A B S T R A C T

The long-term health of the population will be influenced by a number of major forces in the next century. In this brief review, particular emphasis is placed on environmental and economic forces. Major global environmental changes include climate change and global warming, resource depletion, ecotoxicity and reduced biodiversity. We do not yet know the impact on longevity of lifetime exposure to a mix of persistent toxic chemicals in our environment, since it has only been widespread in the past 40-50 years. The health impacts of global warming are only just beginning to be understood and could be profound. But perhaps the most profound threat to population health is economic growth, to the extent that it undermines environmental and social sustainability. We need a new form of capitalism, one that simultaneously increases environmental, social, economic and human capital, if population health is to be maintained in the 21st century.

A B R É G É

La santé de la population à long terme sera influencée par un certain nombre de forces majeures au cours du prochain siècle. Dans cette brève revue, une attention particulière est portée aux forces environnementales et économiques. Les changements majeurs environnementaux globaux incluent le changement climatique et le réchauffement de la planète, l'épuisement des ressources, la toxicité écologique et la réduction de la biodiversité. Nous ne connaissons pas encore les conséquences de l'exposition à vie à des produits chimiques toxiques persistants dans notre environnement sur la longévité puisque leur utilisation étendue ne s'est faite qu'au cours des quarante ou cinquante dernières années. Les conséquences sur la santé du réchauffement de la planète commencent à peine à être comprises et pourraient être profondes. Mais la plus grande menace sur la santé de la population est peut-être la croissance économique, puisqu'elle mine le développement durable, environnemental et social. Nous avons besoin d'une nouvelle forme de capitalisme, une forme qui augmente simultanément le capital environnemental, social, économique et humain, si nous voulons que la santé de la population soit maintenue au 21^e siècle.

Future Directions in Population Health

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My focus is not on the future of the business of the population health “establishment” or approach, but rather on the future of the health of the population. Health promotion – and more latterly, population health – has helped us to recognize that the major determinants of health lie beyond health care, in the broader environmental, social, economic, political and cultural factors that shape our lives as individuals and as communities. This leads to a key insight, which is that the future health of the population will reflect the society that it comprises and of which we are all part. This means that we need to understand some of the major forces that will affect our society over the next few decades.

This brings me to a second important point, namely that thinking about the future means operating in a longer time frame than we normally do. For the most part, futurists operate in what is often referred to as the medium-term future, some 10 to 30 years hence. This is because, while what futurists call “discontinuities” (such as the 1973 oil shock or the fall of the Berlin Wall) may occur, much of what will shape our lives in the next 5 to 10 years is already underway and therefore not so readily amenable to manipulation. Beyond 30 years, it becomes more difficult to anticipate the implications of social and technologic change, in particular. How many people in 1949 predicted cellular phones, the human genome project, the internet, the changing concept of family, or global warming? Yet these are all facts of

our daily lives (with the possible exception of the last of these, which is widely discussed but only just beginning to become apparent). Given that the speed of change has increased substantially since 1949, how easily can we anticipate what things will be like in 30, 40 or 50 years time?

This means that to understand the future of the health of the population, we have to look at the major forces that will likely shape society and population health over the next 10 to 25 years or so. This is the process of environmental scanning, which classically goes by the acronym of SEPT (or PEST), meaning social, economic, political and technological change. This in itself is very revealing, in that it omits the environment. Indeed, most corporate and government futurists have tended to ignore or downplay the implications of the environment,¹ as indeed does the population health “establishment”. It is noteworthy, for example, that in the important population health text, *Why Are Some People Healthy and Others Not?*,² there is no reference in the index to ecology, ecosystem, biosphere, sustainable development, pollution or other aspects of the environment.

In part this may reflect the economic and sociological bias of the principal members of this group, but in part it may also reflect a sense that the environment is just too big and that it is beyond our control (which, in fact, is how the Lalonde Report defined it in 1974); that we do not have good data (it is noteworthy that the set of population health indicators recently proposed by the Canadian Institute for Health Information as yet does not include any environmental indicators, because the Institute could not find adequate data); and finally because many in the population

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health “establishment” do not seem to think that the environment is all that important for health! This view has doubtless been helped by cancer epidemiologists, many of whom have consistently downplayed the role of the environment, and by an industrial system that does not want to have to confront the health implications of its impact on the environment.

In addition to downplaying – indeed pretty much ignoring – the environment, the population health establishment has also tended to see the economy in very traditional terms, while underlining the importance of economic development for human health and well-being. While economic development – and the social development that has accompanied it – has undoubtedly been important for population health, it is by no means true that it will continue to be so. In particular, if economic development and growth continue to be understood in the same way as they were throughout the past century, and in particular if economic development and an increase in GDP are accompanied by the same adverse impacts on resources and the environment that we have seen this century, population health may well be undermined by continued economic development.

Accordingly, I will focus on just two out of the many sets of forces that may affect population health in the next generation or two, namely the environment and the economy. (For a somewhat longer review of the major factors that may affect population health in the 21st century, see reference 3.)

