

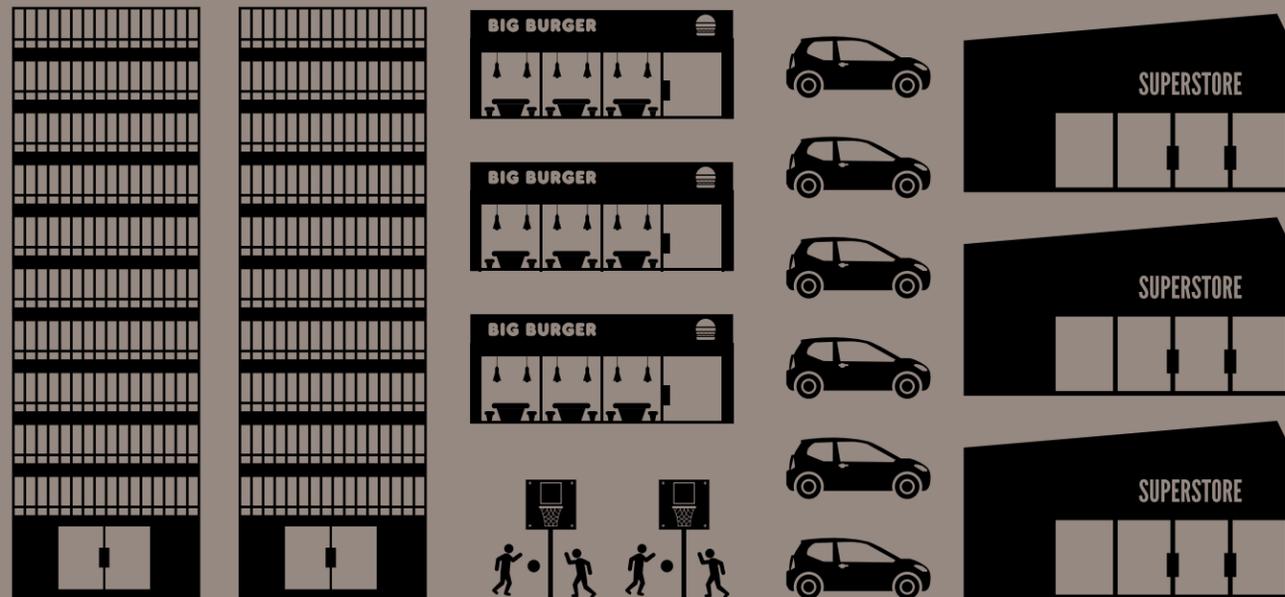
"Not only are we sedentary, but we have chosen a life that is increasingly lived indoors. A baby born in the United States will spend close to 87 per cent of his or her lifetime indoors and another 4 per cent in enclosed transit.

The reason? We have become experts at creating shelter with ever-increasing comfort. [...] In choosing to become an indoor species, we have cut ourselves off from the natural world, making us increasingly oblivious to what we are doing to our immediate outdoor surroundings."

Douglas Farr in: Sustainable Urbanism (2008)

IN SEARCH OF HEALTHY CITIES

By Richard Hobday
Illustrations by Robert Samuel Hanson



People have been living in cities for thousands of years. Two of the biggest challenges that faced city dwellers in the past are still with us today. One is how to stay healthy; and the other is living sustainably. There is a long, if intermittent tradition of planning for both. Some projects were successful, others less so. But they all provide useful insights.

THE IDEA THAT the built environment can influence public health, for good or ill, is not new. Throughout history, some civilisations have recognised the importance of hygiene, sanitation, pure air and sunlight in preventing disease and promoting health. Others have not. Four thousand years ago, people in the north of India arranged their communities to keep themselves healthy. Sites excavated in the Indus Valley, and at Harappa in the Punjab, suggest ancient Indian cities were laid out for health. The streets were broad and paved, with covered sewers. Bathrooms and drains were common features of the buildings.¹ In the 4th century BC, the Greek doctor Hippocrates wrote about cities and health. He said the quality of the air and the properties of the water in a locality were decisive. Hippocrates also wrote about the orientation of cities with respect to the sun. He noted that cities with an easterly aspect – between the summer and winter risings of the

sun – had healthiest residents. They suffered fewer diseases than people in cities facing in other directions; and their illnesses were less severe.² The ancient Greeks planned for the sun. A century earlier, they had severe fuel shortages. Firewood was scarce. Archaeological evidence shows they responded to this crisis by planning cities to allow every homeowner access to sunlight to warm their houses.³

