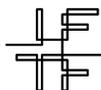




# THE GREENING OF HEALTH

the convergence of health  
and sustainability



INSTITUTE FOR THE FUTURE

**Health Horizons Program**

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## About the ...

### Health Horizons Program

The Health Horizons Program combines a deep understanding of the global health economy, consumer behavior, health and medical technologies, health care delivery systems, and societal forces to identify and evaluate emerging trends, discontinuities, and innovations in the next three to ten years. We help organizations work with foresights to develop insights and strategic tools to better position themselves in the marketplace.

### The Institute for the Future

The Institute for the Future is an independent, nonprofit strategic research group with nearly 40 years of forecasting experience. The core of our work is identifying emerging trends and discontinuities that will transform global society and the global marketplace. We provide our members with insights into business strategy, design process, innovation, and social dilemmas. Our research generates the foresight needed to create insights that lead to action. Our research spans a broad territory of deeply transformative trends, from health and health care to technology, the workplace, and human identity. The Institute for the Future is located in Palo Alto, California.

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# INTRODUCTION: THE EVOLUTION OF GREEN HEALTH

**Deforestation. Drought. Hundred-year hurricanes. Air and water pollution. Threats of pandemics. Global warming. Sick buildings. Poverty.**

Many scientists and public health practitioners recognize that environmental conditions such as these have a dramatic effect on health, but the general public has only recently come to understand that this causal relationship affects their day-to-day lives. Research by the Institute for the Future (ITF) shows that we are now learning to link our personal health not only to our immediate environments but also to the larger ecologies in which we live—and to the whole ecology we call planet Earth. Indeed, we are coming to relate the sustainability of the planet to the sustainability of our health as never before. At ITF, we call this movement Green Health. It is the next chapter in the story of the changing global health economy.

Green Health is emerging from the convergence of the global health economy, which ITF's Health Horizons Program first described in the *Global Health Economy: Map for the Decade*,<sup>1</sup> and the growing public recognition of the imperative for global sustainability. This convergence is visible in the two distinct ways in which our concept of "health" has expanded.

- **We are managing, preserving, and enhancing our health in ways that go beyond the narrow context of traditional Western health care. This broader view of health allows for more holistic paradigms that include underlying causes of well-being and the interrelated systems of our lives, such as where we live, how we work, what groups we are part of, and so on.**
- **Many conscientious citizens are beginning to realize that the sustainability of our life on the planet is not a given, that what we do affects the planet in a fundamental way, and that managing and preserving planetary health is too important to leave to others. Keeping our planet alive is not just the purview of agriculture, energy, and other industries that most directly affect the planet's ecology—the responsibility belongs to all of us.**

The convergence of health and sustainability plays out in many ways. Scientifically, Green Health embodies the epidemiological connections between human health and the environment. Culturally, it represents the understanding of nature as a powerful binding force between people, their health, and the world in which they live. Socially, Green Health occurs at a nexus of morally-laden decisions about living in the world as patients, workers, consumers, and citizens.

In coming to this insight, we have followed an important tenet of social psychology called a “social trap”—that what is distant from us seems less real, as do the consequences of our behavior regarding such distant things. For example, does my huge SUV really cause the polar ice to melt? Social movements change the way we see the consequences of our decisions and behavior by bringing them closer to us, giving them more reality. The concept of Green Health reframes how we understand the cause and effect of our behaviors in the world, and reaffirms the connections between our bodies, our social constructs, and the world around us. We are beginning to realize that not only does that SUV contribute to forces causing the ice caps to melt, it also doesn't do much for the air quality of our towns and cities either.

We don't know what Green Health will look like in practice over time. But, more than any other aspect of the global health economy, Green Health involves intense experimentation on the part of everyone involved—citizens, consumers, the government, and businesses—both within and outside of the health economy. Responses, actions, and products under the Green Health paradigm are proliferating and evolving, from new hospital building materials to re-branded alternative health practices, including new diets and lifestyles. But Green Health is still in its early days. Over the next ten years, as this wide-reaching experimentation continues, a clearer picture of what Green Health means for stakeholders will emerge.

As with all stories of the future, the story of Green Health has deep historical roots and many crooked lines. This report, *The Greening of Health: The Convergence of Health and Sustainability*, charts what IFTF has learned about the greening of health past and present, and offers our take on where it is likely to go in the future.

In Chapter 1, *From Past to Present: A Genealogy of Green Health*, we trace the historical roots of Green Health as illustrated by our *Genealogy of Green Health Map*.<sup>2</sup> In Chapter 2, *How We Got Here: The Drivers of Green Health*, we analyze the five drivers that are converging to create Green Health today. In Chapter 3, *Forecasts: Lenses on the Future of Green Health*, we present our forecasts for Green Health over the next ten years by viewing them through six lenses—six defining points-of-view that help us focus on the effects of Green Health for the future of health and healthcare. And in Chapter 4, *Implications for Stakeholders*, we lay out the implications of these forecasts for various stakeholders, particularly health providers, consumer product goods companies, food companies and retailers, and local governments, as well as people on the street.

Given the extent of the fundamental changes Green Health is likely to bring about, no stakeholders can afford to ignore this growing phenomenon. The goal of this report is to give you both the historical context and a sense of the coming trajectory of Green Health. It should help you consider the impacts of Green Health on your organization's values, goals, strategies, and day-to-day activities.

# 1. FROM PAST TO PRESENT: A GENEALOGY OF GREEN HEALTH

**Although Green Health in its current form may be a new concept, the idea that everyone and everything on the planet is interrelated is certainly not new.**

For thousands of years, this notion has been the foundation of the worldviews and healing practices of many different cultures, from ancient to modern times. To determine the future of Green Health, we need to understand its history. The *Genealogy of Green Health Map* on pages 8–9 lays out the cultural and historical roots of Green Health.

The story of Green Health unfolds over 200 years. The Map follows the changing paradigms for protecting and nurturing health and shows various points in history when the convergence of “green”—naturalism and environmentalism—and “health” has taken place. These enduring themes have converged before, each adding a distinctive influence to the applications of Green Health in the present and the future. Although Green Health represents movements from all over the world, North America has had a distinctive role in catalyzing the philosophy behind it. Green Health is an American story, but the themes which it contains are universal.

Beginning in about 1800, there have been seven major back stories, or “roots,” that have brought us to Green Health today:

1. **Humoral Causality:** Connecting bodies and landscapes
2. **Natural Places:** The spiritual and the healthy
3. **Germ-based Interventions:** Biomedicine ascends
4. **Risky Cities, Risky Farms:** Health disparities recognized
5. **Shifting Responsibilities:** From families to institutions and back again
6. **Well Beings:** Health is more than not being sick
7. **Ecological Bodies:** Humans are part of the ecosystem

Green Health blends values from health and environmental consciousness that have converged before. Today new knowledge, new tools, and a new urgency have caused them to converge again. The emergence of Green Health renews old stories and practices, and reshapes the way we use them in the present.

The *Genealogy of Green Health Map* highlights the evolution of Green Health and provides a framework for exploring the possibilities of the future. Use this map to guide your own exploration and think through how to respond to new market needs, value propositions, and innovation spaces that will open up as this important story continues to unfold over the next decade.

## How To Read This Map

This map tracks the past, present, and future of Green Health from 1800 to 2020 in the form of a loose historical timeline. Think of it as a framework or toolkit for guiding your organization through Green Health.

**We have highlighted seven key stories, which we call **ROOTS**, from which Green Health emerges today.** These stories are spread out across the map in a framework of **Experienced Reality, Historical Catalysts, and Institutional Change**. Some of these stories are not considered mainstream today, but they had deep and layered impacts in the past and are re-emerging in the present

All of the stories are supported by **SIGNALS—events, turning points, or data points** that illustrate their historical context

The last two decades of this timeline contain a set of **DRIVERS** that are shaping the forecasts of Green Health: **Policies, Climate Change, Disease Burden, Resource Constraints, and Rethinking Value & Values**

To highlight the most interesting stories in both the genealogy of Green Health and our forecasts of its future, we have looked at the past through **six LENSES, which reveal patterns** that we call **CONVERGENCES**

**CAUSALITY:** the systems of explanation surrounding of illness, infirmity, health, and well-being

**INTERVENTIONS:** the practices and policies at different scales for affecting changes in health

**Eco-etiology**—the ways in which health and illness are explained in terms of actual and metaphorical ecologies

**BODIES:** the interconnected physical, emotional, and spiritual self

**RISK:** perceived or experienced dangers or susceptibilities

**Biocitizens**—collectives of peers empowered to perceive and protect from risk of and to the body

**HEALTH:** “[a] state of complete mental, physical and social well-being and not merely the absence of disease or infirmity” (Source: World Health Organization)

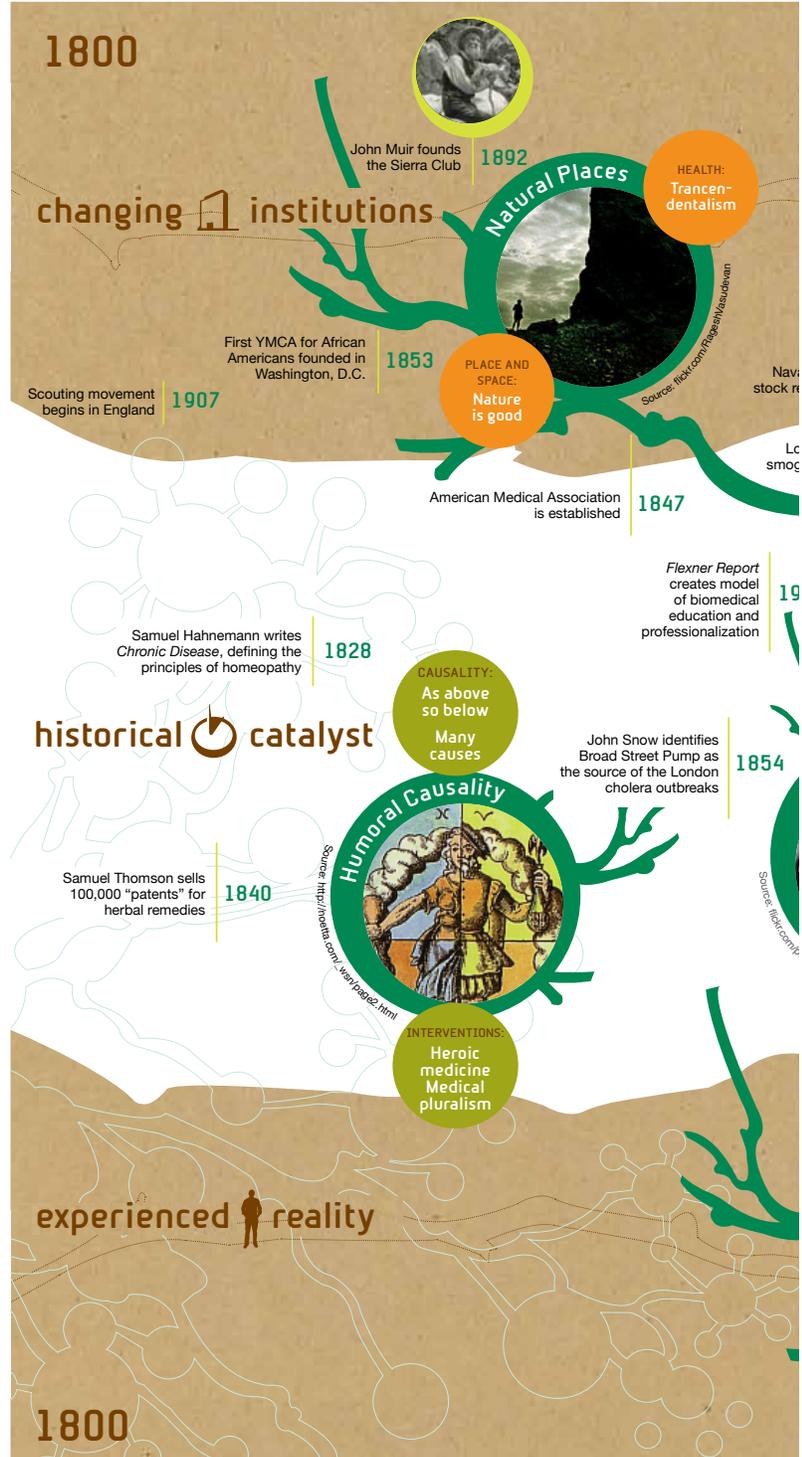
**PLACE AND SPACE:** the contexts and settings where we live work and play

**Health Commons**—alliances of stakeholders and resources contributing to health, organized around place, community, or common cause



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1800

changing institutions



John Muir founds the Sierra Club

1892

Natural Places

HEALTH: Transcendentalism

First YMCA for African Americans founded in Washington, D.C.

