

10 Priorities for Health & Wellbeing

ARUP

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Foreword

The global health and wellbeing challenge - how can the built environment respond?

Katie Wood and Michael Beaven

Globally people are living longer, more urban and more digitally connected lives than ever before. But these changes are not necessarily resulting in improved health and wellbeing for all.

The United Nations has a set of 17 Sustainable Development Goals (SDGs) which provide clear guidelines and targets for all countries to adopt to improve life, in a sustainable way, for future generations.

The third goal, after eradicating poverty and hunger is to achieve good health and wellbeing.

The built environment has a part to play, from the air we breathe, the way we travel, where we live and work and our interaction with each other and the natural world. How we plan, design, build and live in our cities and our buildings has important implications for how healthy and well we can be.

Arup is focussing on the following ten priorities which we believe have the potential to bring about positive outcomes for all.

As with the SDGs, our priorities are interconnected – often the key to success on one will also involve tackling issues more commonly associated with others.



1. Focus on air quality

"Indoor air pollution is ranked as one of the world's greatest public health risks."

— Wolverton, 1997

Breathing high-quality air is vital for our health and wellbeing. Data shows that air pollution is the number one environmental cause of an early death.

It is well known that exposure to outdoor pollution such as particulate matter, nitrogen oxides and carbon monoxide generated by traffic, buildings and construction activities, can put us at greater risk of contracting respiratory and cardiovascular diseases. However, what is less recognized is that indoor air quality is also a risk. Studies from the US Environmental Protection Agency suggest certain common organic pollutants can be two to five times higher inside homes and offices than outside.



Indoor contaminants are typically generated by emissions from building materials, and operational processes like cooking or printing. Densely occupied spaces are prone to high concentrations of CO₂ which impact our alertness and performance.

Additionally, humid and poorly ventilated spaces provide the ideal conditions for biological particulates and micro-organisms, like mould and dust mites.

Opportunities

Understanding the sources of both outdoor and indoor pollution is key to reduce the exposure to outdoor pollutants and achieve optimal indoor air quality.

Considering air quality issues at master planning stage is the best form of mitigation and can shape appropriate building massing, policies and energy strategies to limit buildings emissions.

Building design should consider reducing emissions, filtering outdoor pollutants and minimising indoor contaminants through minimisation of energy sources, appropriate material selection, building ventilation and services design and control strategy.

91%

In 2016, 91% of the world population was living in places where the WHO air quality guidelines levels were not met¹

.....

90%

In developed countries, we spend on average 90% of our time indoors²

1. Ambient (outdoor) air quality and health, WHO, 2018

2. The National Human Activity Pattern Survey, Lawrence Berkeley National Laboratory, 2001



2. Design for building user comfort

"We shape our buildings, and afterwards our buildings shape us"

— Winston Churchill

We have long recognised the link between user comfort and health, wellbeing and performance.

Despite the extensive literature on comfort and associated metrics, occupant surveys and building user feedback reveal a significant gap between design aims and our experience of comfort in buildings.

This is partly due to the subjective and dynamic nature of comfort, which relates to diverse personal psychological, physiological, cultural, and behavioural factors: the way people feel about a space cannot be defined just in terms of the right illuminance levels, decibels or degrees.

To re-focus on human centric design, and create spaces where people can fulfil their maximum potential, we must first acknowledge these complexities and think beyond standards and one-size-fits-all benchmarks.

Opportunities

If comfort is subjective, how can we satisfy all? Embedding flexibility in buildings for different patterns of use, enabling greater user control over the environment, and providing opportunities for adaptation are the first key steps to creating spaces where people can flourish.

For example, acoustic and ergonomic space planning can accommodate different needs for collaborative or quiet spaces, as well as providing opportunity for varying working styles.

Personal temperature controls and task lighting combined with the use of smart technologies can have a positive impact on people's satisfaction.

A space's layout and 'look & feel' does have an impact on our overall sensation of comfort, as well as opportunities for feeling connected to nature, for example having access to a view to outside and natural light, or experiencing a dynamic environment with varying thermal and lighting gradients.

Advanced analysis, dynamic simulation and optimisation design tools can help achieve the building design comfort strategy right first.

Pre- and post-occupancy evaluations help us to understand how the building is performing and input to a revised strategy as required. Data collated from a range of sensing and monitoring technologies (including air quality, temperature, noise and mass motion sensors), and user interfaces, allow a great level of personalisation and a quick response to environmental and user inputs.