Thinking such as this informed the architecture of ancient China and Imperial Rome. China has a long history of building to the doctrine of ‘wind and water’, or Feng Shui. This philosophical approach to housing and planning includes specific instructions on how to design for health and well-being. Traditional Chinese courtyard or quadrangle houses embody many of the principles of Feng Shui.^{4,5} Some of the same features could be found in the best Roman villas: high levels of natural ventilation; plenty of light; and a radiant

underfloor heat source. Like the Chinese, the Romans adapted their buildings to the local climate. In colder regions, they oriented them to benefit from winter sun and to avoid summer overheating.

Often the site for a dwelling, or a public building, or a city, was carefully chosen for its health-giving properties. During the 1st century BC, Marcus Vitruvius Pollio, the Roman military engineer and architect, wrote that the careful siting and design of buildings, such as theatres and temples, prevented illness. Also, proper street planning could help the cure of chronic illness, such as tuberculosis.⁶ For Romans like Vitruvius, protecting the ordinary citizen and the army from disease was a priority. The Roman statesman Marcus Tullius Cicero famously wrote that ‘*Salus publica suprema lex*’, or the health of the people is the highest law.⁷ Presumably, this is why the Romans invested so heavily in aqueducts, piped water, sewerage, public baths and lavatories. The Romans do not seem to have built many hospitals, other than for their military. And they put public health in the hands of their engineers and architects, not doctors.

HOUSING AND HEALTH

In Europe, the practice of planning for health was largely abandoned from the Middle Ages until the early years of the 19th century. The very wealthy sometimes commissioned architects who had an understanding of the influence of locality, climate, ventilation, and daylight on health. But cities built to prevent disease were the exception. Medical thinking had changed. Personal and environmental

hygiene was less important than it had been. Eventually, the laying out of towns and buildings with due care for health re-emerged. This was in response to the squalor, disease and political unrest in the new towns and cities of the Industrial Revolution. Leading figures in the movement for sanitary reform, such as Florence Nightingale and Edwin Chadwick, advocated health promotion, rather than curative medicine. They campaigned for closed drainage and sewerage, clean water, garbage collection and public baths. They also called for improvements in housing and hospital design. Like Vitruvius, Florence Nightingale believed good design could shorten the course of diseases. In her *Notes on Nursing*, she identified five basic requirements for securing health in houses: pure air; pure water; efficient drainage; cleanliness; and light – especially sunlight.⁸ Her concept of public healthcare centred on housing rather than hospitals. In her view, good housing was a better investment than hospital construction:

*“...in all European countries, more sickness, poverty, mortality and crime is due to the state of our poor men’s dwellings than any other cause. And I would rather devote money to remedying this than any institution.”*⁹

Eventually, town planning and good housing were seen as key to improving public health. But there were competing ideas as to how to plan and build for this. Some social reformers saw Britain’s Garden Cities as the solution. Others rejected the gabled cottage style of Bournville Village and Port Sunlight for a more functional,

