

Pontifical Academy of Science

Healthy People Healthy Planet

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Introduction

In the context of our planetary ecological calamity—climate change, stratospheric ozone depletion and UV radiation, biodiversity loss, land degradation and desertification, water pollution and water scarcity, and persistent toxic contamination—^{1,2,3} the global human community is facing an existential crisis. Many of our major challenges take their origin from linear models and associated hierarchical structures; these operating systems have shortcomings that are becoming broadly apparent as we extend our reach far beyond our planet's ecological carrying capacity.

Climate change alone has been called the largest human health threat by public health, medical, and healthcare organization across the globe.^{4,5,6,7,8} Direct and indirect health effects of climate change include temperature-related death and illness, air quality impacts, mental health effects, extreme weather events, water-related illness, and conflict. Food safety, malnutrition, undernutrition and food security are additional concerns, particularly in relation to floods and drought. Rising temperatures increase ground level ozone, which in turn creates difficulty breathing, the aggravation of asthma and the development of new cases of asthma, emphysema, chronic bronchitis, and pneumonia. Ozone can also affect the heart, leading to cardiac arrhythmia and heart attacks as well as increasing the number of low-birth weight babies.⁹ Aeroallergens such as pollen are higher in extreme heat. Higher levels of aeroallergens trigger asthma, affecting close to 300 million people.¹⁰ Heat stress can make working conditions unbearable and increase the risk of cardiovascular, respiratory and renal diseases.^{11,12} Vulnerable populations include children, pregnant women, the elderly and socially marginalized groups, all of whom experience higher susceptibility to climate-sensitive health impacts. Even animals are at risk; pollinators like bees can develop heat exhaustion and decreased immune response.¹³

Many infectious diseases, including water-borne illnesses, occur as a result of climate conditions. Climate change lengthens the transmission season and expands the geographical range of many diseases like yellow fever, malaria, chikungunya, Lyme, West Nile and dengue.

Emotional, spiritual and mental health impacts are also recognized effects associated with climate change and can include trauma, fear, fatalism and loss of loved ones, livelihoods, social support, identity and a sense of control.¹⁴

Indigenous communities have long understood the indivisible relationship between individual, community and ecological health.^{15,16} In the Anthropocene, we are relearning this ancient wisdom by necessity as we confront the stark reality that the health and survival of human populations is intimately connected to the health and resilience of global ecosystems, both of which are in crisis together. We cannot be healthy on an unhealthy planet.

Medical wisdom helps explain these crises as symptoms of an underlying problem, a root cause. The encyclical letter *Laudato Si'* of the Holy Father Francis, *On Care for Our Common Home*,¹⁷ explains how the world's problems cannot be analyzed or explained in isolation; rather we are faced with one complex crisis. Across our global society, it is evident that in our well-intended attempts to understand the parts, we have lost sight of the whole.

It is estimated that 90% of health is accounted for by social and environmental factors outside of healthcare.¹⁸ In the context of the global burden of chronic disease, the health sector is awakening to the limitations of the biomedical approach.^{19,20,21} Industrial agriculture, a sector which contributes approximately 30% of global climate emissions—far greater than transportation—employs a similar mechanistic model with an overwhelming array of unintended impacts to individual, community and planetary health. Our industrial economy is another linear model which inaccurately assumes finite resources and unlimited growth, ultimately contributing to resource depletion, ecological degradation and concentrated wealth.^{22,23,24} The recent World Economic Forum (WEF) Global Risks Report highlights how four out of five categories—environmental, geopolitical, societal and economic—are among the top five most high impact risks to business.²⁵ The report concluded that “Global risks remain beyond the domain of just one actor, highlighting the need for collaborative and multi-stakeholder action” and that “We need clear thinking about new levers that will enable a wide range of stakeholders to jointly address global risks, which cannot be dealt with in a centralized way.”

The distinguished physicist, Albert Einstein, famously said, "We can't solve problems by using the same kind of thinking we used when we created them." The quote is so often repeated because we recognize its profound truth deep within ourselves. Clearly, we must think differently. With urgency, we are now called to relearn and adopt a new worldview. This call to action is central to the emerging Great Transition,²⁶ a global paradigm shift from a mechanistic anthropocentric model to an ecological living systems model. Rather than focusing on discreet parts, we must look at the world for what it is, a complex interrelated holistic system of relationships. If we are successful, we will discover a host of strategies that can release the emergence of powerful, compassionate, equitable approaches to the multitude of problems confronting our common home.

Holistic Thinking

It is not surprising that we are experiencing profound challenges. Many of our institutions and approaches were built on a mechanistic, cause-and-effect scientific model which doesn't fully explain the complexity of humans, our relationships and interconnectedness of all life.^{27,28} Acknowledging this truth helps us understand why, as Pope Francis states, "*It cannot be maintained that empirical science provides a complete explanation of life, the interplay of all creatures and the whole of reality.*"²⁹ Moreover, a linear model precludes full systemic awareness.

