

The health impacts of spatial planning decisions



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'Spatial planning provides the opportunity to align health and planning policies to deliver development solutions that will create the conditions for a healthy lifestyle. The places that will emerge will be attractive, safe and conducive to healthy living. This report provides clear advice on how to achieve them.'

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Abbreviations.

CHD	Coronary heart disease
COPD	Chronic obstructive pulmonary disease
CSDH	Commission on the Social Determinants of Health
CVD	Cardiovascular disease
DALYs	Disability Adjusted Life Years
EWD	Excess Winter Deaths
NHS	National Health Service
NICE	National Institute for Health and Clinical Excellence
PM	Particulate Matter
PPS	Policy Planning Statements
RTA	Road Traffic Accidents
WHO	World Health Organisation

Executive Summary

- Planning affects our health in overt ways, such as levels of air pollution or in damp homes but it also affects our health in less obvious ways. Numerous planning decisions affect health outcomes. Two of the largest contributors to the global burden of disease, cardiovascular disease (CVD) and poor mental health, are significantly influenced by decisions planners make. A quarter of the global disease burden and a quarter of all deaths are attributed to environmental factors. The built environment is also the foundation asset of our health.
- Planners and public health professionals should share their expertise to best create healthier places to live, work, play and travel. Doctors' maxim, 'first do no harm' is one that planners can also adopt.
- Planning and public health share similar goals; to improve the way we live and our quality of life. But these shared goals have not meant these two groups spend much time communicating with each other.
- Four spatial planning issues likely to have significant impacts on health are examined; transportation, buildings and communities, building healthy homes and flooding.
- The health risks associated with spatial planning include:
 - heart disease
 - respiratory disease
 - mental health (short and long term effects)
 - obesity
 - injuries
 - increased mortality, morbidity and costs to NHS
- **Future planning policies should address the added health burden from the effects of:**
 - Air pollution
 - Noise pollution
 - Lack of safe community space or spaces with poor access.
 - Poor or unsafe access to a range of food shops and health services
 - Cold and damp housing
 - Heat waves
 - Road traffic accidents
 - Sedentary lifestyles
 - Poor access to local health centres
 - Poor land use mix failing to encourage local employment
 - Poor housing/building design
 - Flooding

- The evidence base linking the physical environment to health rarely demonstrates a causal relationship but the research base is growing.
- Spatial planning issues related to transport affect health through vehicle emissions, noise and increased road traffic injuries. Air pollution from traffic pollution increases heart and respiratory disease. Air pollution does not cause asthma, but it does aggravate existing respiratory conditions. Both rural and urban areas are affected by air pollution. Levels of air pollution are higher in lower socio-class neighbourhoods.
- Transportation harms health by creating environments where inactivity is encouraged, creating 'obesogenic' environments. Planners have a crucial role in determining whether cycling and walking are obvious and realistic options for urban dwellers. Many of the journeys we take are short and could be replaced by walking or cycling. Car owners walk less, very few children walk or cycle to school and very few commuters cycle.
- Noise pollution evidence negatively affects mental health, particularly children's ability to concentrate.
- Road traffic accidents are falling but over 3000 people die each year in the UK. Road traffic injuries and deaths are more likely to occur in lower socio-class neighbourhoods.
- The provision of safe, community spaces, access to food, access to health services and employment issues are affected by spatial planning decisions. The greater proportion of green space in an area was associated with better levels of self-reported health in all urban areas and rural areas with low income. Access and quality are key issues in the provision of green space. The greater proportion of green space in a district is associated with better levels of self-reported health.
- Safe and accessible green spaces improves mental health. There is contradictory evidence that green spaces improve rates of physical activity.
- Urban areas are best served in terms of access to both GPs and hospitals. Locally based health centres do not necessarily reduce waiting times or A&E attendance.
- Long-term illness and disabilities impede close to 1 in 10 work-age people from working. Unemployment increases morbidity and mortality

- Housing affects health in many ways, such as damp, cold, and indoor contamination. The effects of housing and regeneration initiatives on health are difficult to isolate and measure. Damp homes are common in the UK and lead to thousands of Excess Winter Deaths. Compared to other European nations with colder climates, UK housing has poor thermal standards and a quarter of the total housing stock fails to meet the thermal comfort criterion. Cold housing exacerbates poor health. Asthmatics are two to three times more likely than the general population to live in damp properties.
- Deaths from excess heat occur at 19°C in England.
- Interventions to reduce the health risks of cold and damp housing and heat waves should be targeted at elderly populations, such as improving residential care homes.
- Poorly designed homes cause injuries and affect mental health.
- In England and Wales, millions are at risk from flooding and flooding is likely to become more frequent. There are a very limited number of robust studies on the health impact of flooding in England. There are two main health risks of flooding in England, drowning and mental health problems. The risk to mental health is largest and there is a low risk of drowning.