1853

PLACE AND SPACE: Nature is good

Scouting movement begins in England

1907

American Medical Association is established

1847

Samuel Hahnemann writes *Chronic Disease*, defining the principles of homeopathy

1828

CAUSALITY: As above so below  
Many causes

historical catalyst

John Snow identifies Broad Street Pump as the source of the London cholera outbreaks

1854

Samuel Thomson sells 100,000 "patents" for herbal remedies

1840

Humoral Causality

INTERVENTIONS: Heroic medicine  
Medical pluralism

experienced reality

1800





source:  
[http://noetta.com/\\_wsn/page2.html](http://noetta.com/_wsn/page2.html)

## 1. HUMORAL CAUSALITY: CONNECTING BODIES AND LANDSCAPES

Contemporary natural medicine is the descendent of para-scientific systems that tried to make sense of empirical practices such as herbs, massage, exercise, and positive attitude. Twenty-five hundred years ago, Europe's Hippocratic tradition, India's Ayurvedic medicine, and East Asia's traditional medicine understood the cause of disease in terms of humors, intrinsic qualities in our bodies that reflect the elements of nature—water, fire, earth, and wind, for example. In these traditions, the larger physical and spiritual world “above” effects change in the body “below.” Health was believed to be a complex balance of these qualities brought about by means of regulating emotion, food, exercise, and religious practice. Disease was said to come from many causes, and health was achieved by many different kinds of intervention from spiritual advocacy to changes in diet.<sup>3</sup>

At the beginning of the 19th century in the United States and other Western countries, medical interventions were intense—harsh, bleeding, fasting. In the United States, Native American practices were also adopted, creating a kind of medical pluralism. In both Europe and the United States, systems of natural healing emerged, such as Samuel Hahnemann's homeopathy and Samuel Thomson's naturopathy. In these systems, the metaphysical is privileged over the physical. “Energy” matters. Homeopathic remedies are less physical substances, such as herbal concoctions, than energetic imprints of concoctions that act on our energy bodies.<sup>4</sup> Mirroring the ancestral naturalistic medical systems, the small reflects the large. Your eyes and ears are maps of your body, your body a map of your surroundings.

In the early 19th century, it was believed that causes for ill health were all around—internal, external, spiritual, and physical. None of these causes were isolated. They interacted with each other in complex ways. Each person was a unique configuration of constitutional strengths and weakness, environmental assets and deficits. Healers treated the person, not the disease.



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## 2. NATURAL PLACES: THE SPIRITUAL AND THE HEALTHY

While all over the world, the colonial coexistence of medical traditions was creating medical pluralism, a philosophy emerged in the United States that tried to make sense of it all—American Transcendentalism, associated with such thinkers as Ralph Waldo Emerson and Henry David Thoreau. In the first half of the 19th century, this natural theology emphasized the spiritual aspects of nature. A central tenet was that nature had healing power, that place was somehow integral to health, both physical and spiritual. Although influenced by European and Indian philosophy, Transcendentalism was a distinctly American phenomenon, glorifying the state of nature in which Americans were believed to reside. There was a popular 18th- and early-19th-century belief that held that environment shaped behavior—this idea had been the rationale for Europeans viewing Native Americans (and other colonial subjects around the world who lived bereft of urban civilization) as savages. Transcendentalism took this idea and stood it on its head. Living in nature became more “natural”—an act of nobility, not degradation.

In American Transcendentalism, curiosity and an open mind were encouraged. Political action was also an important value. John Muir, engineer, amateur geologist, and “wilderness prophet,” was a prototype preservationist and advocate of natural places. Transcendentalism, picked up by spiritualists and scientists, integrates such diverse practices as New Age theology, naturopathic medicine, environmental activism, innovative technology development, and innumerable self-help movements.<sup>5</sup>

### 3. GERM-BASED INTERVENTIONS: BIOMEDICINE ASCENDS

While Transcendentalism turned Americans’ notion of health outward toward nature, another very different medical worldview turned inward—germ theory. Germ theory, which emerged in the late 19th century and on which much of modern medicine is still based, posits that pathogenic microorganisms cause disease and eliminating these pathogens is the way to prevent or treat disease. Instead of vague fevers and fluxes, there were specific diseases with particular causes, such as bacteria-induced cholera. Medicine turned from treating each unique patient to treating the disease itself. In addition to hygienists who emphasized sanitation, this new way of thinking brought about the fields of biomedicine and public health.<sup>6</sup> Shifting the focus of medical practice from the individual to the universal illness meant that statistics could be employed to track disease. Statistics would become the basis of medical prognosis and epidemiology.

### 4. RISKY CITIES, RISKY FARMS: HEALTH DISPARITIES RECOGNIZED

Not only was the medical field changing in the second half of the 19th century, so were the demographics of the United States. By the end of the 19th century, America was increasingly urban and multicultural. From 1880 to the end of that century, nearly 15% of the population was foreign-born.<sup>7</sup> Immigration, urbanization, and industrialization took root after the Civil War. Within America’s large and growing cities were pockets of poverty in which disease was rife and access to care was difficult. Access to care on the frontier and on the farms was not much better. Cities were risky places to live, and so were farms. Social and economic inequality intensified these risks.

During this time, many examples of racialized epidemiology were playing out—particular populations were subject to stressors not experienced by more powerful segments.<sup>8</sup> For example, the Dine, or Navajo, who lived in the American Southwest, were introduced to Churro sheep by the Spanish. They integrated herding into their culture, created a weaving tradition, and traded with people from Utah to Mexico. Their population thrived, too much so for the U.S. government. In 1864, Kit Carson was sent in to round up the Navajo, kill their livestock, and march them to Fort Sumner in New Mexico. This “Long Walk” was a conscious policy of environmental warfare designed to make the Navajo dependent and less threatening. After 1868, they returned to their lands, and resolutely rebuilt their herds. By the 1930s, competition for land and, especially, water increased. Pastureland was overgrazed, although the Navajo deny that their practices were the cause. Another campaign of sheep reduction was begun by



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source:  
Dorothea Lange

the Bureau of Indian Affairs, a devastating event that the Navajo call the “second Long Walk.” Eighty percent of the livestock was exterminated.<sup>9</sup>

There were many consequences of this event for the health of the Dine. Poverty escalated, as did tuberculosis. Mistrust of the government intensified, which inhibited cooperation concerning other issues of public health. Disenfranchised Navajo went to the cities, where the bonds of kinship were broken. Without their kinfolk, who had once helped troubled youth resist alcohol and other destructive behaviors, urban Navajo suffered.

The interaction of social inequality and disease is an acknowledged tenet of Green Health. As this example confirms, unequal bodies suffer unequal risk.



source:  
flickr.com/carf

## 5. SHIFTING RESPONSIBILITIES: FROM FAMILIES TO INSTITUTIONS AND BACK AGAIN

In the 20th century, the social responsibilities for health shifted, first away from families and toward institutions, and then back again. From the Depression until the aftermath of the Second World War, the structure of American medical care was rebuilt. Medicine became hospital-centered. Medical specialization led to new niches in practitioner care and public health. Professional associations, such as the American Medical Association, became critical policy players. New forms of payment, such as private and employer-based insurance were coming into play. From about 1950 to 1975, bigger, more complex bureaucracies were created: for example, the Centers for Disease Control and Prevention; Medicare; Medicaid.

This all changed in the last quarter of the 20th century, when new policies of deregulation and the creation of new markets increasingly shifted the responsibility for care out of institutions and onto patients, consumers, and parents. Today, many people are experiencing the burden of empowerment, as they become responsible for more medical decisions—decisions they aren’t necessarily equipped to make. Facing disease burdens without specialized knowledge, people are beginning to understand medicine much more pragmatically, using any tool at hand to help. They are likely to draw on the full legacy of their medical ancestors, including many practices considered alternative by mainstream modern medicine.



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flickr.com/loupiote(oldschool)

## 6. WELL BEINGS: HEALTH IS MORE THAN NOT BEING SICK

The image of the earth hanging in space, the famous “blue marble” photograph, shattered many environmental perceptions. We don’t live in little nation-states printed on maps, this picture seemed to tell us, but on a single planet that we all share, a planet sanctified by its identification with nature. This belief is resonant with a great-grandchild of Transcendentalism, holistic healing. We can only be well beings by blending health and eco-politics.

For all the humor to be found in stereotypes of aging baby boomers twisting themselves

into complicated yoga positions, alternative practices have gone mainstream.<sup>10</sup> Health no longer simply means not being sick; it is about being actively well. People are involved in a range of activities to promote wellness. They buy nutraceuticals, which have found their way into major grocery stores. They follow practices from Asian traditions such as acupuncture and acupressure, which have become legally and commercially available. At the turn of this century, 40% of American adults bought natural health alternatives, generating at least \$27 billion for those who sold them.<sup>11</sup>

## 7. ECOLOGICAL BODIES: HUMANS ARE PART OF THE ECOSYSTEM

Ideas about the environment have undergone a significant shift as well. Ways of experiencing health and the environment have changed how people think about themselves—as ecological bodies. For many years, John Muir’s legacy lived on, and people committed themselves to the ideal of protecting nature. But that ideal seemed far away, off somewhere in a distant future. Some, such as Rachel Carson, in her 1962 book, *Silent Spring*, warned that this was not so, that the consequences were more immediate. However, in the way of social movements, it was not until environmental disasters in our own backyards—such as the 1968 Santa Barbara oil spill and the 1978 disaster at Love Canal—validated her claims that people and policy were mobilized to protect the environment. New institutions such as the United States Environmental Protection Agency were created. Federal legislation was passed, including the Clean Air Act (1963); Federal Water Pollution Control Amendments (1972) and Clean Water Act (1977); and the Endangered Species Act (1973). The Organization for Economic Co-operation and Development council established the “polluter pays” principle in international environmental law (1971).<sup>12</sup>

Environmental consciousness may be global, but concerns are predictably local. Anthropologists and sociologists of social movements have noticed that people are not mobilized by abstract beliefs, but by the participation of their family, friends, and neighbors around particular, very concrete issues.<sup>13</sup> For example, in Silicon Valley, the “new silicon” industries may not have the polluting smoke stacks of older industries, but they all emit contaminants nonetheless. The grassroots Silicon Valley Toxics Coalition was organized in response.

People experience the proximity of ecological risks and see themselves as ecological bodies in diverse ways. For example, in Pajaro, CA, a coastal agricultural area in Monterey County, catastrophic floods in 1995 mobilized the Army Corps of Engineers to consider whether to install floodwalls or levees. Business owners, farmers, farm workers, local community residents, and environmentalists—old timers and new residents alike—all had radically different ideas about what action should be taken. Farmers were concerned about water regulation, theft by pedestrians walking along the levees, and the loss of valuable farmland to public works. Local residents wanted to be able to take in the natural beauty of the area by walking along the levees. Farm workers were concerned with pesticide contamination. Environmentalists wanted to restore riparian habitats. Each group of stakeholders—each ecological body—thought of Pajaro differently: as a home, as a work site, as an investment, as a source of transcendental natural experience. Each of those ecological bodies experiences a



source:  
NASA



source:  
oneread.org

different kind of risk that implies a different kind of action. Green Health encompasses them all.

## THE WORLD ABOVE, THE BODY BELOW: GREEN HEALTH COMES FULL CIRCLE

So we come full circle. New behaviors are emerging, and there is no doubt that the next generations of genomic and ecological knowledge and context-aware technologies (sensors and monitors, etc. are likely to converge with environmental and political activities to create something distinctive.

At the same time, this convergence recalls its ancestral roots. The onset of new diseases and renewed medical understanding of the role of stress, emotion, and environmental contamination has brought us back to seeing illness as the result of many causes. As the world above, so the body below. The belief that nature is sacred has intensified as we come to grips with climate change. Extreme environments, in global cities and on farms, face climatic, institutional, and cultural challenges. Resources are scarce, but new systems of value, and new values, are shaping new practices and policies to conserve them. Out of these fundamental drivers of change is born Green Health.



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[flickr.com/urbanwoodswalker](https://www.flickr.com/photos/urbanwoodswalker/)

## 2. HOW WE GOT HERE: THE DRIVERS OF GREEN HEALTH

### **Rising eco-health literacy is influencing health practice by emphasizing the ecological determinants of health.**

Eco-health literacy means that individuals can recognize the broader environmental and ecological conditions that produce good health—and of course those that don't as well. We identified eco-health literacy as an important story in IFTF's 2006 *Global Health Economy: Map of the Decade*, and it has served as a natural springboard for our thinking about Green Health. The issues raised by the greening of health are much broader than eco-health literacy, however. Green Health is not just a health care trend, nor is it an economic market or an environmental trend. Rather, it is a part of a larger set of intellectual, social, and even political movements that include all of these and more. Together they are expanding—some may even say exploding—the meaning of health and health practices.

In the last 15 years, events, changing institutions, and ways of experiencing health and the environment have converged to reframe how people think about their own bodies—not just as individual entities, but as part of the larger ecology. Climate change, resource constraints, and new chronic and infectious disease burdens make the consequences of our behavior seem much closer than they did before. Risky behaviors include individual actions such as overeating, but also behaviors of the larger body politic such as farm policies that encourage the conversion of corn into high-fructose corn syrup. People are becoming mindful not only of every bite they take but also of the entire food web that supports it.

