

POLICY FORUM

CLIMATE CHANGE

Global warming policy: Is population left out in the cold?

Population policies offer options to lessen climate risks

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Would slowing human population growth lessen future impacts of anthropogenic climate change? With an additional 4 billion people expected on the planet by 2100, the answer seems an obvious “yes.” Indeed, substantial scientific literature backs up this intuition. Many nongovernmental organizations undertake climate- and population-related activities, and national adaptation plans for most of the least-developed countries recognize population growth as an important component of vulnerability to climate impacts (1). But despite this evidence, much of the climate community, notably the Intergov-

ernmental Panel on Climate Change (IPCC), the primary source of scientific information for the international climate change policy process, is largely silent about the potential for population policy to reduce risks from global warming. Though the latest IPCC report (2) includes an assessment of technical aspects of ways in which population and climate change influence each other, the assessment does not extend to population policy as part of a wide range of potential adaptation and mitigation responses. We suggest that four misperceptions by many in the climate change community play a substantial role in neglect of this topic, and propose remedies for the IPCC as it prepares for the sixth cycle of its multiyear assessment process.

Population-related policies—such as offering voluntary family planning services as well as improved education for women and girls—can have many of the desirable

characteristics of climate response options: benefits to both mitigation and adaptation, co-benefits with human well-being and other environmental issues, synergies with Sustainable Development Goals (SDGs), and cost effectiveness. These policies can also enable women to achieve their desired family size, and lead to lower fertility and slower population growth (3). The resulting demographic changes can not only lessen the emissions that drive climate change but also improve the ability of populations to adapt to its consequences.

MISPERCEPTION 1: POPULATION GROWTH IS NO LONGER A PROBLEM

The population growth rate of the developing world increased sharply in the 1950s and 1960s, resulting in a doubling of the world population from 3 billion in 1960 to over 6 billion in 2000 (4). The main cause of this acceleration was the spread of public health measures, which rapidly reduced death rates while birth rates remained high. Slowing this population expansion became a top priority for the global development agenda. In the 1970s and 1980s, substantial international assistance was invested in voluntary family planning programs to reduce fertility.

This early consensus on population policy ended in the 1990s when interest and international support waned for rea-

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A community health worker shows women how to use a condom in Bangladesh.

sions including (i) the belief that fertility declines already under way in Asia and Latin America would soon occur in Africa; (ii) the expectation that high AIDS mortality would halt population growth in sub-Saharan Africa; (iii) the failure of earlier dire predictions, such as worldwide famine, to materialize; and (iv) the call from the 1994 International Conference on Population and Development (ICPD) to emphasize reproductive health and rights over demographic aims. As a result, funding for reproductive health issues (e.g., maternal care, safe delivery, sexually transmitted diseases, and female genital cutting) rose and funding for family planning programs declined. These issues were widely debated in the 1990s and 2000s and may have affected the coverage of population policy in IPCC reports in part because population growth no longer seemed an urgent matter.

Over the past decade, two unexpected developments have led to renewed concern about future population growth, particularly in sub-Saharan Africa. Fortunately, AIDS mortality has dropped sharply as treatment has become more accessible worldwide. In addition, and contrary to expectations, birth rates across sub-Saharan Africa have remained high, and declines in birth rates have stalled in several countries. As a result, the latest UN world population projection is the highest ever, expecting 11.2 billion in 2100, a nearly 4 billion rise from 2015 (4). Much of this rise is projected in sub-Saharan Africa (from 1 billion in 2015 to 4 billion in 2100), but Asia (excluding East Asia) and Latin America are also projected to grow substantially.

MISPERCEPTION 2: POPULATION POLICIES ARE NOT EFFECTIVE

Population policies generally recommend a range of interventions that influence fertility trends, either directly or indirectly. Family planning programs to assist women in achieving their reproductive goals for limiting or spacing births have been the main population intervention adopted by governments (5). These programs have been successful in a number of countries, but further investments are still needed. Each year, about 85 million unintended pregnancies result in 32 million unplanned births worldwide; the large majority of these (28 million) in the developing world (6). Population growth could be reduced substantially by avoiding these unplanned pregnancies.

The vast majority of unintended pregnancies occur among women who want to avoid pregnancy but are not using effective contraception. Reasons for non-use include

lack of access to services and the high costs of modern methods. Fear of side effects of methods, disapproval of partners, and reluctance to violate social norms are also substantial barriers to use (7).

Voluntary family planning programs designed to be responsive to cultural customs reduce these obstacles by increasing access, providing subsidies, and expanding method options. Well-run voluntary programs have contributed to sustained declines in fertility and population growth across Asia, the Middle East, and Latin America and in some countries in Africa (5, 7).