There is strong evidence that:

- The provision of space increases exercise.
- Reductions in traffic reduces air pollution.
- Green spaces improve mental health.
- Moderate exercise improves health outcomes.
- Provision of space to exercise needs to be safe and easily accessed.

There is strong and/or inconclusive evidence that:

- Traffic interventions reduce accidents and/or increase physical activity.
- Green spaces improve rates of physical activity.
- Improving insulation and heating improves health.
- Home insulation, improving heating and subsidising power has shown to be effective in improving health and well-being.
- Mental health might improve even if physical health does not.

There is anecdotal evidence that:

- Local access to healthy food may improve diets.

There are a number of opportunities for planners to make the built environment a healthier place to live, work, play and travel in. Most interventions cannot be carried out by individuals and require structural changes. To make optimum progress on reducing the burden of disease, those working in local, regional and national planning departments need to regard health as a part of their responsibilities. Planning decisions have a great capacity to overtly change environments, but also to create new environments which will encourage people to lead healthier lives.

Introduction

'the places where people live are an important factor in determining their health and sustaining inequalities in health outcome(s)' (Fone and Dunstan 2006: 905).

Planning decisions affect where we live, work, play, how we travel and all of these factors affect our health. The Commission for Architecture and the Built Environment (CABE) states the 'built environment is the foundation asset of our economy', but, importantly, the built environment is also the foundation asset of our health. Planning affects our health in overt ways, such as levels of air pollution or in damp homes and it also affects our health in less obvious ways, such as creating neighbourhoods where people feel unsafe and therefore less likely to walk or exercise in shared spaces. This report argues planners and public health professionals can share their expertise to best create healthier places to live, work, play and travel.

This report aims to provide evidence to help identify health outcomes which are likely to prove most susceptible to spatial planning interventions. The current policy planning statements (PPS) cover a range of issues including housing, transport, pollution, and economic development. Health and the provision of healthcare services are referred to in a number of the existing PPSs, however, no PPS is exclusively dedicated to health. Whether a new PPS is justified or not, this report demonstrates that effective use of spatial planning policies has the potential to make a very significant impact on the distribution and intensity of health conditions in England. If health were made an explicit objective, for example, through the creation of PPS on health, then progress on improving health and reducing inequalities will likely be correspondingly greater.

At points the relationship between planning and health has been described as 'inextricably linked' (Tomlinson 2007) or as an 'umbilical link' existing between environmental conditions and human health (Barton 2005: 281). Planning and public health share similar goals; to improve the way we live and our quality of life. But these shared goals have not meant these two groups spend much time communicating with each other. Too often planners and public health people sit in different departments or organisations (NHS or local government), thus the opportunities to influence each other's work has rarely occurred. Historical examples show the powerful influence planning can have: it was a planning intervention, the development of sewage and sanitation systems in the late 1800s and early 1900s that led to the most

significant reduction in deaths and disease in the twentieth century. However, planners are now more likely to find themselves criticised for creating unhealthy environments, instead of leaders in creating healthy built environments.

More recently, health has not necessarily been a priority in planning decisions. For example, sprawling communities, with retail developments on the edges of towns and cities, lead to car-dependency, and contribute to creating an 'obesogenic' environment. The built environments in many 1980s/90s housing developments discouraged pedestrian use, with numerous cul-de-sacs and few shops or retail opportunities, again contributing to an obesogenic environment, and also affecting mental health. These kinds of planning decisions suggest health has been less of a priority than others, such as cost, however, the relationship between planning and health has not always been this seemingly distant.

The relationship of health to planning has changed, particularly with the introduction of spatial planning and sustainable development concepts. Initially sustainable development concerned itself with only environmentally sustainability; however, it now has a social agenda that encompasses health. Spatial planning seeks to transform traditional planning from its narrow focus to considering the effect of planning on wider contexts. Spatial planning engages with issues affecting planning in society and considers how planning decisions interact with social, cultural, economic, and ecological policies. The potential relationship between health and planning can be difficult to visualize. Barton and Grant's health map¹ demonstrates the numerous ways in which the built environment affects health - from individual to population-wide influences (Figure 1). It is not a linear relationship, but is 'about the whole nature of human settlements' (Barton 2005).

