Future health
Sustainable places for health and well-being

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Introduction

It is widely recognised that the design of the environment affects the healing process. Evidence shows that design can affect patient health outcomes, staff recruitment and retention, and even the effective provision of care.[1] Recently in the UK, major investment in healthcare buildings has resulted in new hospitals, diagnostic and treatment centres and integrated community settings for primary health and social care. Healthcare is in a period of rapid transition as a result of the UK's ageing population, higher public and policy expectations, technological advances affecting medical procedures and information systems, and the demand for more effective care. The need for the built environment to provide safe, effective and high-quality places that can adapt to changing care delivery patterns has never been as clear.

The value of the physical environment in promoting and improving public health is now better understood. With this have come calls for the planning process to support healthy lifestyles through healthier cities and neighbourhoods. Evidence increasingly suggests that the wider environment can reduce stress, encourage exercise and promote good health. In England alone, obesity and physical inactivity cost the country £2.5 billion and £8.2 billion respectively.[2] By contrast, regular physical activity contributes to the prevention of more than 20 conditions including coronary heart disease, diabetes, certain types of cancer, mental ill-health and obesity.[3] Active transport, provision of good public open space in which to exercise and opportunities to foster social cohesion are all factors that should be considered in the planning and design of the built environment.

Within this context, a sustainable planning approach that takes into account the influence of environments on health is urgently needed. There is, for example, considerable potential for the design of the built environment to minimise the effects of climate change. The construction and use of the UK's built environment infrastructure currently accounts for around 50 per cent of national carbon emissions[4] and 1 per cent of total global emissions.[5] The NHS, with the largest property portfolio in Europe, contributes 3 per cent of the UK's total CO_2 emissions,[6] and the NHS Carbon Reduction Strategy (2009) sets goals for the NHS to lower CO_2 emissions in line with government targets on climate change. The Sustainable Development Commission has also articulated how NHS organisations, locally and nationally, have a responsibility to be 'good corporate citizens.'[7]

This report explores how the design of the built environment can help to deliver three key policy objectives: modernising healthcare, addressing health inequalities through lifestyle changes, and creating healthy, sustainable development. Whilst each of these is a specialist topic in its own right, here we focus on the potential for design to address them together. We conclude that this design focus can produce additional benefits. A single design intervention can address the requirements of more than one of these policy objectives: for example, locating services in the community with good transport connections makes services more accessible, reduces CO_2 emissions and provides integrated community services and activities. In this way, the design process can be a catalyst for policy change as well as practical improvements to the built environment.

1   Ulrich, R. & Zimring, C. 2004: *The role of the physical environment in the hospital of the 21st century: A once-in-a-lifetime opportunity*, Center for Health Design, Concord, California
2   Natural England 2009: *Headline Facts: The cost of obesity and physical inactivity* [online]. cabeurl.com/2n
3   Department of Health 2005: *Choosing Activity: a physical activity action plan,* Cm 6374, London, Department of Health. cabeurl.com/2o
4   Department for Business, Enterprise and Regulatory Reform, Communities and Local Government, Department for Environment, Food and Rural Affairs, Department for Culture, Media and Sport & Strategic Forum for Business, 2007: *Draft strategy for sustainable construction: a consultation paper.* cabeurl.com/88
5   This figure is based on emission estimates published by Defra (2008), which calculates the UK's contribution to global carbon emissions as approximately 2 per cent (cabeurl.com/8q). However, this figure has been challenged by Christian Aid (2007) which claims that exported consumption, in the form of the international activities of UK companies, means that the UK's real impact on global carbon emissions has been underestimated. Christian Aid claims that a more accurate figure would actually be around 12-15 per cent of the global total (cabeurl.com/8r).
6   NHS Sustainable Development Unit 2009: *Saving Carbon, Improving Health: NHS Carbon Reduction Strategy for England*, Cambridge, NHS SDU. cabeurl.com/6e
7   Sustainable Development Commission & NHS Sustainable Development Unit, 2009, *Are you a good corporate citizen?* Cambridge, NHS SDU. cabeurl.com/8j

Recommended readership

This document will be useful to those who can affect health outcomes or who shape environments that affect health and well-being, including:

Policymakers:
- those deciding national, regional and local policies for health, well-being and sustainable environments.

Commissioners of healthcare:
- health trusts that respond to the health requirements of local populations.

Providers of healthcare and of environments that impact on health and well-being:
- acute and primary healthcare trusts and their estate divisions
- project managers who deliver building or refurbishment projects within the healthcare estate
- local authority planners who influence the quality of the public realm.

Suppliers of healthcare environments, and environments that impact on health and well-being:
- designers and building and estates managers.

Why health and why now?

As the largest employer in the EU, the NHS has considerable reach and impact (see Appendix 2, iv, *The size and influence of the NHS*). It has the potential to strategically lead the actions necessary to co-ordinate policy and developments for healthcare, well-being and sustainability: an approach that resonates well with the NHS ethos of promoting health and well-being in the whole population. At the same time, there is growing recognition of the way our environment affects our health and well-being, with the spatial planning system now acknowledging the long-term impacts on quality of life and lifestyle factors. Local authorities and healthcare trusts are working together more closely to achieve the positive, long-term outcomes for health that result from action taken today.

How to use this document

Chapter 1 outlines the challenges to our health and well-being, and the role played by the design of planned environments and climate change mitigation. It also explores the commonalities between well-designed, therapeutic environments, improving health outcomes and the sustainability agenda.

Chapter 2 looks at the added benefits of good design at the scale of region, city, neighbourhood and individual developments, illustrated with case studies and pointers for action.

Chapter 3 looks at what needs to change; it examines the assets at our disposal as well as the constraints to be overcome in order to achieve the maximum effect through investment in, and management of, buildings and environments.

Appendix 1 outlines the methodology used in bringing together this material.

Appendix 2 provides background material that quantifies some aspects of the report. A separate document, *Future health: further reading*, lists wider toolkits and key documents and is available on request from CABE.

Appendix 3 summarises useful toolkits. It also describes organisations that are sources of information to help people move from the overview in this report to material that can help in specific situations.

Appendix 4 lists a bibliography of reference works.

Chapter 1
Challenges and opportunities for our health, well-being and environment

Our view of health is changing to encompass a social as well as a medical model. The social model includes changes that can be made in society and in the lifestyles of individuals to make the population healthier. Illness is beginning to be defined from the point of view of the individual's functioning within society in addition to monitoring biological or physiological signs. In other words, good health is determined not simply by access to medical care, but by a range of factors, some of which are closely related to the quality of the physical environment.

Defining health

Overall life expectancy for the UK population is improving. On average, people live 12 years longer than when the NHS was established in 1948.[8] Disability-free life expectancy has increased for males from 60 years in 2000-02 to 78 in 2008 and from 63 to 82 for females in the same period.[9] Medical advances account for much of the increase in life expectancy. However, the ageing population, rising levels of obesity and associated health conditions, burgeoning pools of chronic disease, and growing consumer expectations mean that the health service faces needs and demands for healthcare that are ever-increasing and ever-changing.[10]

Not just absence of disease

The constitution of the World Health Organisation (WHO) defines health not only as the absence of disease or infirmity, but also as 'a state of complete physical, mental and social well-being.' It emphasises that people should enjoy the highest attainable standard of health, saying it is 'one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition.'[11] WHO's statement gives an egalitarian impetus to inform our approach to tackling health issues, one that is standard practice within clinical and health-related professions in the treatment of illness or infirmity. It also highlights the fact that health is about the whole person, mentally and physically, and touches on societal influences which we know affect health and health inequalities.

'A positive physical, social and mental state'

The Department for Environment, Food and Rural Affairs (Defra) defines well-being as: 'a positive physical, social and mental state; it is not just the absence of pain, discomfort and incapacity.'[12] This illustrates the breadth of the concept and relates closely to the WHO definition of health.

Some health problems are longer term, for example, one in four people are affected by mental health conditions.[13] Prevention of ill-health, both physical and mental, is crucial in developing a holistic approach to tackling long-term health issues. This holistic view of health has been steadily gaining recognition and is reflected across academic, political, clinical and health-related fields. It is an approach that sees health and well-being as interdependent; it holds 'prevention' as important as 'cure', and looks for long-term solutions rather than more immediately attainable treatments. It is, however, very difficult to quantify; rather, well-being is a concept implicitly understood and appreciated. Across the board, the term 'well-being' is used together with 'health' as a means of expressing what might formerly have been understood as 'public health', within contexts ranging from work, to leisure, to health and safety. As a population's health and well-being are vital elements worthy of investment in any well-functioning society, contributing factors such as planned environments must be understood as fully as possible.

8   For those born in England and Wales in 1948, the average life expectancy was 66 years for men and 70 years for women. The 2008 figures for those born in England and Wales are 78 for men and 82 for women, a difference of 12 years (Office of Health Economics 2009: *Sixty Years of the National Health Service*. cabeurl.com/2s)

9   Office for National Statistics 2008: *UK residents are living longer in good health*, London, ONS. cabeurl.com/5n See also Sustainable Development Commission 2008: *Health, place and nature: How outdoor environments influence health and well-being: a knowledge base*, London, SDC. cabeurl.com/5o

10 Chief Medical Officer 2009: 'The great survivor: another 60 years'. In *New Statesman*/Pfizer supplement, The Future Direction of the NHS. 9 February 2009. cabeurl.com/8d

11 World Health Organisation 2001: *Fifty-fourth World Health Assembly,* np, WHO. cabeurl.com/5p

12 HM Government 2009: *Sustainable Development: Creating sustainable communities and a fairer world* [online]. cabeurl.com/2t

13 World Health Organisation 2001: *Mental disorders affect one in four people* [online]. cabeurl.com/82

1 Modern healthcare: more than hospitals

In tandem with these changing perceptions of health and well-being, the provision of modern healthcare is undergoing a fundamental change as a result of more integrated strategic planning on the part of healthcare providers and professionals. This is affecting the type of services offered, how care is provided and the settings in which it takes place.

Whilst predicting future trends comes with great uncertainties, particularly in relation to technological advances, it is likely that the pace of change will be faster than before. This section looks at the changes that can be detected in the health landscape, which in turn will affect the delivery of care.

Improving health outcomes

One of the main challenges for the future is for care to be planned strategically across the whole system, and in far closer integration with other services. Other challenges to which this new strategic delivery of services has to rise in order to improve health outcomes include societal influences upon health, the expectations of patients, and the changing expectations of health professionals.

Social changes
Social changes affect both how health services are beginning to be delivered – that is, more strategically and collaboratively – and perceptions about health and staying healthy. They include:

1 Greater understanding of health impacts
Research demonstrates the need to address negative impacts from environmental factors such as food of low nutritional value, poor air quality and lack of opportunity for exercise.

2 Changing nature of disease
The effects of unhealthy eating and lack of exercise place a growing burden on health, as do smoking and excessive alcohol consumption, which are often the results of socio-economic inequalities and poor lifestyle choices. Preventative approaches to these factors need not be limited to publicity campaigns; modifying and improving the quality of our surroundings can encourage and enable healthier behaviours.

3 Profound demographic change
Older people now make up the fastest-growing group in the UK population. In 2007, 9.8 million people were aged over 65, and by 2032 this figure is projected to rise to 16.1 million, equivalent to almost one in four of the population. At the same time, numbers of the 'oldest old' (people aged 85 and over) will more than double, rising from 1.3 million in 2007 to 3.1 million in 2032.[14] Longer survival rates come with a higher likelihood of co-morbidities, coupled with the hazards of frailty. These will need to be met with forward-looking designs that identify and mitigate health risks. On a general level, however, the advantages associated with more inclusive and accessible environments can be life-enhancing for all.

14 Office for National Statistics 2008: *Benefits and challenges of an ageing population*, London, ONS. cabeurl.com/5q

Patient expectations and cultural change

As the consumer- and user-focused culture gathers strength, patients will be making demands on the quality, context and accessibility both of services and of the environmental components that encourage good health. This will be heightened by the generally older demographic of the service-user base, and can be summarised as follows:

1 General user awareness

As awareness is raised about personal responsibility for health, many patients now expect to receive more personalised care, tailored treatment and to play a greater role in taking decisions about their care.