A systems worldview shifts our perception of critical matters in new and profound ways. As this model requires us to change our focus from parts to the whole, it is often described as a holistic approach. Some of its novel attributes include the following shifts:³⁰

- From parts to the whole

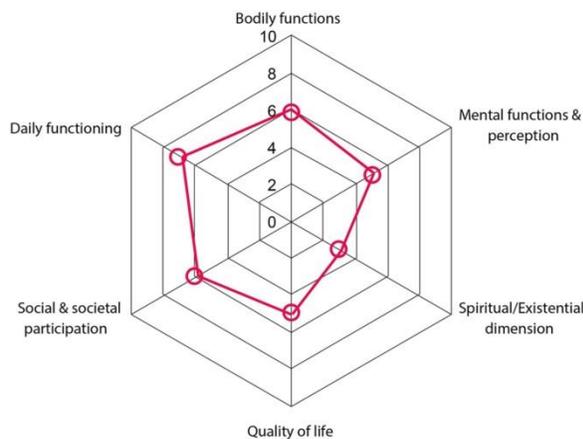
- From objects to relationships
- From isolated knowledge to contextual knowledge
- From quantity to quality
- From structure to process
- From contents to patterns

Systems models support approaches and organizational paradigms that are characterized by collaboration, subsidiarity, networks, fluidity, empowerment, self-organization, transparency, flexibility, evolution, adaptability, listening, and connection, rather than hierarchy, autonomy, self-preservation and control. Systems thinking helps rebalance empirical scientific knowledge by re-prioritizing cultural wisdom and knowledge and by embracing diverse expertise and experiential contexts. Through a shift in value from quantity to quality, an entirely new holistic set of qualitative metrics can be developed. If we are going to succeed in addressing the human-made challenges of our common home, it seems obvious that a living systems model enables us to align our ways of operating in accordance with life on a complex planet, reflective of our true nature.

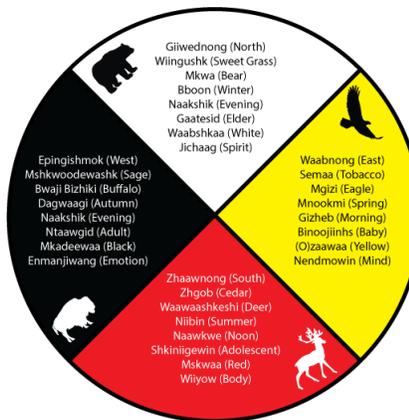
Holism—A Systems Model of Health

Efforts to better incorporate this holistic understanding into institutionalized definitions of health are ongoing. International experts now recognize that the once heralded World Health Organization definition of health, formulated in 1948, as “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity” is insufficient, as the term "complete" suggests an unachievable end state, unintentionally perpetuating the medicalization of society.³¹ “Positive health” is one of the most recent definitions offered by international experts to reflect the dynamic nature of health, or "health as the ability to adapt and to self-manage in the face of social, physical and emotional challenges".³²

Holistic Models of Health



Positive Health³³



Ojibwe Medicine Wheel³⁴

The well-known U.S. poet and farmer, Wendell Berry, made this thoughtful statement about health:

“Health is not just the sense of completeness in ourselves but also is the sense of belonging to others and to our place; it is an unconscious awareness of community, of having in common. It may be that this double sense of singular integrity and of communal belonging is our personal standard of health for as long as we live.”

Though not a clinician or healthcare expert, Berry's observation is consistent with ancient wisdom, modern science and most recent health concepts which understand the indivisibility of individual, community and planetary health.^{35,36,37} Solstalgia, or distress caused by environmental change, negatively affects health, while views of nature improve health.^{38,39} Similarly, a sense of connection, empathy, spirituality and love confer intrinsic health properties.^{40,41,42} Studies show that when we experience a sense of awe from viewing nature, we reduce stress, become more generous, and feel a sense of plenitude.^{43,44,45,46} We can infer from these studies that nature and relationship have helped us co-evolve as a communal species.

Individuals and communities measure health qualitatively, which is different (though equally valid), from those of public health and healthcare experts.⁴⁷ The respect for inherent individual knowledge and self-efficacy and connection is a fundamental point, increasingly understood as a foundational principle, an essential ingredient required to foster agency and thereby improve health.⁴⁸

Within North America, Europe and elsewhere, holistic medicine and nursing approaches are being increasingly embraced. Functional Medicine is a systems biology based approach that focuses on identifying and addressing the root cause of disease and sees health as homeodynamic, a function of dynamic balance between internal and external factors.⁴⁹ Integrative Medicine (IM) is healing-oriented medicine that takes into account the whole person—mind, body, emotion and spirit—including all aspects of lifestyle. It emphasizes the therapeutic relationship between practitioner and patient.⁵⁰

Regardless of any specific health definition or clinical approach, these efforts to elevate our resilience and our relationship to planetary health demonstrate the emergence of collective wisdom. A holistic model of health better explains that we are ever changing, social, sentient beings in intimate relationship with all living beings on a dynamic planet. Individual, community and planetary health are inseparable. The holistic model of health care is fundamental to helping us unlock and galvanize our efforts to support and protect planetary health and ecological integrity. What we do to the planet, we do to ourselves.

