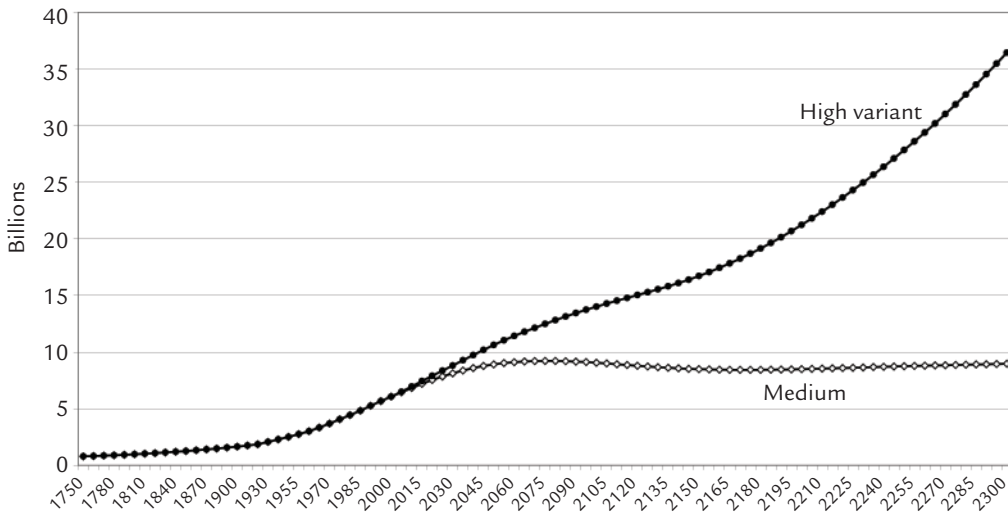
In the event, the actual doubling time of the world's population changed from 123 years (from 1 billion in 1804 to 2 billion in 1927) to 47 years (from 2 billion in 1927 to 4 billion in 1974). Because of the rapid reduction of fertility that many developing countries experienced after 1970, the population growth rate has since declined, leading to a slightly longer doubling time in the future: 51 years, from 4 billion in 1974 to the 8 billion expected in 2025. Nevertheless, today's population growth rate is still more than double that prevailing during the 19th century (1.2 per cent vs. 0.5 per cent) and, without further reductions in fertility, world population could surpass 20 billion by the close of the 21st century.

To explore the implications of different fertility paths on future population growth, in 2002, the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat prepared long-range population projections based on different scenarios of future fertility. Those scenarios show that it would be possible to reach a nearly unchanging world population by the end of the 21st century, provided the populations of all countries maintained

below-replacement fertility levels for 100 years (at 1.85 children per woman) before returning to replacement level. That scenario, described as ‘medium’, produces a world population of 9.1 billion in 2100 and just under 9 billion in 2300 (United Nations, 2004).

Although the medium scenario suggests that attaining population stabilization is within reach, the high scenario indicates that small deviations from the fertility path projected in the medium scenario can result in major differences in world population size (Figure 2.2). Thus, by assuming that fertility levels in the high scenario are 0.5 of a child above those projected in the medium scenario until 2050 and between 0.25 and 0.30 of a child higher between 2050 and 2300, future world population will keep on growing, reaching 14 billion in 2100 and 36 billion by 2300 (United Nations, 2004).

**Figure 2.2. World Population According to Two Different Scenarios, 1950-2300**



Source: United Nations, 2009c.

## Rapid Population Growth in Relation to Climate Change

Today, 47 per cent of the world’s population lives in countries where total fertility is already below replacement level, and just 9 per cent lives in countries where fertility levels are still 5 children per woman or higher (United Nations, 2009d). This situation has led most people to believe that population growth is no longer a problem to be reckoned with, and, because most high-income countries today have populations whose fertility has been below replacement level for two or three decades, population decline and rapid population ageing are their immediate concerns. Consequently, donor governments, in particular, and the international community, in general, are focusing less attention on the rapid population

**Figure 2.3 Percentage Change in Donor Assistance for Family Planning Programmes per Woman Aged 15-49, 1996 to 2006**



Source: United Nations, 2009c.

growth that still characterizes a significant number of developing countries, especially those with the lowest levels of per capita income. Data on donor funding for family planning indicates that in almost all developing countries such funding, expressed per woman of reproductive age, has declined between 1996 and 2006, often by at least 50 per cent (Figure 2.3).