2 Demands of an information society

With increased access to information through the internet, people expect reliable, evidence-based information about their health and their treatment. New techniques for healthcare provision will be developed to exploit communications technologies. This will require changes in both professional training and in places where healthcare is accessed.

3 Rising standards of environments for care

Patients are looking for greater privacy and dignity, such as single bedrooms, welcoming ambience with ease of access, controllable lighting and temperature, reduced noise and views onto attractive external spaces. More hospitality services, such as cafés and shops, and accommodation for relatives and visitors, are also expected. Healthcare buildings have to be designed in response to such demands and so that such changes can be accommodated over time.

Staff expectations

The impact of service standards rests to a great extent on how staff work and how they are facilitated in what they do.

1 A changing workplace

Healthcare professionals expect the organisations they work for to provide high-quality care. They want healthy and efficient workplaces that enhance the well-being of patients as well as themselves, allowing convenient and rapid access to medical expertise.[15]

2 Innovation in delivery

While acute hospitals offer increasingly sophisticated and effective treatments, there is also a policy drive to shift less demanding care closer to the home, and to integrate it with other community services.

3 Improving staff recruitment, retention and effectiveness

Research tells us that the impact of workplace design is significant enough to affect productivity, attachment to the workplace and levels of staff retention (see below).

The user experience: how do therapeutic environments work?

Academic research into the therapeutic effect of environments shows how their design can affect health outcomes for patients and improve the performance of staff. A series of investigations into the impact of factors integral to the design and planning of a hospital – and these principles apply in their own way to primary care buildings – are:

- **Views seen by a patient:** Views visible from a hospital bed can have an effect on the already vulnerable state of a patient's health. 'Notable evidence of negative effects of windowless healthcare environments on outcomes has emerged from studies of critical-care patients. Studies have linked the absence of windows in critical or intensive care with high rates of anxiety, depression, and delirium relative to rates for similar units with windows.'[16] 'Comparisons between patients who had a view out onto a brick wall with those who overlooked natural landscapes showed significantly longer post-operative stays amongst those with poor views'.[17]

- **Noise levels and acoustics:** High noise levels have been found to increase perceived stress levels in staff, and bring about anxiety and sleeplessness in patients.[18]

15 Imison, C. 2008: *Future Healthcare Trends* (PowerPoint presentation, The King's Fund)
16 Ulrich, R. 2000: *Effects of healthcare environmental design on medical outcomes, Design & Health: The Therapeutic Benefits of Design*. Proceedings of 2nd International Congress on Design and Health, Karolinska Institute, Stockholm, Sweden, pp. 51, 52
17 CABE 2002: *The Value of Good Design,* London, CABE. cabeurl.com/5r
18 Ulrich, R. 2000: *Effects of healthcare environmental design on medical outcomes, Design & Health: The Therapeutic Benefits of Design*. Proceedings of 2nd International Congress on Design and Health, Karolinska Institute, Stockholm, Sweden, pp. 51, 52

- **Exposure to natural light and its daily rhythm:** Natural light has been found to be immensely beneficial as 'a powerful regulator of the circadian system and [stimulating] increases productivity, alertness and health and safety of patients and care givers'.[19]

- **Privacy and dignity:** The presence of other patients in multiple occupancy rooms is seen as a major source of perceived stressors such as loss of privacy.[20]

Well-designed environments have a positive effect on healthcare staff. As part of a research project, *The role of hospital design in the recruitment, retention and performance of NHS nurses in England* (2004), CABE sought to determine whether the workplace environment influenced nursing staff. Although issues such as pay and responsibility were more important, the results showed that the workplace environment does influence nursing staff and can influence an individual's decision about where to work. Comments from health staff included:

A hospital that looks modern and clean will attract staff. If you have a dingy looking concrete structure, that will turn you off working there.

When people come into one of the areas which I manage, they comment that they don't think it looks like a clinical area. This is a bonus.

The environment can reduce violence and abuse against staff. The way hospitals are built should reduce noise. It is at night-time that most problems occur when patients are trying to sleep.[21]

The design of many hospitals and health buildings now recognises that the quality of the patient and staff environment is a main driver for efficiency in terms of health outcomes, staff performance and integrated service delivery.

Appendix 2, vi gives more details of research into the effect of environments on health and table 3 summarises the relationship between design factors and healthcare outcomes. The benefits extend beyond hospitals; section 2 in this chapter illustrates how the wider environment can have long-term positive benefits, such as the effect on physical activity, and on stress levels of the proximity of green spaces and contact with nature.

Where are services planned within communities?

Some of the care traditionally provided by acute hospitals can now be provided in facilities closer to home, such as treatment and resource centres and community hospitals. Routine diagnostic procedures and simple treatments are undertaken in community locations and many chronic diseases are now managed in GP surgeries and at home.

There are ongoing efforts to improve the quality and effectiveness of the provision of care, and to transform the way care is organised through patient pathways from home to hospital and back. More efficient care delivery means bringing care to the patient in one place at one time, for example, the 'one-stop shop' approach to diagnosis and treatment.

For primary healthcare and community services, the type and size of facilities are expanding and there is greater integration with services such as social care, leisure, sport, housing advice, police and community development. Integration is encouraging new networks of care across all health sectors and with other public and voluntary services. These buildings have great potential to become a focus for public services for local communities.

In this new landscape, health is not planned in isolation, but by the health sector and local authorities tackling desired outcomes together. It takes account of the wider planning environment and improves the shape of neighbourhoods to meet long-term health needs.

19 Simenova, M. 2004: Healthy Lighting for the Visual, Circadian and Perceptual Systems: *Business Briefing: Hospital Engineering & Facilities Management*, *Report 3, Touch Briefings*, London, pp. 99-102
20 Ulrich, R. 2000: *Effects of healthcare environmental design on medical outcomes, Design & Health: The Therapeutic Benefits of Design*. Proceedings of 2nd International Congress on Design and Health, Karolinska Institute, Stockholm, Sweden, pp. 51, 52
21 CABE 2004: *The role of hospital design in the recruitment, retention and performance of NHS nurses in England*, London, CABE. cabeurl.com/5s. See also Appendix 2, vii, table 4.

Location of facilities

Accessibility is crucial for people to reach services, yet the location of healthcare facilities is often a barrier in itself. According to the Department of Health, during a 12-month period, 1.4 million people miss, turn down or choose not to seek medical help because of transport problems.[22] The layout of urban and suburban environments and patterns of regional distribution of healthcare services clearly play a major part in the ease of access to services. Poorly planned environments and poorly located facilities can affect health. The effects of poor design or location may be difficult to recognise during the planning phase, but they continue long after design and completion.

The choice of site for new services is key to satisfying rising patient expectations of accessibility and quality of care. Issues such as site ownership and availability often impact negatively on access and therefore on health inequalities. CABE's 2008 sample survey of primary care buildings, completed under the local improvement finance trust (LIFT) programme, found that the sites selected were frequently 'owned by the health sector or the local authority and were expendable in terms of their use, or were not wanted by anyone, or not always appropriate for the designated use.'[23]

The opportunities for locating care where it is accessible depend on planning across the whole system, from individual buildings to whole geographical areas, and in close integration with other services. Crucial to the accessibility and efficiency of services are:

- communication between agencies so that services are co-located wherever possible and necessary
- appropriate choice of site and appropriate size of development for services envisaged, with health integrated within the urban form alongside other local amenities wherever possible
- proximity to pedestrian and cycling routes, and public transport.

An ongoing investment

An extensive investment programme has resulted in new hospitals, GP surgeries and other healthcare buildings, many of which have excellent features (as illustrated in the best practice examples of this report).

However, with capital investments slowing down, even modern buildings need modification to reflect advances in healthcare and changing circumstances. Investment to refurbish existing stock is becoming increasingly important to bring facilities up to date and up to expected sustainability standards.

Frequently, within both new and existing facilities, the longer-term benefits of patient well-being and high-calibre healthcare environments are regarded as outside the core priorities of meeting treatment targets. Unfortunately, the value of investing in longer-term outcomes is relegated due to immediate cost concerns. Community Health Partnerships (CHP) addresses this issue of value for money in its 2008 publication subtitled *How to Achieve Value for Money in Health and Social Care Infrastructure*.

> *Sometimes, high expenditure can be good value if it yields a higher benefit per pound than, say, an alternative that requires lower spending. Understanding this issue does not necessarily make matters any simpler. Calculating value gained from health spending is, in any case, notoriously difficult… healthcare is an 'intermediate good' – its value is not intrinsic. Its real value depends on the impact that the healthcare has on the health and well-being of beneficiaries.[24]*

Attention is required at every stage to understand the values being sought and to recognise which options provide those values to the highest level.

Value for money makes most sense in health terms when considered as the long-term value to be gained from careful investment in the right areas. The environmental levels across which long-term value operates can be defined as:

- quality of the environment where care is provided
- location of services
- performance of facilities in supporting effectiveness, safety and efficiency of services.

22 Department of Health & Neighbourhood Renewal Unit 2005: *Creating Healthier Communities: a resource pack for local partnerships.* cabeurl.com/2u
23 CABE 2008: *LIFT Survey Report,* London, CABE. cabeurl.com/5t
24 Community Health Partnerships 2008: *Firm Foundations for World Class Commissioning: How to Achieve Value for Money in Health and Social Care Infrastructure*, London, Community Health Partnerships. cabeurl.com/5u

2 Well-being, positive lifestyles and the planned environment

Well-planned environments can help the health service provide improved care. In a similar way, the wider environment can help improve long-term health and well-being.

The impact of unhealthy environments

Health inequalities are persistent, stubborn and difficult to change.[25] But even some of the UK's most pressing health challenges – such as lifestyle-induced obesity, childhood asthma and the ageing population – can be mitigated by the quality of our everyday environments. In other words, the considerate design of spaces and places can help to alleviate, and even prevent, poor health or physical restrictions.

The Commission on the Social Determinants of Health, in its summary of evidence for the *Review of Health Inequalities in England post-2010*, argues that:

> *The lived environment – urban settings, neighbourhoods, communities – are critical in that they can both promote or inhibit access to goods and services, social cohesion, physical and psychological well being and the natural environment. Health related outcomes as diverse as obesity, depression and injury through violence or accident can all be linked to the way we live.[26]*

For example, because our environments do not always offer the opportunity to weave physical activity into our daily lives, it is not surprising that walking and physical activity levels generally are decreasing among children and adults. US research specifically links this to the quality of the built environment[27], and there are transferable lessons for the UK. Services are frequently too far away or inaccessible other than by car, and the quality of open space in neighbourhoods may discourage residents from enjoying it for exercise.

Below are some of the most pressing challenges in terms of health inequalities, and examples of where the planned environment can play a role.

- **Although 20 per cent of the population are obese, and two-thirds morbidly so, the NHS cannot provide detailed clinical services or intensive clinical services for all of them.**[28]

25 Department of Health 2009: *Tackling Health Inequalities: 10 Years On*, London, Department of Health. cabeurl.com/5v
26 Commission on the Social Determinants of Health, 2009, *Summary of Evidence for the Review of Health Inequalities* Annex 2: Evidence from the Commission on Social Determinants of Health. cabeurl.com/5w
27 Lopez, R. P. & Hynes, H. P. 2006: Obesity, physical activity, and the urban environment: public health research needs, *Environmental Health: A Global Access Science Source* 5 (25). cabeurl.com/5x
28 House of Commons 2004: *Third Report of the House of Commons Select Committee on Health* [online]. cabeurl.com/5y

The UK now has the highest obesity levels in the EU.[29] Nearly a third of our population is obese, and if current trends continue nearly 60 per cent are predicted to be obese by 2050. This would mean more than quadrupling current UK spending on treating obesity-related illness (from around £10 billion to £45.5 billion at today's prices).[30] **The means of getting to work, school, or to local services provide an important opening to weave everyday physical activity into our lives and to combat obesity levels.**

- **In terms of respiratory disease, the UK has the highest rates of childhood asthma in the world**, with one in eight children currently being treated for the condition.[31] Again, the costs to the NHS are high; the estimated annual drug cost for asthma to the NHS in England and Wales in all age groups is approximately £115 million, of which £8 million is on children under the age of five.[32] Research has shown a clear correlation between asthma and the levels of nitrogen oxide (NO_2) in air pollution caused by traffic near the home, which results in repeated hospital encounters.[33] **Reliance on car use — and environments focused on car use — are driving up noxious emission levels, resulting in some of the worst rates of asthma worldwide.**

- **In terms of an ageing demographic, the UK has more people over 65 than under 16 for the first time ever, and the elderly population is set to grow.**[34] This places increasing importance on the accessibility of services and the ease with which older people can move around their neighbourhoods. As we grow older, the neighbourhood becomes an increasingly important factor in the quality of everyday life. Communities and Local Government notes in its 2008 guidance *Lifetime Homes, Lifetime Neighbourhoods* that when local shops, local services or the local park or leisure centre are inaccessible or even dangerous, older people can literally be trapped in their own homes without the confidence or opportunity to get out, make friends or get the help they need.[35] Problems in accessing health services among the over-75s is of particular concern.[36] **Health complications in terms of both physical and cognitive decline become greater with age, and opportunities for both daily exercise and interaction with the community come about with improved accessibility around neighbourhoods and to local services.**

The design and quality of the built and open environment and the siting of buildings and services have a fundamental impact on the health and well-being of communities. So what steps can be taken to use the planned environment to work towards tackling health inequalities?