Solving for Pattern

Agroecology and a Systems Approach to Food and Agriculture

It is widely recognized that our industrial food system—how we currently produce and distribute food—is intimately linked to the declining health of individuals, communities and the planet.⁵¹ The global food system is responsible for approximately 28% of global climate change emissions (21% direct and 7%

indirect, e.g. production of fertilizers).⁵² Worldwide, the agricultural sector is one of the most hazardous to human health because of stress, injury, airborne substances, pesticide exposure, zoonotic disease and more.⁵³ Global demand for meat is rising, with livestock production accounting for an estimated 14.5 percent of global greenhouse gas emissions from human activities.⁵⁴ We are also experiencing serious impacts from the livestock industry in the form of increased antibiotic resistant bacteria, polluted air and water, food-borne pathogens, and collapsing rural communities. A third of the planet's land is severely degraded, and fertile soil is being lost at the rate of 24 billion tons a year due to industrial farming practices. This is important because the loss of agricultural soil carbon through erosion adds to atmospheric loading of carbon dioxide.^{55,56} It is estimated that ten companies now control the entire global food supply, many with revenues greater than national governments.^{57,58} Their staggering influence has far-reaching consequences. Food corporations and private investors are purchasing foreign farmland as a revenue source in "land grabs", displacing small producers and privatizing lands held for community benefit.⁵⁹ Sales of carbonated soft drinks in Latin America have doubled since 2000, while sales of fast food grew 30 percent worldwide from 2011 to 2016.⁶⁰ Malnutrition costs the world \$3.5 trillion per year, while obesity alone is estimated to cost \$760 billion by 2025.⁶¹ It is astonishing to consider this reality on a planet in which almost one billion people go hungry and approximately one third of food produced for human consumption is wasted.⁶² It is estimated that that unless action is taken, up to 25% of the world's food production may become lost due to environmental breakdown by 2050.⁶³ While this situation may seem hopeless on the surface, it poses abundant opportunity for a holistic solution.

Over the last two decades, we have observed an important and necessary response to the industrialized food model. The Good Food movement has evolved a "bottom up" self-organized response through a call to action by civil society organizations for good food for all. Good Food is a holistic definition of food that bridges various food values—environment, equity, justice, subsidiarity and nutrition—rather than a continued isolation of consumer, producer and community needs and interests from one another. The Good Food movement has helped elevate the importance of food sovereignty, "the right of peoples to healthy and culturally appropriate food produced through sustainable methods and their right to define their own food and agriculture systems."⁶⁴

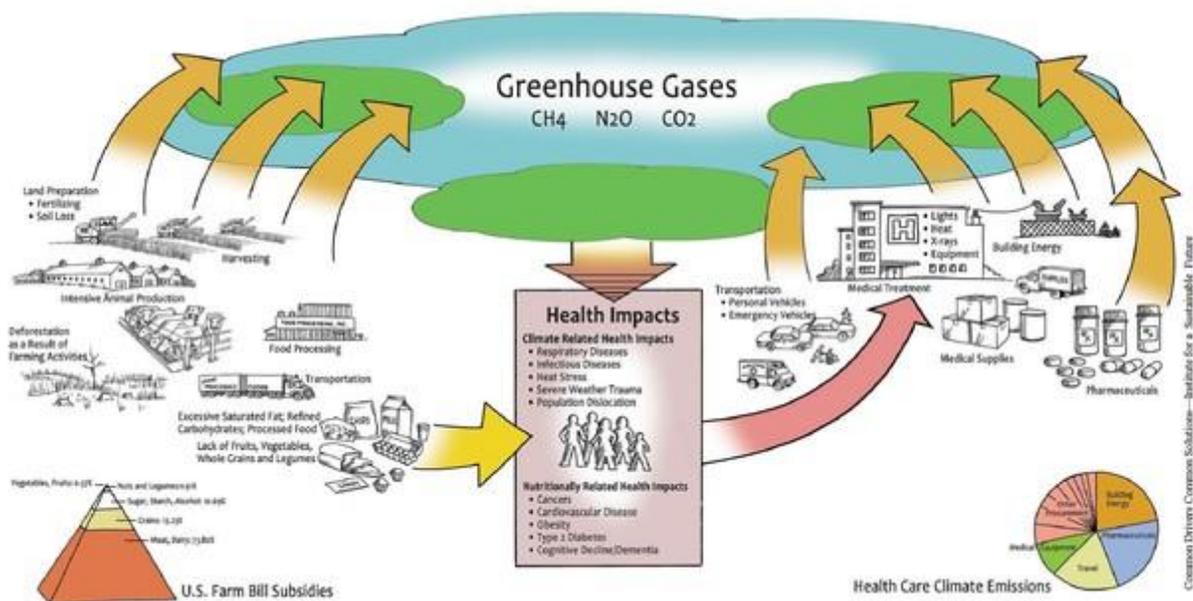
The scientific consensus is also clear. The United Nations funded International Assessment of Agriculture Knowledge Science and Technology (IAASTD) is a landmark report providing recommendations of scientists charged with answering the question: "What must we do differently to overcome persistent poverty and hunger, achieve equitable and sustainable development and sustain productive and resilient farming in the face of environmental crises? Their counsel explicitly recognizes that food production is a systemic issue and that the health of the environment, the social health of communities and agriculture are interrelated and must be addressed holistically.

The IAASTD report provides multiple recommendations including the need for governments to take decisive action to establish appropriate institutions for procurement, food trade and retail markets that direct opportunities and benefits to small-scale producers and local traders and retailers. As well, it includes recommendations to promote value chains, fair trade, organic agriculture and local food systems that distribute benefits fairly and equitably along the chain. It recognizes that the continued

reliance on simplistic technological fixes will not reduce persistent hunger and poverty and could exacerbate environmental problems and worsen social inequity. It acknowledges the need for a diversity of voices in decision making and calls for the support of democratic institutions.

