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ANALYSIS

ESSAY

Ecological public health: the 21st century's big idea? An essay by Tim Lang and Geof Rayner

Public health thinking requires an overhaul. **Tim Lang and Geof Rayner** outline five models and traditions, and argue that ecological public health—which integrates the material, biological, social, and cultural aspects of public health—is the way forward for the 21st century

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It seems to be the fate of public health as concept, movement, and reality to veer between political sensitivity and the obscure margins. Only occasionally does it gain what policy analysts often refer to as traction. Partly this is because public health tends to be about the big picture of society, and thus threatens vested interests. Also, public health proponents have allowed themselves to be corralled into the narrow policy language of individualism and choice. These notions have extensively framed public discussion about health, as though they are not tempered by other values in the real world. As a result, the public health field suffers from poor articulation, image, and understanding. The connection between evidence, policy, and practice is often hesitant, not helped by the fact that public health can often be a matter of political action—a willingness to risk societal change to create a better fit between human bodies and the conditions in which they live.

We have reviewed how public health theory and practice have evolved over the last two or three centuries, and looked at the challenges present and ahead, and we conclude a rethink is in order. In difficult economic times, public health too easily falls down the political agenda. It is judged worthy but not a political priority. Yet there is strong evidence that health is societally determined,[1] that public health is high in the public's notion of what a good society is,[2] and that health underpins economics.[3 4]

What we've forgotten with public health

Today, as financial crises continue—banking failures, debt bubbles, slowing economic growth, nervous but contradictory consumerism—there is an opportunity to review what is meant by public health for the 21st century. The connection between health and societal progress has been severely weakened in public policy of late. It is adrift when it ought to help shape a new direction. Public health ought to be articulating what a good society and a good economy are. Improving public health is at the heart of defining what is meant by progress. Indeed, part of the current crisis is that 20th century notions of progress underplayed how economic development distorted the relationship of humans to the planet, despite it being known that human health ultimately depends on the health of ecosystems. With water, biodiversity, soil structures, energy, and biological resilience all becoming problematic in the era of climate change, this connection is once more central. Somehow, modern public health had almost forgotten the primacy of the human-environmental interface, despite this being a component part of the original sanitarian vision. Edwin Chadwick (1800-1880) and others fully recognised, for example, how the health of towns (now a majority human experience in the 21st century) depended on the sustainability of agriculture. The interface of human and ecosystems health now deserves to be central for policy making).

The public health project, born in the 18th century, established politically in the 19th century, and refined for a richer world in the 20th century, has too often been reduced to old notions of sanitation or newer notions of medical treatment or health education. It deserves better. It is still worth quoting in full Charles-Edward Winslow, who in 1920 defined public health thus:

> Public health is the Science and Art of preventing disease, prolonging life, and promoting health and efficiency through organized community effort for sanitation of the environment, the control of communicable disease, the education of the individual in personal hygiene, the organization of medical and nursing services for early diagnosis and preventive treatment of disease, and the development of the social machinery to insure everyone a standard of living adequate for maintenance of health, so organizing these benefits as to enable every citizen to realize his birthright of health and longevity.[5]

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This definition conceives of public health as a list of intervention strategies requiring knowledge, imagination, and policy advocacy. Winslow's focus was on sanitation, medical infrastructure, and education in personal hygiene, but what can this definition say about escalating climate change, a world population of 9 billion, or mass consumerism shaped by globalised media, or the global co-incidence of mass hunger and mass obesity and non-communicable diseases?

Refocusing on the transitions that shape modern life

Only in the early 20th century did the term public health begin to describe a field; before that it meant essentially what it said on the label: the health of the public. In our view, public health is essentially about shaping the conditions that enable good health to flourish. In policy terms, the rationale is that conditions enable outcomes. Today, this means public health must address and dare to reshape the big trends or transitions that already frame the 21st century. We see a number of major transitions as the forces on which public health must act: demographic, epidemiological, urban, energy, economic, nutrition, bio-ecological, cultural, and democratic. Only by addressing them all will public health regain its central societal relevance.[6]