Physical exercise

As discussed above, lack of exercise is a key factor in the epidemic of obesity apparently developing in the UK. Maintaining physical activity levels helps to avoid cognitive decline in later life; as the World Health Organisation highlights, physical activity is likely to reduce many of the psychological and social hazards that often arise with age. 'Mental illness, particularly depression, Alzheimer's disease and feelings of loneliness and social exclusion, [are] lower amongst people who are physically active.'[37]

Active travel
Research on commuting suggests that those who walk or cycle to work are significantly negatively associated with being overweight and obese.[38] So active travel plays a key role in combating obesity and makes it easier for people to undertake the recommended 30 minutes a day, five days a week of moderately intense physical activity.

29 Sustainable Development Commission 2008: *Health, place and nature: How outdoor environments influence health and well-being: A knowledge base*, London, SDC. cabeurl.com/5o

30 Foresight 2007: *Tackling Obesities: Future Choices—Modelling Future Trends in Obesity and Their Impact on Health*. cabeurl.com/8g

31 Medical News Today 2009: *Traffic-Related Air Pollution Linked To Repeated Hospital Encounters For Asthma*. cabeurl.com/89

32 National Institute for Health and Clinical Excellence, 2008: *NICE issues guidance on inhaler systems for under 5s with asthma* [online]. cabeurl.com/8n

33 Edwards, J., Walters, S. & Griffiths, R. K. 1994: Hospital admissions for asthma in preschool children: Relationship to major roads in Birmingham, United Kingdom, *Archives of Environmental Health*, 49, 223-27. cabeurl.com/7w

34 Office of National Statistics 2008: *Ageing: the fastest increase in the 'oldest old'*. cabeurl.com/61

35 Communities and Local Government 2008: *Lifetime Homes, Lifetime Neighbourhoods: A National Strategy for Housing in an Ageing Society*, London, Communities and Local Government. cabeurl.com/62

36 *Ibid.*

37 World Health Organisation, 2002, *World Health Day – Move for health* [online]. cabeurl.com/63

38 Lidström, M, 2007: Means of transportation to work and overweight and obesity: A population-based study in southern Sweden, *Preventative Medicine*, 46.

Sustrans highlights that although the UK has historically invested heavily in facilitating sedentary forms of transport, the balance must now change, with investment priority being given to active, healthy modes such as walking or cycling.[39] Almost 100 organisations, including all significant UK public health bodies, have signed a policy statement – 'Take action on active travel'[40] – developed by the Association of Directors of Public Health, which recommends 'health checks' on every land-use and transport decision and the creation of safe, attractive walking and cycling paths.

Green infrastructure

Even proximity to green space[41] can play a role in how physically active people are likely to be. In its guidance on health impact assessments for green spaces, Greenspace Scotland references a study which found that in residential areas with high levels of greenery, the likelihood of residents being more physically active was more than three times higher and the chance of their being overweight and obese was about 40 per cent lower than for areas with low levels of greenery.[42]

Urban fabric

Levels of physical activity are not just dictated by the proximity of residents to green spaces; other influences include the quality of the surrounding environment, the density of residences, the mix of land uses and 'the degree to which streets are connected and the ability to walk from place to place, and the provision of and access to local public facilities and spaces for recreation and play.'[43]

Opportunities for active travel, proximity to, and quality of, green spaces, and the quality and mix of the urban fabric all play their role in determining our levels of casual and active physical activity and the associated health benefits.

Positive influences on mental health

Mood, emotion and psychological well-being are positively affected by participation in physical activity, sport and exercise, according to research.[44] It follows that the location in which activity takes place is also going to have an effect. There are numerous examples of how access to nature can work as a stress reliever. A Danish study found a correlation between the distance from home to green space and stress levels for all groups. For younger people, a similar correlation was observed between

distance to green space and obesity.[45] Access to nature can also have a marked effect on people recovering from illness. Table 1 from a study in San Francisco shows responses from people actively using hospital gardens in their recovery process.

Table 1: Effect of use of hospital gardens on recovery[46]

How do you feel after spending time in the garden?

More relaxed, calmer	79%
Refreshed, stronger	25%
Able to think/cope	22%
Feel better, more positive	19%
Religious or spiritual connection	6%
No change of mood	5%

What is it about the garden that helps you feel better?

Trees, plants, nature	59%
Smells, sounds, fresh air	58%
Place to be alone or with a friend	50%
Views, sub-areas, textures	25%
Practical features, benches, etc.	17%
Don't know	8%

143 garden users at four San Francisco Bay Area hospitals

39 Sustrans 2009: *Active travel and adult obesity.* cabeurl.com/65
40 Sustrans 2008: *Take action on active travel - Why a shift from car-dominated transport policy would benefit public health.* cabeurl.com/65
41 Greenspace Scotland, 2009: *Health impact assessment of greenspace – a guide.* cabeurl.com/30
42 Ellaway, A., Macintyre, S. & Bonnefoy, X. 2005: Grafitti, greenery and obesity in adults: secondary analysis of European cross sectional survey, *British Medical Journal* 331, 611-12. cabeurl.com/67
43 Marmot, M., 2008: *Closing the gap in a generation: Health equity through action on the social determinants of health*, np, WHO. cabeurl.com/68
44 Cavill, N. (ed.), 2007: *Building Health: Creating enhancing places for healthy, active lives. Blueprint for action*, London, National Heart Forum in partnership with Living Streets and CABE. cabeurl.com/69
45 Nielsen, T. S. & Hansen, K. B., 2007: Do green areas affect health? Results from a Danish survey on the use of green areas and health indicators, *Health and Place.* cabeurl.com/8l
46 Cooper, M. C. & Barnes, M, 2005: Healing Gardens in Hospitals, *The Interdisciplinary Design and Research e-Publication*, 1(1). cabeurl.com/8e

While there is not necessarily a correlation between one's well-being and being 'cured', it is plain that how someone feels is important to his or her recovery. Interacting with nature and natural surroundings makes people feel better, according to the study above. This is a crucial consideration for our increasingly ageing population.

The impact on health could be very great if our planned environments do not allow for access to therapeutic forms of recovery for future, frailer generations.

Public health within the planning process

The urban planning process is crucial to successful places that enhance people's quality of life. The emphasis of planning used to be on separating land uses, such as those for residential, retail, work and leisure purposes, with heavy reliance on roads and vehicular access to connect areas. That has changed with the move towards spatial planning, which recognises that the key to successful places lies in communication between services and proximity of amenities, from healthcare trusts to local transport networks.

The important role of health within the planning process has been recognised by the Royal Town Planning Institute (RTPI) and is clearly defined in its good practice note 5 (2009).[47] It recommends to planning authorities that:

- neighbourhoods should be designed to promote walking and cycling

- homes and neighbourhoods should be designed to be flexible and adaptable to meet the needs of the local community, including the needs of the ageing population

- there should be co-location and integration of services including those for health, education, social care, the arts and leisure.

In many places, healthcare trusts have joined local strategic partnerships (LSPs) with local authorities in order to tackle together health inequalities at local level and from several perspectives, including having a shared vision within their sustainable communities strategy and linking this within their local development frameworks and local area agreements (see example 1: Joining up across administrative borders to tackle health inequalities through active travel and environmental improvements on p.21).

Health needs to be a strategic planning goal within national, regional and local strategic planning. Active and sustainable movement is critical and must be captured in policy. Essential community facilities such as healthcare centres need to be located on key sites. The significant contribution to public health and well-being of green space and high-quality public spaces has to be championed.

47 RTPI 2009: *RTPI good practice note 5: Delivering healthy communities.* cabeurl.com/33

3 The sustainability link

It follows that in those areas where improvement and respect for the environment are exercised, there is potential for improvement and respect for the public's health. Government recognises the need for protection of the environment; the Climate Change Act 2008 sets out the required reduction of the UK's net carbon account for 2050 by 80 per cent from the 1990 baseline.[48] But where are the links between the sustainability targets and the benefits to our health of a holistic approach to tackling sustainability?

Effects on health of climate change and environmental degradation

Global warming from the build-up of carbon dioxide in the atmosphere has widespread effects on health. Measuring the effects of climate change can only be approximate. But a WHO quantitative assessment, taking into account only a subset of the possible health impacts, concluded that the effects of climate change that has occurred since the mid-1970s may have caused more than 150,000 deaths in 2000. It also concluded that these impacts are likely to increase in the future.[49]

Temperature and humidity fluctuations
Short-term fluctuations in weather can cause adverse health effects, as follows:

- Extremes of both heat and cold can cause potentially fatal illnesses, for example heat stress or hypothermia, as well as increasing death rates from heart and respiratory diseases.

- In cities, stagnant weather conditions can trap both warm air and air pollutants, leading to smog episodes with significant health consequences.[50]

The Department of Health, in its *Heatwave Plan* (2009), concludes that even during relatively mild heatwaves, excess death rates are significantly, but avoidably, higher:

Climate change means that heatwaves are likely to become more common in England. By the 2080s, it is predicted that an event similar to that experienced in England in 2003 will happen every year... We have already experienced in the UK some of the direct health effects of global warming, such as mortality as a result of extreme summer heat. In Northern France in August 2003, unprecedentedly high day- and night-time temperatures for a period of three weeks resulted in 15,000 excess deaths. The vast majority of these were among older people. The Office for National Statistics (ONS)

48 HM Government, 2008: *Climate Change Act 2008*, London, Office of Public Sector Information. cabeurl.com/8u
49 WHO, 2008: *Climate and Health Fact Sheet*. cabeurl.com/6b
50 *Ibid.*

reported a 4 per cent increase over baseline mortality (680 excess deaths) in England and Wales between 16 July and 28 July 2006 when compared with the average for the same period from 2001 to 2005. This may be an underestimate. This compares to an excess mortality of approximately 2,000 people, representing 16 per cent of all deaths in the August 2003 heatwave.[51]

It is essential to consider the implications of weather and temperature fluctuations when designing facilities and places meant to encourage healing and good health. For example, the *Heatwave Plan* recommends shading windows and keeping them closed when the outside temperature is hotter than inside, and opening windows when it is cooler outside than inside. Where hospital wards have sealed windows that do not open, respiratory problems may be worsened.

Another consideration is the urban heat island effect, where temperature levels in urban areas are increased by a lack of planting and shading. The Department of Health recommends strategic planning of the design of facilities and places, for example, 'cool roofs', 'green roofs' and 'cool pavements'. Creating green spaces is another option. Temperatures in and around green spaces can be several degrees lower than their surroundings (see *Urban heat islands* in Appendix 2, ii) because of evaporation and shading from trees and vegetation.

Straightforward design measures can be taken to help mitigate the effects of climate change on health, but they require strategic action, long-term thinking and shared goals.

The role of buildings and places

Transport contributes 21 per cent of total CO_2 levels in the UK, while energy from buildings contributes 65 per cent.[52] Along with emissions from fuel and heating, there is also 'embodied' energy, or the energy used in manufacturing, such as the materials used for building.

During the development of both local facilities and local spaces, there is a cumulative effect of decision-making around environmental factors, which can either make for incremental improvements in the health and well-being of the people that use them, or exacerbate problems that already exist.