This evolution in planning theory is similarly reflected in the changing notion of public health. In the UK, many public health problems have been addressed (unsafe food and water, poor sanitation), life expectancy is increasing, and in general, our health is improving. Instead, new risks, often linked to long term conditions, such as obesity, chronic heart and respiratory disease and poor mental health, are the new priorities for the NHS.

The Health Select Committee Report (2009) into health inequalities highlighted the need for a policy planning statement on health to help reduce health inequalities. If the government is to continue to

¹ Based on the influential 1981 Dahlgren and Whitehead determinants of health model.



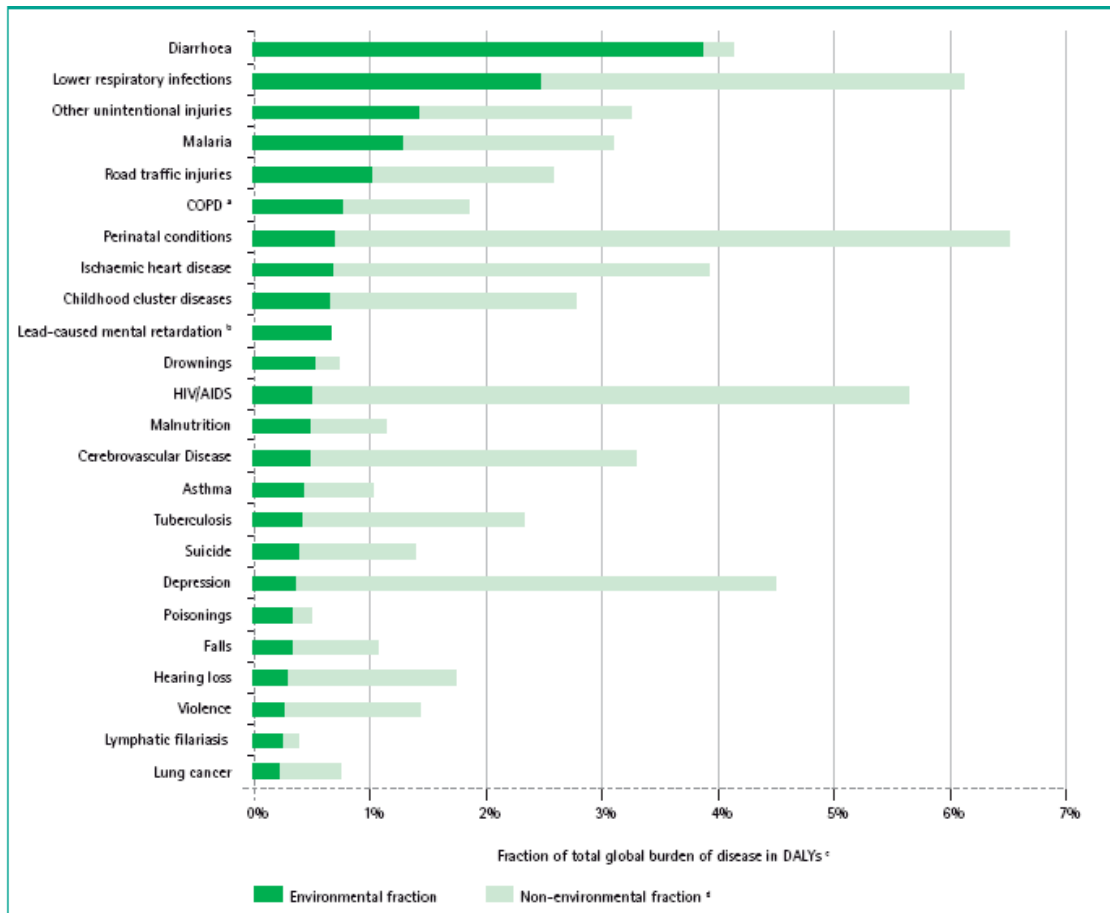
Figure 1. Health map for the local human habitat (Barton and Grant 2006)

reduce health inequalities, than the NHS needs partners to address wider determinants of health, and the Health Select Committee regarded planners as essential to meeting this vision. Public health professionals have long regarded planning as an important determinant of health. Donald Acheson's 1998 *Independent Inquiry into Inequalities in Health* identified transport, the way we travel and access amenities as key drivers of health. The January 2006 white paper, *Our Health Our Care Our Say* encouraged the NHS 'to work closely with planning authorities'. NICE saw planning as essential in carrying out in its 2008 guidelines 'Promoting and creating built or natural environments that encourage and support physical activity'. The recent Commission on the Social Determinants of Health (CSDH) saw planning as essential to reducing health inequalities, stating governments should:

'Ensure urban planning promotes healthy and safe behaviours equitably, through investment in active transport, retail planning to manage access to unhealthy foods, and through good environmental design and regulatory controls, including control of the number of alcohol outlets' (CSDH 2008).