How did we get here? What has been driving the convergence of trends toward Green Health? We have identified five key drivers:

- 1. Climate change gets personal**
- 2. Disease burden reshapes the lines of intervention**
- 3. Resource constraints: the costs of chronic care and resources for human well-being**
- 4. Shifting the responsibilities of regulation**
- 5. Rethinking values and valuation**

## DRIVER 1: CLIMATE CHANGE GETS PERSONAL

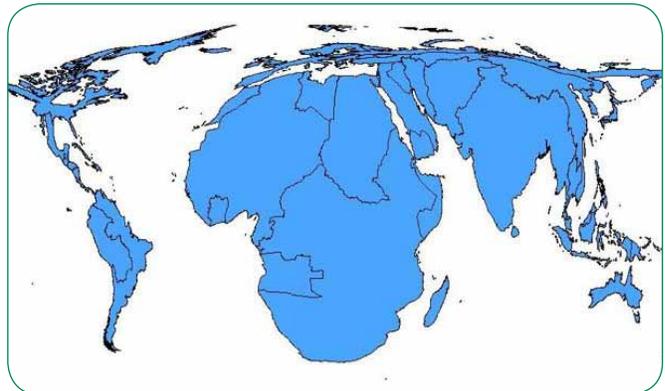
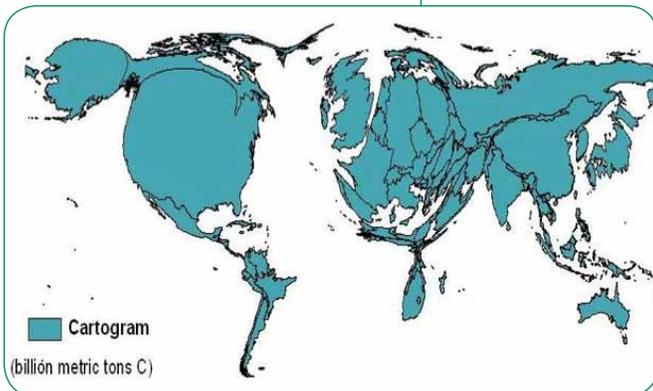
Researchers, government agencies both national and international, and others have been investigating the relationship between human health and global climate change since the early 2000s. Both rigorous scientific inquiry and sheer speculation have fueled the debate, but as more evidence comes to light, we are learning that climate change has serious consequences for our health and wellness. For example, research has shown that rising atmospheric levels of carbon dioxide—a major contributor to climate change—will correlate with an increasing rate of asthma and allergy diagnoses. Also, the number of asthma diagnoses in most developed countries far exceeds those in developing nations.<sup>14</sup> These new connections with climate change build on and enhance greater awareness of the impact of our environments on our health, from cancer clusters to sick building syndrome to increasing allergies worldwide.<sup>15</sup>

The World Health Organization (WHO) has noted that the systemic threats of climate change are unprecedented in scope, and that the more we learn about its potential effects, the more we realize that climate change will affect us all. In fact, 80% of the United States population believes that climate change is real, and of those, 78% are concerned about the impacts of climate change on their health.<sup>16</sup> In turn, climate change stands apart from other environmental issues, such as endangered species or industrial pollution, because it is responsive to personal choices—every single one of us can do something about it. The places we live, the products we buy, the cars we drive all contribute to global warming. As the WHO has observed “The optimal solution ... lies with governments, society and individuals—and requires changes in behavior, technologies and practices to enable a transition to sustainability.”<sup>17</sup> For many, the recognition of the role personal responsibility plays in the fate of polar bears straddling melting ice has led to a greater commitment to environmental stewardship.

Both health and climate change imbue individual decisions with moral implications. These two senses of responsibility, and the emotional strain they create, are becoming intertwined and sometimes conflict. Although scientists are still contesting the human impacts of climate change and the timing and duration of its effects, the threat of global warming is recasting our relationships as humans in the natural environment. Perhaps more than any other issue, climate change has brought Green Health into the mainstream.

Left: Cumulative greenhouse gas emissions in 2002, by country.

Right: Climate-related mortality (per 10<sup>6</sup> population) 2000.



source:  
Jonathan Patz, University of Wisconsin

## DRIVER 2: DISEASE BURDEN RESHAPES THE LINES OF INTERVENTION

Infectious diseases have been virtually wiped out in many Western countries, and life expectancies have increased correspondingly. As successful as medical science has been in eliminating these diseases, public health initiatives have also played a significant role in improving longevity. Environmental interventions, improvements to infrastructure, and sanitation efforts have been credited with contributing 25 years of the 30-year increase in the average American's life expectancy.<sup>18</sup> However, the very same systemic forces have slowly undermined these gains: infrastructure, the environment, and the food system. Controversial and provocative analyses of long-term health data suggest that quality-of-life improvements have flattened out and are even in danger of being reversed.<sup>19</sup>

Meanwhile, the shift from the prevalence of acute, infectious conditions to chronic ones continues. The disease burdens of the 21st century are likely to be the diseases of aging and costs of care for aging populations; lifestyle illnesses such as Type 2 diabetes and heart disease; mental disorders including depression, anxiety, and substance abuse; and macro-environmental disturbances of climate and conflict. All of these call for interventions that stretch and conflict with the current structures of care and medicine.

While many efforts to combat the increasing incidence of lifestyle diseases have focused on food availability and choices,<sup>20</sup> decreasing levels of physical activity for a large number of people, and the concomitant increase in driving, are other contributing factors.<sup>21</sup> In response, the car-centric design of cities has become the focus of a powerful movement for more “livable” cities, uniting the causes of sustainable urbanism with healthy urbanism. Most policy responses to these concerns are deeply local, spreading across city council meetings, urban planning departments, PTAs, and student groups.

Another looming threat that offers a stark counterpoint to biomedicine's triumph over infectious disease is the emergence of antibiotic-resistant strains of extant diseases such as tuberculosis as well as methicillin-resistant staphylococcus aureus (MRSA). One reason these diseases are proliferating is the misuse and overuse of antibiotics; trace amounts of antibiotics are also released into our water supplies, through agriculture, improper disposal, and human waste elimination. The latter problem expands beyond antibiotics to include the contamination of watersheds with pharmaceuticals of many varieties, threatening biodiversity, human health and development. New paradigms of pharmaceutical development and disposal will need to be developed in response.

The diseases of the 21st century, from diabetes to MRSA, will be closely affected by lifestyle choices and environmental considerations. Green Health will provide new ways of thinking about possible interventions for our future disease burdens. It will do so in the places where we spend the most time day-to-day: the home and workplace; the layout of cities; and the energy, climate, and emotional impacts of our buildings.



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### **DRIVER 3: RESOURCE CONSTRAINTS: THE COSTS OF CHRONIC CARE AND RESOURCES FOR HUMAN WELL-BEING**

Not only is the disease burden changing the ways we think about treating the diseases and conditions of the 21st century, but the long-term costs of chronic care are reaching astronomical levels. When rising costs collide with natural resource scarcity, the potential problems increase exponentially.

The Milken Institute's 2007 report on the economic burden of chronic illness examined seven medical conditions (diabetes, heart disease, hypertension, cancers, stroke, pulmonary conditions, and mental disorders) and found that the failure to address these chronic conditions costs the U.S. economy more than \$1 trillion annually.<sup>22</sup> Other research organizations have found that caring for patients with chronic conditions accounts for more than four-fifths of all health care expenditures, or more than \$1.4 trillion annually.<sup>23</sup> By 2023, a likely 42% increase in the number of cases of the seven identified chronic conditions will result in \$4.2 trillion in treatment cost and lost productivity combined. Few dispute that the current hospital-centered, third-party payer system is not designed to treat chronic illnesses cost-effectively.

WHO has issued guidelines for reducing the global epidemic of chronic disease that take into account current cost constraints. These guidelines are based on the notion that the promotion of healthy lifestyles and prevention of premature death and unnecessary disability due to chronic illness require only limited interaction with resources traditionally supplied by the formal health care delivery system.<sup>24</sup> The WHO supports a "health care triad": a partnership between patients and their families, health care teams, and supporters in the community.<sup>25</sup>

## DRIVER 4: SHIFTING THE RESPONSIBILITIES OF REGULATION

Although the environmental legislation of the early 1970s (see Chapter One) sent a powerful message of increasing environmental awareness, the efforts of legislators failed to result in clear, systemic federal regulations. Furthermore, regulatory agencies in the U.S. and elsewhere have failed to fully implement clear precautionary principles.<sup>26</sup> Consequently, a complex web of third-party certification has emerged, creating a kind of independent regulation and non-governmental policy structure. Non-governmental, nonprofit entities such as the U.S. Green Building Council and the Pharos Project promote environmental health through advancing and certifying green building materials and practice. In similar fashion, third-party corporate social responsibility (CSR) labeling has become increasingly common. Exemplified by imprints such as Equal Exchange and Fair Trade Certified, these labels serve to reassure consumers of a corporate commitment to expanding conceptions of sustainability and positive business practices.

While the environmental and CSR labeling and certification regimes have begun to blend, third-party certification programs have yet to add health claims to the mix to any great degree. Instead, it is now commonplace to see unverified health claims, labels, and seals about the “healthiness” of a variety of products and services. This is likely to change as concerns about environmental health continue to move into the domain of personal health values. Soon, consumers will demand third-party certification of health claims as well.

In the future, Green Health will emerge as yet another filter through which corporations will be evaluated. Corporations’ products, services, and business practices will be measured by the impacts experienced by their suppliers, employees, consumers, communities, and other stakeholders. Third-party efforts to account for and certify a wider range of claims—including those concerning wages, pricing, and work conditions—made by private corporations will grow significantly in the next decade, developing into what economist and author Michael Conroy has termed “corporate accountability with teeth.” Today, standards and metrics that measure Green Health are in their infancy, but looking forward, Dr. Conroy argues, “stakeholder-based standard setting [will be] at the heart of the certification revolution.” Standards and regulations that are developed collaboratively by a wide range of stakeholder and corporate representatives have been shown to be the most effective.<sup>27</sup> Consequently, unconventional partnerships between advocacy groups and companies are forming to create metrics and guiding principles to streamline the processes by which certifications are achieved.

Green Health’s standards will come from the crowded world of third-party certification and stakeholder alliances.





source:  
flickr.com/flahertyb

**In examples drawn from earlier Institute work on personal health ecologies, you can see how the convergence of health and green living is happening right now.**

#### **DEBBIE, INVERTED QUARANTINE FOR PERSONAL CARE**

Debbie is a baby boomer, wife, and mother of two grown sons. She used to work in Silicon Valley's semiconductor industry and developed chemical sensitivities. Like others with her syndrome, she calls herself a "canary in the coal mine." She now works as a historical interpreter—she prefers being in old buildings to those with synthetic materials. When she and her husband remodeled their house, she worked hard to find low-fume paints and aged wood. She sealed off living sections from the work areas with tarps. Debbie doesn't go to malls—too many fragrances. Hotels are problematic—too many chemical cleaning products. In dicey situations, she wears a portable air filter mask. She has put herself in quarantine. Debbie also uses naturopathy (herbal medicine) to mitigate what she considers the harmful effects of biomedical pharmaceuticals. She looks for natural products and foods and embraces traditional Chinese medicine to manage her health.

#### **VEEDA: CREATING A HEALTHY COMMUNITY AND ENVIRONMENT**

Veeda is ten years younger than Debbie, a knowledge worker, wife, and mother of two small daughters. She is basically healthy, except when work and travel overwhelm her. She has tried to reshape her day-to-day world to maximize her ability to eat right, be active, and experience the joys of life that underpin her healthy practices. She thought carefully about where to live—a place where she can walk, experience natural beauty, and be supported by family and friends who reinforce healthy practices. She thinks of ways she can still be productive, while minimizing her emotionally and ecologically trying commute. Veeda has her own garden; she exchanges fruits and veggies with friends. She buys organic, locally grown Community Supported Agricultural produce twice a month. For Veeda and her family, food is the Rosetta stone that translates their environment into their bodies.

Both Debbie and Veeda are sensitive to the impact of their immediate physical, emotional, and social environments on their overall health.

- **How are they thinking about "the environment?"**
- **What makes their practices green?**
- **What are the differences between them?**

The role of food in Veeda's story is not surprising—indeed it illustrates the convergence of food, health, and sustainability explored in IFTF's *Future of Foodscapes* research program as well as the *Future of Health and Wellness in Food Retailing* research.<sup>28</sup>



source:  
J.A. English-Lueck

## DRIVER 5: RETHINKING VALUES AND VALUATION

Cultural values concerning “health” and “green” are shifting. As the challenges of chronic disease and our current health care system continue to affect people’s everyday lives, increasingly strong value judgments are being placed on being healthy, and on all of the factors that lead to good health.

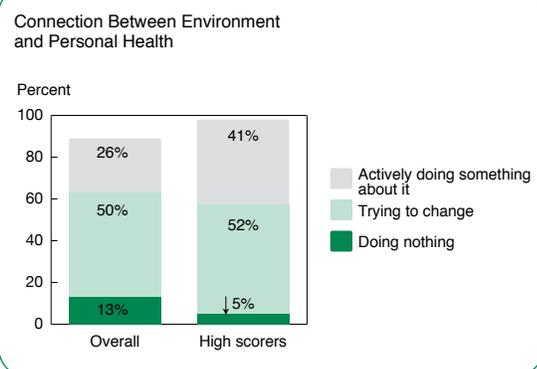
At the same time, green values are already influencing practices in a variety of domains: transportation and energy use; food and nutrition; personal health; and even in areas such as parenting, work, finances, and home care. The concept of sustainability is wide open to interpretation and different sets of practices. How green values get expressed in daily life will vary for different people. How these values get linked to health and shape health management will also vary by person. While some people choose to focus on consumption and relationships with retailers, others do not. What we do know is that a whole range of values based on the concept of Green Health is quickly spreading through the general public.

