

The Stockholm-NYC Conversation (STHLMNYC)

Perspectives on Better Integrating Health and Air Quality into the Sustainable Development Dialogue

Introduction

The emerging dialogue between Stockholm and New York City (STHLMNYC) represents an opportunity to compare and contrast sustainable urban development projects between the two cities, including how they take advantage of technological advances. The goal is that this dialogue can be expanded to include other cities in coming years.

Among other positive outcomes, the 2016 Stockholm-New York City conversation provided an opening for the architectural community to further engage in a dialogue around public health and to better understand opportunities for collaborations based on foundational principles. The guiding principles are: that we place all human well-being and development at the center; work in harmony with the ecosystems today, and for future generations; and ensure that cycles of materials, energy, and resources are restored and maintained within the planetary boundaries. For example, we know that there are limits to the levels of greenhouse gases in the atmosphere, the limits of our fossil groundwater resources, and the need to maintain undeveloped land and ocean resources. We also believe that people are different with respect to their needs and vulnerabilities, which also vary over time. This is not an easy concept to incorporate into urban planning, as equity based on health protections should not imply an uniformly applied set of standards.

The 2016 conversation goals focused on how architects and planners from Stockholm and New York City can maintain a dialogue around creating more sustainable and democratic communities. This meeting occurred against the backdrop of both cities facing significant population increases and expanding needs for affordable housing, where waiting periods can be on the order of several years. In this paradigm, it is the challenge for the architectural community to create harmony out of apparent noise; in essence, to synthesize the various important elements of urban planning into solutions that place human health and well-being at the center. . The STHLMNYC conversation was not focused on the incorporation of health and air quality criteria. Yet, from a public health perspective, its value was less about the content than about creating the means by which health considerations could be more systematically integrated into the broader objectives of sustainable design.

In a manner similar to biology and ecology, architecture has a powerful means to educate by providing a “living classroom.” The conversation provided many examples from cities around the world for a path forward, including examples highlighted in the Center for Architecture itself (<http://cfa.aiany.org/index.php?section=center-for-architecture>), where the meeting was located. It also took advantage of the extraordinary array of field examples right in Manhattan. NYC must face challenges of limited space to develop, and there are immense pressures to build vertically rather than horizontally. Creative solutions, such as WeLive (<https://www.welive.com/>), have devised “neighborhoods” that can occur within a single building, along with a freedom of mobility that allows residents to move from one neighborhood to the other from month to month. This alternative is particularly attractive to the younger generation, which places less value on material possessions and even the need for their own cars. Indeed, there is real feedback from WeLive members that environmental responsibility is important to them. The idea of “living lightly” on the earth is a driver of these kinds of collaborative urban residential models. Carmel Place

(<http://ny.curbed.com/2016/9/22/13019200/nyc-studio-apartment-carmel-place-house-calls>) was another example of an innovative development strategy. Both WeLive and Carmel Place were made possible through a collaboration of architects, planners, developers, and building codes officials in New York City, who were to agree on a set of underlying goals.

Among the most notable technology conversations at the conference focused on the expanded opportunities for timber construction in building structures. Embedded in a renewable resource and sustainability framework, wood technologies create a means by which we can find value added uses for biomass instead of burning it. Not only does wood burning contribute to global warming. It also produces more localized air pollution health impacts, particularly those impacting the cardiovascular system. This was but one example that illustrated the convergence between sustainable architecture and public health improvements, described in more detail below.

Although we are facing increasing resource and environmental pressures, we must not lose sight of the fact that we build communities in ways that bring meaning to our lives, both individually and collectively. The value of individual aspirations and creativity cannot be understated. While such aspirations may seem a luxury to some, they are really quite fundamental to a well-functioning civil society. To address this need, we believe that part of the architect's sustainable vision is that spaces must include an "emotive" quality. Emotive architecture strives to positively affect or impact human emotion. It creates an architecture that "touches the senses" and promotes human well-being. It argues that besides being solely functional architecture fulfills an important role in human well-being, in our quest for harmony and order in the world.

The Convergence of Public Health, Urban Planning, and Architecture

"Architecture," as Goethe once said, "is frozen music." There is in this discipline that creative and dynamic element that underlies all forms of human artistic expression. In this respect, architecture is the means by which we create the space within which we live, work, and congregate publicly.

"Health," according to the World Health Organization, "is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity." When viewed in a social context, achieving this state is in the domain of health: it is the process of creating conditions within which both individuals and communities can achieve their optimal potential.