Emerging digital technologies and processes, such as the Internet of Things, Machine Learning and Smart connectivity are transforming the way users interact with buildings and can play a significant role in human-centric design and operation.

6%

poorer staff performance
in overheated offices¹

.....

4%

poorer staff performance
in cold offices²

.....

66%

poorer staff performance
as a result of distracting
noise³

1, 2, 3: Building The Business
Case, World Green Building
Council, 2016



3. Understand the impact of materials

“Through the selection of safer materials, architects and project teams have the ability to reduce human exposures to toxic chemicals and make communities healthier.”

— Prescription for Healthier Building Materials, AIA/Arup,

Construction is the largest global consumer of materials, and polymers account for the highest growth area. Whilst the health impacts of some construction materials are well-known, for example; asbestos, lead in paints, mercury when released from lighting, the full health impacts of all the synthetic chemicals used in today’s construction products are not currently known.

Construction materials impact building users by emitting chemicals that are hazardous and can be inhaled, such as volatile organic compounds, or producing dust or other substances that can be ingested, such as flame retardants and plasticisers. Hazardous substances, such as epoxies and polyurethanes which can cause sensitisation, can affect the health of producers and installers. Substances which have persistent, bioaccumulative and toxic properties like certain heavy metals and polychlorinated biphenyl can adversely impact the wider environment. Whilst high exposure can lead to serious health effects, such as cancer, lower exposure levels can affect wellbeing by causing headaches, lethargy, skin and eye irritation.

Opportunities

Whilst relevant legislation exists in some countries, there is plenty of scope to select materials with lower health impacts on humans and the wider environment.

Endocrine-disrupting chemicals linked to many types of cancers, fertility and pregnancy complications, and even obesity in commercial products shown to be globally ubiquitous.¹

1. Bergman, Ake, et al. (Eds.) (2013). State of the Science of Endocrine Disrupting Chemicals - 2012. Geneva: World Health Organization. Referenced in Prescription for Healthier Building Materials: A Design and Implementation Protocol, AIA/Arup, 2018



4. Maximize the use of data

"I want us to do even more to utilise data and smart technology to meet the needs of our citizens."

— Sadiq Khan, Mayor of London

The wealth of knowledge surrounding the interface of the built environment with people, the economy and the environment has grown to a substantial size. How do we use the rise of data production, improved technology, and analytical power to better analyse, understand and monitor the relationship between the built environment and health and wellbeing?

Parallel to the growing evidence base is the advent of the digital/information age, the rise of data production, collection and storage and improved computing and analytic technology. The differing types of data, from historic to real time data streams, covering a range of topics such as environmental quality to personal health, allows us to establish an even stronger link between the built environment and the health and wellbeing of inhabitants.

Opportunities

The combination of vast quantities of data and advanced computing and analytic power results in an opportunity to better understand the existing situation. This can be used to model and inform future decisions and designs, and monitor outcomes with real time data; this will impact the daily choices people make regarding their health and wellbeing.

The ability to predict and model future scenarios with greater accuracy is a result of the increased availability of better data and technology such as distributed computing.

The CBRE state that by 2040, the workplace will be fully responsive with the advancement in technology such as 'Epidermal Electronic Systems' (EES) being able to detect cortisol levels, heart rate and body temperature; adjusting ambient temperature and light accordingly.

.....
12x

It is estimated that the number of connected devices in the UK will increase 12-fold by 2026 and mobile data use is growing at more than 30 per cent a year¹

1. Review of latest developments in the Internet of Things, Ofcom 2017



5. Design for healthy streets and active travel

“As a fish needs to swim, a bird to fly, a deer to run, we need to walk, not in order to survive, but to be happy.”

— Enrique Peñalosa, Mayor of Bogotá, in J. Speck, “Walkable City”, 2012

How we get around is intrinsic to the quality of life we experience in a city. But for the past century, the car has dominated how we plan and grow our urban areas.

We must now seize the opportunity to place people back at the heart of our cities and drive a human-focused approach to the design of the built environment. Walkability and human-centred design should be used as a catalyst for developing sustainable, healthy, prosperous and attractive cities.

The health benefits of walking are well-known—an active lifestyle dramatically reduces the likelihood of chronic disease. But there is so much more to be gained from encouraging walking. A walkable city improves mental health, reduces visible signs of inequality, attracts inward investment, improves air quality and urban micro-climates, and reduces noise.