At present, low rates of natural increase (the excess of births over deaths) characterize most high-income countries, whereas low-income countries have both high rates of natural increase and generally high rates of population growth. This negative association between the speed of population growth and per capita income contrasts with the strong positive association that exists between income levels and the production of the greenhouse gases that cause climate change. Thus, as is well known, the countries that produce the lion's share of greenhouse gases are those with high or rapidly increasing per capita incomes and whose populations are generally growing slowly, if at all. In contrast, countries in which the population is still growing fast tend to have low per capita incomes, and their per capita emissions of greenhouse gases are also low. Furthermore, the evidence suggests that rapid population growth in low-income countries can, by itself, be a drag on economic growth (United Nations, 2009c), thus further contributing to keeping their per capita greenhouse gas emissions low. Consequently, the linkages between population growth and climate change are far from straightforward. In order to consider the potential impact of population growth on climate change, account must be taken of the interrelationships between population growth, economic development, energy use and deforestation, as well as on the impact of all these processes on global warming.

Complex models that take into account the effects not only of population growth but also of changes in the age structure of populations and their distribution between urban and rural areas on economic productivity, economic growth and energy use indicate that population change, driven by changing fertility, can

have a sizeable impact on the production of greenhouse gases. Full results of such models have not yet been published, but the preliminary results of scenarios to 2100 show that maintaining a lower population growth rate, particularly in the rapidly growing economies of the developing world and in high-income countries, would by itself make a sizeable contribution to the reduction in greenhouse gas emissions considered necessary to prevent dangerous global warming (O'Neill, forthcoming).

It is worth reviewing the assumptions regarding future population growth underlying the scenarios of future greenhouse gas emissions developed by the Intergovernmental Panel on Climate Change (IPCC, 2000). For the A1 and B1 families of scenarios, the IPCC uses a population projection that combines low fertility with low mortality and migration. World population in that projection peaks at 8.7 billion in 2050 and declines to 7.1 billion in 2100. The A2 family of scenarios is based on a high population projection where world population reaches 15 billion in 2100. The B2 family of scenarios uses a medium population projection in which world population reaches 9.4 billion in 2050 and rises to 10.4 billion in 2100. Because each family of scenarios varies with respect to other assumptions about future economic development, comparing their outcomes does not allow an assessment of the effect that population growth per se would have on greenhouse gas emissions. Furthermore, given that population and economic growth are interrelated, it would be unrealistic to model a future in which only population growth varies from one scenario to the next. In fact, in setting assumptions about future economic growth, the IPCC acknowledges its interrelationships with population trends and therefore assigns the highest economic growth to the family of scenarios with the slowest population growth (A1 with a growth rate of 2.9 per cent per year and B1 with 2.5 per cent per year).

The other two families of scenarios are assigned a medium level of economic growth (B2 with 2.2 per cent annually on average) or a low one (A2 with 1.3 per cent annually on average). The fourth assessment report of the IPCC presents the results of the different scenarios with respect to their impact on climate change (IPCC, 2007). Those results are sobering, because they indicate that the impact on climate change is highest in the A2 scenario despite the low economic growth it embodies. Both the rapid population growth it incorporates and its assumption of slow technological change contribute to that result. Only one family of scenarios, denoted A1F1, which incorporates low population growth combined with continued high use of fossil fuels, produces worse effects on the climate than A2.

The stark reality is that a reduction of greenhouse gas emissions requires lower overall consumption of energy derived from fossil fuels. Hence, the more people there are on Earth, the more the per capita use of fossil fuels needs to decrease to attain safe emissions levels. Existing disparities in energy use stemming from sharp differences in per capita incomes add complexity to the argument, but do not invalidate the fact that current levels of population growth cannot continue over the long run without endangering the sustainability of the planet, particularly if standards of living are to be improved for a growing population.