The potential of the NHS to influence planning

Along with local authority planners, the NHS can exert substantial influence over the planning of buildings and the shape of neighbourhoods to achieve long-term health improvements. As the largest employer in the EU, it is not surprising that the NHS has one of the largest carbon footprints at 18 million tonnes of CO_2 per year (3 per cent of the UK's total emissions). This is composed of energy (22 per cent), travel (18 per cent) and procurement (60 per cent). Despite an increase in efficiency, the NHS has increased its carbon footprint by 40 per cent since 1990. As it recognises in its Carbon Reduction Strategy (2009), this means that meeting the Climate Change Act targets of a 26 per cent reduction by 2020 and 80 per cent reduction by 2050 will be a huge challenge.[53]

Building on mutual improvements for health and for the environment resonates well with the NHS ethos of promoting health and well-being to the whole population.

The economic incentive

As well as mitigating damage to our environment and health, there are economic incentives to acting. In its 2006 report, *The Economics of Climate Change*, the Stern Review emphasised the advantages of well-thought-through processes in reducing the risk of very damaging and potentially irreversible impacts on ecosystems, societies and economies. 'With good policies the costs of action need not be prohibitive and would be much smaller than the damage averted.' It warns, however, against delay in economic terms:

'Reversing the trend to higher global temperatures requires an urgent, world-wide shift towards a low-carbon economy. Delay makes the problem much more difficult and action to deal with it much more costly.'[54]

51 Department of Health 2009: *Heatwave Plan for England 2009*. cabeurl.com/6c
52 DirectGov 2009: *The Causes of Climate Change* [online]. cabeurl.com/6d
53 NHS 2009: *Saving Carbon, Improving Health: NHS Carbon Reduction Strategy for England*, London, NHS SDU. cabeurl.com/6e
54 Sir Nicholas Stern, 2006: *Stern Review on the Economics of Climate Change,* Cambridge, Cambridge University Press. cabeurl.com/8a

The importance of economic sustainability is also made explicit in the Zagreb Declaration for Healthy Cities, which was signed by politicians from the major cities of Europe at a conference organised by WHO in October 2008. One of the five principles and values of action says:

Sustainable development: the necessity of working to ensure that economic development – and all its supportive infrastructural needs including transport systems – is environmentally and socially sustainable: meeting the needs of the present in ways that do not compromise the ability of future generations to meet their own needs.[55]

Making an impact

Any commitment to reduce carbon levels must embrace the management and design of buildings, procurement and choice of transport, as the NHS Carbon Reduction Strategy (2009) acknowledges. It outlines the health benefits for patients and populations, and for the healthcare system itself. For example, increased levels of active travel lead to a reduced risk of 'obesity, diabetes, heart disease, and mild mental illness, as well as reducing road traffic injuries and deaths, and improving air quality.'[56]

The database of guidance and case studies of sustainable health buildings continues to expand. Amongst the most significant, the Sustainable Development Commission (SDC) works with the NHS to clarify the nature of, and the benefits gained from, sustainable healthcare buildings. These qualities include:

- accessibility by public transport, walking and cycling

- site and design that preserve and enhance biodiversity

- adaptability to change, for example, climate, new ways of working and new technology using resources such as energy and water efficiently in its construction and throughout its lifetime.[57]

Some of the toolkits described in Appendix 3, such as the checklist from SHINE, deal with how to measure the impact of design ideas on sustainable performance. These need to be used throughout the life of a building or public place.

Best practice in environmental management generally involves using simple, well-understood ideas and executing them really well, ensuring that buildings are easy to manage to their optimum performance, with robust systems that can, as far as possible, be handled by non-specialist users. Simpler approaches tend to be more robust, easier to manage and more predictable.

55 World Health Organisation Europe 2008: *Zagreb Declaration for Healthy Cities: Health and health equity in all local policies*, Policy declaration, np, WHO. cabeurl.com/6f
56 NHS 2009: *Saving Carbon, Improving Health: NHS Carbon Reduction Strategy for England*, London, NHS SDU. cabeurl.com/6e
57 Sustainable Development Commission 2005: *Healthy Futures: Buildings and Sustainable Development*, London, SDC. cabeurl.com/6g

Chapter 2
Best practice

Revisiting the design of places, spaces and buildings and how they work can be a catalyst for change.

Design can synthesise complex requirements and make sustainable places for health and well-being. Many current developments are driven by a single agenda and satisfy a narrow set of goals. When policy, planning processes, needs assessments and design projects are better co-ordinated, they can succeed in multiple ways.

The following scenarios at city, neighbourhood and building scales demonstrate how to resolve complex demands for sustainable environments that also better serve the long-term health needs of populations and enhance physical and mental well-being.

Influencing the future of towns and cities

Planning at town and city scale is a complex activity shaped by many hands. Change is often the result of incremental development on which the health of city populations so depends. In its Healthy Cities initiative, the World Health Organisation defines a healthy city as one that is continually creating and improving the physical and social environments, and expanding the community resources that enable people to support each other in performing all the functions of life and in developing their potential.[58]

Those who influence development at this scale need to be supported in thinking carefully about how networks of different facilities, including green infrastructure and healthcare buildings, can be deployed over time in optimum locations, where they are accessible through sustainable modes of travel. To do this means bringing people concerned with well-being, illness prevention and healthcare into the discussion of policy development and interpretation at the vital early stages. Communication and common incentive-building between local authorities and health authorities is an essential foundation for this.

Some principles conducive to health, well-being and sustainability that can run though local authority policies at city scale are as follows:

- Create urban form that is compatible with the characteristics of a healthy city, as defined by WHO.[59]

- Develop a hierarchy of acute primary and community healthcare facilities that join up delivery of services from hospital to home.

- Develop a joining-up policy between healthcare and local authorities (see example 1: Joining up across administrative borders to tackle health inequalities through active travel and environmental improvements on p.21).

- Co-ordinate health projects with existing and proposed transport and pedestrian networks, with larger facilities located at major hubs and more local delivery within walking distance of the communities they serve.

- Establish networks of green infrastructure to manage air quality, overcome urban heat island effects and reduce noise and stress (see best practice example 4: Tackling the urban heat island effect at city level on p.21).

- Integrate city- or district-wide heating for housing and local community health facilities so that they can be shared across areas (see example 3: Creating district heating, including a hospital with its own combined heat and power plant on p.21).

- Use approaches to development that reduce speed and volume of motor traffic and encourage walking and cycling so that air quality, accessibility of services and opportunities for physical activity are improved (see example 2: Locating networks of facilities according to pedestrian accessibility on p.21).

- Try to anticipate future developments in healthcare delivery, including technology to improve treatment and prevention, and the impact on urban form and location of facilities (see example 5: Projecting future scenarios for city-integrated healthcare networks on p.22).

58 World Health Organisation 2005: *Healthy Cities and Urban Governance* [online]. cabeurl.com/6h
59 *Ibid.* see also Appendix 2.i, fig.1.

Best practice examples

1: Joining up across administrative borders to tackle health inequalities through active travel and environmental improvements

Buckinghamshire Primary Care Trust (PCT) plays a strong role in Bucks Strategic Partnership, the local strategic partnership (LSP) for Buckinghamshire. A major priority of the LSP is the Healthy Communities Strategy, which is about the wider determinants of health and well-being rather than the delivery of healthcare itself. It promotes physical activity through walking and reducing carbon emissions for all public sector organisations. The strategy recognises that 'improving the physical and social environment is essential if health and well-being are to be improved.' **www.buckspartnership.co.uk**

2: Locating networks of facilities according to pedestrian accessibility

Liverpool PCT and Liverpool & Sefton LIFTco have joined up their thinking for the equitable provision of healthcare facilities across the city. After surveying residents and pinpointing an optimum 15-minute maximum walking time to any health centre, a new network sites centres across the city within 15 minutes' walk of every residential address. The partnership also provides services in the evenings and at weekends. **www.lshp.co.uk**

Picton Health Centre, MBLA architects © Daniel Hopkinson

3: Creating district heating, including a hospital with its own combined heat and power plant

Southampton has developed the first geothermal energy and combined heat and power (CHP) district heating and chilling scheme in the UK. The city council persisted despite initial setbacks and now has a CHP generator and absorption heat pumps. Royal South Hampshire Hospital has also opened its own CHP plant. Pauline Quan Arrow, Chairman of Southampton City PCT, says: 'We are pleased to be leading the way... carbon dioxide and other emissions are a serious threat to our health and well-being, and therefore the NHS has a major part to play in ensuring that this is tackled. I would encourage other NHS trusts to get involved with similar initiatives.' **cabeurl.com/3i**

4: Tackling the urban heat island effect at city level

The city of Chicago has enacted legislation that requires landscaping around parking lots and more energy-efficient building practices. The council encourages residents to use light-coloured, reflective materials for roofs, to plant trees on properties to increase the shading of buildings and parking lots, and to increase the amount of vegetation overall. Projects include a rooftop garden on City Hall which has set the precedent for green roofs in the city, a permeable and reflective alley on the North Side, miles of median planters and many campus parks that transform asphalt parking lots around public schools into parks. Chicago also uses green building technologies and practices in all of its public building projects. **www.cityofchicago.org**

Conservation Design Forum © Andi Cooper, Conservation Design Forum

5: Projecting future scenarios for city-integrated healthcare networks

The Hygiopolis city planning project, conceived by Medical Architecture and Art Projects (MAAP), hypothesises a city in the future where healthy lifestyles and access to healthcare are priorities. It emphasises active and public transport systems, accessible green and blue spaces, adaptable homes suitable for care at home, and integrated services. A 'neighbourhood centre' is proposed, with a primary school, facilities for older people, community mental health nurses, social workers and GPs all on one site. **cabeurl.com/8b**

Hygiopolis, MAAP architects © VIEW pictures

Influencing the shape and health of neighbourhoods

Development at a neighbourhood scale can range from small-scale interventions in established communities, through to the wholesale redevelopment or regeneration of failing urban areas. Those involved include local planning authorities, health authorities, housing associations and private developers.

Health benefits at this scale of development involve locating appropriate community facilities in the right place and structuring the environment to encourage people to use sustainable forms of travel and take physical activity.

Compact mixed-use developments

- Provide an appropriate level of neighbourhood healthcare facilities within walking distance of the communities served (see example 1: Locating healthcare services accessibly and alongside other public amenities on p.24).
- Employ approaches that design out crime, such as buildings overlooking public routes and spaces (natural surveillance), and good street lighting.
- Use urban design to help wayfinding, and support this with clear information on walking, cycling and public transport options.

Sustainable transport solutions

- Provide safe, legible, convenient and attractive routes that encourage people to walk and cycle.
- Ensure pedestrian and cycling routes connect healthcare buildings to residential neighbourhoods as well as other key areas of activity such as shops, schools, leisure facilities and workplaces.
- Consider the use of 'home zones' in residential areas, which lower traffic speeds, prioritise pedestrian movement, and emphasise place over movement as the main function of residential areas.
- Implement measures to reduce the speed and volume of traffic and thereby lower the frequency and severity of traffic accidents.

The potential of green spaces

- Use trees and other planting in local parks to create carbon sinks, improve air quality, reduce soil erosion, and provide shade in summer.
- Encourage outdoor exercise, including active play for children and teenagers (see example 2: Using green space to encourage active lifestyles and reduce pollution on p. 24).
- Promote bio-diversity and provide access to the natural world because this can reduce stress and relieve the sense of overcrowding in urban environments (see example 3: Improving mental well-being through contact with nature on p. 24).
- Champion the creation and upkeep of allotments and contact with nature to encourage physical exercise, healthy eating, mental well-being and reduction in carbon emissions from food miles.

Wider servicing strategies

- Make district-wide heating for housing and local community healthcare facilities a possibility so that they can be shared across areas.

Best practice examples

1: Locating healthcare services accessibly and alongside other public amenities

Luton Walk-in Centre is a four-storey, patient-focused facility in central Luton next to a busy shopping street. There are minor treatment areas and flexible spaces for drop-in clinics. The volume of patients is high and throughput is fast. The PCT carried out a thorough site search and appraisal, and made creative use of an existing building.

