Editorial

Family planning, population growth, and the environment

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As we enter a new decade and the 50th anniversary year for *Contraception,* earth's human population is nearly 7.8 billion. When Dan Mishell started our journal in 1970, earth's population had not yet reached 4 billion. By this metric, one might conclude that our efforts at family planning have failed. More optimistically, we look at the considerable diversity of modern contraceptive methods, and the impact they have made in improving women's lives and at reducing the risk of unintended pregnancy.

With better policies, increased financial resources and luck, our collective work in family planning will slow the rate of population growth over the next 80 years; population will peak at or below 10.9 billion around 2100 before gradually stabilizing or declining in the next millennium (Figure 1) [1]. However, attaining this goal will require us to achieve rapidly a global total fertility rate (TFR) of about 2.1, a feat yet accomplished. We remain optimistic in pursuit of this objective; the consequences of failure are unacceptable. Family planning is the most humane and viable strategy for human survival.

Most people have little understanding of the dynamics of human population growth. About 2 million years ago, hominoids began their assent on the African continent and spread throughout the world [2]. By 40,000 years ago, the era of speciation of humans had ended, with only *Homo sapiens* remaining [3]. Throughout most of human history, world population remained stable and in balance with resource consumption. Human population did not reach 1 billion until about 1827 [4]. Emerging technologies allowing exploitation of new energy resources, advances in disease prevention, and improved agricultural techniques have since resulted in exponential growth; we reached the second billion by 1920, the third by 1957, the forth by 1974, the fifth by 1987, the sixth by 1999, and 7 billion people in 2011 [4-8]. Between the third and fourth billion, sometime around 1970, the resources used daily surpassed what the Earth can

maintain, meaning that Earth cannot generate resources fast enough to support our growing population [9]. Already, nations compete vigorously for the finite resources of Earth, with ecosystem transformation, extinctions, and pollution contributing to rising nationalism, war, famine, and migration of displaced people symptoms of massive inequality of wealth and resource distribution [10].

Fifty years ago, Professor Paul Ehrlich of Stanford University alerted the world to the hazards of unchecked population growth through publication of *The Population Bomb [11]*. Widely criticized as Malthusian sensationalism, his predications of exponential population growth leading to food insecurity and environmental degradation generally reflect the dilemma of our modern world [12]. In a 2014 commentary, Ehrlich urged greater activism: “All scientists should be allocating a significant amount of effort to promoting understanding and action to deal with the major drivers of environmental destruction: population growth, overconsumption by the rich, and socio-economic inequity” [13]. As family planning specialists, we should devote part of our effort to educating policy leaders and the public about the importance of our work from an environmental standpoint.

Paul Erhlich and John Holdren provided a useful formula to relate environmental impact to population and consumption in a 1971 paper published in *Science [14]*:

I = P*A*T

where: I = environmental impact
P = population size
A = affluence (a measure of consumption)
T = technology (a measure of energy use to support the affluence)

This formula allows us to compare the relative environmental impact of different countries. Rich nations like the United States, with high affluence,

wasteful energy policies and a relatively large population size have the greatest overall global environmental impact. In rich nations with stable populations, a duel strategy of embracing policies that reduce both the **T** (such as substituting renewable energy for coal) and **A** (changing the ethos to “enough” rather than “more”) diminish overall impact. While poor nations such as India with low per capita affluence and energy use have a comparatively lower global impact, we cannot neglect the contribution of a large and growing population. Understandably, citizens of poor nations aspire to gain the wealth common in rich nations, but as income rises so does energy use and consumption. Even small gains in **A** and **T** in nations with large and growing populations contribute greatly to global **I**. For example, China has become the world's leading consumer of natural resources and the greatest emitter of the greenhouse gas CO_2, and estimates suggest that total carbon emissions from developing nations will exceed those of more developed economies by 2030 [15]. Moreover, migrants to the United States and Europe from poor regions understandably seek to consume at North American and European levels, increasing global **I** even faster**.**

The only variable that will reduce **I** under all scenarios is reduction in **P.** We cannot overemphasize the importance of voluntary contraception and global family planning policies as the most humane and practical approach to a just and peaceful future for our grandchildren. The Centers for Disease Control and Prevention recognized the importance of these issues, citing family planning as one of the 10 great public health achievements of the 20th century [16].

As we continue further into the 21st century, how will we respond to the possible addition of 4 billion more inhabitants by the end of the century? As biologists, we see a world of finite resources under significant stress at our current population under siege by a global economic policy that assumes

human ingenuity will continue to provide for any number of humans. This ingenuity hypothesis faces an enormous test in the coming decades. Will we see global cooperation or conflict as nations vigorously compete for earth's limited resources? The wild card effects of global warming and degradation of ecosystem services contribute further to our concerns about overpopulation [17,18].

The history of our era will be the story of how the minority of earth's inhabitants living in rich nations will either share or deny earth's finite resources to the majority of inhabitants living in poor nations. The unrelenting pressure of future population growth only intensifies every environmental and social challenge. Unfortunately, the politics of population growth and income inequality often interfere with discussion of population policies. For this reason, many environmental and social justice advocates hesitate to prioritize family planning as a policy objective. This thinking fails to consider our fragile and interconnected earth. Both rich and poor nations have a responsibility to limit family size and future population growth. The world cannot sustain unchecked consumption in rich nations, nor high fertility in poor nations. While social justice efforts to reduce inequality must continue, it is naïve to consider that increasing population does not exacerbate the problem of wealth disparity. Given that current levels of migration have led to the rise of right-wing anti-immigrant governments in many nations, what can we expect as environmental disasters and conflict increase the flow?