Some people care about the environment for the environment’s sake. But more people care about the environment as it affects their own health—and that of their children. In a recent IFTF survey, we found that the link between a person’s health and the health of their families and children is a powerful motivator in practicing sustainable behaviors (for a full report, see the Appendix). As more people make this connection between the environment and personal and family health, personal practices of sustainability will spread even more broadly into multiple domains and hold even more weight in people’s decisions, as shown in the two stories in the sidebar on the opposite page.

The economic value of healthy and green practices is also changing as organizations experiment to “try to change”—just like people. The growing popularity of Health Impact Assessment tools for designing and building health places is resulting in tying more and more policy decisions that are tied directly to health and well-being.<sup>29</sup> Cap-and-trade markets, biodiversity markets, and other developing credit systems seek to translate the value of nature into economic terms. And health credits, proffered by employers to healthy or improving employees to reduce or offset health insurance premiums, are incentivizing healthy behaviors in progressively more direct economic terms.

The five drivers discussed in this chapter shape the context in which individuals, communities, and organizations are creating the experiments that form the emergence of Green Health today. Green Health will be invigorated as these forces are pushed into the public consciousness. What are these experiments, and how will they evolve? What does the greater awareness of Green Health mean for the future? These are some of the questions we ask in the following chapter, as we look through each of the six key lenses of Green Health to see many future directions with powerful and diverse implications.

**Overall 89% of people surveyed saw a connection between their health and the environment, this graph shows the struggle to translate values into action. Even the “high scorers,” who have sustainability practices in place in 5 - 6 of the domains of daily life surveyed, are searching for strategies to green their health. This is a portrait of opportunity.**



source:  
IFTF Nutrition, Health and Sustainability survey, 2007. Sample size 1005.



## 3. FORECASTS: LENSES ON THE FUTURE OF GREEN HEALTH

**The *Genealogy of Green Health Map* shows that health and the environment have converged in the past, and that they are converging again today as the result of the drivers laid out in Chapter 2.**

They are converging in the form of what can only be called experiments—new practices at the scale of the individual, the organization, the community, and even society at large. And though Green Health values are widely shared, people, groups, and organizations are still searching for ways to weave them into everyday activities. In this chapter, we forecast what the convergence of forces represented by Green Health will look like over the next ten years.

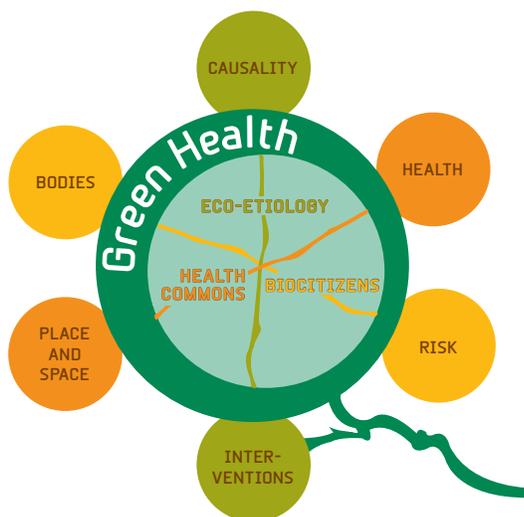
To provide a framework for these forecasts, we have identified six “lenses” that represent defining characteristics of Green Health’s defining effects. The lenses are:

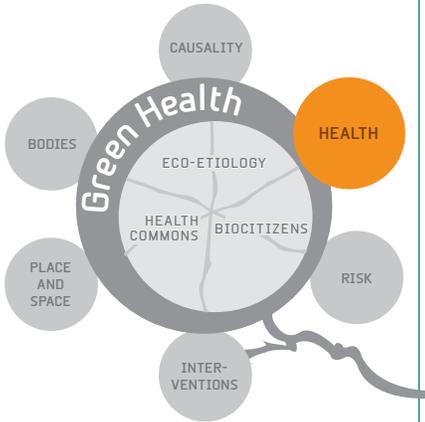
- Health
- Place and space
- Risk
- Bodies
- Causality
- Interventions

We use these lenses to analyze the key shifts discussed in Chapter 1 and to envision the future greening of health, well-being, and health care.

The lenses are interrelated—they build on each other and combine to create tipping points and reveal new patterns. We have used combinations of the lenses to develop “artifacts from the future,” which illustrate how some of our forecasts might play out in everyday life, and the dilemmas that may result. You’ll find these artifacts throughout the chapter.

You can use our forecasts individually to help you pinpoint what part of the changing landscape most deeply impacts your own individual and organizational practices. However, change in one area is not isolated from changes in other areas; the interplay of the lenses may create unexpected challenges and opportunities for you.





## FORECAST LENS 1: HEALTH

*Definition (from the WHO constitution): A state of complete mental, physical and social well-being and not merely the absence of disease or infirmity.<sup>30</sup>*

### Context:

Personal health will be tied to environmental well-being as people expand their personal values and practices regarding sustainability to many other domains in order to protect their bodies, their homes, their communities, and their planet. More people will try to live sustainably, and more organizations and communities will try to operate that way, but they won't all take the same path. We will see an increased emphasis on emotional and spiritual health. This will also mean that place will come to matter much more in an individual's health ecology. As a result, we will see a growing interest in and demand for information about places, particularly those that affect health for better or worse. People will develop novel practices for distinguishing what places and aspects of place affect their health. To do so, citizen-consumers will turn to sensors, monitors, context-aware technologies, and mapping technologies to locate the health resources in their lives and communicate their findings and insights to their neighbors, and to governments and corporations.

### Forecasts:

**Health and Sustainability Combine to Define a New Shopping Filter.** Health-driven green values will expand demand for innovative alternative products and diagnostics that mitigate risks in the household, the community, and the global environment. These new demands will dramatically affect the retail industry as citizen-consumers put their green values to practice and filter out products that do not address both their environmental and health concerns. They will make purchasing decisions based on not only how the product itself affects health and the environment, but how its production and distribution does so as well. Expect to see even more demand for new kinds of product categories and metrics that show how well products align with consumers' increasingly green values and needs.

**Green Health Values Get Expressed in Local Movements and Actions.** Green Health will move from the home outward, into the community and the global environment at large. The local environment will be the critical locus of Green Health activism. We see a dramatic rise in backyard "victory gardens" and community gardening as food prices rise and fresh, local food is emphasized as a health, community, and food access intervention.<sup>31</sup> Community health data mapping projects are proliferating, tracking environmental risks as well as health and wellness resources. Some are based on specialized software and organized by local public health departments and nonprofits, while others are based on Google Earth and are open to citizen contributions.<sup>32</sup> Taking care of local environments will become a form of collective health management.

This artifact from the future highlights how health and sustainability shopping filters could converge through interactive product packaging.



source: IFTF 2007

## FORECAST LENS 2: PLACE AND SPACE

*Definition: The contexts and settings of where we live, work, and play.*

### Context:

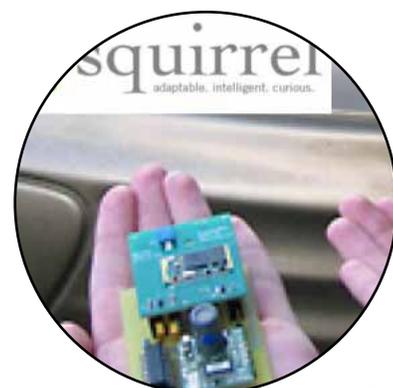
As the ability to map health data at different scales becomes more sophisticated and reveals new patterns of place-based risk and disease, the geography of health will take on greater importance. Place matters to health in multiple dimensions, giving rise to more experimentation and new ways of understanding the interactions between space and health. Where we live, work, and play will generate a context for the risks that people experience, the interventions they take, and what good health can mean. The greening of public spaces and workplaces will create demands on other areas in which we live our lives, focusing attention on the link between personal health and the environment unlike ever before. Practices designed for one setting will migrate to other settings, and in time, we'll see a diffusion of place-based Green Health practices.

### Forecasts:

**New Tools Emerge to Assess Risk in Place.** A whole ecology of devices, sensors, and social platforms is emerging, and will be leveraged to collect, annotate, and reveal new patterns of risk in place. For example, Whoissick.com is a website that invites everyday people to enter information about their minor health symptoms (e.g., sore throat, vomiting) and then layers this and similar data from others over a map of their locality. This website signals an important change, whereby our collective information will reveal new patterns of risk and disease in the environment. At the same time, a recent study, "Life and Death from Unnatural Causes," which demonstrates that place matters to your health through detailed mapping of one county.<sup>33</sup> The authors conclude that access to proven health protective resources such as clean air, healthy food, and recreational space, as well as opportunities for high quality education, living wage employment, and decent housing, is highly dependent on the neighborhood in which one lives. These inequities cluster and accumulate over people's lives and over time successfully conspire to diminish the ultimate quality and length of life in these neighborhoods. The visibility of these fault lines of access will drive new forms of citizen participation in public health, and it will encourage the acknowledgement of shared health risk and the need for collective action.

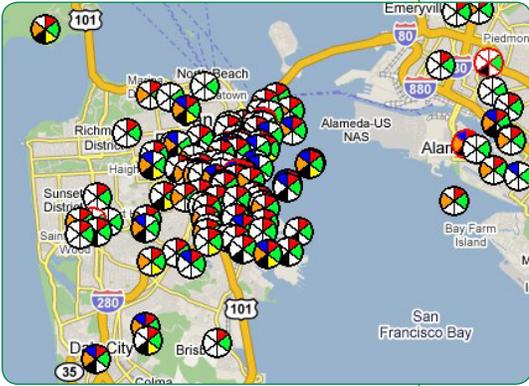


**San Diego engineer-turned-artist Shannon Spanhake invented a personal pollution sensor called Squirrel, which samples air pollutants and sends data to a cell phone, which in turn transmits data to a centralized database. This is one of a growing number of projects to democratize environmental monitoring with mobile phones and pollution sensors.**



source:  
[ucsdnews.ucsd.edu/  
thisweek/2007/04/23\\_squirrel.asp](http://ucsdnews.ucsd.edu/thisweek/2007/04/23_squirrel.asp)

This map shows reports of coughing in San Francisco.



source:  
WholsSick.com

**Health and Sustainability Are Mapped Together.** The relationship between geography and health has been recognized for some time. Over the next decade, it will reveal not only new patterns of risk, disease, and susceptibility, but also hotspots of well-being and sound practices. We see this in sweeping projects such as *The Blue Zones* book and community, which looks at longevity through geography and cultural traditions,<sup>34</sup> and the Green Map System, which seeks to share knowledge about healthy and sustainable community practices through initiative and resource mapping.<sup>35</sup> With the rise of social media that are inherently participatory, scalable, and networked, expect to see experimentation and engagement in public health by everyday people. These efforts will make invisible risks visible and will allow everyday people to share strategies for health promotion across geographies by locating and profiling what works in specific places. Profiles of healthy and unhealthy geography will be useful in assessing whether or not our neighborhoods, regions, and even states provide the conditions that produce good health. This trend will affect the housing and real estate markets especially, as well as other place-based sectors including tourism and recreation, public education, and city planning.

This map links to local maps of resources for green living and healthy communities around the world.



source:  
GreenMap.org

**Land-Use Policy Becomes a Tool for Public Health.** Local Green Health efforts will converge with politics and drive demand for:

- new policies and ordinances such as risk-free zones
- moratoriums on certain kinds of development (even beyond those relating to obvious threats such as hazardous materials)
- regulations for businesses that contribute to the local disease burden.

Consider, for example, the moratorium on fast food developments recently passed in Los Angeles; similar legislation is being considered in other cities in California and other states.<sup>36</sup> While land-use policies may have previously been concerned with preserving open spaces and commons such as watersheds, the land-use policies of the future will look at human habitats and apply the same environmental concerns and interventions.

## ARTIFACT 1: HEALTH COMMONS EMERGE AROUND PLACE

As multi-causal explanations of disease become better known, the place-based, shared determinants of good and ill health will be an intense locus of investigation. Web applications, for example this map of an office space, help to locate and express all the data associated with ecological impacts on health. This makes contextual and community-level variables easier to measure, report, and share. Aggregating experiences and observations of a given place will help support explanations of disease and well-being within a specific population, rather than only having each individual cope with experiences separately.



### What:

Sciatica and repetitive strain injury are contentious conditions of chronic back pain, often associated with overuse of certain body motions. Rather than conceptualizing each person's back pain as an isolated, private problem, analysis of this hypothetical office building of the future identified the comfort and safety of all its inhabitants as a problem of the commons. The people who work here use this web-based mapping application to track the factors they feel are important based on their research, floor by floor, desk by desk. This has made connections between their symptoms and a variety of measurable factors in their physical environment visible by tracking, measuring, and sharing their symptoms and surroundings. Together, they are collectively drawing correlations between their experiences and their office building and furniture, which in turn requires their human resources and facilities departments to manage their building as a health commons.