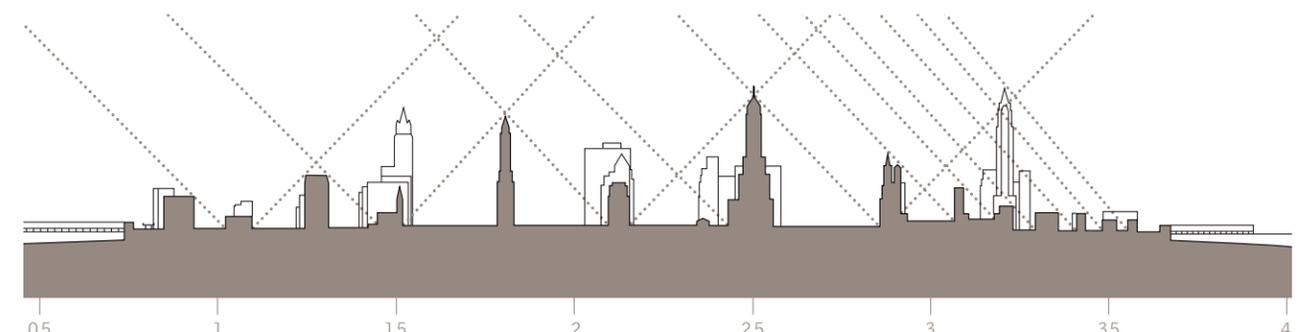
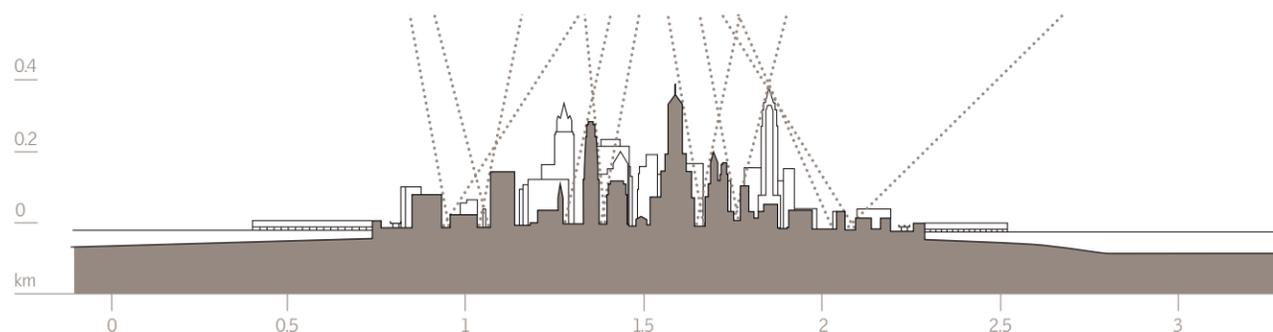
more modern approach. A great failing of architecture and planning in the years that followed was a reluctance to learn from the experience of others. The ring of new towns built around London after the Second World War illustrates the point. The aim was to move half a million people from the poorer parts of the capital to live in healthier, self-contained communities. One of the first of these projects, at Harlow in Essex, was planned to this end. Among other features, it had one of the first large sports centres in England, and its own golf course. Harlow was successful by the standards of the time. One indicator of this was the fall in infant deaths. Between 1961 and 1975, the infant mortality rate in Britain fell from 21.6 to 15.7. In Harlow it fell from 20.6 to 9.0. The mental health of the residents improved too. Careful planning and better housing had raised the health of an industrial working-class community to the level of wealthier middle-class suburb. Years later, a doctor who

“The problem is that the bulk of what is being built today, which could stay with us for hundreds of years, may have even more negative impacts on the urban communities they are designed to serve than the ones built by the well-intentioned social reformers of the last centuries.”

Ricky Burdett and Philipp Rode: *Living in the urban age*. In: *Living in the endless city* (2011).

Comparison drawing showing a section through Manhattan (above) and what it would theoretically look like if all the buildings were spaced according to the building codes of Vienna, Austria.

(Source: Manfred Berthold, TU Vienna)



"The natural world appears to abound with examples of arrangements based in some measure on exposure to the sun. [...] Observations of the modern built world reveal that we have not usually followed nature's example in this regard. Our cities are non-directional. Our buildings are undifferentiated by orientation to the sun. They stand static, unresponsive to the rhythms of their surroundings."

Ralph L. Knowles (1981)

was a member of the design team recalled how he mistakenly thought Harlow would serve as a model for all later new towns. Instead, to his surprise and dismay, the design was roundly criticised: *'It was an autocracy; it was over-planned; it was under-planned; it was too diffuse; it had too few flats; it had too much green space; it was unoriginal; it harked back to the past; it was not towny enough; the main traffic arteries should have been built up; it needed a "grid-iron" pattern for its streets; it was – in the final condemnation – a "first generation" new town. So the smart young planners went ahead and produced the horrors you can see in all too many of the second and third generation new towns. Every error that we had carefully avoided was perpetuated elsewhere with a flourish for its great originality. Tower blocks, we had shown, were suitable for 5% only of the population; the new city planners provided them for 30, 40, or 50%. And when these failed, they banned them altogether.'*¹⁰