David Morley architects © Morley von Sternberg

2: Using green space to encourage active lifestyles and reduce pollution

Before its refurbishment, Mile End Park was a bleak, fragmented, under-used open space in the centre of Tower Hamlets, an authority with a large population and little good-quality open space. The park now houses a leisure centre and gym, and provides safe and attractive pedestrian and cycle routes, significantly contributing to pollution reduction where neighbouring roads are heavily used and congested. It has become an invaluable green chain of open space and tranquillity through London's East End. **cabeurl.com/6i**

© Michele Turriani

3: Improving mental well-being through contact with nature

With the National Care Farming initiative, partnerships are formed between farmers and health and social care agencies, to develop the potential of individuals rather than focusing on their limitations. Commercial farms, woodlands and market gardens are used as a base for promoting mental and physical health through normal farming activity. **www.ncfi.org.uk**

© The Fold Care Farm, Worcestershire

4: Encouraging greater self-responsibility for health and well-being

The Well-being Wagon is set up under Activate London, a group of projects aimed at promoting healthy eating, and physical and mental health, supported by the Big Lottery fund. Cookery demonstrations and nutritional advice are given to residents. Staff help people to use the internet for healthy living websites and information on recipes, exercise and ways of alleviating stress. **cabeurl.com/5o**

Running and delivering healthcare buildings

Regardless of their size or function, whether newly constructed or a refurbishment, all building projects can be structured to create a positive impact on people's health and well-being. The collective decisions of health-service users, design teams, planning authorities and those responsible for the day-to-day provision of services will determine whether projects merely deliver on narrow goals, or whether they contribute in a more holistic way, providing wider health and well-being benefits.

Key issues to address in the design stage include the following.

Making healthcare facilities accessible
- Select sites for healthcare facilities that are well-served by public transport and pedestrian routes and plan primary care, such as GP surgeries, to be within cycling or walking distance of the communities they serve.
- Plan health- and social care strategically, to deliver services in the most appropriate environment, from the hospital through to the home.
- Consider bringing other services and activities into healthcare buildings to create a community focus, allowing a wider range of patient care and advice to be provided by co-ordinated teams of professionals.
- Use ICT to improve services. Provide appropriate infrastructures for increased access to healthcare provision, in the home, in healthcare facilities and other community buildings. This will increase operational efficiency, making services more convenient and reducing the need to travel (see example 2: Adopting smart technology systems on p.26).

Creating therapeutic environments
- Design interiors that use natural light and exploit views to reduce stress, aid healing, help wayfinding and provide inspiring living and working conditions (see example 5: A therapeutic care environment for mental well-being on p.27).
- Specify materials from sustainable sources that are robust and durable, but ensure these create a non-institutional feeling capable of uplifting the spirits (see example 4: The most sustainable GP practice? on p.27).
- Make good use of colour, but be sensitive to the effects of sensory stimuli on people in mental distress.
- Provide personalised care in places with strong identity and local character (see example 1: Personalised care and community resources in a place with strong identity on p.26).

Providing adaptable accommodation
- Plan the site and building form to allow for flexibility, so that facilities can be extended or reconfigured to respond to future changes in the delivery of health services.

- Ensure all buildings are adaptable over time to accommodate new climate change technologies as they become available.
- Design spaces in community health buildings for multi-functional use to allow delivery of a range of treatments and services (see example 3: Long-term flexibility and the ability to respond to service change on p.26).

Encouraging physical activity
- Use site characteristics, path networks and green infrastructure to create easily accessible exercise trails.
- Locate attractive staircases in convenient places to encourage walking and reduce the use of lifts.

Best practice examples

1: Personalised care and community resources in a place with strong identity
Maggie's Cancer Care Centres offer a community of advice and support for cancer patients within carefully designed and welcoming buildings that have a domestic feel. Each centre is situated beside an NHS cancer hospital and has been designed to be as uninstitutional as possible, with light, space and warmth. The heart of the centre is always the informal kitchen area (such as here at Maggie's Inverness).

Maggie's Highlands, Inverness. Page & Park architects © Ashley Bingham and Mark Ellis, ICD Photography

2: Adopting smart technology systems
At Akershus Hospital, Oslo, a motorised system distributes medication from a pharmacy store in the hospital direct to wards using robots. Clean, sterilised staff uniforms are distributed daily from vending machines to keep hygiene levels as high as possible by removing the necessity for staff to bring their uniforms in and so helping to keep infection levels down.

CF Møller architects © Torben Ekserod

3: Long-term flexibility and the ability to respond to service change
At the Heart of Hounslow LIFT building, two wings containing health and social services and office spaces are suitable for business, health, social and community use and are designed to be flexibly used for whichever service may need to operate in the area. A covered communal street creates a mall-like informal meeting space for the community, and a public plaza sits at the front for the surrounding neighbourhood.

Penoyre & Prasad architects © Anthony Weller – Archimage

4: The most sustainable GP practice?

The award-winning Swaffham Surgery is one of the best-performing new buildings in the NHS estate. The cost implications were dealt with pragmatically by the architect, the contractor and Norlife LIFTco, with the carbon footprint reduced through sustainable building materials, clever orientation and passive temperature control.

5: A therapeutic care environment for mental well-being

At the Bamburgh Clinic, St Nicholas Hospital, Newcastle, a mental health unit was designed to provide a secure but therapeutic environment for patients, many of whom require long-term care. The vision was to provide a non-stigmatising environment by enabling the necessary observation through design, providing good daylight, views and access to outdoor space.

Chapter 3
What needs to change

By using the planned environment to help nurture a healthier population, we can reduce the burden on the healthcare service. But, in order to achieve this, there are fundamental issues to address in how we plan, procure and approach the narrowing of health inequalities.

Planning

Although various public health objectives have been designed to address widening health inequalities, the long-term health and well-being implications for the users of both new and improved developments are not yet fully integrated within planning policy and local authority development plans.

Local authorities are still insufficiently supported in their consideration of the long-term effects on healthcare developments, for example, in terms of the volume of traffic due to the siting of services or the quality of open spaces for safe physical activity.

Procurement

The pressure within public service procurement to deliver on time and on budget means that holistic thinking on health and well-being can fall by the wayside, even on projects that are supposed to be promoting health. For example, the creation of therapeutic healthcare environments that use natural daylight and ventilation can bring the added benefits of shorter patient recovery times, and in the longer term are worth the initial higher capital outlay.

However, project teams are not always resourced with the spread of skills needed to ensure that this is considered. As a result, there may be no or limited checks to ensure that the health-related design aspirations of a brief have been embedded in the schemes.

Overcoming silo thinking

Delivering wider public health benefits through the design of the built environment is dependent upon good strategic decision-making. This is not happening as effectively as it could because the agendas to deliver on healthcare, well-being and a sustainable approach to our built environment have not yet fully moved away from the silos in which they tend to reside.

To overcome this, a fuller understanding of the wider context of a delivery arena needs to be encouraged. Agencies can successfully come together early in the development process to create a shared public health agenda – example 1 (on p.21) and example 3 (on p.26) show where this is already happening.

Using assets effectively

A core message – that health, well-being and sustainability must all be considered together – is emphasised in a variety of ways in much of the existing guidance and general information available to trusts and those responsible for environments that impact on our health. Many of these explain how the design process provides a time when these ideas can be integrated, and give examples of how this can be done.

Guidance, however, can be hard to act on. The right information may not be available at the time it is needed. It can be hard to convince a budget-holder to spend more time and more money initially in order to get the best solution for the long term. Appendix 3 describes some of the key guidance and lists sources of further help and information. A more extensive list of further reading is available on request from CABE.

Recommendations

The benefits of a holistic approach to healthcare, well-being and sustainability are clear and the skills and knowledge exist to implement it. But how can we make it happen?

Interrogating how development decisions are made is a first step. Better outcomes may cost more, but they will deliver additional value. Joined-up thinking is needed to ensure that maximum health, well-being and sustainability benefits accrue from every development intervention or management process.

For the policy-makers who set national, regional and local visions for health, well-being and sustainable environments this means:

- **Join up the policy initiatives in health, environment and planning, from national to community level.** More collaborative working between government departments, such as regular, informed discussions and joint initiatives between the departments for Health; Communities and Local Government; Environment, Food and Rural Affairs; and Energy and Climate Change would help deliver more efficiently on sustainable public health policy. The existing ministerial design champion network would be ideally placed to lead on this collaborative working between officials.

- **Encourage joint goals within communities by supporting the available vehicles for strategic service delivery.** Joint strategic needs assessments (JSNAs) and local strategic partnerships (LSPs) go a considerable way towards inter-agency working. But they can only work well if they are properly resourced and efficiently run; if sustainability is embedded; if information is systematically shared between agencies and if roles are clearly defined. Again, top-level support is essential if joint initiatives are to happen on the ground.

- **Make collaborative work easy by streamlining the impact assessments and best practice standards that protect health, well-being and sustainability.** Wherever separate assessments are required, a separate set of people is needed to carry them out. Drawing on the common net benefits for communities by combining tools such as health impact assessments, environmental impact assessments and sustainability impact assessments will enable healthy, sustainable environments to become a reality.

- **Set minimum design standards.** The 2009 Communities and Local Government publication *World Class Places* (cabeurl.com/8c) says that all public building programmes should have minimum design standards. Design policy and minimum standards should be defined for all relevant government departments.

- **Explain the market advantages, identifying the mutual benefits that a joined up approach can bring.** The prestige associated with radical, innovative interventions can bring attractive long-term benefits to providers as well as communities.

For commissioners setting out the health and well-being requirements for local populations, this means:

- aiming for change and thinking afresh about long-term investment

- developing strategic plans for public services that encompass health and social care

- overcoming silo working: engage agencies for change at a local level including health trusts, local authorities and the independent sector

- ensuring that all development is helping to deliver high-quality environments for health and well-being in a responsible and sustainable manner

- being unafraid to ask for fresh thinking that is rigorously tested through propositions and different scenarios.

For providers of healthcare and environments that affect health and well-being, this means:

- valuing design as a catalyst for change: realise the potential for design to synthesise complex issues to best advantage

- getting the 'DNA' of the project right at the outset: realise the benefits of providing effective care, improving health outcomes and responding to the changing climate through design

60 Communities and Local Government, 2009, *World Class Places: The Government's strategy for improving quality of place*, London, Communities and Local Government. cabeurl.com/8c

- making the quality of experience a priority: create therapeutic places to engage people and support well-being

- responding to the dynamic and changing nature of healthcare delivery, and creating environments that are long life, loose fit (flexibly designed to respond to evolving patterns of care) and low carbon.

Wherever we may be within the processes that have long-term impacts on people's health and well-being, we can think beyond our traditional remits by committing to more integrated working methods and collaboration with useful agencies where necessary to achieve common goals. To meet those priorities of environmental quality that can have a lasting effect on our own health, we can make an impact on health inequalities and enable stronger health and mental well-being for future generations.

Appendices

Appendix 1
Methodology

This report is informed by the following resources:

- **A literature review of evidence and connections
  between health and/or well-being, and
  the design of buildings and places.**
  From national and international sources.
  This is available from CABE on request.

- **Detailed consultations**

  Specialists were brought together in a
  series of workshops to debate the context
  for healthcare, well-being and sustainability
  across the public and private sectors, and
  where planned environments, including health
  premises, can bring these agendas together.
  These workshops were made up of
  specialists from:

  - healthcare service delivery and research

  - well-being, in particular with respect to healthy
    neighbourhoods and masterplanning for health

  - healthcare building design

  - sustainable design.

- **Toolkits and advice on how to carry
  out projects for healthcare buildings,
  neighbourhood planning and
  successful design and planning projects.**
  Key toolkits, checklists and guidance
  are described in Appendix 3.

Appendix 2
Further research and detail to supplement the report

i. Well-being

The UK Sustainable Development Strategy defines well-being as:

A positive physical, social and mental state; it is not just the absence of pain, discomfort and incapacity. It requires that basic needs are met, that individuals have a sense of purpose, that they feel able to achieve important personal goals and participate positively in society. It is enhanced by conditions that include supportive personal relationships, strong and inclusive communities, good health, financial and personal security, rewarding employment and a healthy and attractive environment.[61]

The above definition of well-being is very much in the spirit of the WHO definition of health, which states that a healthy and attractive environment in itself contributes to well-being.