As this report will demonstrate, planning decisions affect health outcomes. Two of the largest contributors to the global burden of disease, cardiovascular disease (CVD) and poor mental health, are significantly influenced by decisions planners make. The World Health Organisation (WHO) estimate 24% of the global disease burden and 23% of all deaths are attributed to environmental factors (Prüss-Üstün and Corvalán 2006). The WHO's work on

global burden of disease demonstrates the significant impact planning decisions have on health (Figure 2).



^a Abbreviations: COPD = Chronic obstructive pulmonary disease.
^b Lead-caused mental retardation is defined in the WHO list of diseases for 2002, accessed at: www.who.int/evidence.
^c DALYs represents a weighted measure of death, illness and disability.
^d For each disease the fraction attributable to environmental risks is shown in dark green. Light green plus dark green represents the total burden of disease.

Figure 2. Diseases with the largest environmental contribution (Prüss-Üstün and Corvalán 2006).

The planning profession has the capacity to influence health and create 'positive physical environments which nurture better health and wellbeing' (Scottish Government 2008). Similar to the changing role of the NHS, they can concentrate more on promoting good health and preventing disease,

'(i)t is time for a shift to communities intentionally designed to facilitate physical and mental well-being...The first step is to understand better the elements of the built environment that promote health' (Jackson 2003: 1383).

Barker's (2006) review of land use planning similarly argued there 'are also social and health benefits to living in pleasing surroundings which function well. Well-designed neighbourhoods and towns can

give rise to a durable and sustainable virtuous circle'. Doctors' maxim, 'first do no harm' is one that planners can also adopt.

Types of evidence?

In traditional public health research, epidemiology and statistical analysis are used to calculate health risks and outcomes. More modern health risks, which harm our health in less obvious ways, may require new measurement methods. For example, it is difficult to measure the precise contribution of the environment to disease and ill-health. As such, the evidence base linking the physical environment to health rarely demonstrates a causal relationship (e.g., Srinivasan et al. 2003). The research base is growing, with more journals (e.g. *Health and Place*) and conferences examining the relationship between the built environment and health. More research is needed, particularly longitudinal studies and research examining the costs and benefits of interventions.

Regardless of the difficulty of collecting evidence, this should not stop interventions or actions being adopted which are based on a 'strong suspicion that they will deliver a beneficial outcome' (Morris et al. 2006: 892). Whilst evidence might not be available which proves a causal relationship between planning and improved health outcomes, many of these interventions will not make situations worse. For example, creating accessible green spaces or reducing air pollution will not necessarily improve health, but it is extremely unlikely to make it worse.

Methodology and outline of report

Relevant literature was reviewed and evidence of relationships between planning and health and related interventions were analysed.² Initial general reading on spatial planning on health led to four key spatial planning issues being identified as likely to have more significant impacts on health. The four areas examined are; transportation, public spaces and services, housing and flooding. The specific risks to health from each of these areas are analysed (see Table 1).

² This report is not a systematic review of evidence.

Spatial planning issue	Health risks from:
Transportation	• air pollution
	• road traffic accidents
	• noise pollution
	• creating sedentary lifestyles
Public spaces and services	• creating sedentary lifestyles
	• inadequate access to food
	• inadequate access to health services
	• un/employment and related issues
Housing	• damp and cold homes
	• excess heat
	• poor design
Flooding	• flooding

Table 1. Analysis of literature.

Each of the four sections includes:

- an overall assessment of the spatial planning issue and its relationship with health;
- a table examining the analysis of evidence;
- an assessment of interventions.

The table of evidence in each section assesses the level of evidence between the spatial planning issue and its relationship to health, any contribution to increased morbidity and mortality and whether the issues exacerbates health inequalities. Each health risk is then assessed using star ratings and given one, two or three stars. The ratings are based on an assessment of the:

- **Evidence of the health risk:** assessing the amount of evidence and the quality of this evidence, such as the size of sample, use of randomised control trials (the greater the level of quality evidence, the higher the rating);
- **Evidence of the health risk in relation to spatial planning:** assessing the impact of the spatial planning issue on health and the level of evidence supporting these claims (the greater the impact on health, the higher the rating);
- **Evidence that spatial planning interventions will improve health and reduce health care costs** (the greater the level of evidence, the higher the rating).