In these respects, architecture and public health share a common core value – achieving the state of physical, mental and social well-being. These two disciplines are aligned when we consider how urban planning can impact the built environment. Essentially, we have to address the various challenges we face regarding how we can best live collectively in community and build a common set of metrics that recognize the important contributions of the architectural community to human health and well-being.

Consequently, architecture doesn't happen unless the environment, society and human well-being are sustained. In short, architecture is not the building, but the means creating space that supports human well-being and prosperity; the built environment is a product of architecture and when not fulfilling the means of architecture is merely building or objects.

Yet, despite the philosophical affinities that public health has with disciplines concerning our built environment, there is little consideration of integrating planning and architecture into traditional public health practice. To a large extent, this lack of integration reflects the fact that public health has been largely focused on downstream effects. This focus is evidenced by the fact that public health activities are often driven by retrospective analyses of relevant data (e.g., disease rates, unhealthful behaviors). As such, they lack a certain creative vision, particularly when it comes to conceiving how fundamental changes in our physical environment can cause major improvements in health outcomes. They lack an anticipatory and precautionary strategy. On the other hand, there are skill sets and tools (such as health impact assessments) that public health practitioners could bring to sustainable planning conversations if afforded the opportunity to do so. Such integration of public health data into sustainable design could thus represent an opportunity for an ongoing dialogue as both the positive and negative health impacts of our built environment become better understood.

Another missed opportunity for public health is in how it can better promote strategies to create a more civil society. As a bedrock consideration, design and planning at the infrastructure level should ensure the delivery of clean water, clean and renewable energy, and sustainable food systems, regardless of socioeconomic circumstances. Yet, matters of racial and income inequality, gender discrimination, gentrification, food and energy security, safe and affordable housing, and need to promote economic democracies in our workplaces and communities rarely make it into public health conversations. There is an emerging literature, however, on how such matters do impact public health. Income inequality, for example, has been shown to have significant negative impacts on a wide variety of public health measures, as described by Wilkinson and Pickett in their seminal work, *The Spirit Level*. Further, as recent studies have shown, income does not correlate with individual or collective happiness (as measured by several important social metrics), at least beyond a certain basic level.

One means to make the connections among public health, architecture, and urban planning could be to acknowledge more systematically their interdependencies. Specifically, the domain of sustainable architecture could provide a forum for realizing many important health objectives that are not normally addressed in current public health paradigms. For example, the importance of Wellness as a design driver has been an important movement within architecture and interior design over the last 10-15 years. The design community now routinely tries to find ways for people to be more active, breathe fresh air, gain access to natural light, and create less stress in working and living environments. City planners have long been concerned with greenspace, building density, building generated shadows, traffic management, and bike lanes. These efforts strive to ensure that a person's daily experience is enhanced by opportunities for clean air and water, healthy acoustics, plenty of light, exercise and quality food. It could be within this context where the complex nature of pollutant health impacts might be most fully appreciated and where air quality improvement strategies be most effectively realized.

Practical Considerations

From a practical standpoint, health considerations can be most conveniently incorporated into sustainability projects through a series of design specifications at both building and community levels. Certain specifications can and should be incorporated into building design, such as radon-resistant foundations, local exhaust ventilation, and low VOC (volatile organic compound) materials. Yet, there are often trade-offs that need to be considered. These include balancing energy efficiency with indoor

air quality, comfort, and occupant performance, for example. Other considerations include how varying outdoor environmental conditions are to be addressed (such as extreme temperatures, water intrusion), whether they may be short term fluctuations or longer term consequences of climate change.