Similar calls to action have been released.^{65,66} The United States Institutes of Medicine concluded that the food system can be conceptualized as a complex, adaptive system and found that systemic approaches that take full account of social, economic, ecological, and evolutionary factors and processes will be required to meet challenges to the U.S. food system in the 21st century.⁶⁷ In 2017, a report commissioned by the International Panel of Experts on Sustainable Food Systems (IPES) and by the Global Alliance for the Future of Food declared that, "Truly healthy food systems will be built on a more integrated, multi-faceted, and holistic approach including nutrition, health, happiness, and social and cultural indicators interpreted together and in relation to each other within the context of healthy and well-functioning food and agricultural systems."⁶⁸ The collective science strongly aligns with the values of the good food movement; in combination they provide a global framework and clarion call for action.

Importantly, a holistic approach is also understood as a essential model to reduce food and agricultural greenhouse gas emissions through soil conservation, less intensive livestock production, and reduced reliance on inorganic fertilizers and pesticides. More than twice as much carbon is stored in soil than vegetation, so soil maintenance and the sequestration of carbon is vital for climate mitigation.⁶⁹ Farm diversification increases the resilience of agricultural systems, which, even under the most optimistic future scenarios, will be needed for adaptation to climate change.^{70,71,72} Through a systems approach to food and agriculture not only will we have a means to mitigate and adapt to climate change, we will foster multiple other economic, environmental and community benefits.



A wide variety of recommendations and strategies for how we might foster health through the Great Transition in food and agriculture exist. The interconnections between the food system, health and climate are illustrated in the accompanying figure, Common Drivers, Common Solutions. For example, by incorporating environmental considerations into official dietary recommendations, we would reduce food production's environmental impacts dramatically.⁷⁴ Eshel et al shared how “Gradually shifting human diet toward much heavier reliance on plants – also with a clear corollary of recent decades’ advance in nutritional science⁷⁵– must therefore be viewed as a central element in the broader national and global food policies that emphasize renewed commitment to minimizing food disparities, hunger and climate change beyond magnitudes to which we have already committed.”⁷⁶ By reducing heart disease, stroke, type 2 diabetes, and cancer through more plant-based diets that are consistent with standard dietary guidelines, we could reduce global mortality by 6–10% and food-related greenhouse gas emissions by 29–70%.⁷⁷

While the deleterious social and ecological consequences of the industrial agricultural model work against its long-term economic self-interest, dominant industries within the sector continue to resist policies that might begin to shift their model despite the potential of significant benefit to human and planetary health.⁷⁸ But planetary citizens do not have the option of waiting until the old paradigm model exhausts itself and the planet. We require immediate action.

Our challenge will be how to amplify our voices into collective action and resist the allure of deeply entrenched mechanistic thinking, which will encourage us to divide communities, silo our approaches, rely on science expertise and technology, and privatize and monopolize our gifts of nature—our air, water, land, forests, fisheries, seeds and more. Across the globe, we are witnessing the emergence of new paradigm models.

The Egyptian organization SEKEM, embraces the establishment of biodynamic agriculture as the competitive solution for the environmental, social and food security challenges of the 21st century. SEKEM is now a fully interconnected, sustainable food and agriculture enterprise, with a code of conduct based on the Universal Declaration for Human Rights (UDHR). This successful international model, has won numerous international awards.

Food Commons Fresno has been described as, “one of the most ambitious regional efforts to reimagine the food system from farm to plate”⁷⁹ and “marks a radical shift from a narrow focus on the production of food on its own, towards a whole-system approach in which the interests of farm communities and local people, the land, watersheds and biodiversity are all considered together.”⁸⁰ Paradoxically, Fresno is located in the most productive agricultural region in the world and is also ranked one of the poorest and most food insecure cities in the United States. “To develop systemic solutions, the Food Commons has established a network of community-owned trusts that bring together landowners, farmers, food processors, distributors, retailers, and workers to support a shared mission: high-quality, safe, locally grown, food that everyone can afford.”⁸¹ This agroecological approach not only shields the individual components from the vagaries of the industrialized food system, it connects them through a shared, valued-based operating paradigm, requisite for the model to succeed as a system. “Instead of siphoning away profits to investors, the Food Commons mutualizes financial surpluses on a system-wide scale,