Based on this evidence, each health risk receives one, two or three stars. The higher the rating, the larger the impact a spatial planning intervention would have:

1 star 

- level of evidence (weak or anecdotal only)
- health improvement (none or unlikely)
- reduction health care costs (no reduction/unlikely)

2 stars 

- level of evidence (growing)
- health improvement (likely)
- reduction health care costs (likely)

3 stars 

- level of evidence (strong)
- health improvement (very likely)
- reduction health care costs (very likely)

Each section ends with a brief examination of the effectiveness of spatial planning interventions on health outcomes. Interventions are assessed to indicate levels of reliability and effectiveness. The levels of evidence:

- Strong evidence
- Strong / Inconclusive evidence
- Anecdotal evidence

Section 5 examines the costs of these health risks to the NHS and lists relevant government targets planners and public health professionals may use to support their work.

The discussion / conclusion in Section 6 reflects on the levels of evidence and provides recommendations for future planning policy and areas of research.

Section 1: Transportation

Introduction

Urban planning and health behaviour research consistently finds that how communities are built influences whether or not people use public transport, drive, walk or cycle to get to their destination (Edwards and Tsouros 2006: 10). Environmental factors, such as inadequate pedestrian and cycling infrastructures, also make a significant contribution to injuries from road traffic accidents around the world (40%) (Prüss-Üstün and Corvalán 2006: 10). As Figure three shows, there are numerous health risks associated with transport, however, how these risks may be associated with planning is less obvious.

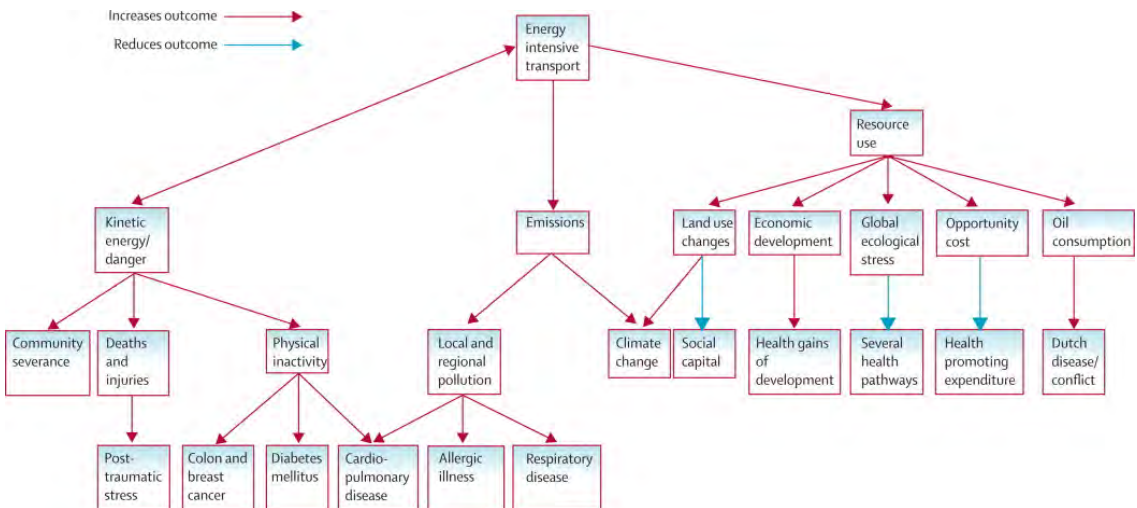


Figure 3: Health risks associated with transportation (Woodcock et al. 2007).

On average almost 10 people die and 98 are injured each day on UK roads (I&DeA 2009). The majority die from mistakes related to human error, but **a quarter of all fatalities occur because of speed**, a factor planners can influence, in addition to road infrastructures (Department of Transport 2007A).

Transportation also affects our health through the emissions from cars and airplanes, through air pollution and noise pollution. Legislation, such as the Clean Air Acts of 1956 and 1968, have reduced industrial emissions in the UK so much that **road transport is the main source of air pollution**. Particles less

than 2.5 micrometers in diameter (PM_{2.5}) are referred to as 'fine' particles and are believed to pose the greatest health risks.³ Transport related air pollution affects cardiovascular and respiratory mortality, allergies, cancer, pregnancy, birth outcomes, male fertility (WHO 2009).

Whilst road transport emissions are falling (Figure four), future levels of air pollution, particularly ozone concentrations, are uncertain as they depend on trends in emissions and meteorological factors (e.g. climate change) (Department of Health and Health Protection Agency 2008).