## Population and the Environment in the United Nations: A Historical Perspective<sup>2</sup>

Consideration of the interrelationship between population trends and the environment began with the founding of the United Nations. Those interrelationships were the focus of the first session of the United Nations Population Commission (now the Commission on Population and Development) held in 1947 (United Nations, 2001). At that time, the discussion was mostly framed in terms of whether the natural resources needed to ensure that the large population growth expected over the next few decades would be compatible with economic development. The need to ensure adequate access to land for a growing rural population in order to maintain or increase agricultural production was also a prominent focus of discussion. In the 1950s, data on demographic and socio-economic trends in developing countries were scarce. Consequently, the first studies on the relationship between population and the environment related mostly to the experience of developed countries and tended to focus on how socio-economic development shaped demographic trends by improving health and contributing to changing the norms on the number of children desired.

In the 1960s, awareness that global population growth was reaching very high and unprecedented levels raised concerns about overall environmental sustainability. In response, the General Assembly decided to convene a United Nations Conference on the Human Environment (resolution 2398 [XXIII] of 3 December 1968), noting that “rapidly increasing population and accelerating urbanization” were accentuating the “continuing and accelerating impairment of the quality of the human environment”. A subsequent report of the Secretary-General (United Nations, 1969) cited the explosive growth of human populations as “first among the portents of a crisis of worldwide scope concerning the relation between man and his environment” (United Nations, 2001).

Held in Stockholm in 1972, the conference adopted a Declaration (United Nations, 1973, ch. I) and an Action Plan for the Human Environment (ch. II). Those documents guided the activities of the United Nations system on environmental issues during the 1970s and 1980s. Although population growth was recognized as a relevant factor in relation to the environment, and paragraph 5 of the Declaration stated that “the natural growth of population continuously presents problems for the preservation of the environment, and adequate policies and measures should be adopted, as appropriate, to face these problems”, it was left to the United Nations World Population Conference held in Bucharest in 1974 to consider the issue of population and its consequences for the environment.

Late in 1973, an expert Symposium on Population, Resources and the Environment was convened in preparation for the World Population Conference. The state of knowledge at the time did not yield strong conclusions about the interrelationships between population size and growth, on the one hand, and the environment on the other, mainly because, as experts recognized, population was only one of the factors—and not necessarily the most important—causing resource and

environmental problems. At the conference itself, the debate reflected profound divergences in the perception of the population-environment interactions among Member States, differences that continue to this day. As a result, the World Plan of Action adopted by the World Population Conference gave only cursory treatment to the interrelations between population and the environment.

In 1984, a second intergovernmental conference on population, the International Conference on Population, was held in Mexico City. The conference adopted recommendations for the further implementation of the World Population Plan of Action (United Nations 1984, ch. I, sect. B [III and IV]) which acknowledged the importance of environmental issues by calling for national development policies and international development strategies based on an integrated approach that would take into account the relationships among population, resources, environment and development (recommendation 1). Furthermore, using language that would become the cornerstone of the development paradigm of the 1990s, the recommendations stipulated that the formulation of national population goals and policies should take into account the need for long-term environmentally sustainable economic development (sect. B, para. 8). More specifically, the conference urged the governments of “countries in which there are imbalances between trends in population growth and resources and environmental requirements” to adopt and implement, “in the context of overall development policies, . . . specific policies, including population policies, that will contribute to redressing such imbalances . . .” (United Nations, 1984, ch. I, sect. B [III, recommendation 4]).

The United Nations Conference on Environment and Development, held in Rio de Janeiro in 1992, was a milestone in the evolution of an international consensus on the interrelations between population and the environment, based on the concept of ‘sustainable development’, defined by the report of the World Commission on Environment and Development as development that “meets the needs of the present without compromising the ability of future generations to meet their own needs” (para. 1, United Nations, 1987, annex). Even more explicitly, the World Commission declared in its report that poverty, environmental degradation and population growth were inextricably related and that none of those problems could be successfully addressed in isolation. The Commission’s report noted that, in several regions of the world, rapid population growth had exceeded the available natural resources and was jeopardizing development possibilities. Moreover, the fact that curbs on population growth were necessary made it imperative to integrate population programmes into mainstream development efforts. Although members of the World Commission remained divided on both the significance of population growth as a cause of environmental degradation and on concrete policy prescriptions, the prominence given to the issue raised its visibility on the international agenda (United Nations, 2001).