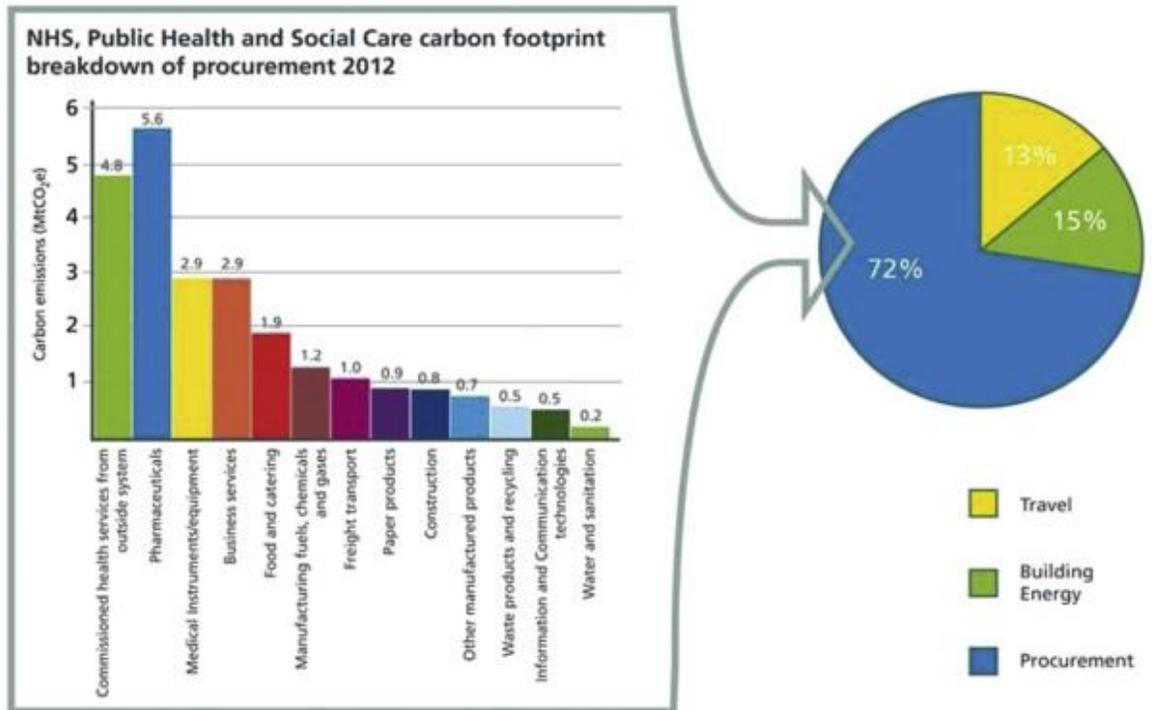
reducing market pressures to deplete the soil, exploit farm workers, degrade food quality, and raise prices." By design, The Food Commons supports an ecological model of health and social justice.

Our opportunity is to deepen our commitment to these systems models, strategies and approaches and bring them to light. By so doing, we will foster healthy communities and better align with the many values that ultimately make us resilient, healthy and whole and allow us to thrive.

A Health Commons and Healthy and Resilient Care Systems

One manifestation of the industrial food system model is the obesity crisis and the global burden of chronic disease, which have aggravated a financial crisis in the healthcare sector.⁸² Climate change is anticipated to further exacerbate this financial stress. These stressors are also leading to our increasing awareness of a broader fragility of the healthcare sector itself. Much like the industrial food model, its design and operations have largely been built on a mechanistic model, putting its long term health and that of the planet in peril.

For example, the way that health care is organized, financed and delivered may contribute to health disparities by limiting access to certain populations, inadvertently incentivizing utilization.⁸³ In addition, the health care sector has a sizable ecological footprint including discharge of toxic chemicals, pharmaceuticals, air and water pollution and solid waste—all associated with negative health outcomes. Healthcare is also a substantial contributor of greenhouse gas (GHG) emissions. The U.K. National Health Service generates an estimated 39% of all public sector emissions.⁸⁴ The United States healthcare sector represents an estimated 10% of total U.S. GHG emissions. If the U.S. healthcare sector were itself a country, it would rank thirteenth in the world for GHG emissions, ahead of the entire United Kingdom.⁸⁵ While there are vast differences in healthcare's carbon footprint across the globe, up to 82% is



National Health System Carbon FootPrint Breakdown 2012 ⁸⁶

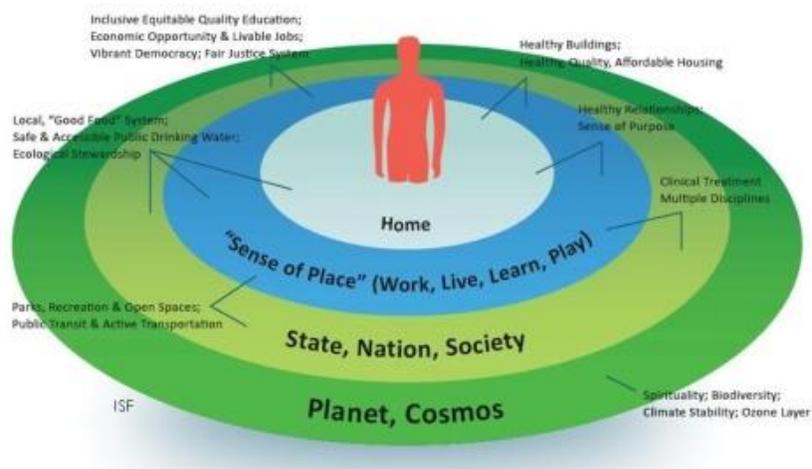
embedded within the supply chain of materials. The pharmaceutical footprint is an estimated 21% of the U.K. healthcare footprint, greater than building energy. Reducing the pharmaceutical impact by 2.5% is estimated to offer the highest carbon reduction impact,⁸⁷ which offers strong insights regarding the potential of wellness or resiliency as a powerful climate mitigation strategy. Importantly, weather events are highlighting the extreme vulnerability of healthcare infrastructure across the globe from climate change related flooding and winds, including structural damage, loss of power, potable water, sewage and cooling.

Viewed systemically, it becomes clear that our focus on disease treatment has caused us to lose sight of a more comprehensive whole, and has inadvertently created a self-magnifying disease treatment sector with deleterious climate and ecological health impacts that imperil its own sustainability.