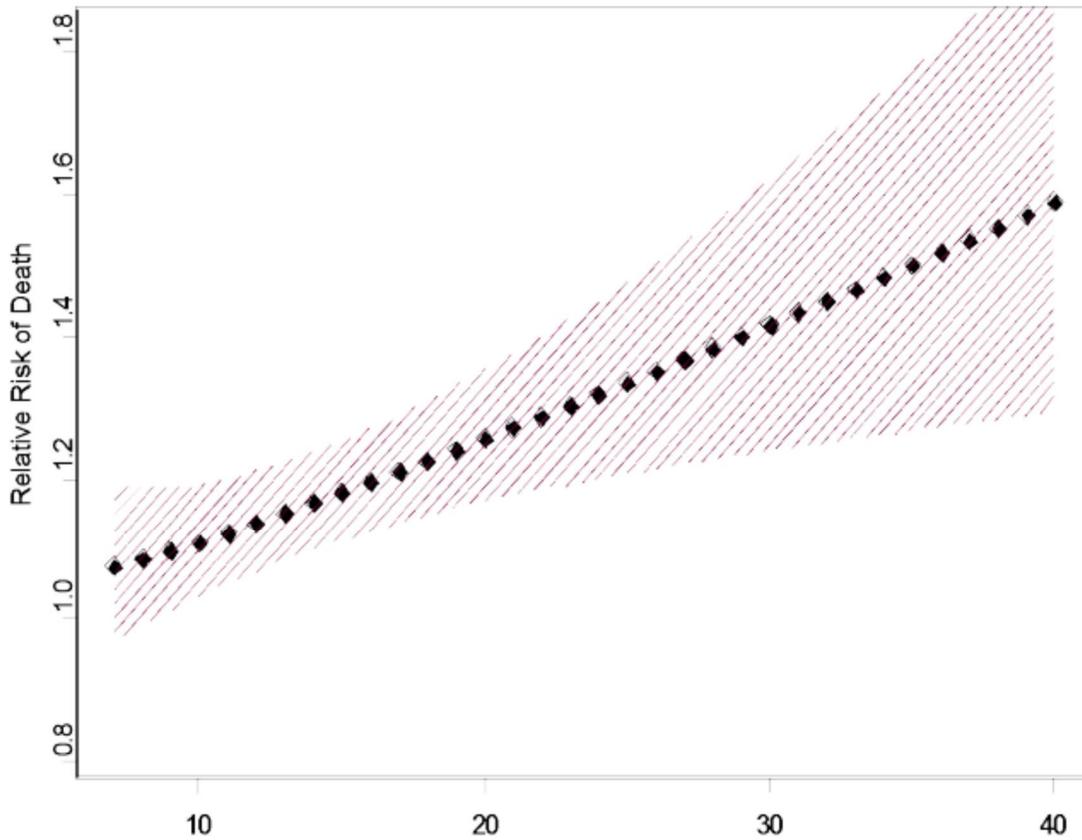
The longer term considerations will increasingly need to be influenced by shifting environmental baselines related to our food and water supplies, population dynamics, biodiversity, and most importantly, climate change. The concept of shifting environmental baselines refers to the idea of a gradually degraded environment, and that successive generations will come to view the environment into which they are born as natural or normal. If we look back over the course of human history, we need to recognize this sense of loss which not only affects our current societal well-being but the trajectory of environmental degradation for future generations as well. In this respect, when we think about sustainable design, we must consider an environmental footprint that is as close to zero as possible, or even restorative in such a manner that the built environment can improve our ecological surroundings. Architects and designers are increasingly addressing such emerging priorities, including considerations of indoor “microclimates” that provide buffers against hostile weather conditions while providing opportunities to address basic human needs.

Even if pollutant levels remain constant or are reduced, another factor to incorporate into the design disciplines is our ever expanding knowledge base of pollutant health effects, particularly with regard to cumulative and low level exposures. For example, it is widely recognized in the public health community that the healthfulness of our outdoor air quality cannot be assured from simple reliance on outdoor air quality standards. No safe level of exposure can be determined for most air pollutant exposures. Furthermore, these exposures contribute to a variety of short term effects (such as asthma exacerbations and heart attacks). Prolonged exposures to ambient air pollutants can contribute to other chronic effects, such as low birth weight, developmental disabilities, neurodegenerative diseases, and cancer.

Of all the outdoor air pollutants studied, exposure to fine particulate matter (particles 2.5 microns or less in diameter) has been increasingly shown to cause adverse health impacts, even at low ambient concentrations. A recent Lancet article estimated that, as the fifth leading cause of death globally, ambient levels of fine particulates for 4.2 million deaths annually. Particulate matter is responsible for 21% of all cardiovascular disease, 25% of stroke deaths, and 27% of lung cancer deaths.

Approximately 92% of the world’s populations live in areas that exceed the World Health Organization guideline of 10 ug/m³. While Asian countries such as India and China often have the highest levels, recent experiences in London have shown that extreme pollution events can take place in developed countries as well. Also, as indicated above, even a 10 ug/m³ guideline is not health protective. The famous Harvard Six City study found, for example, that risk of death from particulate matter increases above essentially background concentrations of 8 ug/m³ (see below).

Concentration-Response Relation between PM_{2.5} and Risk of Death on Followup: Six City Study



Source: Joel Schwartz, Air Pollution Kills, presented at the Heinz Endowments The Air We Breathe Conference, 2013 <http://www.heinz.org/UserFiles/File/AirWeBreatheConference/Schwartz.pdf>

From the perspective of urban planning, the negative health consequences of non-threshold relationships such as the one just described are:

- The health impacts on those engaging in outdoor activities;
- The increasing importance of separating the indoor environment from the outdoor environment through air sealing, enhanced filtration systems, and the positioning of air intakes;
- The need to consider exposures of both short and longer term durations, and that can vary geographically throughout a community;
- Air pollution burdens can vary over time;
- Setback distances from major roadways for schools and other vulnerable settings could limit the available space for real estate development.