Some of these transitions are well documented and accepted within the public health field, notably the demographic and epidemiological transitions. Some are beginning to be acknowledged (if not surmounted), such as urbanisation, or the transformation of food supplies creating a nutrition transition, so important in creating non-communicable disease. Other transitions, such as that of energy, barely register as being within the purview of public health, despite, for example, public health activists in the past seeing the move to coal and oil for domestic and industrial power as both progress and pollution. Today, the energy transition rightly attracts attention in relation to climate change, yet pollution is less acknowledged. Similarly, the mass psychological impact of modern advertising, media, and virtual manipulators on the cultural conditions in which people live requires urgent action in the name of health. Current policy response is too narrowly corralled within the language of corporate social responsibility, partnerships, and so called shared value. The long pursuit of democracy is another problematic transition, critical for public health. What other notion than democracy—a sense of and actual engagement in shaping society and life—is appropriate for a world in which so many people are excluded from control or who experience a sense of alienation in their lives? How else can we reframe thinking about mental health, social exclusion, and inequalities in health? The pursuit of health and progress have become tangled up with consumerism as though there are no environmental consequences for health.

Too often the health of the public is confused with healthcare. While improvements in medical knowledge are wonderful, realism is required about healthcare's scope. By 2018 the US is set to spend $344 billion (£219 billion; €280 billion) a year treating obesity—more than one health dollar out of every five.[7] One calculation even estimated the outcome that all American adults would be overweight or obese by 2048.[8] Such an economy and society must literally collapse under its own self-inflicted weight. Obesity may well be the sanitation problem of the 21st century. In a world where hypermarkets offer excess calories priced without thought to health, and where antibiotic resistance undermines genuine pharmaceutical advances, 21st century public health needs a better model of how human health depends on the complex processes of biological adaptation and rapid socioeconomic change. The mismatch of humans and conditions (that is, how we live) looms as the big public health challenge. In our view, this requires complex ecological thinking and it is why we propose ecological public health as the most appropriate 21st century model. But why act at all? Can this not all be left to market dynamics?

Look back to look forward

Crusty Victorians like Edwin Chadwick weighed health in terms of cost versus benefit. He drew deeply upon the utilitarian philosophy of his mentor, Jeremy Bentham, for whom the purpose of public policy was to secure the "greatest happiness for the greatest number." For Chadwick, happiness (or democracy for that matter) was probably too bold an aspiration: public health meant less death and disease for male heads of household, with long term financial benefits flowing to the state. His American follower, Lemuel Shattuck, however, promoted a new aspirational goal for public health in 1850, that of "perfect health"—an extraordinary vision for that time.[9]

Nevertheless Chadwick's thought encapsulated a broader notion: that good health flows from the population level to the individual rather than the other way round. By the end of the Victorian era, this implied that no-one, however rich, however well endowed with so called good genes (then expressed through eugenics), living in any circumstances, could wholly prevent the impact of the collective experience or poor conditions threatening their individual health. Among the multiple routes to health improvement that Chadwick promoted, one critical path lay with new professions. From this stemmed the penchant for viewing public health as a field, a task, a set of interventions or a set of laws or technologies, led by professional expertise. In constructing a technical route for public health, Chadwick sowed the seeds of the problem now binding much public health—that it is couched in managerialist terms, the language of "delivery" and "evidence based policy." Now this managerialist language and focus are being reduced still further to the micro, the so called nudge, and minute behaviour change.[10] This diminution of perspective discourages attention on the macro, the large scale, the big picture, the shaping forces, and whatever frames the context for how people live. The capacity to think and plan on a large scale is ceded to corporations, world elites, and the dehumanised forces of the market, citing the inevitability of globalisation, as though that process was itself not initiated by vested interests who too often marginalised health impacts.

Is this what public health is becoming: a technocratic localised act; benign social engineering on the personalised scale? If so, the consequence may be irrelevancy. Political pragmatism, opportunism, and so called realism about what is feasible within the balance of forces are features of public health history. The smoking ban on London's underground only happened in the policy space that emerged following the dreadful 31 deaths in the 1987 King's Cross station fire. Winslow once observed that if the Boston school's free medical programme, introduced in 1894, had been proposed in terms other than the medical policing of infectious disease, it would probably have been denounced as "socialism of the most dangerous kind."[5] Public health advocacy, then as now, requires a political savvy not reflected in the mantras of evidence based policy. But if public health is understood more in terms of managerial actions than of visions and movements, the risk is that the possibility of the field being about altering circumstances to enable health fades.

Five models of public health

Too often policy makers think of public health as though it is one entity, or perhaps with two broad interpretations—biomedical and social. The World Health Organization (WHO)'s Commission on Social Determinants on Health, for example, mapped public health from a societal basis.[11] We chart not two but five main models for public health, each with different core ideas, conceptions, and traditions (table ⇓). Understanding each model clarifies both the tensions and possibilities in modernising public health.