Studies show that progress toward reducing health disparities will involve support for community-based strategies, enhanced understanding of the social determinants of health and an increased diversity of the health-care workforce.⁸⁸ Symposia convening healthcare and community highlight the imperative to adopt a systemic approach to health, emphasizing themes which include the concept that health is placed-based, holistic thinking and the need to include a diversity of community expertise.^{89,90}

Across the world, medical professionals are among the most trusted occupations.^{91,92} While this would suggest that health professionals are apt spokespeople and advocates for a new paradigm of health, the danger is the assumption that medical school training and education has prepared medical professionals to engage in new paradigm conversation. For example, in the United Kingdom, the limited training of

physicians on nutritional and lifestyle has been described as interventional , "It is a response to pathogenesis, rather than a prophylactic part of "salutogenesis" (the creation and maintenance of health and wellbeing)".⁹³ A study in the Netherlands, demonstrated how physicians (and policy makers) assessed health significantly more narrowly with an emphasis on bodily functions and quality of life than did patients.⁹⁴ These are important reminders that health as a biophysical process remains deeply embedded in our collective psyche, including healthcare. Moreover, they illustrate the need and growing demand for a holistic healthcare training and curriculum.⁹⁵ In parallel to the failures of the industrial food model, the healthcare sector itself is called to think holistically. Healthcare itself is but one part of a health commons; the collective resources and relationships within a defined geographic boundary that foster health.



Next Health System⁹⁶

This transition will challenge a powerful medical industry with economic interests vested in supporting and maintaining our attention on individualized treatment. Similarly, the idea that health is transactional, something given, or received—rather than dynamic and relational—is a powerful, alluring concept that is deeply entrenched and will remain difficult to resist.

Nevertheless, in the context of climate change we can no longer wait. There is an urgency to radically redesign our communities to foster health. To do so, we must shift the locus of health to whole persons and the system of relationships in which they exist.

The Nuka System of Care is a health care model operating in the new paradigm.⁹⁷ This internationally recognized model, based in South Central Alaska, was completely redesigned several years ago, moving from a centrally organized bureaucratic system to customer ownership and control of the health care system. Designed around Alaska Native values and needs, the vision and mission is holistic—a native community that embraces physical, mental, emotional and spiritual wellness. Operational principles are based on relationships, with an emphasis on wellness of the whole person, family, and community. The Nuka System of Care brings the foundational understanding that health is a longitudinal journey across decades in a social, religious, family context and highly influenced by values, beliefs, habits, and other

voices. One of the most significant causes of poor health, social isolation, for example, is understood in the Nuka System of Care as a diagnosis unto itself, and embeds appropriate treatment into the care of the patient (and therefore the community).

In the United Kingdom, the well-known Bromley on Bow Center is based on the premise that health and wellbeing are created through focusing on assets and strengths and that if people are healthy, happy and well, their communities will be as well. Rather than rely strictly on medical expertise, they engage and listen to the needs of communities, so as to shape public spaces and foster health. Their model comes from within their community and creates an environment that builds connections between people, where daily life enriches and promotes health and wellbeing. These efforts are now linking and supporting a network of health centers with a fundamental purpose—to create vibrant, resourceful communities.⁹⁸ Together, they are helping to illustrate functional new paradigm models while also strengthening a relational narrative of health in which the health of individuals, communities and the planet are one.

A New Economy and Being Well Together

The last 150 years of industrial evolution have been dominated by a one-way or linear model of production and consumption in which goods are manufactured from raw materials, sold, used and then discarded or incinerated as waste.⁹⁹ This linear model has been supported by an economic system requiring an endless growth of production, which itself is contingent on consumption or consumerism.¹⁰⁰

The nature of the economic system reinforces the primacy of economic growth, which promotes the externalization of social and environmental costs. At the current rate of consumption, only fifty eight years of minerals and metals remain available.¹⁰¹ Additionally, our oceans and marine life are filled with plastics, and the web of life is contaminated with persistent toxic chemicals.¹⁰² Ironically, CO₂, the waste product from the same fossil fuels which feed the global economy¹⁰³ is now predicted to destroy it.¹⁰⁴

Growth has been uneven, with extremes in inequality across the globe. In the United States, income inequality, or the gap between the rich and everyone else, has been growing markedly for 30 years.¹⁰⁵ Income disparities have become so pronounced that America's top 10 percent now average more than 9 times as much income as the bottom 90 percent, while the top 1 percent average over 40 times more income than the bottom 90 percent.¹⁰⁶ As of the end of 2015, 100 CEOs collectively had company retirement funds worth \$4.7 billion—a sum equal to the entire retirement savings of 41 percent of U.S. families.¹⁰⁷ The world's wealthiest individuals, those owning over \$100,000 in assets, total only 8.1 percent of the global population but own 84.6 percent of global wealth,¹⁰⁸ while the world's 10 richest billionaires own \$505 billion in combined wealth, a sum greater than the total goods and services most nations produce on an annual basis.¹⁰⁹ The concentration of economic power and influence is highly concentrated with 147 companies, the majority financial institutions, controlling 40% of the global economy.¹¹⁰ In such a dominant system, it is difficult to imagine how anyone might discover any hope in their ability to affect change. It should come as no surprise that inequality negatively affects our health.