### So What:

Health commons can be defined and administered at many levels, from global health to micro-communities (for instance, this office building). While most of our examples of health commons come from community health, civic partnerships, and intellectual property, this artifact presents a more intimate view. Health mapping, as a tool of Green Health, allows collectives to find each other through shared values and experiences. Once these collectives of diverse stakeholders find each other, they can create commons to govern the resources that affect their current and future health, to advocate for new lifestyles and share strategies and best-practices.



## FORECAST LENS 3: RISK

*Definition: Perceived or experienced dangers or susceptibilities.*

### Context:

Different forms of risk continue to emerge, while old risks take on new significance. Large, distant concerns—such as the impact of climate change—are becoming more visible, immediate, and threatening to more and more people. At the same time, minute environmental dangers and their effects on human bodies and health are understood with increasing specificity and certainty. There is a need to understand the interrelationship between forms of risk and risk management, including the financial risks of the disease burden in our communities and families as well as the safety, sustainability, and resilience of food supplies. This connection between health and the environment is most evident at the point of purchase, as once-distant risks threaten to enter our homes, our refrigerators, and our very bodies. Now, more than ever, purchasing food has taken on new meaning as we carefully make choices that not only minimize our impact on the environment but also minimize the impact of the environment on us.

### Forecasts

**Toxic Body Burdens Bring New Scrutiny to Everyday Items.** The risks associated with everyday products are becoming a common concern, undermining our sense of trust in everything from laundry detergent to cosmetics to food. Books and studies such as *Exposed: The Toxic Chemistry of Everyday Products and What's at Stake for American Power*,<sup>37</sup> by Mark Schapiro, and the Commonwealth Biomonitoring Resource Center's *Taking It All In: Documenting Chemical Pollution in Californians Through Biomonitoring*,<sup>38</sup> heighten this sense of risk, making it specific and personal. These exposés both drive demand for more powerful regulatory frameworks and fuel the development of cleaner, greener products and reformulations.

What captures the popular imagination most are tainted foods: spinach, jalapeños, tomatoes, melamine in milk products and pet foods, green beans, beef. Emotionally-charged forums of national and international media shed light on how sources of contamination—from the water surrounding growing fields to ingredient middlemen—represent risks in the food system that affect individuals' bodies. These episodes are frequent enough for consumers in the United States to shoulder a burden of empowerment long felt by consumers in China and elsewhere<sup>39</sup> to be on the lookout for contaminated and risky products that end up close to—or inside—them. This is shifting however back into broader movements of policy and collective action. Michael Pollan's widely circulated open letter to the "Farmer in Chief" attacks industrial monoculture farming as the source of food risks.<sup>40</sup> President Obama's considered response indicates a shifting of the tide away from the sheer production drive of our food system and toward ecological resilience and human health.<sup>41</sup>

**Cradle-to-Cradle and Product Stewardship Becomes the New “Polluter Pays.”**

What we do with our “waste” products—from commonplace items for which we no longer have a use to more obviously toxic materials—often creates major risks to our health. For example, getting rid of old carpeting poses significant environmental risks because of the large volumes of it that end up in landfill where the chemicals in it cause contamination problems. William McDonough’s concept of “cradle to cradle,” first applied in architecture to holistically re-thinking the health impacts of reusing building materials,<sup>42</sup> is now being adapted to thinking about personal care products. The Teleosis Institute for Green Health’s pharmaceutical take-back program hints at and argues for a larger trend of extending the logic of systemic responsibility into medical and pharmaceutical practice, protecting waterways and humans at large without sacrificing clinical cleanliness. Just as “polluter pays” became entrenched in environmental law’s calculus of risks and responsibilities in 1971 via the Organization for Economic Co-operation and Development, we could see product stewardship become the new common sense around everyday items including drugs and medical supplies.

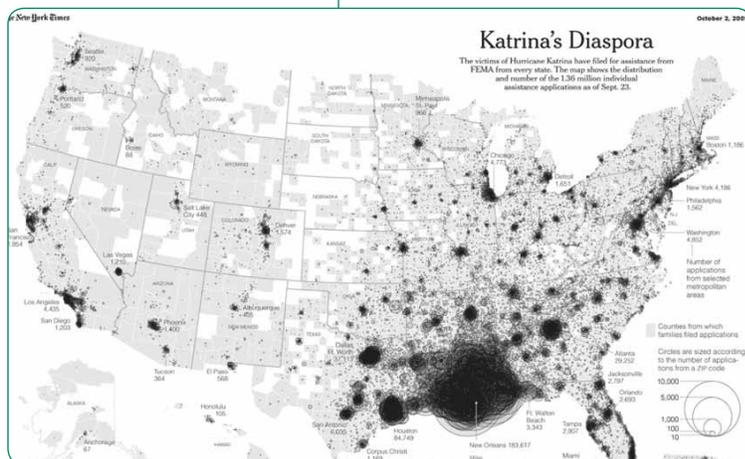
**Catastrophic Risks Become Visible, Visceral Realities.** Migration prompted by natural disasters gives us visceral images and mind-bending maps of the medium- to worst-case scenarios that may result from climate change—and the devastating impact such displacement has on human well-being. While the number of hurricanes worldwide has been steady since 1970, the percentage of Category 4 or 5 hurricanes has nearly doubled; this is one of many signals pointing toward increased volatility and risks to coastal areas.<sup>43</sup> As the largest disaster relief and resettlement effort in U.S. history, Hurricane Katrina threw into sharp relief the implications for displaced populations, as well as the socially instigated nature of the risks involved. Katrina and its lingering aftermath bridged the gap between our ability to relate to large, distant risks and our experience of intimate, personal risks and realities. It allowed us to connect satellite images of, for example, the washed-out delta in Burma in the spring of 2007 to flooded city streets and disaster diasporas, as pictured in the *New York Times* map. The tangled involvement of government agencies, international relief organizations, and private insurers highlights how institutions’ responsibilities for human health in the face of these risks are shifting. This shifting landscape also reveals long-term impacts on all of us, bringing these issues close to home as disaster mitigation strategies (property insurance, for one) become more uncertain.

**G Diapers apply Cradle to Cradle principles to return component materials to the ecosystem in a neutral or beneficial way, circumventing the choice of disposable or cloth that has forced parents to chose between varying environmental impacts, convenience and their child’s comfort for decades. We can expect to see more personal care, health and beauty products moving in this direction.**



source: IFTF

**The New York Times published this map of Hurricane Katrina’s diaspora shortly after the storm. It illustrates the wide spread of Katrina’s victims across the United States.**



source: New York Times



**Fresh, green, local and organic food is emerging as a way for employers to connect sustainability practices to their worker's energy, productivity, happiness and loyalty.**



source:  
flickr.com/wasabicube

## FORECAST LENS 4: BODY

*Definition: The interconnected physical, emotional and spiritual self.*

### Context:

People must be held at the center of any health question. Our surroundings affect our physical, emotional, and spiritual selves, and connect us to a sense of planetary and collective well-being. This expanded notion of self will shape our identities and our affinities with others, as well as our responses to both individual and collective risks. Research and interventions around asthma and cardiovascular disease, for example, already reflect this connection between our bodies and the environment; they locate risk in the places we live and the pollution we breathe. The ramifications of these expanded understandings will drive us to protect ourselves and become civically engaged.

### Forecasts:

**Children's Health Makes Schools a Key Site of Change.** In the United States, eco-literacy—the ability to understand the ways in which our personal and collective choices are dependent on and affect the ecological systems around us—shows up perhaps most widely in children's educations. For example, the movement that Alice Waters started with her Edible Schoolyard program in Berkeley, California, has spread widely to schools throughout the country, from Wisconsin to West Virginia. Also, drawing on data that shows the overlap between determinants of educational success and those of good health, the question of what foods our children have access to in their schools has become a matter of serious debate. Expect teachers, parents, and public health advocates to escalate the level of citizen involvement around the 2012 Farm Bill, with children themselves making demands for a food system more conducive to their future health. Longer term, we will see a generational shift when these children, who are increasingly educated in the connections between the food system and their own health, come of age.

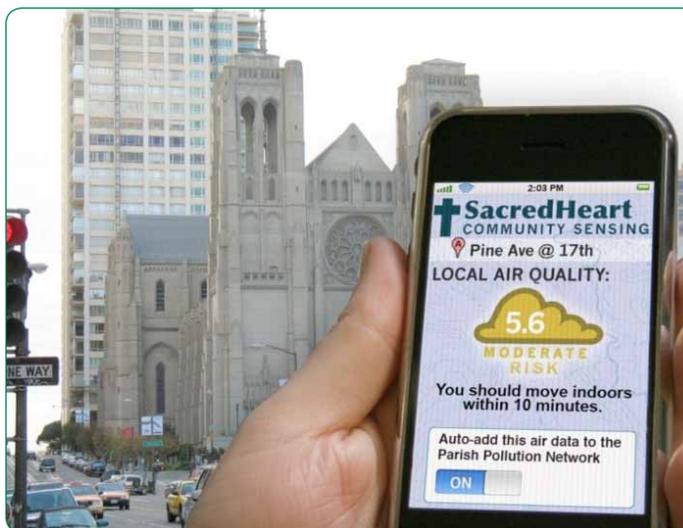
**Productivity Drives Eco-Health in Workers' Health and Energy.** New corporate policies and the everyday practices of workers reflect a growing awareness in the workplace of the convergence of immediate environments, environmental sustainability, and human health. Wal-Mart's Personal Sustainability Project (PSP), which encourages health and wellness as well as sustainability efforts among its vast workforce, makes this connection in a more explicit way than most. PSP resulted from an internal survey that was designed to elicit ideas about accessible sustainability strategies but ended up focusing on the synergy between personal health and the environment; half the responses mentioned personal health goals, such as losing weight and quitting smoking.<sup>44</sup> Similarly, the success of companies such as Bon Appétit Management, a green catering company with clients including Google and many university systems, stems from connecting sustainable practices—in this case, organically and sustainably-sourced food—to increases in workers' and students' energy, productivity, and loyalty. The motivations of both corporations and workers to increase energy and well-being in the name of productivity will be a prominent expression of Green Health in the coming decade.

## ARTIFACT 2: BIOCITIZENS

Biocitizens are people who have formed social affinity groups based on biological data or status (such as manic depression or HIV). They embody aggregated risks and have the potential to drive change by highlighting gaps and demanding responses from the institutions they expect to protect them.

### What?

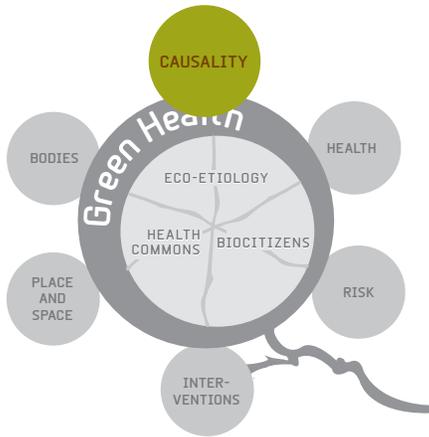
A church-based, grassroots, pollution-sensing network uses mobile devices equipped with air quality sensors that are quickly becoming smaller and cheaper, and that enable continuous monitoring. Each person—clergy, staff, parishioners, and volunteers—is a node collecting data about local air quality. Their data is mapped and shared at the parish level and translated by a secure server into simple displays and instructions about how the air quality affects their health, and what they should do at that moment. This system also contributes their data to a larger map of air quality in the city, used by secular organizations as well. By making transparent the environmental risks in their immediate surroundings this community is primed to take action for themselves and their neighborhoods and cities.



### So what?

This pollution-sensing network is presumed to be an alternative source of pollution data: alternative to data from government testing projects. These sensors are rapidly becoming less expensive; they will soon be so cheap that anyone can deploy them. The capacities for networking sensors and aggregating and analyzing their data are also developing rapidly. The Personal Environment Impact Report (PEIR) project in Los Angeles is a real-world example of this concept, and in addition to mobile and online applications, the Center for Embedded Network Sensing is also building the architecture for this participatory sensing paradigm. As access to the ability to set up these networks expands, creating trust in them will be an important challenge.

This artifact builds on the broad acknowledgements by many denominations, from Catholics to Christian evangelicals to Episcopalians, of the links between environmental health, personal health, and global stewardship. Here a church turns to networked sensing technologies to quantify the impact of the environment on its parishioners' health, and provide a tangible service that brings their congregation together. Church networks also scale, from the parish to the (inter)national organization; this sensor network can similarly grow in scope and participation.