We include as an indicator of emotional wellbeing the incidence of low-level mental health problems such as depression, anxiety, stress, panic attacks, phobias and obsessive-compulsive disorders. But emotional wellbeing is broader than just the presence (or absence) of common mental health problems and so we also include life satisfaction and levels of happiness.

Life expectancy has reached its highest on record and the 2008 figures for those born in England and Wales are 78 for men and 82 for women.

In rich countries, (e.g. UK) low socioeconomic position means poor education, lack of amenities, unemployment and job insecurity, poor working conditions and unsafe neighbourhoods.[62]

Figure 1: WHO qualities of a healthy city

A city should strive to provide:

1	A clean, safe physical environment of high quality (including housing quality)
2	An ecosystem that is stable now and sustainable in the long term
3	A strong, mutually supportive and non-exploitative community
4	A high degree of participation and control by the public over the decisions affecting their lives, health and wellbeing
5	The meeting of basic needs (for food, water, shelter, income, safety and work) for all the city's people;
6	Access to a wide variety of experiences and resources, with the chance for a wide variety of contact, interactions and communications
7	A diverse, vital and innovative city economy
8	The encouragement of connectedness with the past, with the cultural and biological heritage of city dwellers and with other groups and individuals
9	Urban form that is compatible with and enhances the preceding characteristics
10	An optimum level of appropriate public health and sick care services accessible to all, and
11	High health status (high levels of positive health and low levels of disease).

WHO 1997: *Twenty Steps for Developing a Healthy Cities Project*, 3rd edn, Copenhagen, WHO Regional Office for Europe.

61 Defra, 2008: Sustainable Development Indicators in your Pocket. cabeurl.com/6o

62 Marmot, M. 2008: *Closing the gap in a generation: Health equity through action on the social determinants of health*, WHO Commission on Social Determinants of Health: final report, np, WHO. cabeurl.com/68

ii. Climate change

Table 1: Health effects associated with climate change

Heatwaves	Heatwaves are projected to become more frequent. The very old, chronically ill and poor are most susceptible to heat-related illnesses. The additional deaths in summer will be offset by a decline of approximately 20,000 cold-related deaths each year due to warmer winters. In the period 1971–2003 mean annual heat-related deaths did not rise as summers warmed. This implies an increase in the population's tolerance to heat. In the same period annual cold-related mortality fell by more than 33 per cent (DH, 2008a). Improved tolerance to heat in the future will reduce impact of hotter summers, but increased frequency and intensity of heatwaves are still a major concern to human health. By 2012, there will be a 1 in 40 chance that the South East of England will experience a serious heatwave (averaging 27°C in South-East England) causing over 3,000 immediate heat-related deaths and 6,350 further heat-related deaths soon afterwards (DH, 2008a).
Air pollution	The air pollution of the UK will continue to change. While concentrations of a number of important pollutants are likely to decline over the next half-century, the concentration of ground-level ozone is likely to increase due to the projected increases in dry, sunny weather in summer which favour ozone production. This will increase attributable deaths and hospital admissions. The increases are likely to be significant with as many as 1,500 additional deaths and hospital admissions each year.
Cold-related illness and deaths	Cold-related illness, falls and deaths are likely to decline due to warmer, wetter winters.
River, coastal flooding and flash floods	Floods are associates with few direct deaths, but the full effect on health, in terms of indirect mortality and morbidity due to infectious disease, mental health, and injuries, is not known (DH, 2008a). The risk of major flooding disasters caused by severe winter gales, heavy rain fall and coastal erosion is likely to increase contamination of drinking water, increase waterborne infections and exposure to toxic pollutants, accompanied by psychological consequences, destruction injuries and deaths. Later effects of flooding include stress and mental health problems (Tapsell, 2002). River floods or storm surges, which can be forecast several days in advance, have fewer casualties compared to flash floods where there is no prior warning.
Infectious diseases	Cases of food poisoning (Salmonellosis) and waterborne diseases (Cryptosporidiosis) linked to warm weather are likely to increase. A 1°C increase in temperature might result in about a 4.5 per cent increase in food poisoning. The effect of warmer summers on food borne disease incidents will depend on future food hygiene behaviour and the relative contribution of different pathogens, as well as changes in temperature (DH, 2008a).
Vector-borne diseases	Outbreaks of malaria in the UK are likely to remain rare, though health authorities need to remain alert to the possible outbreaks of malaria in other European countries and to the possibility that more effective vectors (different species of mosquito) may arrive in the UK. Rapid response to outbreaks of malaria will reduce the chances of the disease becoming endemic in the UK. Tick-borne diseases (e.g. Lyme disease) are likely to become more common in the UK, but this is more likely to be due to change of land use and leisure activities that to climate change. The likelihood that tick-borne encephalitis will become established in the UK is very low.

Sunburn, skin cancer and cataract	Changes in climate such as increases in sunshine, reductions in precipitations and higher temperatures will be likely to favour patterns of behaviour involving more outdoor activity, lighter clothing and greater exposure to the sun. This is likely to result in sunburn, skin cancer and cataracts (DH, 2008a). It has been suggested that cases on skin cancer could increase to up to 5,000 cases per year and cataracts up to 2,000 cases per year (DH, 2002).
Water and food shortages	Drought may increase the risk of infectious diseases due to reduced public and personal hygiene and increased risk of water contamination. There may be an increase of cases of dehydration due to inadequate water intake. There is the chance of increased mental health problems due to anxiety of loss of water supply and introduction of emergency measures. Sea level rises may salinate coastal areas leading to impaired crop yields.
Possible ancillary health benefits	Increase in physical activity due to extended warm weather, but outcomes could be worse during extreme heat events. Possibly health eating if sustainable farming and food policy are adopted.
Extreme weather events	The direct health effects due to changes in wind storm intensity or frequency are likely to be small relative to other health effects of climate change in the UK. However, the increase in the occurrence of severe winter gales is still an area of concern. Deaths during severe gales are commonplace, as are severe injuries. These reflect people being simply blown over, being struck by flying debris or being crushed by falling trees or collapsing buildings. The likely loss of electrical power supplies during severe storms adds to these problems.

Source: Haq, G., Whitelegg, J. & Kohler, M. 2008: *Growing Old in a Changing Climate: Meeting the challenges of an ageing population and climate change*, Stockholm, Environment Institute. cabeurl.com/8h

The magnitude of health impacts as currently understood are summarised in figure 2 from the Intergovernmental Panel on Climate Change. While these are global impacts, they all have some relevance to the health status of the UK population.

Figure 2: Health impacts associated with climate change

	Negative impact	Positive impact
Very high confidence Malaria: contraction and expansion, changes in transmission season	← →	
High confidence Increase in malnutrition	←	
Increase in the number of people suffering from deaths, disease and injuries from extreme weather events	←	
Increase in the frequency of cardio-respiratory diseases from changes in air quality	←	
Change in the range of infectious disease vectors	← →	
Reduction of cold-related deaths		→
Medium confidence Increase in the burden of diarrhoeal diseases	←	

Source: Intergovernmental Panel on Climate Change, 2007, IPCC Fourth Assessment Report (AR4), *Climate Change 2007: Impacts, Adaptation and Vulnerability*, chapter 8. cabeurl.com/8p

Urban heat islands

During a heatwave it is likely to be hotter in cities than in surrounding rural areas, especially at night. Temperatures typically rise from the outer edges of the city and peak in the centre. This phenomenon is referred to as the 'urban heat island' (UHI) and its impact can be significant. In London during the heatwave of August 2003, the difference in temperature between urban and rural locations reached 9°C on occasions. A range of factors varies between rural and urban areas and contributes to the UHI.

- Thermal properties of building and road materials and the height and spacing of buildings and air pollution levels result in more of the sun's energy being captured, absorbed and stored in urban surfaces compared with rural surfaces during the day and a slower loss of this energy at night, resulting in comparatively higher air temperatures.

- Less evaporation and shading, with a consequent reduction in associated cooling, takes place in the typically drier urban areas as there is less vegetation.

- Greater inputs of heat as a result of the high density of energy use in cities, for example from buildings and transport, ultimately ends up as heat.
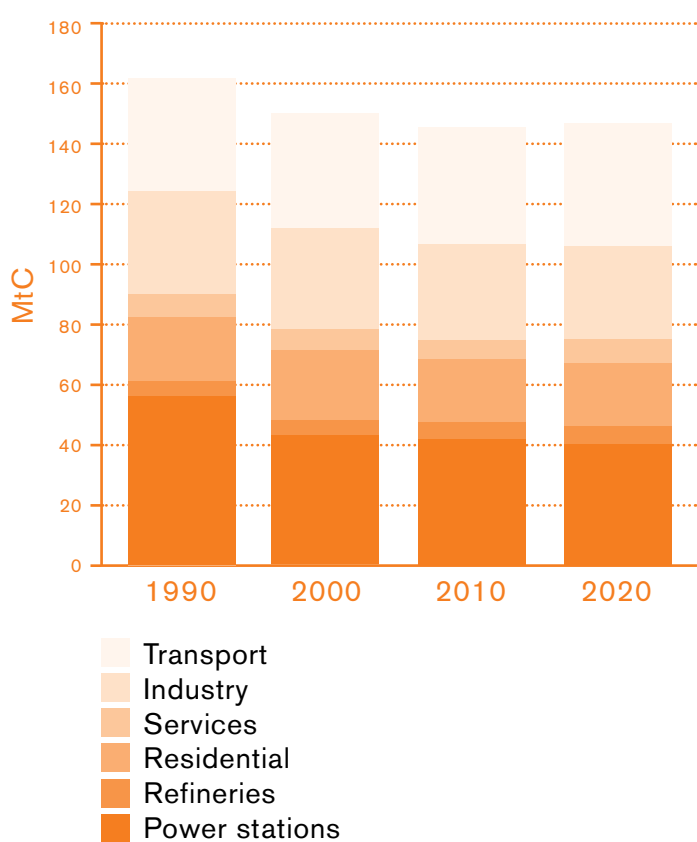
Strategic planning is therefore required to take account of the above factors, particularly in the context of climate change. At a local level, this includes the modification of surface properties, for example cool roofs, green roofs and cool pavements. Planting trees and vegetation and the creation of green spaces to enhance evaporation and shading are other options, as temperatures in and around green spaces can be several degrees lower than their surroundings.[63]

63 Department of Health, 2009: *Heatwave Plan for England 2009: Protecting health and reducing harm from extreme heat and heatwaves*, London, Department of Health cabeurl.com/6c

iii. The NHS carbon footprint

Figure 3 shows the necessary reduction in NHS carbon emissions by 2020 in order to meet targets set out in the Climate Change Act 2008. It demonstrates the high proportion in comparison with emissions from other sources.

Figure 3: Carbon dioxide emissions (MtCO2) by source, 1990-2000 and predicted to 2020

Transport
Industry
Services
Residential
Refineries
Power stations

CO2 emissions by source, 1990 to 2020, MtC

Source: Sustainable Development Commission 2008: *NHS England Carbon Emissions Carbon Footprinting Report*, London, SDC. cabeurl.com/6s

Total emissions

The total NHS England CO2 emissions for 2004 were estimated to be 18.61 MtCO2. This compares with overall UK and England consumption emissions calculated as follows:

2.7%   of total UK emissions (699 MtCO2)

3.2%   of total England emissions (584 MtCO2)

88%   of the whole of Northern Ireland's emissions (21.3 MtCO2), which has 1.7 million inhabitants

58%   of the whole of Wales's emissions (32.0 MtCO2), which has 2.9 million inhabitants

32%   of the whole of Scotland's emissions (58.8 MtCO2), which has 5.1 million inhabitants.[64]

64 Sustainable Development Commission 2008: *NHS England Carbon Emissions Carbon Footprinting Report*, London, SDC. cabeurl.com/6s

iv. The size and influence of the NHS

At the time of writing, the NHS in England includes:

- 147 PCTs
- 235 NHS trusts
- 10 care trusts
- 10 strategic health authorities (SHAs)
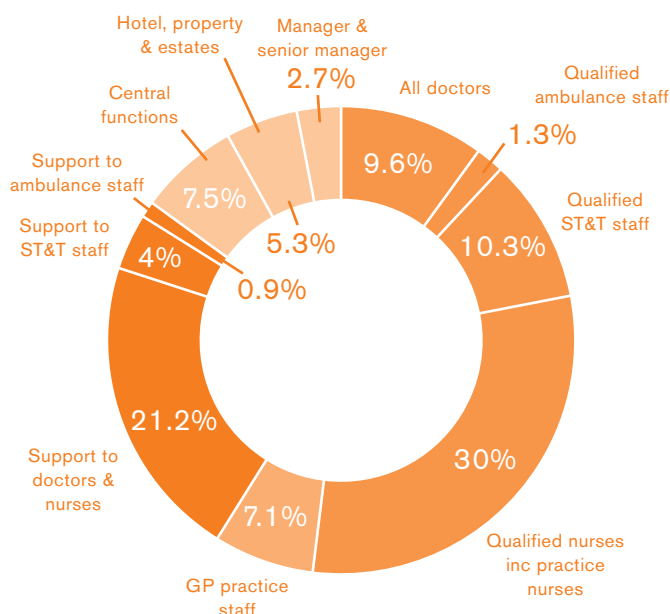- 10 special health authorities
- five regional directorates.