Opportunities

Creating visions and strategies for walking, recognising it as a transport mode in its own right, creating safe and efficient transportation systems, liveable environments and a sense of place and community will all help to make walking a normal part of everyday life and the natural choice for shorter journeys.

-22%

early death risk

People aged 60 and over who do just 15 min of exercise a day reduce their risk of dying early by 22%.

33%

mental health

A study found that those who walk for more than 8.6 min per day are 33% more likely to report better mental health. ¹

Towards a Walking World,
Arup, 2016



6. Incorporate green and blue infrastructure

“By integrating nature based solutions into urban design and planning, increasingly large and dense cities can improve human health and well-being, while offering ecological and economic co-benefits.”

— EU expert group on ‘Nature-Based Solutions and Re-Naturing Cities’

Incorporating green and blue infrastructure systems into the design of our urban and rural environments is vital to our health and wellbeing, as well as having many other social, economic and environmental benefits.

There is growing research on these benefits to people’s wellbeing, both physical and mental, particularly in cities where human connection with nature is at its most vulnerable. The benefits are known to include reduction in stress, depression and other mental health issues, as well as improved community cohesion and the promotion of an active healthy lifestyle. Green and blue infrastructure is also a key component of a resilient environment. Shocks and stresses such as air & water pollution, extreme heat, flood and drought risk & food security are increasingly common with a warming planet.

Opportunities

The use of nature based solutions within our cities and buildings, and the shift from grey to green and blue infrastructure, is critical to our health and wellbeing as well as our adaptation to a changing world.

90%

of the people taking part in a study by Mind said that doing physical exercise outdoors in a natural environment was either important or very important in determining how they felt¹

1%

reduction in the sedentary population of the UK could deliver up to £ 1.44bn a year in economic benefits, equivalent to £800 per person, through social benefits and reduced health risks ²

1. Landscape Institute, 2013, Public Health and Landscape: Creating Healthy Places

2. CJC Consulting, 2005, Green Spaces for Physical and Mental Health: Scoping Study. Forestry Commission report



7. Take evidence-based planning decisions

"Health in All Policies is an approach to public policies across sectors that systematically takes into account the health implications of decisions, seeks synergies, and avoids harmful health impacts in order to improve population health and health equity."

— World Health Organization, 8th Global Conference on Health Promotion, Helsinki, Finland, 2013

As urban populations rise and our average life expectancies increase, spatial planning has a duty to incorporate opportunities for sustained physical, mental and social health and wellbeing.

There are clear connections between our environment and the way we behave. Planners have the opportunity to help reverse the trend towards sedentary lifestyles and to deliver infrastructure that creates healthy spaces.

Opportunities

National planning policy should set a framework for designing vibrant, healthy and inclusive communities.

Building an evidence base ensures that a planned development appropriately meets the health and wellbeing needs of the community. Through planning mechanisms such as research, joint-strategic need assessments, health impact assessments and engagement with a wide range of stakeholders we can build up a comprehensive view of community needs.

Informed by these comprehensive policy and evidence bases, the design for healthy and liveable environments then hinges on the production of masterplans and the delivery of physical infrastructure that promotes healthy, happy communities.

63%

of global mortality is due to non-communicable (chronic) diseases, many related to the risks from urban environments. These include physical inactivity, obesity, and cardiovascular and pulmonary diseases from transport-generated urban air pollution.¹

1. World Health Organisation, Global Health Observatory data



8. Create cities for all ages and abilities

"We have to stop building cities as if everyone is 30 years-old and athletic."

— Gil Penalosa, founder and chair, 880 Cities

The ageing population is one of the greatest economic and social challenges faced by developed countries, while the quality of life experienced by urban populations, and particularly by children, will determine our global future.

The young and old have much in common. Mobility, perception, physical dependence, meaningful social networks and communication are all shared concerns.

However, there is increasingly less contact between generations as families live further apart. In care homes the elderly might rarely see children, and children are segregated by age throughout school.

There is international evidence that intergenerational schemes save lives among older people. Some of the benefits include greater mutual understanding and acceptance, improved feelings of wellbeing, decreased loneliness and enhanced social cohesion. Cities that all ages can enjoy together, which support children's independent play alongside the needs of elderly people, will deliver tangible health benefits for the whole community.