The Ixodes tick is the vector of Lyme disease. Ecological disruptions are amplifying the extent of the disease in the northern hemisphere.



source:  
flickr.com/dnnya/

## FORECAST LENS 5: CAUSALITY

*Definition: Explanations of illness, infirmity, health, and well-being.*

### Context:

Explanations for illness and well-being have gone from the macrocosmic—humors—to the microcosmic—pathogens—and are moving back to include the macrocosmic in the form of the environment and its ecosystems. More people will view health and risks to well-being in the context of the environment itself, whether that is the natural environment and climate change or the built environment and its endemic lifestyles. The current focus on the health impacts of climate change and disease burden is heightening public awareness of science and health research for multi-causal and ecological explanations of disease. Expanding awareness of how health is related to the environment will reveal more complex and ecological conceptions of how diseases are caused—and how they can be treated. Increasingly, we will recognize that greatest risks to our health are not explained by simple cause and effect, but can better be understood as a range of complex interactions

### Forecasts:

#### **Ecological Causality Will Become More Central to Understandings of Health.**

Green Health is expanding the notion of causality to include ecological causality. When considering the cause of any ailment, the paradigm of ecological causality broadens the scope of inquiry, describing the larger structures and systems of behavior and environment. For example, the complex relationship between obesity and diabetes has been the subject of a long-unfolding and now prosaic theoretical debate in epidemiology, dating back to the 1960s and 70s.<sup>45</sup> Today, public debates around obesity and diabetes have mainstreamed the conversation about causes encompassing environments, behavior, and biological disposition.

At the outer edges of this paradigm, we enter into the holism that characterizes many alternative health practices. The ecologies in question range from the literal to the metaphorical. The spread of Lyme disease in North America and worldwide highlights the role of humans in complex ecological systems and the spread of vector-borne illnesses. The disease is spreading geographically due to climatic shifts attributed to global warming; its rate of incidence is increasing due to shifting predator-prey relationships and decreasing biodiversity. Development patterns and lifestyles are bringing more people into contact with ticks and their mammalian hosts. These factors have thrown humans into a riskier position vis-à-vis the Ixodes tick, which transmits the bacterium that causes the disease.<sup>46</sup> On this level, we can expect to see more incidences and greater complexity of vector-borne diseases and complications from them.

**A New Miasma Theory Will Emerge, Leading to Self-Quarantining.** Miasma theory was a form of eco-etiology prevalent throughout the Middle Ages. Today, scientific understandings of the causal relationships between environmental factors and disease continue to become more expansive and nuanced, but the public is inundated with confusing details. To help deal with this information overload, many people resort to vague notions of environmental causality that are akin to Miasma theory. For example, they routinely associate the strength of their immune system and common ailments to environmental factors such as furniture, air quality, and the patterns of their everyday movement in relation to pollutants.<sup>47</sup> Especially among people who suffer from autoimmune and chronic pain disorders (rheumatoid arthritis, for example), where the evidence of connections between the immune system and the environment are still being explored in mainstream medical research, metaphorical ecologies and folk explanations will proliferate. In other words, expect to see more environmental causal explanations, supported by scientific evidence or not.



## FORECAST LENS 6: INTERVENTIONS

*Definition: The practices and policies for effecting changes in health.*

### Context:

Therapeutic and preventive health interventions aren't focused only on our bodies, but also on the environments in which we live. Ecological health acknowledges that people with diabetes live in a larger ecosystem of information, health, and food systems. Interventions will reflect ecological causality and be expressed in policies and practices, scaling from local to global. We see cities—Denver, CO, Los Angeles, and San Jose, CA, among others—issuing “Green Prints” that combine public health and environmental goals with urban planning processes. Health interventions that focus only on changing individual behavior without making changes in the environment will seem inadequate. For example, together, behavior modification and improvements in food webs will be important for preventing the anticipated global disease burden of obesity and diabetes in the next decade and beyond.

### Forecasts:

**Ecological Health Will Drive the Proliferation of Gardens for Food, Community, and Therapy.** Research from the field of environmental psychology supports the work of the therapeutic and community garden movements, which use natural spaces for everything from curbing Attention Deficit Disorder to improving in-patient recovery time. In urban spaces, green roofs and new design structures that are co-designed or re-purposed as mental health interventions will create unique convergences in the greening of health. Projects such as San Francisco's Quesada Gardens Initiative show how collective gardening can provide a focal point for creating resilient communities when the traction comes from the grassroots. Across the country, other entities may follow the lead of alliance-building organizations like Urban Farming, which works with county public health departments, cities, and religious organizations to provide gardening supplies and know-how as health interventions into food access, violence prevention, and community solidarity.<sup>48</sup>

**Rebranding Alternative and Preventive Medicine as Green.** As Green Health grows within the constraints of financial and natural resource scarcity, alternative and preventive medical practices will be re-branded as “green” conservers of health resources. Already, many of the graduates of the Teleosis Institute's Leadership in Green Health online course are alternative and complimentary medicine providers. Research shows that eschewing pharmaceutical medicine and focusing on health and well-being are key aspects of alternative medicine that activate people in their engagement with their own health and the environment.<sup>49</sup> While environmental groups seek to make their goals concrete through connections with personal health, preventive health groups such as the Prevention Institute seek to channel the political will generated by climate change to re-energize and re-brand their interventions. Social inequity and environmentally linked chronic health risks are central to this politically charged thread of Green Health.

### **Successful Interventions Will Build on Synergies Between Health and Sustainability.**

The Green Light, a concept design by Natalie Jeremijenko's Environmental Health Clinic, illustrates in microcosm the kind of overlapping purposes that will make the most successful interventions in Green Health. Powered by a lightweight solar awning, the hydroponic light features plants that neutralize toxins and refresh air ventilation in buildings. In theory, this kind of product will cut down on the high energy costs involved in the air circulation requirements of buildings, while tapping into the mood-enhancing benefits of greenery. On a far grander scale, Tom Cooper's High Performance Building Committee at Kaiser Permanente applies the same logic of bundling positive environmental and health attributes with design and construction demands, using rigorous quantitative cross testing and cost analysis. The Committee's efforts feed into Kaiser's Global Health and Safety Initiative, which distributes these and similar conclusions across the health sector.

**Therapeutic garden at St. Rose Hospital,  
Henderson NV, USA**



source:  
[flickr.com/carlberger](https://www.flickr.com/photos/carlberger/)

### ARTIFACT 3: ECO-ETIOLOGY

Eco-Etiology is one name for the emerging paradigm of looking for the causes of illness in actual and metaphorical ecologies that surround us. It drives us to consider a larger range of causal factors, and to think more broadly about the options for making health interventions.

#### What?

This advertisement shows a car company making a clear, if somewhat ironic, value proposition in a Green Health product line. Focusing on the air pollutants inside cars, particularly for commuters stuck in traffic. Hypothetical car company Tonda offers a filtration technology that senses inside and outside air pollution levels and actively optimizes filtration. This “healthyAir” technology is installed in all their 2010 cars—rebranding Tonda as a personal and family health company.



#### So What?

Interventions based on eco-etiology move from municipal, state, and national concerns down to the individual and family level. The objects and devices in our immediate environment translate between broader atmospheric conditions and our bodily health. Here that translation is active—once there is a measurable recognition of environmental risk, a proactive mobile intervention emerges in one of the places we spend our time: the car. The logo of healthy breathing lungs over a car makes this metaphor explicit.

Yet this vision of the future is fraught with dilemmas. By narrowly interpreting environmental health to mean the immediate environment, this product sidesteps larger issues concerning the role of car emissions in climate change. Like Debbie (see page 20) it focuses on self-quarantine from environmental health impacts rather than building community and planetary environmental health. It also ignores the personal health impacts of driving as a transportation form supporting sedentary lifestyles.

## 4. IMPLICATIONS FOR STAKEHOLDERS

**Given the drivers we identified in Chapter 2 and our forecasts in Chapter 3, we think that concerns for health and sustainability will drive the greening of health in the next decade.**

This convergence—Green Health—will take a myriad of forms across many sectors. But what does this mean in practical terms for key stakeholders? Green Health will create opportunities and threats for:

- people on the ground (citizens, consumers, workers, and grassroots organizations)
- global health economy companies, including traditional health industry players (hospitals; payers and providers; independent medical practices; and bio-pharmaceutical companies)
- more recent health-economy entrants (food and consumer goods companies; medical and environmental technology; retailers; and entrepreneurs and small businesses).

Many functions within businesses of all kinds will also face disruptions and potential for innovation. Operations and facilities will need to think about the synergistic effects of safety and green design in the workplace. Human resources will have to assess the impact of environments on their workers, and their workers' environmental values. Research and development will use holistic design to define new market categories. Marketing and communications will have to learn how to tap into self-organized "green health" communities to figure out what people want and how to give it to them. Organizations will discover and express their core competencies as people seek novel ways for living their versions of Green Health. As the experiments in the greening of health proliferate, successful experiments will continue to emerge and differentiate themselves. Many of the opportunities will lie in being ready to discern successful strategies when they emerge.

The range of implications for stakeholders in the global health economy will be wide and deep. We trace below six broad implications of Green Health:

1. **Eco-health Literacy Focuses External Brand Images and Internal Competencies**
2. **Ecological Health Drives Rethinking and Creation of Research, Products, and Services**
3. **The Greening of Health Fosters Employee Safety, Well-being, and Loyalty**
4. **Green Health Opens Possibilities for New Alliances and Collaborations**
5. **The Greening of Health Will Shape Participation in Local and Regional Health Commons**
6. **Risk Mapping Will Drive New Forms of Citizen Engagement**

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To put these implications into context, we return to the six lenses we used to frame the forecasts: health, causality, place and space, risk, bodies, and interventions. We overlay these onto key areas of stakeholder organizations to bring into focus specific opportunities and disruptions.

## 1. ECO-HEALTH LITERACY FOCUSES EXTERNAL BRAND IMAGES AND INTERNAL COMPETENCIES

**Key Questions:** What strengths do you already possess that could be highlighted through eco-health literacy? How can you synergize value propositions of health and sustainability rather than fragmenting them? How could eco-health values help consolidate and expand your presence in your local markets?

The health care system defines health literacy too narrowly—as the capacity to navigate the health care delivery system.<sup>50</sup> Eco-health literacy is a broader concept: the ability to understand the ecological systems that support life—all life—on a broad scale.<sup>51</sup> With a heightened emphasis on place and space, consumers will seek solutions for managing and maintaining the health of the environments in which they live, including their homes, workplaces, communities, and larger geographical regions. This offers players across the global health economy an opportunity to look to their core competencies and enhance those that shine in the light of eco-health literacy. For example, retailers, consumer product goods and food companies might examine their product lines and brands. Health provider systems might examine their facility management and services. And operations and communications aspects of many kinds of organizations will have to work closely to align value-adding efforts and corresponding messages.

The danger lies in consumers making trade-offs between price, effectiveness, health, and sustainability in ways that diminish the value of existing products in the marketplace. As consumers become savvier about Green Health, companies will have to find ways of creating real value, not just perceived value. Especially in times of economic turmoil and uncertainty, the bundling of real value that enhances health and well-being in the long run will be key in maintaining stakes in fragmenting markets.<sup>52</sup>



The Home Depot EcoOptions line, particularly the Healthy Home segment, adds value to their core audience of do-it-yourselfers by offering products with better environmental and personal health impacts. Introduced in Canada in 2004 and the United States in 2007, the line is also an example of new players entering the global health economy through the convergence of health and sustainability.

source:  
The Home Depot

## 2. ECOLOGICAL HEALTH DRIVES RETHINKING AND CREATION OF RESEARCH, PRODUCTS, AND SERVICES

**Key Questions:** How will ecological health open possibilities to improve your product offerings and formulations? How will new ecological health research challenge your offerings or operations? Are you prepared to shoulder the new responsibilities of product stewardship?

Ecological thinking will define new directions in health research. Already we see public health efforts to uncover the risks found in place, and to link poor health to living arrangements, entrenched poverty, failing public infrastructure, and the “unhealthy” ecosystem surrounding large populations. Stakeholders across the global health economy will need to learn to think ecologically to find opportunities to identify potential partners; cooperation will be key if health care’s pressing problems are to be successfully addressed. Researchers and medical practitioners will increasingly look at upstream factors for correlations and causation. Medical practitioners will also have to consider a broader palette of health interventions beyond pharmaceutical drugs and may even consider more upstream factors for primary and secondary prevention.

Research and development efforts at food and consumer product goods companies will be challenged by competing demands for new products and reformulations that take into account personal health, environmental health, and concerns about the sourcing of materials. However, cost-effective reformulations, rather than competing for customers, can expand markets, as did Clorox’s Green Works line for healthy, natural cleansers.

While fields such as green chemistry and sustainable agriculture promise exciting opportunities for new product development, the life-cycles of products—old and new—remain a concern in Green Health. Personal care and medical products, among others, will face increasing scrutiny of the ecological health impacts of their origins and disposal. One response will be to have products re-conceptualized as services. Significant opportunities will arise in the area of “product stewardship,” which involves offering responsible disposal and recycling services, with particular relevance to medical device and pharmaceutical companies.<sup>53</sup>



The Teleosis Institute of Green Health in Berkeley, CA, has initiated a pharmaceutical take-back program hosted at pharmacies, hospitals, and drug stores across the United States. While pharmaceutical take-back programs are orchestrated by industry in Belgium, France, Luxembourg, Portugal, and Spain, in other countries this critical responsibility is sorely fragmented.<sup>54</sup> As cradle-to-cradle becomes the new common sense for action in the 21st Century, companies’ responsibilities toward their products will shift.