PLANNING FOR HEALTH

As the slums in industrial towns and cities of Europe and North America were cleared, and living conditions improved, the threat from infectious disease receded. The harmful effects of bad housing were not as obvious as they had been. The link between housing and the health of the public became less direct. By the second half of the 20th century, the idea that a building could promote health, rather than simply prevent disease no longer informed the design process. In many countries, national policies on health and the built environment separated, and now have different aims. Government guidelines and standards often place more emphasis on the environmental impact of buildings than on improving the well-being of the people inside them. And developers and property investors have not always put occupants' welfare first. Meanwhile, health policy is now largely directed towards treating disease rather than preventing it. Within health care services, poor housing does not feature prominently. Until recently, building design, housing improvement and town planning were not regarded as health interventions in themselves. And indoor health is not the priority it once was.

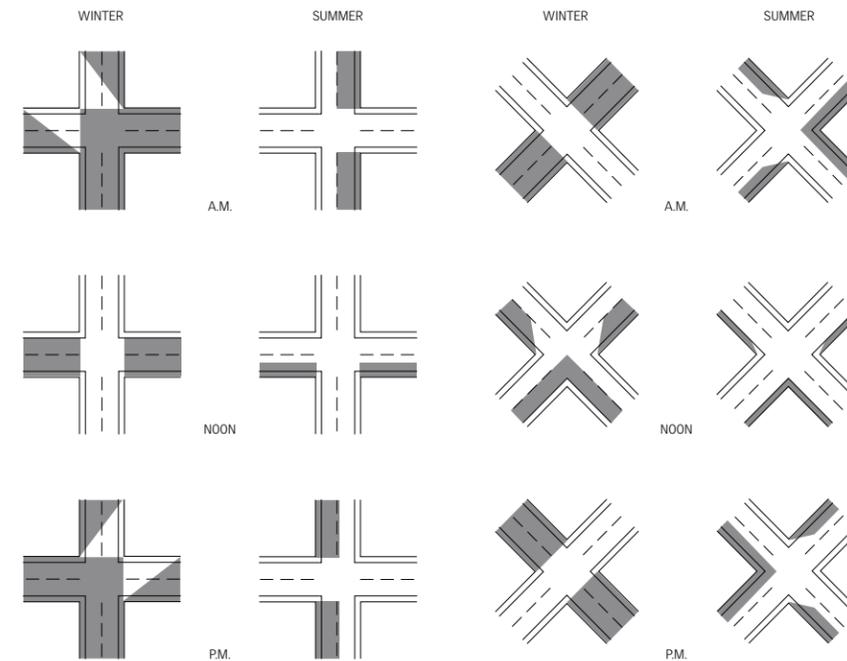
There is growing concern about the levels of pollutants in modern buildings; many of which are sealed and conditioned.

Current codes and standards specify environments that minimise discomfort. Yet there is no scientific evidence that this has health benefits. Indeed, a neutral, closely controlled environment may compromise well-being over the longer term. Designing for comfort in this way runs counter to a basic principle identified by Florence Nightingale and others. Historical and scientific evidence suggests that for health, indoor conditions should follow those outdoors. Building occupants should not be isolated from natural changes in humidity, temperature and light levels in the way that many of them now are.

CITIES AND THE SUN

If we turn to today's cities, some of them provide all of their residents with clean water and sewerage. Many do not. Those that do often follow the western model of urban living, in which the motor car predominates. Roads and highways cut through urban centres, improving traffic flow by keeping vehicles separate from pedestrians. When not in their cars, city dwellers spend most of their time indoors. They may not be troubled by the illnesses endured by people living in slums - diarrhoea, tuberculosis, measles, diphtheria and the rest. But they are at risk of diseases brought on by sedentary indoor lifestyles. On average, people now spend about 90 per cent of their time indoors. And one thing they do not see much of is sunlight. An experiment from the 1990s confirms this. Scientists fitted light detectors to the head and wrists of volunteers in San Diego, California. Measurements showed they were only in daylight at levels greater than 1000 lux for about 4 per cent of the time. Much of the rest was at an average intensity of about 100 lux. If people living in one of the sunnier regions of the United States limit their time in bright light to this extent then those of us living further north are likely to be equally light deprived, perhaps even more so.