Although many studies have assessed outcomes of family planning programs, these mostly examined near-term effects on raising contraceptive use and reducing birth rates. Very few studies estimate impacts of family planning programs on longer-term demographic trends, in part because isolating the exact impact of programs versus socioeconomic development and other factors is not straightforward in most countries. The potential impact of these programs on long-range population size is illustrated by comparing Bangladesh and Pakistan, which had almost the same population size in 1980. Bangladesh then implemented one of the world's most effective voluntary family planning programs. By contrast, Pakistan's program was considerably weaker, lacking government commitment. As a result, fertility trajectories differed substantially from 1980 onward, resulting in increasingly large differences in population size over time (see the figure). By 2100, Pakistan's population is projected to be double the size of Bangladesh's. This suggests that the Bangladesh family planning program led to a large cut in the country's potential 2100 population. Fertility and population trends are also affected by levels of socioeconomic development, but this is unlikely to be the dominant explanation for the different trajectories (see supplementary materials). Development levels as measured by the Human Development Index are nearly the same for Bangladesh and Pakistan (8), which are both poor majority-Muslim countries in South Asia.

High-quality voluntary family planning programs can also have a large impact in Sub-Saharan Africa. Programs implemented in the early 2000s in Ethiopia, Malawi, and Rwanda have already resulted in sharp declines in fertility. Unfortunately, in many African countries, including Nigeria, family planning is still given low priority. Existing programs in Asia and Latin America also could be improved.

In addition to improving the health and welfare of women, families, and communities, reduced fertility assists in eliminat-

ing poverty and reducing pressure on the natural environment. Family planning programs are one of the most cost-effective health and development investments available to governments (9).

Population policies often include other relevant programmatic interventions such as education and empowerment of women. These are not only important development interventions, but they also accelerate fertility decline (10). Of course, educated and empowered women must have access to contraception to regulate their fertility.

MISPERCEPTION 3: POPULATION DOES NOT MATTER MUCH FOR CLIMATE

The emissions and land use that drive climate change are a result of income and consumption growth, technological change, changes in economic structure, related policies, and other factors. Past and current emissions have been attributed primarily to economic growth powered by fossil fuels in the currently high-income countries. However, multiple studies using increasingly sophisticated methods have demonstrated that population plays an important role both in historical and projected future emissions (11). Although slower future population growth would not be the most important means of reducing future emissions, it could reduce global emissions by 40% or more in the long term (12). Slower population growth and associated changes in age structure can also have positive economic effects that would tend to drive greenhouse gas emissions up, but these effects do not appear to be large enough to offset the emissions reduction produced by the slower population growth (see supplementary materials).

The potential emissions reduction is large even though policy-induced declines in population growth would be largest in regions that currently have low per-capita emissions. Anticipated future growth in incomes and energy use in these developing regions explain this result. Over the next few decades, overall emissions from low-income countries are likely to rise because of a rise in emissions per capita from rapid industrialization, as well as because of increasing population.

Slower population growth is also anticipated to reduce climate change risks by freeing up resources for adaptation. Improvements in education and health, which can both lead to and result from slower population growth, can reduce vulnerability to natural disasters and climate risks (13). Population-related policies that affect the spatial distribution of population, including those influencing immigration, labor mobility, urbanization, and coastal development, can also affect vulnerability.

The IPCC itself has partially assessed the topic, concluding that population growth, urbanization, and changes in age structure are important drivers of emissions. It has also concluded that demography shapes the exposure and vulnerability of populations to climate impacts and can limit, or facilitate, the ability of society to adapt to those impacts. What is missing is an accounting of how reductions in population growth might play a role in responses to the climate issue (see supplementary materials).

Many in the climate policy community currently focus on achieving substantial emissions reductions in the near future. Although slowed population growth would contribute only modestly in the short term, its cumulative effect over the 21st century would be substantial. Slowed population growth would reduce emissions and the demand for energy that would have to be satisfied with low- or zero-carbon sources. It would therefore also have an important effect on the scale of the energy system ultimately required under a stabilized climate.

MISPERCEPTION 4: POPULATION POLICY IS TOO CONTROVERSIAL TO SUCCEED

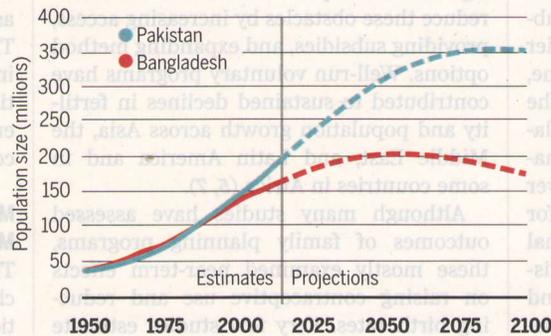
Family planning programs have attracted criticism since their initiation. The most persistent opposition has come from conservative religious and social groups. One of their main concerns is that making contraception readily available encourages promiscuity and leads to a breakdown of family life. In addition, the Catholic Church opposes artificial contraception, and Islam opposes sterilization. These religious concerns are shared by conservative political allies, leading to frequent controversy.