BODIES

PLACE  
AND  
SPACE

### 3. THE GREENING OF HEALTH FOSTERS EMPLOYEE SAFETY, WELL-BEING, AND LOYALTY

**Key Questions:** What kinds of Green Health initiatives would your employees use and appreciate? How can you green your facilities to leverage safety, efficiency, and well-being?

Initiatives aimed at corporate and manufacturing facilities and employees are a vital testing ground and site of action for organizations finding their footing in the greening of health. The burgeoning field of green building, renovating, and re-purposing facilities—once focused overwhelmingly on resource efficiency and containing cost margins—is now synergizing with safety and personal health impacts. For instance, Kaiser’s effort to procure non-vinyl-backed carpeting yielded an innovative new product that met cost concerns while delivering numerous benefits. In addition to not risking the health of workers and those living near vinyl production facilities, the new backing is made of recycled materials and is anti-microbial; it also has more give underfoot, reducing knee injuries and workers compensation claims.

Strategies to promote active, environmentally low-impact living among employees are also forming vibrant expressions of Green Health. While persuasive and informational messaging is one approach, more concrete promotions of active living and green working and transportation habits are also proliferating. These strategies apply to any employer, from the largest to the smallest. Wal-Mart’s Personal Sustainability Program is perhaps the most extensive example, providing the infrastructure for social support and bottom-up influence of objectives. Small companies such as ClifBar provide bicycle subsidies, time and facilities for exercise, and support environmental and community service. While employers experiment with ways to keep their workers safe, healthy, and productive, insurance companies will look for ways to connect ecological thinking with opportunities to leverage and promote self-care practices.



Lockheed Martin’s Yellow Bicycle Program, started in 2006, provides bicycles to promote the option of biking instead of driving around the corporate campus. In addition to the very important benefit of cost savings from reducing the need for internal shuttles and commute support, the bicycles’ contribution to health benefits and environmental action is a huge morale boost among employees. Other companies have initiated bicycle programs, including Humana’s successful pilot in Louisville, KY, leading to plans to expand the program across the company’s other offices.<sup>55</sup>

source:  
flickr.com/sizumaru

#### 4. GREEN HEALTH OPENS POSSIBILITIES FOR NEW ALLIANCES AND COLLABORATIONS

**Key Questions:** What kinds of knowledge and best practices would you be willing to share with other players in your sector to become a leader in Green Health? Who is already collaboratively building what the greening of health means in your industry and business type, and how could you compliment each others' efforts?

In a fast-changing world of experiments and initiatives for Green Health and health care, finding the right actions in isolation is a challenging proposition for any organization. Alliances and cooperative knowledge commons are forming to define and promote best-practices in Green Health that offer shared benefit without undermining actions that could yield competitive advantages. Healthcare Without Harm, founded in 1998 and now including 473 organizations in more than 50 countries, was one of the earliest examples of collaboration to improve health and environmental impacts in the health care industry. It has since been joined by Practice Greenhealth and the Global Health and Safety Initiative.

The reworking of values around natural capital and human well being are uniquely tied to the emergence of new organizational models of social entrepreneurship. Do-good small businesses, profitable nonprofits, and superstructures of information and resource sharing around environmental and health causes are proliferating and gaining toe-holds at the margins of mainstream institutions. These lead innovators and shared repositories are critical for translating the insights and implications presented in this report into actions specific to your industry, sector, location, and organizational function.



The Global Health and Safety Initiative—spearheaded by Kaiser Permanente and joined by Ascension Health and dozens of other health providers, payers and nonprofit groups—aims to “support evidence-based improvements at the intersection of patient safety, worker safety and environmental sustainability.”<sup>56</sup> Its research spans facilities design and remodeling, supply purchasing, operations, and public policy.



source:  
Global Health and Safety Initiative

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## 5. THE GREENING OF HEALTH WILL SHAPE PARTICIPATION IN LOCAL AND REGIONAL HEALTH COMMONS

**Key Questions:** What Green Health commons are forming or may form in the areas where you operate? Where could your organizational competencies and aspirations benefit from participating in such commons efforts? Could such Green Health commons prove a challenge in markets where you operate? How can you build value on top of these health commons, supporting them and profiting from them at the same time?

Navigating the health risks tied to place and the range of potential interventions will be no easy task. As people begin to see themselves living within larger systems, they will move beyond individual choices and influences and be compelled to organize and demand policy changes at the systems level. We already see signs of this—obesity among young people is no longer only framed around individual behavior, choices, and responsibility but now includes an emphasis on the larger food system surrounding youth. In Los Angeles, for example, this kind of understanding drove the passage of city ordinances calling for a moratorium on fast food development within the city. In San Francisco, local retail pharmacies are being banned from selling cigarettes and alcohol.

Companies in the global health economy will face new challenges as consumers begin to focus particular scrutiny on the food supply chain and the health care delivery system, as well as other complex areas that affect their own health and that of their environment. Some companies will respond proactively not only with transparency but also by making changes in supply, logistics, and communications. Examples can already be found in the retail food industry, in which companies such as Whole Foods are driving sustainability practices throughout the supply chain by creating preferred provider networks with similar values and commitment to stewardship for the environment. Consumer-citizens will no longer give companies a free ride for the societal costs of their business models. To protect themselves, their communities, and the planet, people will exert pressure on both companies and policymakers for systemic change.



The Health Trust and Healthy Silicon Valley hosted an event in the fall of 2008 about how to start building a collective Green Health movement based on common resources around greening medicine, promoting physical activity in urban planning, supporting green health initiatives among employers, and improving food access.

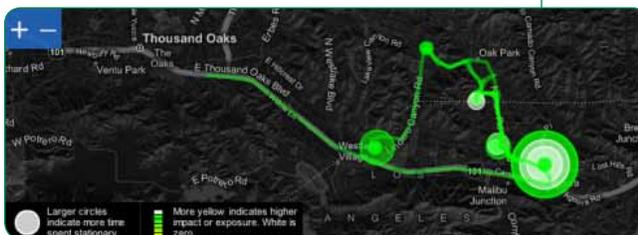
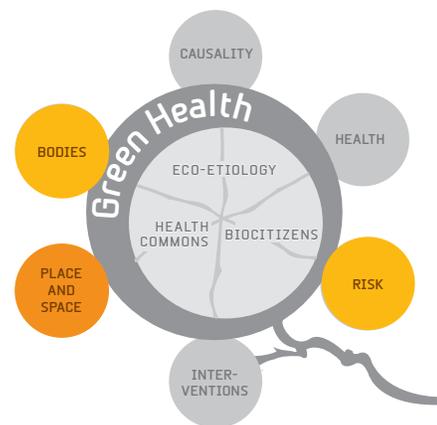
source:  
healthsiliconvalley.org

## 6. RISK MAPPING WILL DRIVE NEW FORMS OF CITIZEN ENGAGEMENT

**Key Questions:** How will your operations show up in the new participatory maps of environmental health risks? How can you create positive relationships with risk mapping efforts? Are you ready to supply the kinds of information that may be demanded of you in this future?

The combination of geo-health tagging, participatory monitoring, and citizen engagement will drive people's ability to locate risks in their bodies and environments with increasing specificity. A new era of participatory health could emerge as social media and other tools make it easy for citizens to participate collectively in data gathering and eco-health monitoring, and to engage in surveillance on the behalf of all the citizens within a region.

Opportunities will abound to both integrate and help empower these technological and social efforts. Challenges will also arise for some stakeholders in the global health economy, as ecological risk mapping may implicate them in the risks citizens are trying to avoid. Such efforts will reveal the natural boundaries of risk, and whole regions—the southern part of the United States or the areas affected by West Nile Virus—will be seen as places in need of attention and support. Ultimately, patterns of risk will become more transparent and will influence the formation of shared identities that can drive engagement at the point of purchase and the ballot box. For all players across the global health economy, but especially for retailers and health providers, there is an opportunity to expand on the kind of health information they provide and look for ways to tie that information to the places relevant to the consumers they serve. For those whose facilities and transportation functions impact the communities around them, these developments could spark challenges and calls to make practices cleaner and greener.



PEIR, the Personal Environmental Impact Report, is a mobile device-based environmental monitoring application that allows people to track and map the impact their choices have on the environment, and what health impacts their environments have on them. Developed by UCLA and the Center for Embedded Network Sensing, PEIR exemplifies the kind of risk mapping that will both influence personal behaviors and incite civic engagement.



source:  
peir.cens.ucla.edu



# APPENDIX:

## SURVEY FINDINGS AND METHODOLOGY

### SURVEY FINDINGS

#### Hypothesis:

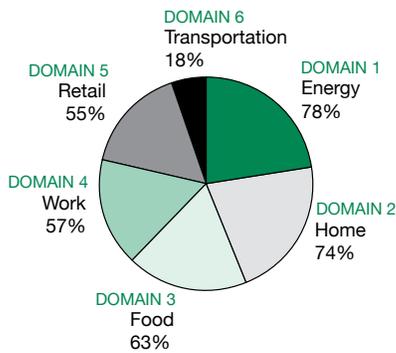
Before constructing the Food, Health, and Sustainability Survey, conducted in December 2007, IFTF hypothesized that the heightened focus on the environment and sustainability would result in green values shaping the way people take care of themselves. In order to further investigate what the “green” and “environmental” signals were really telling us about everyday attitudes and behaviors, we designed a survey to explore what people were thinking and doing in the areas of food, health, and sustainability. We posited that personal health practices would integrate concepts such as sustainability and issues such as climate change, shaping the way consumers think about bodies and risk, and bodies and the natural environment, and perhaps even influencing the kinds of interventions people make in their homes, workplaces, and communities.

Green values are already influencing practices in a variety of domains: transportation and energy use, food and nutrition, personal health, and even in areas such as parenting, work, finances, homecare, and so on. The concept of sustainability is wide open to interpretation and different sets of practices. How green values get expressed in daily life will vary for different people. How these values get linked to health and shape health management will also vary by person. While some people focus on consumption and relationships with retailers, others do not. There are so many different shades of green in the marketplace. Some people will have practices in place across many and varied domains. Some will only focus on one area, such as food or energy use.

#### The Sample

Results of the 2007 Food, Health, and Sustainability Survey are based on a sample of 1,005 adults aged 18 and older who have Internet access and are members of Survey Sampling International’s SurveySpot panel. Data were weighted so that the demographics of the sample match national population parameters. The margin of error for the entire sample is  $\pm 4.2\%$ . Results are presented as though interviews were conducted with a random sample drawn from the entire population. However, since the data were collected online, those with no Internet access were excluded from the sampling frame and are not represented in the sample. We used the results from this survey to find out how consumers were practicing behaviors of sustainability in different areas of their lives.

Figure 1  
Domains of the Personal Sustainability Ecology



**How do people implement green values in their day-to-day lives?**

In order to answer this question, we looked at questions in six different domains of a person's life. A domain is simply an area in our lives in which we focus our attention, our time, and our resources or money. (For more information on how the domains were constructed to create the personal sustainability index, see below.) These six domains represent key focal points in a person's life. The six domains we looked at are pictured here: energy, home, food, work, retail, and transportation.

We chose these six domains because they reflect a wide variety of things people can do to support sustainability, but they are also integral to daily life. What we found when we looked at the data across these six domains was that green values are completely mainstream, reflected in the normal distribution in Figure 2.

The histogram (Figure 2) and univariate statistics reflect a normal distribution across sustainability behaviors. The index ranges from 0 to 26. What is interesting is that 30 respondents, or 3% of the population, scored a perfect score on the index. In contrast, 17 respondents scored zero.

Figure 2  
Personal Sustainability Index

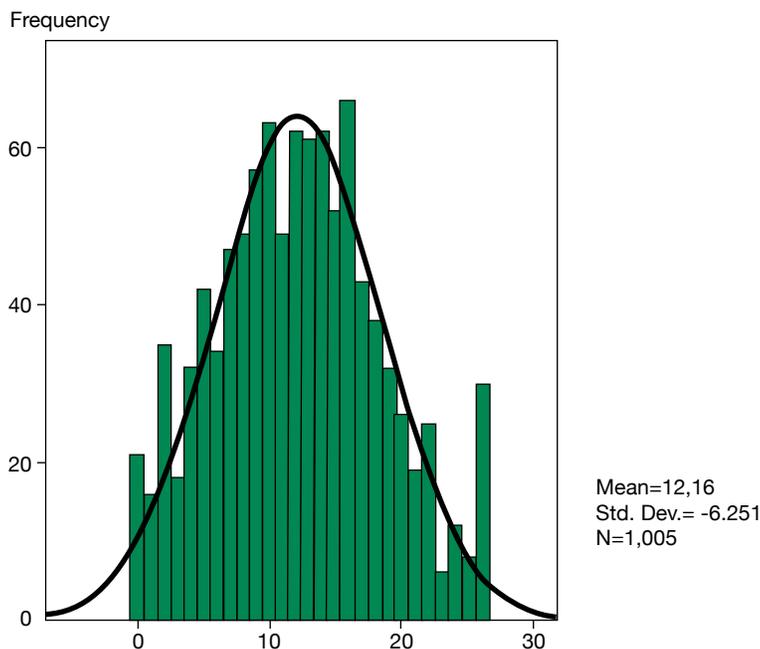


Table 1  
Percent of people practicing green behavior in each number of domains

DOMAINS	PERCENT
All six	9%
Five	23%
Four	22%
Three	16%
Two	15%
One	11%
Zero	5%

### How do people differ on the personal sustainability index?

We used the number of domains people participated in to determine how green they are (Table 1). Those who practiced green behavior in five or more domains were classified as high scorers for further analysis. These high scorers reflect 32% of the total sample. The more domains in which people practice “green” behaviors, the higher they score on the personal sustainability index.