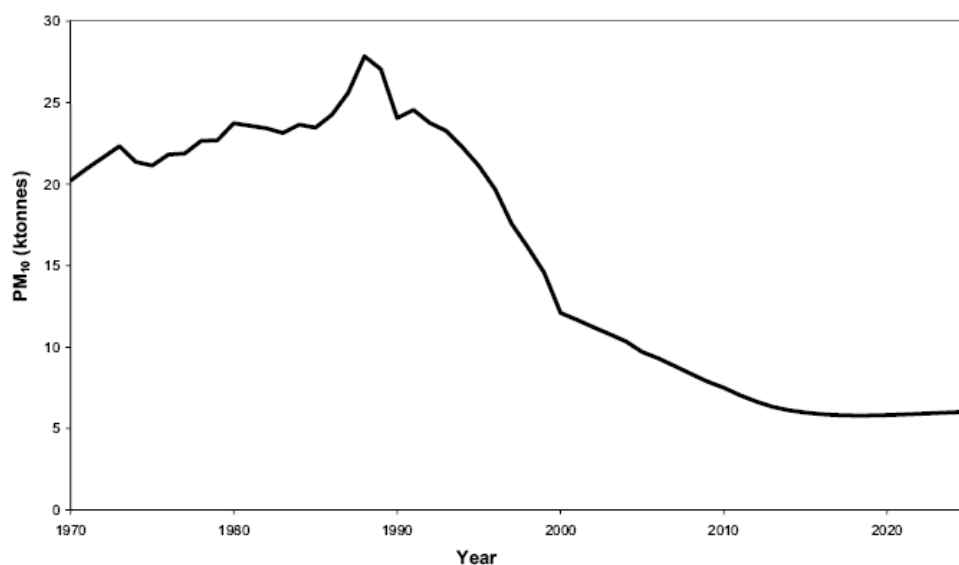


Figure 4: Urban UK emissions of PM₁₀⁴ from road transport (Department of Health and Health Protection Agency 2008).

As well as being the main source of air pollution, **road traffic noise is the main source of noise pollution** (Dora and Racioppi 2003).

Transport affects health not only through vehicle emissions, noise and increased road traffic injuries, but in less direct ways. Transportation harms health by creating environments where inactivity is encouraged, creating 'obesogenic' environments. An obesogenic environment is the 'sum of the influences that the surroundings, opportunities or conditions of life have on promoting obesity in individuals and populations' (Swinburn and Egger 2002: 292). Evidence shows we travel much more by car than we used to. The distance travelled by cars (including light vans and taxis) rose from 388 billion passenger kilometres in 1980 to 689 billion in 2007, a 78% increase (Department of Transport 2008A). Travel by car is increasing everywhere, for both short and long journeys. On

³ PM₁₀ is the measured particle to which limits are set in the UK.

⁴ Particles measuring 10µm or less.

average, each EU citizen travels 35 km a day – 75% of this distance is covered by car (WHO 2007A: 23) and the trend is for car travel to increase. In 2000, traffic volumes were 402,890 vehicle kilometres. It is forecast that this will grow by 40% over the next twenty years (Department of Transport 2004) if current trends continue.

At the same time as car travel has increased, walking and cycling has decreased. Between 1980 and 2007, the distance travelled by pedal cycle fell by 17% (Department of Transport 2008A). In the same period, bicycle mileage fell from 51 to 39 miles per person per year (NICE 2008). Cycling accounts for only 1% of all trips (Department of Transport 2007B). Similarly, walking declined by 23% between 1972 & 2005 (Davis et al. 2007). The average distance walked, per person per year, has fallen from 255 miles in 1975/76 to 201 miles in 2006 (NICE 2008). Levels of cycling differ in England, in some areas cycling rates are increasing. Before the introduction of the congestion charge, cycling rates in London were already increasing. Between 2000-2007, cycling levels in London increased by 83% (Mayor of London 2009).

Many of the journeys we take are short and could be replaced by walking or cycling. Cycling accounts for 2% of trips of less than 2 miles (Department of Transport 2007B). More than 30% of trips made in cars in Europe cover distances of less than 3 km and 50% less than 5 km. 'Over two thirds (68%) of all trips and over half (58%) of car trips are under 5 miles, approximately a half hour cycle ride' (Department of Transport 2007B). Replacing short car journeys with walking and cycling trips 'would enable most motorists to achieve recommended levels of physical activity⁵' (Woodcock et al. 2007). Approximately two-thirds of all adults in England do not meet the 'five by 30 minute' rule (Primarolo 2009). Understanding external and internal factors affecting decisions to be physically active, will help to improve low levels of physical activity. Many factors influence the levels of physical activity in communities, and the built environment is a key factor (Figure five).