Other concerns about family planning programs have been raised by human rights advocates who fear coercion. They point to examples of massive abuses by the Chinese government during the implementation of the one-child policy and by the Indian government during an emergency period in the late 1970s. These abhorrent practices were and are universally condemned. Nevertheless, reproductive health remains a political issue in many countries, and constraints on women's choices continue to exist (e.g., limited choice of contraceptive methods or lack of services).

A key point of sensitivity is that family planning programs largely aim to reduce fertility in the developing world while people in the developed world, which is primarily responsible for causing the climate to change, continue their excessive emission of greenhouse gases. At the same time, many

Population estimates and projections for Bangladesh and Pakistan

Differences suggest that a good family planning program (as in Bangladesh beginning in the 1980s) can have a large impact on population trajectories in the long term. Data are from (4). See supplementary materials for details on data and methods.



developed countries are also increasingly concerned about aging and decline of their populations. Many in the climate change community believe that entering into a population policy discussion thus blames the poor countries for problems created by the rich countries. Although this belief is real, it does not change the fact that population growth in developing countries poses challenges for climate and development and deprives the international community of an important policy lever to improve human welfare.

Although these controversies do indeed exist, they are not the obstacles to program implementation that some in the climate community believe them to be. Governments around the world now support the conclusions of the ICPD, confirmed by the SDGs, which call for a human rights-based approach and for women everywhere to have the right to freely choose when and how often to get pregnant (14). Many countries in Asia and Latin America have invested in family planning programs, and increasing numbers of governments in sub-Saharan Africa have started such programs. There is widespread agreement among governments and international organizations that family planning programs are a valuable investment. The SDGs in fact call for more such services. But these programs are often given low priority because they are considered a health investment rather than an investment with wide-ranging socioeconomic and environmental benefits.

POLICY LEVERS

Rapid population growth is one of the key drivers of emissions and one of the determinants of vulnerability to impacts; it therefore should be considered as a potential climate policy lever. A key first step in remedying the current neglect of the issue is for the IPCC to include population policy in its assessment

of the literature on mitigation and adaptation options. Although the outline for the sixth IPCC assessment report has already been agreed upon (with no explicit mention of population policy), there is ample opportunity within its structure to assess literature on population policy as a component of mitigation or adaptation responses, as well as its costs and benefits, implementation barriers, and links to SDGs (see supplementary materials). The IPCC should also consider the inclusion of more social scientists experienced in reproductive health and population policy.

Beyond the IPCC, the climate and environmental communities and international development institutions should embrace scientifically sound analyses of population policy and human rights-based reproductive health programs. Other international environmental assessments (11, 15) have done somewhat better than the IPCC in covering this topic. Given the urgency of addressing climate change, all available options, especially those that have multiple benefits for sustainable development, should be assessed by experts and considered by governments. ■

REFERENCES

1. C. Mutunga, K. Hardee, *Afr. J. Reprod. Health* **14**, 133 (2010).
2. Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2014: Synthesis Report* (IPCC, Geneva, Switzerland, 2014).
3. G. J. Abel et al., *Proc. Natl. Acad. Sci. U.S.A.* **113**, 14294 (2016).
4. United Nations, *World Population Prospects: The 2017 Revision* (United Nations Population Division, New York, 2017).
5. J. May, *World Population Policies: Their Origin, Evolution and Impact* (Springer, 2012).
6. G. Sedgh, S. Singh, R. Hussain, *Stud. Fam. Plan.* **45**, 301 (2014).
7. J. Bongaarts, J. Cleland, J. Townsend, J. Bertrand, M. Das Gupta, *Family Planning Programs for the 21st Century: Rationale and Design* (Population Council, New York, 2012).
8. United Nations Development Program (UNDP), *Human Development Report 2016: Human Development for Everyone* (UNDP, New York, 2016).
9. Copenhagen Consensus Center, "The Economist: Special Online Supplement" (Copenhagen Consensus Center, Copenhagen, 2015); www.copenhagenconsensus.com/post-2015-consensus/economist.
10. S. Jejeebhoy, *Women's Education, Autonomy, and Reproductive Behaviour: Experience from Developing Countries* (Clarendon, Oxford, 1995).
11. Millennium Ecosystem Assessment (MA), *Ecosystems and Human Well-Being: Synthesis* (Island Press, Washington, DC, 2005).
12. B. O'Neill et al., *Lancet* **380**, 157 (2012).
13. W. Lutz, R. Muttarak, E. Striessnig, *Science* **346**, 1061 (2014).
14. United Nations, Report of the International Conference on Population and Development (Population Division, Department for Economic and Social Information and Policy Analysis, A/CONF.171/13/Rev.1, United Nations, New York, 1995).
15. United Nations Environment Programme (UNEP), *Global Environment Outlook 5: Environment for the Future We Want* (United Nations Environment Programme, Nairobi, Kenya, 2012).

SUPPLEMENTARY MATERIALS

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