High-scoring participants usually practice green behaviors in multiple domains, so we took a closer look at these high scorers to see who they are. We did not find a relationship between scoring high on the index and gender, education, income, having a chronic illness, or body mass index. (Sample size was too small to say anything about race/ethnicity).

Figure 3  
Personal Sustainability Index Highlighting High Scorers

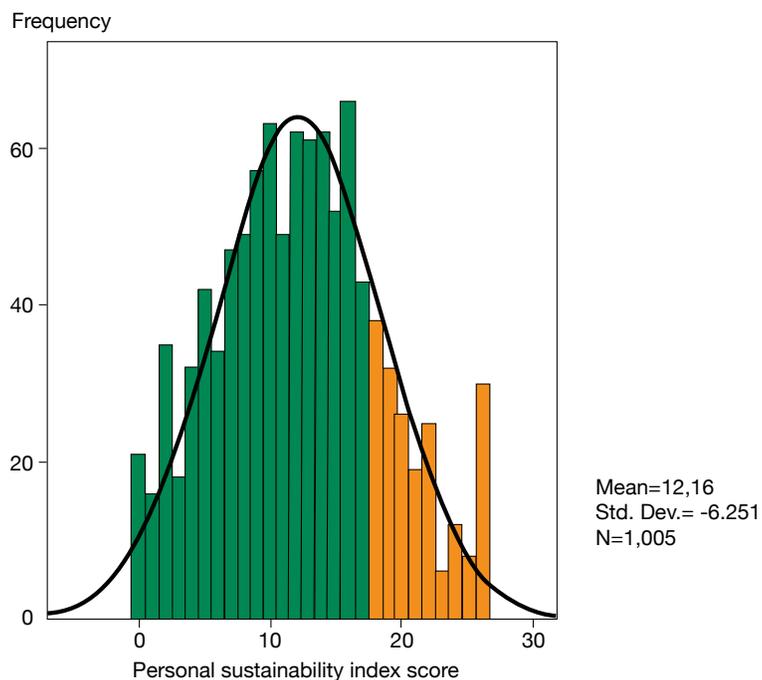


Table 2  
Sustainability Behaviors and Age

AGE	SCORED HIGH
18–24	36%
25–34	41%
35–44	32%
45–54	33%
55–64	30%
65+	15%

What we did see was that high scorers tended to be younger (Table 3), to live in cities (Table 4), to have children living in the household (Figure 4), and to be in excellent or very good health (Table 5).

The personal sustainability index ended up being correlated with some interesting behaviors. Those who scored high on the index were strongly correlated with:

- Practicing alternative medical practices (Pearson's correlation = .533),
- Social networking, such as talking to people online (Pearson's correlation = .404)

Those who score high on the index were weakly correlated with

- Using technology in everyday life (Pearson's correlation = .322)

Even more interesting was how strongly the personal sustainability index was correlated with people who believe in the connection between the environment and their own personal health. We looked at the connection people were making between the well-being of the environment and personal health. Overall, 89% of consumers believe in the connection between the environment and their health, but how does this belief translate into action?

Figure 4  
High Scores on Sustainability Index  
More Likely to Have Children in  
Household

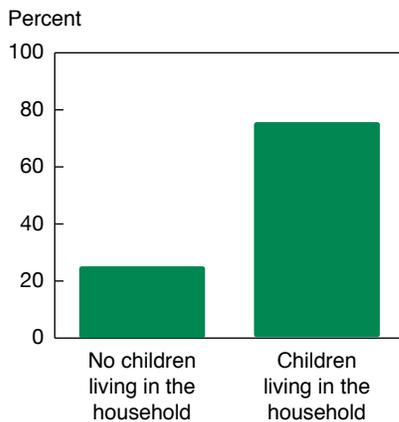


Table 3  
Sustainability Behaviors and  
Rural/Urban Living

URBAN CLASSIFICATION  
SCORED HIGH

Large cities	42.5%
Suburb	33.5%
Small City/Town	29.4%
Rural Area	25%

What we can see from this graph is that while the majority of people hold green values, only a smaller percentage (26%) are consistently acting on those values. Another 50% are trying to change their behavior to ensure a healthier environment. This is important because it represents a market interested in making changes.

But even more interesting when we look at those high scorers (that 32% practicing green behaviors in 5 or 6 domains) is how high scorers make the connection between the environment and personal health. It turns out that they are much more likely to make the connection—a full 98% of high scorers make the connection between the environment and their health. High scorers are also significantly more likely to be actively doing something about the environment (41% compared to 26%), which makes sense since they are already practicing green behaviors in 5 or 6 domains. However, this is an important story because it shows us that high scorers are more likely to make the connection between the environment and health. As people see the connection to their personal health, they will have increased motivation to act on their beliefs and values. We see that in action by looking at the tiny 5% of high scorers that are doing nothing to ensure a healthier environment (even though they are practicing sustainability behaviors in many domains, they are not participating in green behaviors for health reasons).

What are some of the people who are defining Green Health doing? Well, food is one way in which people translate the environment to their bodies, and we found this to be the case here, too. People who were acting on their belief in the connection of health to the environment were much more likely to purchase organic foods or foods without pesticides (just one example of green values influencing health choices).

Figure 5  
Connection Between Environment and Personal Health

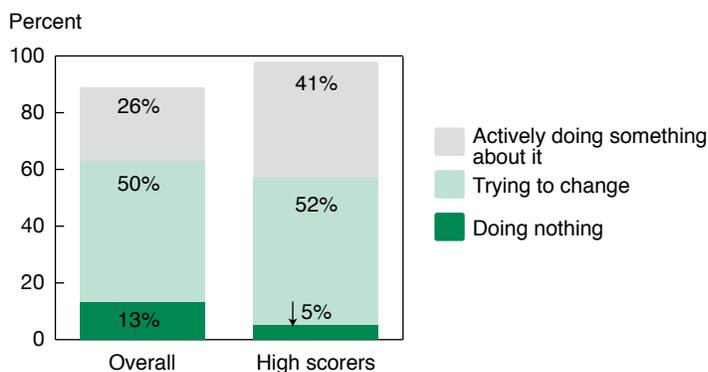


Table 4  
Sustainability Behaviors and Self-Reported Health Status

HEALTH STATUS	SCORED HIGH
Excellent	36%
Very Good	39%
Fair Health	18%
Poor Health	14%

### What does all this data mean?

We know that the expression of sustainability and green values varies from person to person. Some may focus on sustainability through their food purchases, by buying local and seasonal products whenever possible, for example. Others will concentrate on energy usage because of volatile gasoline prices. Some people care about the environment for the environment's sake, but a larger percentage of people care about the environment because of its impact on their own personal health. What we wanted to see was how people were putting their green values into practice.

We found that the link with a person's health (or even the health of their families and children) was a powerful motivator in practicing sustainability behaviors. As more people make this connection between the environment and personal health, sustainability behaviors will spread to multiple domains and hold more weight in people's decision-making strategies.

## SURVEY METHODOLOGY

Fieldwork conducted by Princeton Survey Research Associates International (PSRAI) for The Institute for the Future, December 2007.

### SUMMARY

The Food, Health, and Sustainability Survey, created by the Institute for the Future, obtained online interviews with a sample of 1,005 adults aged 18 and older who live in the United States. The interviews were conducted online from November 29 to December 3, 2007. Statistical results are weighted to correct known demographic discrepancies. The margin of sampling error for the complete set of weighted data is  $\pm 4.2\%$ .

Results are presented as though interviews were conducted with a random sample drawn from the entire population. However, since the data were collected online, those with no Internet access were excluded from the sampling frame and are not represented in the sample.

Details on the design, execution and analysis of the survey are discussed below.

### DESIGN AND DATA COLLECTION PROCEDURES

#### Sample Design

The sample was provided by Survey Sampling International (SSI). The SSI SurveySpot panel, a premium source of samples for online surveys, was used to recruit respondents. The SurveySpot panel recruits panelists by means of many sources, including banner ads, online recruitment methods, and RDD telephone recruitment. Unsolicited email or “spam” is not used. The panel is continually growing and currently covers about 4.5 million household members and 1.5 million panelists. Panelists are continuously monitored to prevent under-surveying and over-surveying in an effort to maintain their interest in participating. Panelists are offered rewards with each survey invitation, increasing their likelihood of participation. Because the average length of interview was estimated to exceed 20 minutes, panelists were paid an additional \$5 to complete the Health and Nutrition Survey.

#### Questionnaire Development and Testing

The questionnaire was developed by the staff of the Institute for the Future in collaboration with PSRAI. In order to improve the quality of the data, “a soft launch” of the survey was done prior to inviting the broad group of panelists to complete it. Based on this initial launch, PSRAI determined that the survey programming was working properly, including measures to ensure that sample quotas would be met, and the full launch immediately followed. No modifications were made to the content of the questionnaire before the full launch of the survey. Survey language and data are available from IFTF upon request.

### Weighting and Analysis

Weighting is generally used in survey analysis to compensate for patterns of non-response that might bias results. The interviewed sample was weighted to match national parameters for sex, age, education, race, Hispanic origin and region (U.S. Census definitions). These parameters came from a special analysis of the Census Bureau's 2006 Annual Social and Economic Supplement (ASEC) that included all households in the continental United States that had an eligible household member.

Weighting was accomplished using Sample Balancing, a special iterative sample weighting program that simultaneously balances the distributions of all variables using a statistical technique called the Deming Algorithm. Weights were trimmed to prevent individual interviews from having too much influence on the final results. The use of these weights in statistical analysis ensures that the demographic characteristics of the sample closely approximate the demographic characteristics of the national population. Table 6 compares weighted and unweighted sample distributions to population parameters.

### Effects of Sample Design on Statistical Inference

Post-data collection statistical adjustments require analysis procedures that reflect departures from simple random sampling. PSRAI calculates the effects of these design features so that an appropriate adjustment can be incorporated into tests of statistical significance when using these data. The so-called "design effect" or  $deff$  represents the loss in statistical efficiency that results from systematic non-response. The total sample design effect for this survey is 1.82.

PSRAI calculates the composite design effect for a sample of size  $n$ , with each case having a weight,  $w_i$  as:

Table 5  
Sample Demographics

	2006		
	Parameter	Unweighted	Weighted
<b>Gender</b>			
Male	48.4	49.4	48.7
Female	51.6	50.6	51.3
<b>Age</b>			
18–24	12.7	19.0	14.9
25–34	18.0	15.5	16.3
35–44	19.6	15.4	21.2
45–54	19.5	22.1	22.0
55–64	14.1	21.2	14.1
65–74	16.1	6.8	11.6
<b>Education</b>			
Less than HS Grad.	15.4	1.9	5.8
HS Graduate	35.9	28.4	37.8
Some College	23.2	35.4	27.1
College Graduate	25.5	34.3	29.3
<b>Region</b>			
Northeast	18.6	20.9	18.9
Midwest	23.2	25.4	25.9
South	36.7	33.8	34.4
West	21.5	19.9	20.8
<b>Race/Ethnicity</b>			
White/not Hispanic	68.7	86.7	70.5
Black/not Hispanic	11.6	4.2	10.1
Hispanic	13.6	5.0	12.5
Other/not Hispanic	6.1	4.1	6.9
<b>Population Density</b>			
Lowest → 1	20.1	27.5	18.0
2	20.0	20.5	20.2
3	20.1	19.3	20.9
4	20.2	18.7	20.3
Highest → 5	19.6	14.1	20.7

In a wide range of situations, the adjusted standard error of a statistic should be calculated by multiplying the usual formula by the square root of the design effect ( $\sqrt{deff}$ ). Thus, the formula for computing the 95% confidence interval around a percentage is:

$$\hat{p} \pm \left( \sqrt{deff} \times 1.96 \sqrt{\frac{\hat{p}(1 - \hat{p})}{n}} \right)$$

Where  $\hat{p}$  is the sample estimate and  $n$  is the unweighted number of sample cases in the group being considered.

The survey's margin of error is the largest 95% confidence interval for any estimated proportion based on the total sample—the one around 50%. For example, the margin of error for the entire sample is  $\pm 4.2\%$ . This means that in 95 out every 100 samples drawn using the same methodology, estimated proportions based on the entire sample will be no more than 4.2 percentage points away from their true values in the population. It is important to remember that sampling fluctuations are only one possible source of error in a survey estimate. Other sources, such as respondent selection bias, questionnaire wording, and reporting inaccuracy, may contribute additional error of greater or lesser magnitude.

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