Environmental change

In a paper prepared under the auspices of the Royal Society of Canada's Canadian Global Change Program, Hancock and Davies⁴ identified four main aspects of global environmental change that will impact on the health of the population: climate and atmospheric change, resource depletion, ecotoxicity, and reduced biodiversity. Two of these topics – ecotoxicity and global climate change – are briefly reviewed here.

Ecotoxicity

One of the stock responses of the chemical industry, when concerns are raised that

the widespread chemical contamination that we experience today is affecting health, is to point out that life expectancy continues to increase – so where's the problem? This response, however, displays a remarkable ignorance, willful or otherwise, of the meaning of life expectancy. There seems to be a widespread belief that life expectancy is somehow predictive, whereas it is anything but that. It is in reality a somewhat sophisticated and complex way of measuring average age of death. Life expectancy tells us absolutely nothing about how much longer we may live, it simply tells us that if everyone born today had the same average life experience as all those dying this year, they could expect on average to live as long as those who are dying this year. So in reality, life expectancy tells us a lot about those who die but tells us nothing about the living. And of course the basic premise is false, because we will not experience the same life circumstances as those who are dying, on average in their mid-70s, today.

One of the ways in which we differ is that, since approximately the 1950s, people have been born with a body burden of persistent organic pollutants such as DDT and PCBs, and have continued to be exposed throughout their lives to a multitude of toxic chemicals at very low levels – called “ecotoxicity.”⁵ Ecotoxicity, of course, is not confined to humans but affects other species in the web of life, and thus threatens overall ecosystem health. Thus we are approximately 40 years into a major experiment to find out what happens when an entire cohort is exposed to such ecotoxicity throughout its life. While we do know that the average age of death for those born before 1930 is still increasing, we have absolutely no way of knowing what will be the average age of death of those born in the 1950s, 1960s or subsequently. Moreover, we will not know the answer to that for another 30 to 50 years. So we will just have to wait and see whether ecotoxicity shortens life.

Climate Change

Another of the long-term environmental impacts that we face, and that is somewhat better understood, is climate change – specifically global warming. With the

exception of a few sceptics who for the most part are bought and paid for by the industries that stand to lose most from reductions in fossil fuel use, it is now widely accepted that human activity is contributing to global warming.⁶ On average, global temperature will increase 1 to 3.5°C over the next century, with higher temperature increases closer to the poles. The health impacts of global warming include increased mortality and morbidity from heat waves and severe weather events; increases in a variety of infectious diseases, especially those that are vector-borne such as malaria (an additional 50-80 million cases a year are projected by the middle of the 21st century); disruptions to food supplies resulting in malnutrition or starvation in some parts of the world; rising sea levels that will displace large populations and create large numbers of eco-refugees.⁷ While such major impacts are hard to quantify at present, there seems little doubt that they will occur. The implications of these major environmental changes for human health and well-being is significant, particularly on a global scale. The impacts in Canada will depend to a great extent on our ability to adapt to and cope with such changes, the flexibility of our institutional, economic and social structures and in particular the effectiveness of our public health systems in preventing the spread of infectious diseases.

Is economic growth sustainable?

Economic development and growth, fuelled by cheap energy, massive exploitation of the earth's renewable and non-renewable resources and the concomitant widespread contamination of our ecosystems, has been the underpinning of human and social development in the past couple of centuries. The holy grail of economic policy today remains economic growth, with scant regard for the real implications of this growth. An annual increase in GDP of 3.5% means a doubling time of 20 years, or a 16-fold increase during the 80-year life span that we expect we will enjoy (earlier caveats notwithstanding). But we are already facing a situation where, if everyone on the planet were to consume at the same level as Americans do today, we would require four more planets to meet

the demand (see the "Footprint of Nations Report" at <<http://www.iclei.org/iclei/eco-foot.htm>>, which is the website for the Toronto-based International Council for Local Environmental Initiatives).

In recent years, there has been a growing appreciation that the GDP and similar economic measures are totally inadequate and misleading; in fact they are false measures of progress. One reason is that they lump together both positive and negative measures, so that the Exxon Valdez oil spill in Alaska adds hundreds of millions of dollars to the Alaskan GDP, as do the economic costs of the medical care necessitated by the sale of tobacco, or the economic activity in a community that results from the destruction of a large building. But there is beginning to be a shift towards considering capital as being not simply economic but human, social and ecological capital as well;⁸ even the World Bank is beginning to understand this,⁹ as is the public health community. A 1992 report from the Canadian Public Health Association¹⁰ explicitly addressed the topic, suggesting that:

"Human development and the achievement of human potential requires a form of economic activity that is environmentally and socially sustainable in this and future generations."

I believe that one of the fundamental challenges for the promotion of population health in the 21st century will be to reinvent capitalism, so that we *simultaneously* increase all four forms of capital – ecological, social, economic and human. Indeed, the true measure of progress in the 21st century will be an increase in human development, human potential and human capital, which includes health; at the same time we will need to increase social and ecological capital and maintain an adequate level of prosperity to ensure health for all.¹¹ How well we succeed in this will determine the health of the population in the 21st century.

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