The Biosphere, Health, and "Sustainability"

We will miss an important opportunity if the World Summit on Sustainable Development in Johannesburg, South Africa, at the end of this month concentrates on conventional economic development. Material advancement, freer trade, and expanded markets are legitimate immediate goals, as is poverty reduction. Indeed, the former should enhance the latter. But these will count for little unless we sustain Earth's life support systems. Real sustainability, spanning distant future generations, requires societies that maintain social cohesion, human well-being, and population health; and that, in turn, requires some hard decisions about our stewardship of the biosphere.

"Sustainability" is widely assumed to mean maintaining current economic processes and growth rates. Despite the evidence, such as incipient climate change, that humankind is now overloading the biosphere, we display little awareness that the human-made economy is wholly dependent on nature's economy. Humans transform materials and energy from nature, thereby increasing disorder (entropy) in the natural world by depleting, disrupting, and polluting. The human economy's dependence on nature is clear enough in hunter-gatherer cultures, where food and materials are acquired from natural sources, shared within families, and traded between communities. In modern urbanized communities, we easily overlook this ecological dependence. Food grows in supermarkets, and wastes are dispatched unseen.

We can achieve ecological insight by viewing population health within a larger frame. Western individualism fosters a commodity-like view of health as something transacted at a personal level via consumer choices, behavior, occupational exposure, and access to health care. Yet at the population level, throughout history, shifts in human culture and technology and in the local balance between environmental supplies and society's demands have determined the patterns of disease and survival. Early agrarians acquired novel infectious diseases from their newly herded livestock (as we recently acquired HIV/AIDS from primates); trade, militarism, and colonization led to the exchange of epidemic diseases; various evolving agricultural practices altered the profile of micronutrient deficiencies and affected susceptibility to famines; urbanization and industrialization saw some diseases advance and others retreat; and the recent combination of energy-dense processed foods and low-activity lifestyles is generating a tidal wave of obesity and associated diseases. Today's global environmental changes, historically unprecedented, pose various risks to human population health.

How then does health relate to sustainable development? The facile answer is to say that governments should invest in health to enhance their societies' economic performance. Healthy people produce more and thus contribute more to development. A second view is that the population's health is a frequent casualty of economic development. Thus, increased exposures to pesticides, heavy metals, too-fast traffic, inner-city isolation, and sedentary TV viewing are, incidentally, damaging to health. Beyond contributor or casualty, there is a third "c-word" for population health in relation to development: It can be viewed as a criterion of sustainability. If a society opts for social institutions, technologies, and conservationist behaviors that sustain the natural resource base—the life-supporting ecosystems—then the long-term health of that population will be enhanced. In contrast, erosion of natural resources will cause economic difficulties and regional conflicts and will eventually harm the health even of distant wealthy populations.

Of course, the relationship is not that simple. The achievements of human culture are such that modern industrialized societies, with their enhanced levels of education, food security, public infrastructure, and health care, are fairly well buffered against immediate environmental stressors. It should not be a surprise, then, that primary population health indices, such as infant mortality and adult life expectancy, have generally improved in recent decades. These health gains, however, have partly been achieved at the expense of natural capital. The Green Revolution damaged much arable land; the building and powering of cities has contributed mightily to atmospheric greenhouse gas accumulation; injudicious use of antibiotics has enfeebled those natural allies against pathogens; chlorofluorocarbon-based refrigeration of foods has contributed to stratospheric ozone destruction; persistent chlorinated hydrocarbons, released at mid- to low latitudes, have bioaccumulated in polar regions; and harvesting fish for a burgeoning population has depleted various ocean fisheries. The nonsustainable aspects of these activities have become increasingly apparent, as have the risks they pose to population health.

Hence, a wide appreciation of the ecological significance of population health, viewed over decadal time, is vital to enrich the prevailing, usually superficial, shorter-sighted discourse on sustainable development.*

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*See T. McMichael, *Human Frontiers, Environments and Disease: Past Patterns, Uncertain Futures* (Cambridge University Press, Cambridge, 2001).