Influenced by the findings of the commission, the Rio Declaration on Environment and Development identified population policies as an integral element of sustainable development, and principle 8 of the Rio Declaration stated that “to achieve sustainable development and a higher quality of life for all people, States



should reduce and eliminate unsustainable patterns of production and consumption and promote appropriate demographic policies” (United Nations, 1993, resolution 1, annex I, principle 8). Furthermore, chapter 5 of Agenda 21 (United Nations, 1993, resolution 1, annex II) addressed demographic dynamics and sustainability and noted that “the growth of world population and production combined with unsustainable consumption patterns places increasingly severe stress on the life-supporting capacities of our planet” (para. 5.3).

These issues were revisited at the International Conference on Population and Development (ICPD), held in Cairo in 1994. The central theme of the conference was to forge a balance among population, sustained economic growth and sustainable development. The Programme of Action adopted by the conference recognized “that population, poverty, patterns of production and consumption and the environment are so closely interconnected that none of them can be considered in isolation” (United Nations, 1995, ch. I, resolution 1, annex, para. 1.5) and acknowledged that population factors could sometimes be inhibitors of sustainable development: “Demographic factors, combined with poverty and lack of access to resources in some areas, and excessive consumption and wasteful production patterns in others, cause or exacerbate problems of environmental degradation and resource depletion and thus inhibit sustainable development” (para 3.25). Crucially, the Programme of Action noted that “slower population growth has in many countries bought more time to adjust to future population increases. This has increased those countries’ ability to attack poverty, protect and repair the environment, and build the base for future sustainable development. Even the difference of a single decade in the transition to stabilization levels of fertility can have a considerable positive impact on quality of life” (para 3.14).

In June 1997, when the General Assembly conducted the first five-year review of the implementation of Agenda 21, it concluded that, whereas many of the overall trends that impacted on sustainable development had become worse since 1992, population growth rates had continued to decline at the global level, and, if such trends continued, the stabilization of the world population could be reached during the 21st century. The *Programme for the Further Implementation of Agenda 21* adopted in 1997 (General Assembly resolution S-19/2, annex) affirmed that:

*The impact of the relationship among economic growth, poverty, employment, environment and sustainable development has become a major concern. There is a need to recognize the critical linkages between demographic trends and factors and sustainable development. The current decline in population growth rates must be further promoted through national and international policies that promote economic development, social development, environmental protection, and poverty eradication, particularly the further expansion of basic education, with full and equal access for girls and women, and health care, including reproductive health care, covering both family planning and sexual health, consistent with the report of the International Conference on Population and Development (United Nations, 1997, para. 30).*

In 2000, the General Assembly adopted the United Nations Millennium Declaration (United Nations, 2000), which set a number of key development goals regarding, inter alia, the reduction of poverty and hunger, the attainment of universal basic education, the reduction of child and maternal mortality and the promotion of gender equality. The Millennium Declaration also contained a section focusing on the protection of “our common environment” (sect. IV) but the issues highlighted in it did not include population growth. Nor was population growth mentioned in the outcome documents of the World Summit on Sustainable Development held in Johannesburg in 2002, although the Johannesburg Plan of Implementation adopted by the Summit mentioned the crucial role that agriculture plays in “addressing the needs of a growing population” (United Nations, 2002, para. 40). It also called for the strengthening of health systems in order to “address effectively, for all individuals of appropriate age, the promotion of healthy living, including their reproductive and sexual health, consistent with the commitments and outcomes of recent United Nations conferences and summits” (para. 54[j]).

In regard to the United Nations Climate Change Conference that will be held in Copenhagen in December 2009, the draft of the outcome document that is still under negotiation makes no mention of population dynamics or population growth.

