

ONLY CONNECT **Nicholas A Christakis**

The anthroposphere is changing

What are the health implications of our changing population?

The human population is undergoing a rapid and inexorable demographic change in ways that will affect medicine and public health. I do not mean that our numbers are exploding—a topic that has been attracting attention since Malthus. Nor do I mean that life expectancy is rising—a fact that is widely appreciated. I mean a very modern and massive set of changes in the composition of the human population.

Changes in four aspects of population structure are key: sex ratio, age structure, kinship systems, and income distribution.

Sex ratios are becoming increasingly unbalanced in many parts of the world, especially in China and India (which account for 37% of the global population). The usual sex ratio at birth is roughly 106 males for every 100 females, but it may at present be as high as 120 for young people in China, or as high as 111 in India. This shift may arise from preferential abortion or the neglect of baby girls relative to boys. Localised sex imbalance may also have other determinants, such as large scale migration of one or the other sex in search of work. But this shift has many implications. For example, given the historical role of females as caregivers to elderly parents, a shortage of women to fill this role will induce large social adjustments. Moreover, an excess of low status men unable to find wives results in an easy (and large) pool of recruits for extremism and violence.

This shift in sex ratios may have other, less heralded implications, however. Some of our recent work suggests that this shift may actually shorten men's lives. Across a range of species, skewed sex ratios result in intensified competition for sexual partners, and this induces stress for the supernumerary sex. In humans, it seems, a 5% excess of males at the time of sexual maturity shortens the

survival of men by about three months in late life, which is a substantial loss.

On the other hand, the population worldwide is getting older, especially in the developed world. Globally, the UN estimates that the proportion of people aged 60 and over will double between 2000 and 2050, from 10% to 21%, and the proportion of children will drop from 30% to 21%. This change also has numerous implications, including for the “dependency ratio,” meaning that fewer young people are available to provide for the medical and economic needs of the elderly. Much less heralded, however, is the fact that war is a young person's activity, and it is entirely possible that, as populations age, they may become less aggressive.

The changing nature of kinship networks, such as the growth in blended families—whether due to changing divorce patterns in the developed world or to AIDS killing off parents in Africa—has implications for the network of obligations and entitlements within families. Changing kinship systems in modern American society (with complex mixtures of remarried and cohabiting couples, half-siblings, step-siblings, and so on) are having profound effects on caregiving, retirement, and bequests. Who cares for Grandma? Who gets her money when she dies?

One recent study of a random sample of Americans found that step-parents were not seen as family members when it came to traditional norms of helping with respect to healthcare needs. People face all kinds of conundrums, many of which are manifest during everyday clinical care. There is the woman whose elderly mother remarries a man without children. If her mother dies before the man, will she be expected to take care of this man she barely knows? There is the man who does not know what amount of grief is



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appropriate when his step-sibling, whom he met when he was 14, dies when they are both adults. There are the squabbling half-siblings, arguing about their standing to decide on life-support withdrawal for their parent.

Finally, it is not just the balance between males and females, or young and old, that is changing, but also the balance between rich and poor. Income inequality is reaching historic heights throughout the world. The top 1% of the people in the world receives 57% of the income. Income inequality in the United States is presently at its highest recorded levels, exceeding even that in the Roaring Twenties. And although economic development in China has proceeded with astonishing rapidity, income is not evenly distributed; the prospects for conflict in that country as a result seem very high in the coming decades. These forces may increase the propensity for violence and mental illness, and perhaps even poor physical health, judging from a string of intriguing studies of the impact of income inequality on health.

Lacking any real predators, a key feature of the human environment is other humans. In our rush to focus on threats such as global warming and environmental degradation, we should not overlook this fact. It is well to look around at who, and not just what, surrounds us. We are all embedded in an anthroposphere—the part of the material world that is us ourselves, the very thin bleeding line within the thin blue line—and it is changing. Our health, wealth, and peace depend on it.

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