At the local level, high inequality can create a sense of personal and public insecurity.¹¹¹ Rich countries with higher inequality consume more resources and generate more waste per person, influencing health through multiple pathways.^{112,113,114} In a vicious cycle, reducing the formation of human capital, unequal access to education, poor health and inadequate nutrition are both causes and consequences of inequality.¹¹⁵ Those on the lower end of economic disparity experience higher infant mortality and decreased mental health, life expectancy, levels of trust, altruism, social cooperation, reciprocity and trust in political institutions.^{116,117,118,119,120,121}

Viewed holistically, inequality may in fact represent one of the largest influences on the health of individuals, communities and the planet. Underpinning the industrial food system and healthcare delivery model, the global economic model has become self-reinforcing, driving itself towards its own collapse. Citizens across the planet are experiencing a deepening spiritual emptiness as the economic model pulls us away from a vital sense of connection and relationship with one another and the planet; this connection helps make us resilient, healthy and whole. The extremes in inequality are rapidly eroding the sense of trust and cooperation necessary for the functioning of civil societies and the global economy itself. And, in our singular quest for economic growth, we have lost sight of what makes us healthy and whole. Our hearts and minds tell us we need a new regenerative economic paradigm, designed first and foremost to support the health and resilience of all living beings together on our common home. This model is taking form.

Across the globe, communities have created local currencies such as the Talente (Langenegg, Austria), the Bristol Pound (Bristol, U.K.), Berkshares (Berkshires, U.S.), allowing them to make place-based decisions about where money should flow, rather than giving sole decision-making power to banks.¹²² Participatory budgeting is a democratic process in which community members directly decide how to spend part of a public budget. Designed to include those often left out of the democratic process such as low-income individuals and youth, participatory budgeting has now spread to thousands of cities across the world and been promoted as a best practice for democratic governance by the United Nations.¹²³

¹²⁴ ¹²⁵

Blockchain technology has created the ability to create new decentralized digital platforms to enable the sharing of wealth, knowledge and decision-making. As a real sharing alternative to the monopoly Uber, Arcade City (Germany), VTC Cab (France), ATC Tax Coop (U.S.) are examples of ride sharing apps that more broadly distribute the benefits of the digital economy.^{126,127} British Columbia, Canada, has adopted a tax (or fee) and dividend to regulate carbon emissions. Tax and dividend improves health by equitably distributing financial benefits to all citizens, allowing the just transition to a carbon-free economy.¹²⁸

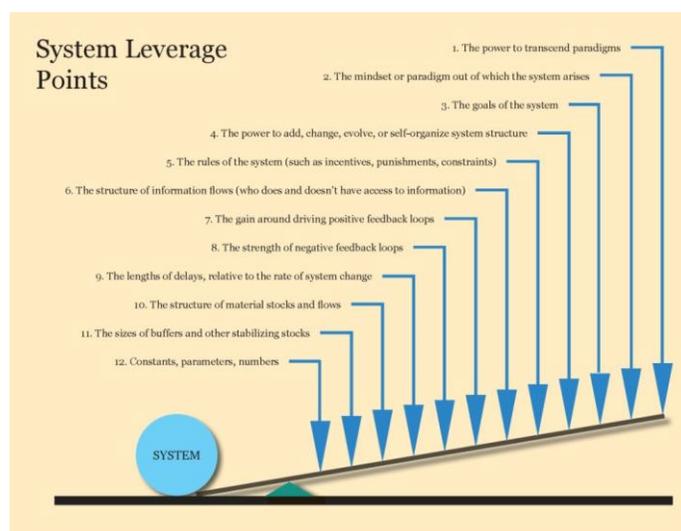
Inequity is driving a renewed focus on cooperative and worker ownership models, especially as research demonstrates how employee-ownership offers significant benefits including higher median wage income, job stability and household wealth, and benefits such as flexible work schedules, retirement plans, parental leave, and tuition reimbursement.¹²⁹ Mondragon, a worker-owned multinational cooperative enterprise which originated in Spain, is now a multinational federation with annual

Despite the debilitating climate change predictions, punishing inequality and all the other crises affecting our planet, we are witnessing creativity, self-organization and the worldwide emergence of a new economy that can work for all. Collectively, these are helping to demonstrate that we can change our current trajectory and there are viable economic alternatives that put the health and resilience of people and the planet at the center.

Planetary Solutions and Leverage Points

As we grasp our predicament, it is natural that we search for the one quick fix, the big win, the silver bullet. Frustratingly, the very nature of complex systems means there may not be a big fix, or that the big fix is often impossible to see. We do have some valuable guidance, however.

Ecologist Donella Meadows has helped highlight the importance of leverage points, places to intervene



in a system,¹³⁹ explaining the crucial need to change our mechanistic paradigm towards holism and to position health and resilience as central societal goals.

Nobelist, Elinor Ostrom elucidated effective management principles for the commons, “resources” or gifts of nature—such as seeds, forests, water, or fisheries—and social creations such as libraries, the internet, traditional medicines or practices that are vital for shifting how humanity manages diminishing resources.¹⁴⁰ At the core of the commons is the importance of a fair set of rules, a means to be represented, transparency, self-governance, subsidiarity, a sense of place, and inclusivity.

The following are some strategies and approaches to mitigate climate, foster planetary health and resilience and help catalyze the Great Transition.

Climate Justice

A holistic worldview informs us that climate change is not strictly an environmental issue but one that also connects and links all of humanity. Strategies and approaches must be grounded in a human rights framework which guards the rights of the most vulnerable people and shares burdens and benefits of climate change equitably. Organizations and approaches must be grounded in climate justice principles such as the Mary Robinson Foundation Climate Justice Principles.¹⁴¹

Healthy Diets, Less Meat

Industrial meat production has an outsized global carbon footprint. Cities, hospitals, churches, schools and universities can initiate support for policies, practices and programs such as the global Meatless Monday's Initiative¹⁴² and catalyze a global shift towards healthy sustainable diets.