Opportunities

To keep up with the global shift in demographics we need to be delivering accessible public transport, improved active infrastructure and integrated age-related services. Interventions include car free and programmable open space, indoor and outdoor learning opportunities such as communal gardening. We need to encourage the use of these spaces by diverse groups.

3x

Globally, the 80 and over population is projected to triple by 2050¹

70%

of world's children to live in cities by 2050²

1. World Population Prospects, UN, 2015

2. Global Urban Strategic Framework, UNICEF, 2018



9. Optimize operations, behaviour and the built environment

“There is no such thing as a neutral design. Seemingly arbitrary decision, will have subtle influence on how the people who use the building interact.”

— Richard H. Thaler, Cass R. Sunstein

As described in the other priorities, physical and tangible elements of our built environment have the potential to support better health and wellbeing. However, it is essential to recognise that the interaction between spaces and people, and between people in those spaces, are additional factors for improved wellbeing outcomes. The design role for modern buildings and infrastructure is expanding to include how people feel about a space and behave in it.

The complex challenges we face, including sedentary lifestyles, high absenteeism, stress and burnout make a holistic approach to wellbeing essential.

This involves consideration of operating models and procedures, organisational cultures and ways of working, and the dynamics amongst diverse workers, customers and visitors. Therefore, the range of professional disciplines that are considered part of the built environment must expand and diversify.

These disciplines should include operations specialists, human factors and ergonomics professionals, psychologists and behavioural specialists, logisticians and data analysts.

By optimizing the design of the built environment for operational performance and people’s behaviour, such multi-disciplinary teams can promote wellbeing and encourage healthy habits and lifestyles.

Opportunities

For buildings and cities to reach their potential they must be designed with people in mind. With a healthier operational and psychosocial environment comes a huge range of benefits including improved public health outcomes, better user experience, improved engagement, higher staff productivity and retention. These in turn build resilience and create long term social value for communities.

90%

**of typical
operating costs**

are attributable to the workforce compared to 1% represented by energy bills¹

.....

People living in better quality housing have fewer psychological issues, including decreased anxiety and depression²

1. World Green Building Council, 2016

2. Mental Health Network NHS Confederation, Issue 233, 2011



10. Improve evaluation of health and wellbeing outcomes

"First life, then spaces, then buildings - the other way around never works"

— Jan Gehl, architect

If city-makers are to address health and wellbeing through urban design, where should we begin? First we need the right data and information to build a tangible evidence base that demonstrates the potential for design to impact positively (and negatively) on health and wellbeing. This will help us to identify the urban design opportunities that add value by improving health and wellbeing in cities.

Understanding how our spaces and places impact our health and wellbeing is the first step in making better decisions to create healthy cities in the long term.

Opportunities

Many tools and methods exist for capturing the impact of our surroundings on both our physical and mental health. They can be applied at a range of scales, from individual buildings to whole city regions. These approaches can be applied in advance to predict optimal design solutions, and retrospectively to evaluate the impact achieved.

+2bn

more people will be living in cities by 2035, added to the three billion urban dwellers today ¹

+40%

increased risk of depression

for city dwellers, compared to people who live in the countryside ²

1. Alejandro Aravena, Keynote speech, Habitat III, 2016

2. Mind the GAPS Framework, Centre for Urban Design and Mental Health, 2016



Leading the way

We are living in an unprecedented time, both in terms of urban growth and technological change.

Our awareness of the impacts on health and wellbeing at both individual building and community levels has never been more advanced. With the Sustainable Development Goals, there now exists not only a growing body of evidence to support us, but also the political will to see the right choices are made.

From where we live to where we work, from the way we travel to the air we breathe, it is all influenced by the way we plan, design and maintain the built environment around us.

Our own health and wellbeing is a priority for each of us. However, those of us involved in creating the built environment can make healthy choices and lifestyles a straightforward choice for everyone, including future generations.

Arup will continue to focus our multi-disciplinary teams on these 10 priorities for health and wellbeing and welcomes collaboration, and sharing of best practice.

A bright, sunny day in a cobblestone square. In the foreground, a man in a plaid shirt and dark pants is seen from the back, looking towards a group of people. A woman in a white t-shirt and blue shorts is also visible. In the background, many people are playing with large, iridescent bubbles. A man in a dark shirt and shorts is in the center, blowing bubbles. A yellow bucket and a red bucket are on the ground. The background shows a mix of green trees and old stone buildings under a clear blue sky.

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