Like others, we identify a sanitary-environmental model. This model has historically focused on the health of populations in their physical circumstances. Like its early classical formulation pioneered by the Romans, the task of the sanitary-environmental model in the 19th century was to tackle the dirt and detritus of industrialisation, which were viewed as the determinants of epidemics. New professions were spawned, including public health inspectors, engineers, town planners, building regulators, and even street designers. In the richer parts of the world today, these measures are taken for granted, invisible because they are so normal. In the developing world, this is not the case.

The second model is biomedical, coming in two forms: individual and population focused. The latter is typified by vaccination from the early 1800s or in the creation of public health laboratories. The personalised version is also old but it has recently received unprecedented attention and investment. In the 1950s, the US spent only 4.4% of gross domestic product on healthcare, yet by 2009 this had become 17.4%, and by 2040 is expected to rise to nearly 30%.[12] At any amount of spending, however, medical technology cannot alter the conditions that shape the rising rates of many non-communicable diseases such as obesity.

This is the rationale for the third, social-behavioural, model, which may seem new but is not. Rulers have attempted to influence the behaviour of their people for health reasons for centuries. In modern terms, social-behavioural thinking invokes the evidence since the 1950s on how changes in behavioural rules and social norms affect health literacy and everyday habits. This model is now the main rival to the biomedical model proffered to tackle non-communicable diseases. The social-behavioural model, however, says little about who makes or influences these social-behavioural rules. Why not? In a study we conducted for WHO, we showed that Coca-Cola spent more on its marketing of soft drinks than the entire biannual WHO budget.[13] Such unequal distribution of power frames behaviour and choice, and helps set the conditions for public policy on health. Yet today adherents of this model continue to advocate that public health should emulate commercial methods, such as social marketing, or the latest fad, the so called nudge, on tiny budgets.

The fourth model we term techno-economic. This sees public health as dependent on two processes: economic growth and knowledge growth. Economic growth raises living standards which in turn improve health. Economics Nobel prize winner Robert Fogel termed this trend "technophysio evolution."[14] There is in fact no automatic link between economic and knowledge growth and improved public health. Up to a point perhaps, but, critically, public health depends on other factors, such as how such knowledge and wealth is distributed, as well as effective institutions, the rule of law, and reasonable levels of democracy.

Each of these four models has merit but, tellingly, they mostly engage with health in anthropogenic terms. By this we mean that the health of the living, natural, and physical world—ecosystems health—is marginalised. This is one among many reasons we now champion a fifth model: ecological public health. Centrally, ecological public health focuses on interactions, with one strand focusing on the biological world—in concerns about increasing strains on biodiversity or antimicrobial resistance, for example. Another strand centres on material issues such as links between industrial pollution, energy use and toxicity, and the impact on human species and nature. The advantage of ecological thinking is that it theorises complexity, a key feature facing modern conceptions of health.

Ecological public health and embracing complexity

For some, ecological thinking means the socio-ecological model (actually Bronfenbrenner's child development model extended into public health), but this has downplayed ecology's biological linkages; indeed, the term ecology was coined by Ernst Haeckel, disciple of Darwin. For us, the power of ecological thinking is its acceptance of complex and multilayered connections. The philosopher John Dewey (1859-1952) cautioned against its compartmentalisation into biological, material, and social channels. In perhaps the first integrated presentation of ecological public health, John Hanlon, assistant US surgeon-general in the 1960s, said that public health needed to address the entire biological, material, social, and cultural dimensions of the human, living, and physical world. This tradition is again prominently espoused today by the US Institute of Medicine.[15]

A strength of the ecological public health model is that it draws upon and integrates parts of the other models). Secondly, it articulates modern thinking about complexity and system dynamics, addressing, for example, questions of non-linearity, variations in scale, feedback, and other emergent qualities of nature, biology, and human behaviour. In the UK, we see some of such thinking in the government chief scientist's Foresight programme.[16] Thirdly, ecological public health seeks to build knowledge as a continual intellectual engagement. This means more than just evidence, and includes the open pursuit of social values, highlighting the role of interest groups, and debate across society not just within restricted scientific circles. Think Darwin and Wallace, Beveridge or Roosevelt: big thinking about the nature of life, good societies, order and change. Fourthly, it incorporates an evolutionary perspective, from matters like nutritional mismatch to questions of biological feedback. Fifthly, this is an overtly interdisciplinary and multi-actor model. It celebrates that public health requires action on multiple fronts and embraces the argument familiar in the 19th century that public health action requires a public health movement.