The sun is our external timekeeper.¹² Without the time-cues given by the sun, the underlying rhythm of the human body can become disturbed. This can cause a range of health problems. Disruption of the body's 24-hour clock has been linked to many of the diseases we now associate with urban living: depression; heart disease; diabetes; obesity; and cancer. New research shows disruption of



The orientation of streets has a significant effect on the availability of sunlight in streets. This diagram shows the shaded portions of a typical street intersection during different times of day and year, depending on its orientation. It can be seen that a street grid oriented SW/NE and NW/SE is actually better for sunlight provision than a traditional north/south and west/east grid, where a large number of streets remain entirely in the shade for long periods during winter.

the circadian clock also weakens resistance to infection.¹³

Besides being the human body's external timekeeper, the sun is its main source of vitamin D. Recent studies have found alarmingly high rates of vitamin D deficiency throughout Europe, North America, the Middle East and elsewhere. In Britain rickets, the classic bone disease of vitamin D deficiency, is resurgent. In Australia, such is the concern about vitamin D deficiency and poor bone quality, there has been a reversal in public health policy. People living in some Australian states are now advised to go out in the sun rather than avoid it. Research now shows that in addition to bone mineralisation, vitamin D is fundamental to the functioning of the immune system, the brain, to physical strength, balance, resistance to infection and so on. Unfortunately, getting out into the sun to make vitamin D, or synchronise our body's biological rhythms, can be difficult in the developed world. Buildings are not as open to the sun as they used to be. And neither are towns and cities. In practice, it is the orientation of the buildings within it; and how much sunlight each one gets. If the streets are not lined up for the sun then little else is. It seems Australia's buildings are not.

The Chief Health Officer of Victoria recently published guidance on the subject entitled *Vitamin D & the Built Environment in Victoria: A Guideline for Planners, Engineers, Architects & Policy Makers in Local & State Government*. This illustrates the extent to which public health policy, building regulations and planning laws have underestimated the importance of the sun in promoting health.

NEW DISEASES, NEW CITIES

Over the past half-century, thanks to antibiotics, bacterial infections have been amenable to treatment. And it is fair to say that people in the developed world have become more complacent about infectious diseases than they would have been a hundred years ago. One consequence of this more relaxed attitude is that there has been less emphasis on fresh air, light and cleanliness in buildings than there was during the pre-antibiotic era. Unfortunately, worldwide there is now an epidemic of antibiotic resistance. And the development of new antibiotics has stalled. The 'golden age' of antibiotic therapy may soon be at an end. In 2011, the World Health Organisation warned the situation had reached a critical point. If no action was taken, '...the world is heading towards a post-antibiotic era, in which

many common infections will no longer have a cure and, once again, kill unabated.¹⁴ To compound the problem, over the last three decades outbreaks of new viruses and other pathogens have become more common. So infectious diseases are set to become more of a public health issue in the developed world than they have been. And many of them, such as avian influenza, SARS and drug-resistant tuberculosis, are diseases of the indoor environment.

Modern buildings and modern cities are not planned to prevent infections spreading. For example, sunlight is the principal natural disinfectant in the environment. It kills bacteria, viruses and fungi that might otherwise infect us. The citizens of Imperial Rome had right-to-sunlight legislation. By contrast, few countries today can claim to be as advanced in this respect. The Romans took the view that it is more effective to prevent diseases than to treat them. Florence Nightingale believed buildings should promote health, not merely prevent disease. In the past, architects, engineers, city planners and politicians worked together with this in mind. There is evidence that some of their work greatly enhanced people's physical and emotional well-being. In the 21st century, it should also be possible to create sustain-

able towns and cities that have a positive influence on health. While there will be opportunities for innovation, it would be unfortunate if the lessons of the past were overlooked.

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In the early days of North American high-rise architecture, there were vigorous discussions on the effects of high-rise buildings on sunlight provision in cities. This diagram was drawn by Boston Architect William Atkinson in 1909 to prevent the construction of a 300-foot tall building in the city. It shows the shadows cast by the tower at different times of day during midwinter solstice.