⁵ The recommended physical activity guidelines are 30 minutes of moderate exercise 5 days a week.



Figure 5 Factors influencing physical activity in communities (Adapted from Dahlgren in Edwards and Tsouros 2006: 4)

In 2008 NICE published guidance on how to improve the physical environment to encourage physical activity. These guidelines regarded planning as key to creating new environments where physical activity was integrated into each community. The guidance recommended local governments:

‘Ensure planning applications for new developments always prioritise the need for people (including those whose mobility is impaired) to be physically active as a routine part of their daily life. Ensure local facilities and services are easily accessible on foot, by bicycle and by other modes of transport involving physical activity. Ensure children can participate in physically active play’ (NICE 2008).


Regular, moderate physical activity can help prevent or reduce the impact of most avoidable chronic diseases. Physical activity does not need to be vigorous to achieve health benefits, thus **walking and cycling are key factors in reducing obesity levels.** Overt exercise ‘accounts for a very small proportion of total energy expenditure and is likely to play only a minor role in preventing obesity’ (Butland et al. 2008: 48).

In a wide ranging review of the link between health, physical activity and provision for cycling and walking (Racioppi et al. 2005), found that the choice to walk and cycle is strongly influenced by urban settings and transport policy. They concluded **planners have a crucial role in determining whether cycling and walking are obvious and realistic options for urban dwellers.** The Foresight report (Butland et al. 2008) also found the distance between shops, workplaces and schools be seen as opportunities for walking and that these routes need to be connected to increase the walkability of the environment.


Evidence of key health risks and transportation


The following table discusses the health risks associated with transportation:


- air pollution
- road traffic accidents
- noise pollution
- contribution to creating sedentary lifestyles

Health Risks and Transportation			
	Evidence UK and international	Mortality & Morbidity	Inequalities
Air pollution 	<ul style="list-style-type: none"> - CVD mortality increased (with a relative risk of 1.14) in 1991 when London experienced a period of air pollution with elevated levels of nitrogen dioxide and moderately increased levels of black smoke, There was a 4% increase in CVD mortality between 1987 and 1992 when ozone levels were increased (Anderson et al. 1996a, 1996b). - 42% of people with asthma say that traffic fumes stop them walking and shopping in congested areas and 66% of people with asthma feel that traffic fumes exacerbate their symptoms (Asthma UK 2009). - It is estimated that 1,600 accelerated deaths and 1,500 respiratory hospital admissions occur each year in London as a result of air pollution (British Lung Foundation 2009). - One in five people is at risk from air pollution. People who already have a lung disease, the elderly and children are likely to be especially affected by high levels of pollutants (British Lung Foundation 2009). - Both urban and rural areas are affected by air pollution, and there are no differences in mortality rates. 'Ambient pollutant concentrations were still associated with the risks of hospital admission for COPD' in rural England (Sauerzapf et al. 2009). - Heavy traffic flow has also been shown to increase childhood asthma admissions (Edwards et al. 1994). 	<ul style="list-style-type: none"> - It is estimated 'that up to 24,100 deaths were brought forward by air pollution in the UK. Around 23,900 new or brought forward hospital admissions for respiratory diseases were also associated with air pollution' (COMEAP 1998: 12). - Estimates air pollution reduces life expectancy average 8 months (DEFRA 2007). - A decrease in the concentration of PM_{2.5} of 10 micrograms per cubic meter is associated with an increase in life expectancy of 0.77 year (Krewski 2009). - No clear north-south divide in rural-urban split of pollution but all cause mortality shows a marked north-south split. Death rates higher in the north and lower in more affluent south. 	<ul style="list-style-type: none"> - In England, the most deprived 10% of areas experience the worst air quality, and 41% higher concentrations of nitrogen dioxide from transport and industry than the average. In Wales the highest concentrations of air pollution are found in the least deprived wards (Walker et al. 2003). - There is some evidence that socioeconomic status influences asthma prevalence. The relationship between socioeconomic status, local air quality, and combined effects on respiratory health were studied using data from the Health Survey for England.