Such health threats place challenges on architectural design and community planning. For example, restrictions on natural ventilation or requirements for enhanced filtration systems that limit outdoor pollutant intrusion may be necessary. Further, the health benefits of engaging in outdoor activities may

be offset by negative impacts of increased outdoor pollutant exposure. These challenges are especially true in design plans that seek to better integrate the indoor environment with the natural world around it, and that promote active transportation, physical activity, and shared outdoor spaces as essential health objectives. These areas where co-benefits can be realized are particularly ripe for the architecture profession and the environmental health sciences to work collaboratively on producing and promoting creative and innovative solutions. There is a need to further develop evaluation tools that can fully assess the overall social benefit of these undertakings.

A fundamental ethical and economic question, however, underlies these apparent trade-offs. Controlling pollution at its source is already the preferred exposure reduction option. Not only is source control fair economically in terms of internalizing costs that are otherwise borne by the surrounding community, through a combination of increased development costs, health impacts, and by reduced freedom of movement. It is also crucial if we are to make cities that promote mixed use development and grow like self-sufficient, interdependent organisms. Yet, rather than viewing these currently perceived constraints as obstacles, the STHLMNYC dialogue presents the possibility that a more integrated design and planning process could exist. Viewed in this light, the perceived challenges can motivate creative responses around identifying opportunities for innovation, sustainable economic development, and increased community cohesion.

The Broader Context

At a higher level of social organization, we need to consider the sociological context in which housing decisions are made that can either aggravate or reduce health disparities. Is there equal access to employment, public spaces, and cultural/social exchanges? How do we best incorporate the lessons from past urban planning projects so that we don't exacerbate inequalities based on race, ethnicity, income, education, or age? Related concerns are how communities address needs around the local schools and community centers, alternatives to institutionalization (e.g., nursing homes) such as housing in place, and gentrification that can occur from the ground up within a community rather than by displacing people from their homes and neighborhoods.

As daunting as the current challenges are, they are going to be made much more daunting due to exponentially escalating stressors of population increases, resource depletion, and climate change. The refugee crisis, already horrendous due to war and the consequences of failing economic systems, will be severely aggravated as a consequence of climate related sea level rise, drought, and other factors. The current differences between the US and Sweden couldn't be starker in these respects.

As a minimum, we need to take seriously some sort of planetary boundary system as it relates to defining sustainability in quantitative terms (e.g., greenhouse gases, protected land and oceans, etc.). This may be very challenging in practice as it is likely that many critical planetary thresholds have already been exceeded. It is likely that whatever boundaries we can determine for the present, they will likely have to be reduced in the future for the planet to remain habitable. Yet, our ecological future should appear far less daunting if we view it not as a crisis of pollution but of perception. As McDonough and Brungart stated in their 2013 book *Upcycle*:

“Human beings don’t have a pollution problem; they have a design problem. If humans were to devise products, tools, furniture, homes, factories, and cities more intelligently from the start, they wouldn’t even need to think in terms of waste, or contamination, or scarcity. Good design would allow for abundance, endless reuse, and pleasure.”

Moreover, community planning decisions need to incorporate climate resiliency and adaptation components (such as protection from extreme heat and flooding) and, increasingly, permanent relocation of essential services or complete abandonment. Further, as more and more areas of the world become uninhabitable, and torn apart by related crises involving civil conflict, population displacement crises will become commonplace. In fact, the world has never seen a larger percentage of a mobile population as now. Communities need to plan for surges in immigrant/refugee populations, including unaccompanied children, as well as long term carrying capacity. Sweden’s current response to the refugee crisis could serve as a model for all of us as we head into these uncertain times.

Ultimately, from a sustainable planning and development perspective, we need to develop a systematic means by which we evaluate our success and learn from our experiences. Rooted in this activity should be a comprehensive set of metrics sufficient to encompass the full breadth and nature of this undertaking. In this regard, the evaluation team must be multi-disciplinary in nature, comprising at a minimum environmental scientists, building performance professionals, epidemiologists, psychologists, medical practitioners, statisticians, sociologists, architects, artists, economists, and planners. We propose the formation of an eclectic group of evaluation partners there will emerge a new, transdisciplinary paradigm that can guide our actions well into the future.

April 9, 2017

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