Sustainable Food Guides

Influencers such as religious leaders and the healthcare community can support and advocate for national food guides, such as Brazil's National Food Guide,¹⁴³ which is founded on a holistic model of health and includes traditional foods, locality, spirituality, nutrition and sense of community and family.

Phase-out or Tax and Dividend Sugary Beverages

High caloric beverages are significant contributors to obesity with a direct and indirect climate footprint. Institutions can adopt policies to phase-out sales. Examples from Mexico and the United States¹⁴⁴ and other countries demonstrate how sugary beverage taxes can increase consumption of healthy beverages and indirectly mitigate climate change,¹⁴⁵ while revenue can be directed to support publicly owned water systems or be allocated through participatory budgeting.

Good Food Purchasing

Cities can encourage anchor institutions such as hospitals, schools and universities to adopt purchasing policies similar to the U.S. based Center for Good Food Purchasing,¹⁴⁶ which provides steps and metrics that catalyze good food production and demand.

Participatory Budgeting

Participatory budgeting deepens democracy and builds stronger communities and helps local governments better manage money. Citizens and community leaders can encourage and support the adoption of participatory budgeting polices¹⁴⁷ in local government or similar institutions such as schools and entities that manage public monies.

Ownership Matters

Through investments and reduced regulatory burdens, investors and governments can support value-based business ownership models. Citizens, institutions and other purchasing entities can use their purchasing power to align their values by preferentially supporting these businesses. These include businesses with employee stock ownership programs (ESOP)'s or worker, consumer and other cooperative models which are designed to feature principles of human well-being such as justice, equity, ecological stewardship, and community.

Health Commons and Fostering Health

Governments, communities, healthcare, nursing and medical schools can locally adapt recommendations similar to the NHS Manifesto for Health Creation,¹⁴⁸ Manifesto for Sustainable Global Health,¹⁴⁹ or the Commons Health Network.¹⁵⁰ These suggestions encourage place-based community decision making, group clinical visits, a shift away from a disease model and more holistic training in medical and nursing schools, including multi-disciplinary fellowships such as the Academy of Integrative Health and Medicine Fellowship.¹⁵¹

Stuttgart Integrative Health & Medicine Declaration

Support and adopt the Declaration which calls on governments to recognize integrative health and medicine as a whole society approach that will help to reach the Sustainable Development Goals (e.g. to decrease the pharmaceutical carbon footprint) and to support the WHO Traditional Medicine Strategy World Health Assembly resolutions to include traditional and complementary medicine into national health service delivery and self-care.

Climate Smart Healthcare

Citizens and governments can encourage hospitals across the globe to adopt climate smart healthcare strategies such as those outlined in the World Bank Group document, Climate Smart Healthcare,¹⁵² or adopt the 2020 Health Care Climate Challenge, an activity of the Globe Green and Healthy Hospitals initiative to mobilize health care institutions around the globe to protect public health from climate change.¹⁵³

Zero Waste

Citizens can adopt and mobilize their homes, communities, schools, universities, hospitals and local businesses to adopt zero waste policies and eliminate the landfilling and incineration of waste. Food waste reduction strategies are a high priority. Other strategies such as those proposed by GAIA¹⁵⁴ include municipal composting, phase-outs on styrofoam, plastic straws and other single use items such as carry-out bags.

All that we Share

In the context of scarcity, it will be vital to develop strategies to preserve and equitably share our commons. The commons include but are not limited to public forests, fisheries, parks, public owned water treatment, solar energy, libraries, medicinal plants etc. It is vital that governments and citizens develop legislation, legal structures and self-governance strategies which maintain these assets for our commonwealth and future generations.

Skills for the New Operating System

The transformative models that we are called upon to design require a new operating system, a new way of being. On a planet in crisis, we will need to improve and hone lost skills for working in community and in collaboration, especially within individualistic cultures. This transition will require practices to open hearts and open minds such as mindfulness, meditation and deep immersion in skills and methods

to harness the collective wisdom and self-organizing capacity of groups, such as those offered by the global Art of Hosting community of practice.¹⁵⁵

Conclusion

For the last half century or more, we've ignored the growing signs that our planetary life support system is in peril as demonstrated by deforestation, biodiversity loss, marine plastic pollution, ozone loss, a web of life contaminated with industrial chemicals. Through floods, drought and storms, climate change has cracked a dam of hubris and denial and is stirring an awareness about the inter-relationship of all life. Now, with our reach extended far beyond our planet's ecological carrying capacity, we are awakening to the realization that humanity's challenges are our own doing, a function of linear models and associated hierarchical structures and operating systems incongruous with the complexity of life.

Perhaps one of our biggest challenges is to understand the pervasive power and influence of our dominant narrative. We are challenged by patterns of thought that have been reinforced daily through our culture since birth. It makes us want to focus on climate change or carbon as a singular issue, when climate change is a complex product of multiple factors. Many of us have lost the skills to work in groups; without these necessary skills, the notion of collaborating with individuals having diverse perspectives can be paralyzing. We can be intimidated by a cultural belief in the primacy of science and question our internal wisdom when something doesn't feel right even though deep-rooted human values will almost always offer the best path forward hand-in-hand with scientific knowledge.

In fact, leading with one's heart and an awareness of the connection to all life is the essence of planetary health and resilience. Though we are challenged with little time to spare, it is this awareness that offers us necessary direction. By adopting a new regenerative operating system with health and well-being at the core, we have the opportunity to elevate a new narrative together and we can co-create a healthy and resilient world for all.

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