NHS England does not include nursing homes, charities, hospices and private hospitals.[65]

The breakdown of staff by role is shown in Figure 4.

On a typical day in the NHS, there are:

- 90,000 doctors
- 300,000 nurses
- 150,000 healthcare assistants
- 22,000 midwives
- 13,500 radiographers
- 15,000 occupational therapists
- 7,500 opticians
- 10,000 health visitors
- 6,500 paramedics
- 90,000 porters, cleaners and other support staff
- 11,000 pharmacists
- 19,000 physiotherapists
- 24,000 managers
- 105,000 practice staff in GP surgeries.

Figure 4: Staff in the NHS 1997-2007 (England)[66]

Hotel, property & estates
Manager & senior manager 2.7%
Central functions
Support to ambulance staff
Support to ST&T staff
All doctors 9.6%
Qualified ambulance staff 1.3%
Qualified ST&T staff 10.3%
7.5%
5.3%
4%
0.9%
21.2%
30%
Support to doctors & nurses
7.1%
GP practice staff
Qualified nurses inc practice nurses

Key facts

The total workforce figure has been rising each year since 1997, but fell for the first time in 2006, and again in 2007 but at a slower rate.

Top line figures, 2007:

- There are 1.3 million staff in the NHS.

- Of these, just over 50% (nearly 680.700) are professionally qualified clinical staff, e.g. there are just over 128,200 doctors and about 399,600 qualified nurses.

- They are supported by around 441,100 staff in trusts and GP practices.

- The remainder (about 207,800) are NHS infrastructure support staff, with nearly a half (just under 100,200) of them in central functions, just over a third (71,100) in hotel, property & estates and just under a fifth (36,500) are managers.

65 Sustainable Development Commission 2008: N*HS England Carbon Emissions Carbon Footprinting Report,* London, SDC. cabeurl.com/6s
66 *Ibid.*

On a typical day in the NHS:

- almost 1 million people visit their family doctor
- 130,000 go to the dentist for a check-up/treatment
- 33,000 people get the care they need in accident and emergency
- 8,000 people are carried by NHS ambulance
- 1.5 million prescriptions are dispensed
- 2,000 babies are delivered
- 25,000 operations are carried out including 320 heart operations and 125 kidney operations
- 30,000 people receive a free eye test
- district nurses make 100,000 visits.[67]

v. NHS building stock

There is still a demand for investment in community healthcare facilities, and for improved energy performance. But unlike recent PFI projects for large new hospitals, these projects will be mainly refurbishments of existing buildings. Implementing them will require imaginative use of design and management ideas in existing contexts.

- By 2010, just a fifth of the NHS stock of hospitals will pre-date the birth of the health service in 1948. Before the current government's building programme, it stood at 50 per cent.

- Since May 1997, 89 major hospital schemes (68 PFI and 21 public capital) opened and 26 are under construction and are worth over £10.5 billion.

- 49 capital LIFT schemes worth over £1 billion have delivered 125 new primary care buildings and 74 are under construction.

- 189 ProCure 21 schemes worth £854 million have been completed and 133 are in development with a programme value of over £2.3 billion.[68]

67 Sustainable Development Commission 2008: *NHS England Carbon Emissions Carbon Footprinting Report*, London, SDC. cabeurl.com/6s
68 *Ibid.*

vi. Research into therapeutic design

Noise
Studies have found that hospital noise levels are often high (65-85dB), and produce widespread annoyance among patients and perceived stress in staff. Some research has investigated the effect of noise on outcomes, particularly in critical or intensive care units. Most findings suggest that noise detrimentally affects at least some outcomes, e.g. producing sleeplessness and elevating heart rate.[69]

Windows
Notable evidence of negative effects of windowless healthcare environments on outcomes has emerged from studies of critical-care patients. Studies have linked the absence of windows in critical or intensive care with high rates of anxiety, depression, and delirium relative to rates for similar units with windows.[70]

A study in a suburban Pennsylvania hospital examined the records of patients recovering from cholecystectomy. It compared patients whose rooms had windows overlooking natural landscapes with patients who looked out onto a brick wall, and found that the patients with open views: had shorter post-operative stays (7.9 days compared with 8.7), had fewer negative evaluation comments from nurses, took fewer strong and moderate analgesic doses and had lower rates of minor post-surgical complications.[71]

Sunny rooms
Findings from two studies raise the possibility that patient rooms looking out onto sunshine, rather than cloudy or drab conditions, foster more favourable outcomes.[72]

Multiple occupancy versus single patient rooms
[There is] limited evidence that infection rates in critical care units can be lower in single rooms than open wards... The presence of other patients in multiple occupancy rooms [is seen] as a major source of perceived stressors such as loss of privacy.[73]

Flooring materials
Elderly patients walk more efficiently (longer steps, greater speed) and feel more secure on carpeted compared to vinyl surfaces. Ulrich (2000) found that family and friends made longer visits to rehabilitation patients when patient rooms were carpeted rather than covered with vinyl composition flooring. Employees, however, overwhelmingly favoured vinyl composition (83%) mainly because of greater ease in cleaning up spills.[74]

Lighting
Research in light and health has confirmed that light not only serves the visual system but is also a powerful regulator of the circadian system and increases productivity, alertness and health and safety of patients and care givers.[75]

Access to nature
It is important to recognize that 'healing' is not synonymous with 'cure'. A garden cannot mend a broken leg or cure cancer, but it can do the following:

- Facilitate stress reduction which helps the body reach a more balanced state.

- Help a patient summon up their own inner healing resources.

- Help a patient come to terms with an incurable medical condition.

- Provide a setting where staff can conduct physical therapy, horticultural therapy, etc. with patients.

- Provide staff with a needed retreat from the stress of work.

- Provide a relaxed setting for patient-visitor interaction away from the hospital interior.[76]

69 Ulrich, R. 2000: Effects of healthcare environmental design on medical outcomes, *Design & Health: The Therapeutic Benefits of Design* 49-59. cabeurl.com/6u
70 *Ibid.*
71 CABE, 2002: *The Value of Good Design*, London, CABE. cabeurl.com/5r
72 *Ibid.*
73 Ulrich, R. 2000: *Effects of healthcare environmental design on medical outcomes, Design & Health: The Therapeutic Benefits of Design* 49-59. cabeurl.com/6u
74 *Ibid.*
75 Simenova, M. 2004: Healthy Lighting for the Visual, Circadian and Perceptual Systems. *Business Briefing: Hospital Engineering & Facilities Management, Report 3, Touch Briefings.* cabeurl.com/6v
76 Cooper, M. C. 2005: Healing Gardens in Hospitals, *The Interdisciplinary Design and Research e-Publication*, 1(1), 1-27. cabeurl.com/6w

vii. Effects of hospital design on nursing staff

Table 3 shows the effect on various health outcomes of hospital design factors such as quality of layout (where staff can both find their way round instinctively and do not often have to respond to visitors asking the way), the presence that the services have within the community as expressed by the architecture, and the detail of ample and well-designed storage. Table 4 (on p.43) shows their impact on nursing staff, where they prove to have a strong hand in recruitment, retention and performance.[77]

Table 3: Effect of design factors on health outcomes

	Single bed rooms	Access to daylight	Appropriate lighting	Views of nature	Family zone in patient rooms	Carpeting	Noise reducing finishes	Ceiling lifts	Nursing floor layout	Decentralised supplies	Acuity adaptable rooms
Reduced hospital acquired infections	✓✓										
Reduced medical errors	✓		✓				✓				✓
Reduced patient falls	✓		✓						✓		✓
Reduced pain		✓	✓	✓✓			✓				
Improved patient sleep	✓✓	✓	✓				✓				
Reduced patient stress	✓	✓	✓	✓✓	✓		✓✓				
Reduced depression		✓✓	✓✓	✓	✓						
Reduced length of stay		✓	✓	✓							✓
Improved patient privacy & confidentiality	✓✓				✓		✓				
Improved communication with patients & family members	✓✓				✓		✓				
Improved social support	✓				✓	✓					
Increased patient satisfaction	✓✓	✓	✓	✓	✓	✓	✓				
Decreased staff injuries								✓✓			✓
Decreased staff stress	✓		✓				✓		✓	✓	✓
Increased staff effectiveness	✓		✓				✓		✓	✓	✓
Increased staff satisfaction	✓	✓	✓	✓			✓				

✓ = Indicates that a relationship between the specific design factor and healthcare outcome was indicated, directly or indirectly, by empirical studies reviewed in this report.

✓✓ = Indicates that there is especially strong evidence (converging findings from multiple rigorous studies) indicating that a design intervention imprives a healthcare outcome.

Source: CABE 2004: *Healthy Hospitals Campaign*, London, CABE. cabeurl.com/2z

77 Ulrich, R., Zimring, C. M., Zuemei, C., DuBose, J., Seo, H., Quan, X., & Joseph, A., 2008, A Review of the Research Literature on Evidence-Based Healthcare Design, *HERD: Health Environments Research & Design Journal* cabeurl.com/6x

Table 4: Design factors affecting nurses

Factors identified as part of this research	Factors identified in CABE's 'Healthy Hospitals' campaign	Recruitment	Retention	Performance
External space	Exterior & public transport	✓✓✓	✓✓	✓
	Landscape design	✓	✓	✓
Internal environment	Entrance and foyer	✓✓	✓	✓
	Layout	✓	✓	✓✓✓
	Signage	✓	–	–
	Interior	✓✓	✓✓	✓✓✓
	Storage	✓	✓✓	✓✓✓
Functionality	Design of consulting rooms	✓	✓✓	✓✓✓
	Versatility	✓	✓✓	✓✓✓
Civic value	Integration of architecture	✓✓✓	✓	✓
Facilities	–	✓✓	✓✓	✓✓✓
✓ = Limited evidence ✓✓ = Moderate evidence ✓✓✓ = Strong evidence				

Appendix 3
Toolkits and key organisations

Toolkits
An indication of the relevant themes and
professional disciplines are made next
to each of these summaries.

MC = modern care
SD = sustainable development
QD = quality design
HN = healthy neighbourhoods
D = designer
Pl = planner
C = client
Po = policy-maker

**Achieving Excellence Design
Evaluation Toolkit** (AEDET) D, C
cabeurl.com/6l
AEDET is a tool for evaluating the quality of design in
existing and planned healthcare buildings. The NHS
worked with the Construction Industry Council and the
University of Sheffield to develop the toolkit, which
allows users to create a design evaluation profile.

**Advice to trusts on the main components of the
design brief for healthcare buildings** Pl, D, C
cabeurl.com/87
Advice note for trusts involved in healthcare
building projects. Strategic project briefing
and design quality briefing along the criteria
of AEDET (see above) are covered.

**Association of Public Health
Observatories** (APHO) MC, Po, Pl
www.apho.org.uk
APHO represents a network of 12 public health
observatories (PHOs) working across the UK
and Ireland. They produce information, data and
intelligence on people's health and healthcare
for practitioners, policy-makers and the wider
community. Their expertise lies in turning information
and data into meaningful health intelligence.