We argue that 21st century ecological public health must address the inherent complexity of shaping factors across what we call the four dimensions of existence. These are: (a) the material dimension—that is, the physical and energetic infrastructure of existence (matter, energy, water), and the physical building blocks on which life depends; (b) the biological dimension—that is, the biophysiological processes and elements, including all animal and plant species and also micro-organisms; (c) the cultural dimension—that is, how people think and through which mental categories they think, and the spheres of interpersonal relationships, community, and group and family traditions; and (d) the social dimension—that is, institutions created between people and expressed in terms of laws, social arrangements, conventions, and the framework of daily living generally outside individual control.

Public health in the 21st century requires policies and actions to engage in all four dimensions of existence to be most effective. Behaviour change programmes designed to improve nutritional status, whether for individuals, communities, or populations, are unlikely to work if they are limited to what people know or think they know. The material and social context—where and how people live—also needs simultaneous change. Telling families who live in poverty that they should make healthy choices ignores the conditions that prevent them doing so and is insulting and even futile. We now all live in total commercial environments in which many drivers are dominated by sponsors. The modern Olympic games symbolise this world of contrast between the overweight mass and a superfit elite, with an alliance of state and commerce as mediator. Instead of Olympian spectacle, what is needed is a world in which fitness and sustainable diets are built into daily lives, requiring different investment.

The difference the ecological public health model makes

In Victorian times, the central state required action to be taken by local bodies; it created or empowered them accordingly. Today, public health requires multilevel action, coordinated across not just the state but private spheres, commerce, and civil society. The current localist focus in the UK superficially recalls past Victorian methods, but is inappropriate if economic and policy determinants are shaped at international and global levels. How can local action fully shape behaviour affected by decisions made in boardrooms on the other side of the planet? Although reorganisation of public health in the UK has put specialists back into the local authority, this is at a time when local government is squeezed more than ever. Money may be ring fenced for the moment, but political commitments are not. Specialists need to be noisy and to build alliances. The case for integrated public health activity across local government needs to be fleshed out. The risk is that specialists become statistical aides to town halls. They need to be change agents, building and supporting movements with agencies above and beyond the local. Specialists need to engage at the material, biological, social, and cultural levels like never before.

Public health success is as much about imagination as evidence: challenging what is accepted as the so called normal, or business as usual. Public health must regain the capacity and will to address complexity and dare to confront power. This demands a new mix of interventions and actions to alter and ameliorate the determinants of health; the better framing of public and private choices to achieve sustainable planetary, economic, societal, and human health; and the active participation of movements to that end. Public health professions today need to think and act ecologically if they are to help reshape the conditions that enable good health to flourish.

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Table

Table 1| Five models of public health

	Sanitary-environmental	Biomedical	Social-behavioural	Techno-economic	Ecological public health
Core idea	The environment is a threat to health	Health improvement requires understanding of biological causation	Health is a function of knowledge and behaviour patterns	Economic and knowledge growth is prime elevator of health	Health depends on successful co-existence of the natural world and social relationships
Conceptions of ill health	Threats stem from the world: dirt, poor hygiene, unhealthy products	Physiological malfunction	Ignorance, lack of social support, social dependency	Low income and standard of living	Mismatch of bodies and environment
Key methods	Engineering; product quality and regulation; licensing	Two strands: individual medical intervention; population interventions	Information campaigns, health literacy, social marketing	Scientific and product development, knowledge dissemination	Systems analysis in order to manage social transitions and create healthy habitats
Great moments	Clean water, sewerage treatment, tobacco control legislation	Medical statistics, anaesthetics, antibacterial drugs, vaccination	Contraception; psychology-led behaviour change; HIV/AIDS information campaigns	Hygiene products, agricultural improvements, national health insurance	Evolutionary thinking permeates sciences
Main criticisms	Leaves out individuals; limited impact on modern lifestyle diseases, such as obesity	Cost; reactive not proactive; narrow disciplinary base and concepts of prevention	State interference, reduces health to cognitive factors, underplays cultural determinants	Perverse impacts of economic growth	Long term, requires systems change, little role for individual effort
Current status of model	Mainly seen as applicable to developing countries; low visibility	Increasingly focused on genetic predispositions; personalised medicine	Incorporated into consumerism, e.g., via nudge theory	Public-private partnerships, corporate social responsibility, shared value	Increasing awareness of macro-environmental change

Source: Rayner G, Lang T. Ecological public health: reshaping the conditions for good health. Earthscan/Routledge, 2012.