Family planning is the most humane vehicle for achieving sustainable social and environmental justice. *Contraception* has been an important means for scientists and scholars to share advances in family planning research and advocacy over the past fifty years, with the last ten years notable for being the official journal of the Society of Family Planning. As we move into the next fifty years of family planning research and advocacy, let us proudly

promote our work, and educate policy makers and the public about the link between human population and complex environmental and social problems.

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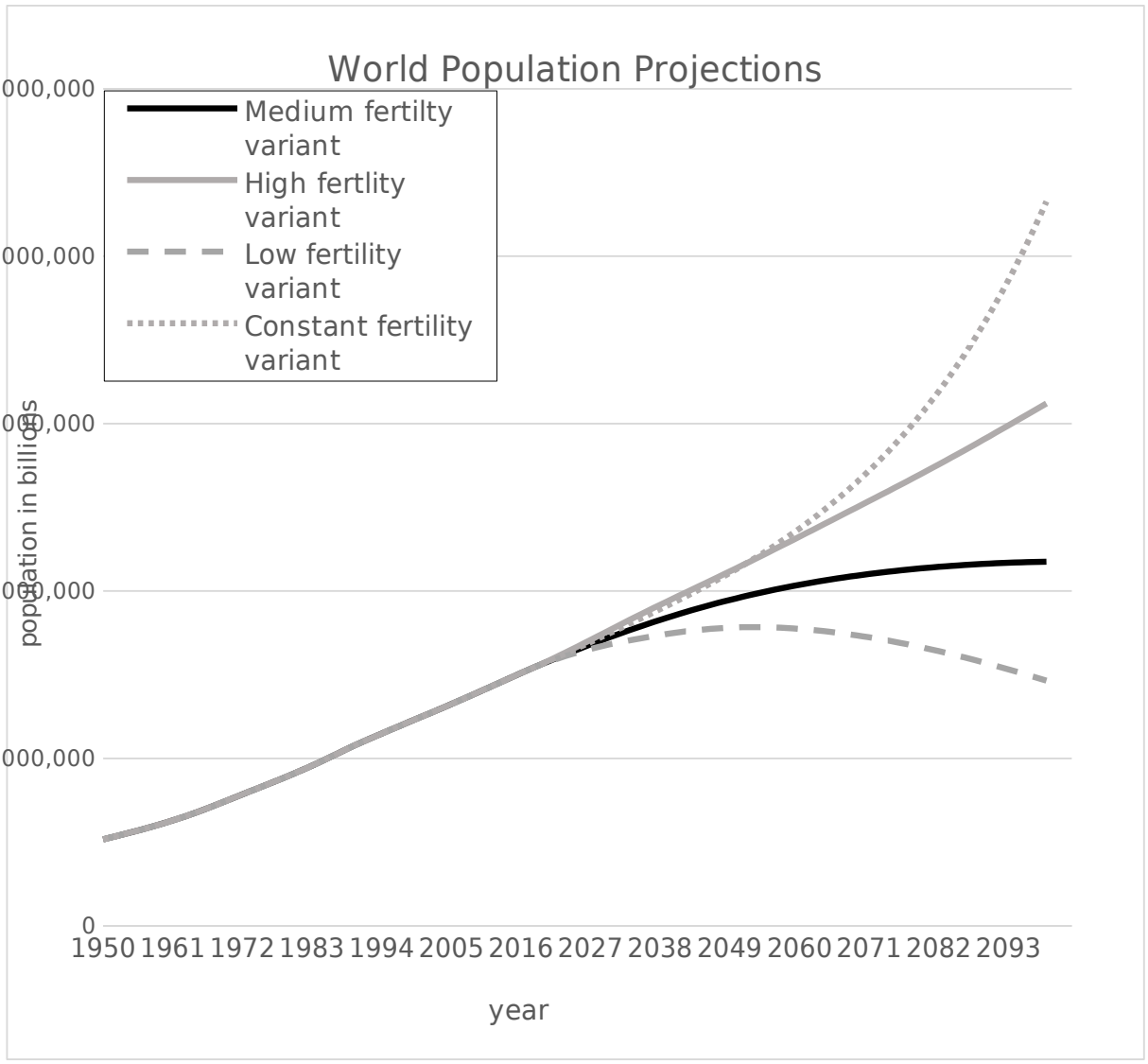

Fig 1. World population 1950-2019 with projections to 2100 according to various total fertility rate (TFR) scenarios. In the medium variant projection, global fertility falls from just under 2.5 births per woman in 2019 to around 2.2 in 2050 and further to 1.9 in 2100. Under the high variant, fertility remains 0.5 births above the medium variant fertility over the entire projection period except for the initial years. Under the low variant, fertility decreases to 0.5 births below the medium variant fertility estimate over most of the projection period. The constant-fertility variant assumes fertility remains constant in all countries at the level estimated for 2015-2020. Mortality and migration estimates are the same in all variants

Source: United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019, Online Edition.

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