Architects for Health QD, D
www.architectsforhealth.com
Architects for Health campaigns for better healthcare
environments by bringing together individuals and
organisations who share an interest in excellence
in the planning and design of healthcare facilities.
It is a non-profit-making organisation for anyone
interested in the design and planning of healthcare
facilities. Its inception in 1992 was a response to
considerable strategic change in the health sector.

**Building Research Establishment
Environmental Assessment Method
Healthcare** (BREEAM: Healthcare) D, C
cabeurl.com/6m
BREEAM: Healthcare is used to assess the
environmental sustainability of healthcare
developments. The Department of Health requires,
as part of the outline business case approval, that
all new builds achieve a BREEAM Excellent and
all refurbishments achieve a Very Good rating. All
projects are required to have a sustainable travel plan.

Campaign for Greener Healthcare SD, Po, Pl, D, C
www.greennhs.org
The Campaign for Greener Healthcare focuses
on clinical transformation for a sustainable health
service. It performs green audits, and is developing
a national evidence-base for sustainable healthcare.
It works with the public, private and community
sectors, and puts green words and targets
into tangible and sustainable action, primarily
within the NHS and associated industries.

Care Quality Commission MC, Po, Pl, D, C
www.cqc.org.uk
The Care Quality Commission is the independent
watchdog for healthcare in England. It seeks
to improve services provided by the NHS and
independent healthcare organisations.

The Climate Connection SD, Po, Pl, D, C
www.theclimateconnection.org
The Climate Connection is a partnership
network for action on public health and
learning on climate change. It is funded by the
Department of Health and co-ordinated by the
UK Public Health Association (UKPHA).

The Climate and Health Council SD, Po, Pl, D, C
www.climateandhealth.org
The Climate and Health Council is a not-for-profit
international organisation that aims to mobilise and
inform health professionals across the world to take
action to limit climate change. Any health professional
or healthcare organisation can become a member.

**Commission for Architecture and the Built
Environment** (CABE) QD, Po, Pl, D, C
www.cabe.org.uk
CABE is the government's advisor on architecture,
urban design and public space. CABE works with
architects, planners, designers, developers and
clients, offering them guidance on how to achieve
well-designed buildings that meet the needs of users.

Community Health Partnerships
(CHP) HN, Po, Pl, D ,C
www.communityhealthpartnerships.co.uk
CHP develops, creates investment in and helps find
and implement innovative ways to improve healthcare
and local authority services. It has delivered the local
improvement finance trust (LIFT) initiative, providing
purpose-built premises for healthcare and local
authority services. It is an independent company,
wholly owned by the Department of Health.

Department of Health MC, Po Pl, D, C
www.dh.gov.uk
The Department of Health (DH) is the government
department responsible for providing health- and
social care policy, guidance and publications
for NHS and social care professionals.

**Designed with care: design and neighbourhood
healthcare buildings** MC, QD, C, D
cabeurl.com/8n
CABE report examining 15 of the best neighbourhood
healthcare buildings in the country, from a doctor's
surgery to an NHS walk-in centre. The case
studies show how high-quality design creates a
human, inclusive and reassuring environment.

European Health Property Network
(EuHPN) QD, Po, Pl, D, C
cabeurl.com/83
EuHPN is an international network of governmental
departments and research centres with a
common interest in all aspects of health
facilities, but especially in their financing,
design, management and organisation.

Fit for the Future SD, MC
cabeurl.com/36
Report from the NHS Sustainable Development Unit
arguing that the NHS must take urgent action now to
play a leading role in the response to climate change
if it is to provide the best quality healthcare. It details
a set of scenarios and recommends five key steps to
creating a sustainable, low-carbon healthcare system.

Guide to town planning for NHS staff
cabeurl.com/2y
Guide from the Department of Health explaining
the planning system in England with reference
to issues specific to the NHS. It aims to ensure
that the needs of the health service are taken
into consideration, and met, from planning
policy through to planning applications.

Natural England: Our Natural Health Service
cabeurl.com/81
Campaign aiming to ensure good access to green
space for all, and so that health services make
better use of green spaces, for example by every
GP or community nurse signposting patients to an
approved health walk or outdoor activity programme.

Open space strategies: best practice guidance
cabeurl.com/7m
Practical guidance from CABE to local authorities and their stakeholders on how to prepare, deliver, monitor and review an open space strategy.

Health and Care Infrastructure Research and Innovation Centre (HaCIRIC) MC, Po, Pl, D, C
www.haciric.org
HaCIRIC's focus is on the underlying built and technical infrastructure for health- and social care, and the interaction between this infrastructure and change and innovation in care services. It is a collaboration between existing research centres at Imperial College London and the universities of Loughborough, Reading and Salford.

Healthy hospitals: radical improvements in hospital design
cabeurl.com/2z
Research by CABE and PricewaterhouseCoopers showing how important clinical staff feel the design of healthcare premises is and why. It outlines CABE's 10 points for a well-designed healthcare building.

Health impact assessment of greenspace – a guide
cabeurl.com/30
Advice from Greenspace Scotland on how to assess the health and equity impacts of green space projects; and minimise any negative and maximise positive impacts.

The Health Practitioner's Guide to Climate Change: Diagnosis and Cure
eds. Jenny Griffiths, Mala Rao, Fiona Adshead, Allison Thorpe, 2009
An introduction for health practitioners to climate change and its current and future health impacts, describing the relationship between health and the environment, and setting out the huge benefits to health of acting on climate change and how to design healthy, sustainable communities.

Health Protection Agency MC, Po, Pl, C
www.hpa.org.uk
The Health Protection Agency provides an integrated approach to protecting UK public health through the provision of support and advice to the NHS, local authorities, emergency services, government departments and the public.

Health and Sustainability Network SD, Po, Pl, D, C
www.healthandsustainability.net
The Health and Sustainability Network was originally called the Convergence of Health and Sustainable Development Network. Its purpose is to enable people and organisations in the healthcare community to work together to give a much higher priority to sustainable development, and in particular acting to prevent the worst effects of climate change.

The health and urban planning toolkit
cabeurl.com/31
NHS London Healthy Urban Development Unit (HUDU) guide setting out a step-by step approach to improving working between primary care trusts and local planning authorities.

Integrating health into the core strategy
cabeurl.com/32
HUDU's guide shows how PCTs can influence the spatial plans that councils need to prepare.

King's Fund MC, Po, Pl, D ,C
www.kingsfund.org.uk
The King's Fund is an independent charitable foundation that undertakes research to inform better health, especially in London. It helps develop informed policy, effective services and skilled people by fostering innovation, and building understanding. It helps develop capacity and leadership through original research and objective analysis.

London Health Commission (LHC) HN, Po, Pl, C
cabeurl.com/84
The LHC works in partnership with agencies across the capital to reduce health inequalities and improve the health and well-being of all Londoners. It aims to influence key policy-makers and practitioners, support local action, and drive forward specific priority issues through joint programmes of work.

Manchester Joint Health Unit HN, Po, Pl, C
www.manchester.gov.uk/health/jhu
The Manchester Joint Health Unit focuses on strategic planning and partnership working for health improvement, and tackling health inequalities in Manchester. Part of its remit is to be the lead on building new healthcare facilities in regeneration areas.

Manual for Streets
cabeurl.com/5k
Guide from the Department for Transport emphasising that streets should be places in which people want to live and spend time, and are not just transport corridors. It aims to reduce the impact of vehicles on residential streets by asking practitioners to plan street design intelligently and proactively, and gives a high priority to the needs of pedestrians, cyclists and users of public transport.

National Heart Forum (NHF) HN, Po, Pl, D, C
www.heartforum.org.uk
NHF is an alliance of more than 50 national organisations working to reduce the risk of coronary heart disease and related conditions such as stroke and diabetes, and cancer. Members include charities, and non-governmental and professional medical organisations.

National Institute for Health and Clinical Excellence (NICE) MC, Po, Pl, D, C
www.nice.org.uk
NICE is the independent organisation responsible for providing national guidance on the promotion of good health and the prevention and treatment of ill-health.

New Health Network MC, Po, Pl, D, C
www.newhealthnetwork.co.uk
The New Health Network is an independent, multi-professional network that promotes sustainable modernisation of the NHS and focuses exclusively on patient interests and public health.

NHS Confederation MC, Po, Pl, C
www.nhsconfed.org
The NHS Confederation is the independent membership body for organisations that make up the NHS. It represents more than 95 per cent of NHS organisations as well as a growing number of independent healthcare providers.

NHS Institute for Innovation and Improvement MC, Po, Pl, D ,C
www.institute.nhs.uk
The NHS Institute for Innovation and Improvement supports the NHS in transforming healthcare for patients and the public by rapidly developing and spreading new ways of working, new technology and world-class leadership.

NHS London Healthy Urban Development Unit (NHS London HUDU) HN, Po, Pl, D, C
www.healthyurbandevelopment.nhs.uk
HUDU promotes health improvement and the narrowing of health inequalities in London through pursuing the alignment of health and spatial planning strategies. It supports the integration of health into local development frameworks, and facilitates effective engagement between the health and planning sectors and access to modern healthcare.

NHS Sustainable Development Unit (SDU)
SD, Po, Pl, D, C
www.sdu.nhs.uk
SDU gives leadership, expertise and guidance on sustainable development to all NHS organisations in England. It raises awareness as to the responsibilities of, and actions for, the NHS on sustainable development and climate change. It ensures that best practice and innovation are evaluated and costed, and that the mechanisms for implementation are made fully available to all NHS organisations.

Peabody HN, Po, Pl, D C
cabeurl.com/7z
Peabody housing association aims to ensure that as many people as possible across London have a good home, a sense of purpose and a strong feeling of belonging. Peabody runs events for London residents to encourage health and well-being, focusing on mental health, healthy eating and exercise.

SHINE SD, Po, Pl, D, C
www.shine-network.org.uk
SHINE helps NHS trusts improve on the sustainability of their estates through a learning network of guidance, case studies, events and training, including achieving sustainability through NHS procurement processes. It is supported by the Department of Health, the London NHS and Community Health Partnerships.

Sustainable Development Commission (SDC) SD, Po, Pl, D, C
www.sd-commission.org.uk
SDC is the government's independent advisor on sustainable development. It provides advocacy, advice and appraisal to help put sustainable development at the heart of government policy. It uses evidence-based public reports on environmental, social and economic issues, and expert opinion to advise government, invites debates on controversial subjects and gives watchdog appraisals of the government's progress.

Sustainable Development Unit
(SDU) SD, Po, Pl, D, C
cabeurl.com/85
The government's SDU sits within the Department
for Environment, Food and Rural Affairs (Defra). It
reports on and monitors sustainable development
across Whitehall and the UK. It implements the UK's
Sustainable Development Strategy and ensures
the sustainability of new communities, and Defra's
interests in planning systems, housing supply,
sustainable buildings and construction, strategic
transport issues and the Olympics. It sponsors
the Sustainable Development Commission.

**Twenty Steps for Developing a
Healthy Cities Project** Po, Pl
cabeurl.com/6n
Publication from the World Health Organisation
Regional Office for Europe outlining an action plan
for implementing WHO's qualities of a healthy
city (See Appendix 2, i Figure 1). It is aimed at
local government, community groups, healthcare
providers and neighbourhood associations.

UK Green Building Council (UK-
GBC) SD, Po, Pl, D ,C
cabeurl.com/85
The UK Green Building Council (UK-GBC) brings
clarity, purpose and co-ordination of sustainability
strategy to the construction sector. It brings together
anyone involved in the process of planning, designing,
constructing, maintaining and operating buildings,
in a cross-sectoral approach, providing information,
facilitating learning between members and helping
the industry take the action required on sustainability.

**Working tool on city health development planning:
concept, process, structure, and content** Po, Pl, D, C
cabeurl.com/7y
Guidance from the World Health Organisation,
referring to phase III of the WHO Healthy Cities
project in Europe. Its goal is to build and maintain
strategic partnerships for health. It describes in detail
a seven-step process that can be followed to develop
a local health plan. This model also provides the broad
framework for city health development planning.

World Health Organisation (WHO) MC, Po, Pl, D, C
www.who.int/en/
WHO is the directing and co-ordinating authority
for health within the United Nations. It is responsible
for providing leadership on global health matters,
shaping the health research agenda, setting norms
and standards, articulating evidence-based policy
options, providing technical support to countries,
and monitoring and assessing health trends.

Appendix 4
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