## Why Has Population Disappeared from the Environmental Debate?

A number of reasons can be given for the disappearance of population growth as an issue to be considered in finding ways to mitigate climate change. The first reason was acknowledged in 1997 when the first five-year review of the implementation of Agenda 21 concluded that the declining trend in the global rate of population growth was a success (United Nations, 1997). Since then, the continuing decline in the growth rate has not been conducive to eliciting the sense of urgency that was common among policymakers in the 1970s and 1980s, despite the fact that, because of population momentum, increasing numbers of people will have to be accommodated on the planet no matter how rapidly that rate falls.

The second reason relates to the fact that two distinct trends are causing the reduction of the global growth rate: reductions in fertility, on the one hand, and increases in mortality in the countries most affected by the HIV/AIDS epidemic on the other. As a result of the 1994 ICPD, policies and programmes related to fertility trends, as well as efforts to control the HIV/AIDS pandemic, have been subsumed under the class of actions aimed at improving reproductive and sexual health. Within that group, programmes for the prevention and treatment of HIV/AIDS, which hardly existed in the early 1990s, have expanded markedly, absorbing an ever increasing share of the available funding (United Nations, 2009a). It is partly for this reason that donor financing for family planning has declined on a per capita basis and that the attention of the international community has shifted toward major health issues, including both the control of the HIV/AIDS pandemic and the reduction of maternal and child mortality.

A third reason involves the key feature of the ICPD Programme of Action: the recognition by the international community of the existence of reproductive rights. Within the United Nations, the first mention of a right related to human reproduction dates from 1968, when the International Conference on Human Rights adopted the Proclamation of Teheran in which the international community recognized that “parents have the basic human right to determine freely and responsibly the number and the spacing of their children” (United Nations, 1968, para. 16). The characterization of this basic human right was developed further in the Principles and Objectives of the World Population Plan of Action adopted by the World Population Conference in 1974, which states in paragraph 14(j) that “[a]ll couples and individuals have the basic right to decide freely and responsibly the number and spacing of their children and to have the information, education and means to do so; the responsibility of couples and individuals in the exercise of this right takes into account the needs of their living and future children, and their responsibilities towards the community” (United Nations, 1975).

In addition, the World Population Plan of Action, which was the first United Nations document to provide guidance to governments on how to develop population policies, noted explicitly that those policies should conform to human rights, as stated in para. 17: “Countries which consider that their present or expected rates of population growth hamper their goals of promoting human welfare are invited, if they have not yet done so, to consider adopting population policies, within the framework of socio-economic development, which are consistent with basic human rights and national goals and values.”

Over the next two decades, as increasing numbers of countries formulated and implemented population policies, the recognition that successful policies had at their core a full respect for human rights was strengthened. The result was the characterization of reproductive rights that was adopted in 1994 by the ICPD, the main tenets of which are that:

*. . . reproductive rights embrace certain human rights that are already recognized in national laws, international human rights documents and other consensus documents. These rights rest on the recognition of the basic right of all couples and individuals to decide freely and responsibly the number, spacing and timing of their children and to have the information and the means to do so, and the right to attain the highest standard of sexual and reproductive health. It also includes the right to make decisions concerning reproduction free of discrimination, coercion and violence, as expressed in human rights documents. In the exercise of this right, they should take into account the needs of their living and future children and their responsibilities toward the community. The promotion of the responsible exercise of these rights for all people should be the fundamental basis for government- and community-supported policies and programmes in the area of reproductive health, including family planning. As part of their commitment, full attention should be given to the promotion of mutually respectful and equitable gender*

*relations and particularly to meeting the educational and service needs of adolescents to enable them to deal in a positive and responsible way with their sexuality . . . . (United Nations, 1995, para. 7.3).*

The holistic approach to reproductive and sexual health implicit in the above and the explicit mention of the needs of adolescents were major steps forward, but they have contributed to weakening the focus of population policies on family planning. This outcome was not intended by the framers of the ICPD Programme of Action, which contains a full section on family planning. The “basis of action” presented in that section is well worth recalling because it distills the accumulated experience of three decades of family planning programmes:

*The aim of family-planning programmes must be to enable couples and individuals to decide freely and responsibly the number and spacing of their children and to have the information and means to do so and to ensure informed choices and make available a full range of safe and effective methods. The success of population education and family-planning programmes in a variety of settings demonstrates that informed individuals everywhere can and will act responsibly in the light of their own needs and those of their families and communities. The principle of informed free choice is essential to the long-term success of family-planning programmes. Any form of coercion has no part to play. In every society there are many social and economic incentives and disincentives that affect individual decisions about child-bearing and family size. Over the past century, many Governments have experimented with such schemes, including specific incentives and disincentives, in order to lower or raise fertility. Most such schemes have had only marginal impact on fertility and in some cases have been counterproductive. Governmental goals for family planning should be defined in terms of unmet needs for information and services. Demographic goals, while legitimately the subject of government development strategies, should not be imposed on family-planning providers in the form of targets or quotas for the recruitment of clients (para. 7.12).*

To sum up, the third reason for the increasing invisibility of population issues in the environmental debate is the change of focus from family planning to the holistic approach implicit in reproductive health, coupled with certain legacies of what some people characterize as ‘the population control era’ in which governments expected family planning programmes to meet explicit demographic goals and used incentives or disincentives to achieve those goals. The sensitivities surrounding these issues make them difficult to address in international negotiations, especially when, as in the case of negotiations on how to prevent climate change, many other challenging issues are yet to be settled. Furthermore, although population trends are likely to shape the future paths of greenhouse gas emissions in significant ways, their effect is still far in the future even if the time to act is now.

## If Population Is Relevant for Climate Change, What Next?

So, does population matter for climate change? This chapter has provided several reasons for the answer to be in the affirmative, but, in a manner reminiscent of the first United Nations Conference on the Human Environment, the international community is likely to leave the debate on future population trends and how to shape them to the next international conference on population. In the meantime, there is still much to be done. Indeed, universal access to reproductive health, one of the key goals of the ICPD Programme of Action—echoed by the 2005 World Summit (United Nations, 2005) and now part of the framework of the Millennium Development Goals—is still far from being achieved. Unmet need for family planning is significant in many countries and particularly in the least-developed countries, where 23 per cent of women of reproductive age who are married or in a union have an unmet need for family planning (United Nations, 2009b). In the least-developed countries, only 24 per cent of those women use a modern method of contraception, whereas 60 per cent do so in the rest of the developing world. There is also a need to improve access to a full range of family planning methods in developing countries, since, in many, contraceptive use is heavily clustered in just one or two methods.

Experience has shown that the best decisions about family planning are those that people make for themselves, based on accurate information and a range of contraceptive options. People who make informed choices are better able to use family planning safely and effectively (Upadhyay, 2001). To enable people to make informed choices, governments can ensure that people have access to a full array of methods and eliminate unnecessary medical barriers to access. Governments can also develop communication programmes to convey the message that people have a right to information about their health and can make family planning decisions for themselves, based on their own needs and desires. Communication programmes should also encourage people to visit family planning providers and prompt them to ask questions and express any concerns they may have. Managers of family planning programmes should make informed choice the norm in service delivery and ensure that service providers are trained to provide information without interfering in the ability of clients to make decisions. Governments can take measures to ensure that a variety of methods are available through as many service delivery outlets as possible. Donors can support free choice by ensuring that family planning programmes have adequate supplies of a wide array of contraceptive methods. All these actions are consistent with the guidance provided by the ICPD Programme of Action. There is ample experience to show that, with government commitment, the strategies and tools to ensure that people can exercise their reproductive rights effectively can produce the population trends that will, over the medium and long term, contribute to ensuring the sustainability of life on the planet. Given the enormous challenges that achieving sustainability poses, there is no time to lose.



## Notes

- 1 The views and opinions expressed in this paper are those of the author and do not necessarily reflect those of the United Nations.
- 2 This section draws extensively on Chapter I of United Nations, 2001.

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