	Evidence UK and international	Mortality & Morbidity	Inequalities
Air pollution (con't)	<p>- The odds ratios for asthma and a number of asthmatic symptoms increase in those exposed to heavy lorry traffic (Ciccone et al. 1998). Studies carried out in the UK and United States have suggested those living within close proximity to a road are also at an increased risk of hospitalisation with asthma (Lin et al. 2002).</p> <p>Reflecting international evidence</p> <p>- In Europe, outdoor air pollution was found to account for approximately 1.4% of total mortality and 0.5% of all DALYs (WHO 2002A).</p> <p>- Exposure to outdoor air pollution accounts for approximately 2% of the global cardiopulmonary disease burden (WHO 2002A).</p> <p>- Long-term exposure of PM₁₀ increased the risk of mortality for elderly COPD patients in 34 US cities. A significant association was established (Zanobetti et al. 2008).</p> <p>- A systematic review of the effects of transport pollution found good evidence for an increase in total mortality, respiratory morbidity, allergic illness and symptoms, cardiopulmonary mortality, non-allergic respiratory disease, and myocardial infarction and a possible link to lung cancer (Heinrich et al. 2005).</p> <p>- Based on a survey sample of 9,319, a Swedish survey found that living within 100m of a road with more than ten cars/minute (compared with no 'heavy road' at the same distance) was associated with the prevalence of an asthma diagnosis (Lindgren et al. 2009, see also Viegi et al. 2006).</p>	<p>There is little correspondence between the spatial distribution of mortality rates and of air pollutant concentrations (Janke et al. 2007: 13).</p> <p>- In Europe, outdoor air pollution was found to account for 2% of cardiopulmonary disease (WHO 2002A).</p> <p>- 350, 000 Europeans died prematurely in 2000 due to outdoor air pollution (WHO 2007A: 46).</p> <p>- High concentrations of particulate matter decrease life expectancy of every European by, on average, almost one year (WHO 2009).</p>	<p>- In the UK, 'urban lower social class households were more likely to be located in areas of poor air quality' (Wheeler and Ben-Shlomo 2005).</p>

	Evidence UK and international	Mortality & Morbidity	Inequalities
<p>Sedentary lifestyles</p> 	<ul style="list-style-type: none"> - Distance walked by adults in car-free households is 131 miles per year more than adults in households with cars. This increased walking could prevent an average 2lb 11 ounce weight gain per year and a slide in obesity over a decade (Davis et al. 2007). - 2% of trips to and from school by secondary school children (aged 11-16) and 1% by primary school children (aged 5-10) are by bicycle. - The main reasons for making a cycling trip are leisure or social purposes - 38% of cycling trips (Department of Transport 2007B). - 3% of commuting trips are made mainly by bicycle (Department of Transport 2007B). - Around 3 in 10 car users say they would reduce their car use 'if there were more cycle tracks away from roads ' (31%), 'if there were more cycle lanes on roads' (27%) or 'better parking facilities for cycles' (30%) (Omnibus in (Department of Transport 2007B). <p>Reflecting international trends</p> <ul style="list-style-type: none"> - In the USA, the built environment and travel patterns are important predictors of obesity in that each additional hour spent in a car per day was associated with a 6% increase in the likelihood of obesity (Lawrence et al. 2006). 	<ul style="list-style-type: none"> - Around one in every eleven early deaths could be prevented if people started doing at least 30 minutes of moderate exercise five days a week (Primarolo 2009). - 9% of deaths from CHD in the UK could be avoided if people who are currently sedentary or have a light level of physical activity increased their activity to a moderate level. 	<ul style="list-style-type: none"> - 'People living in households with lower levels of income make, on average, fewer bicycle trips and travel shorter distances by bicycle than those in higher income households. On average people in the highest income groups cycle 49 miles per person per year compared with 29 miles among people in the lowest incomes This contrasts with the pattern for walking, which is a more important form of transport for lower income households than higher income households'. (Department of Transport 2007B).

	Evidence UK and international	Mortality & Morbidity	Inequalities
Road traffic accidents 	<ul style="list-style-type: none"> - Fatalities from road traffic accidents in Britain have averaged over 3,000 per annum since 1998. In 2006 a further 29,000 people were seriously injured on the nation's roads (Department for Transport 2007A). - Number of casualties and injuries is falling (Department for Transport 2008B). - Child pedestrians are at high risk in the UK, with twice the rate of injury seen in France or Germany (Woodcock et al. 2007). <p>Reflecting international evidence</p> <ul style="list-style-type: none"> - The WHO World Report on Road Traffic Injury Prevention estimated that 1.2 million people were killed and 50 million people injured in road-traffic crashes in 2002 (Peden et al. 2004). - 34% of deaths of children due to injury in the European Union (EU) are caused by road crashes and the distribution of these injuries varies greatly by country (Zimmerman et al. 2004). 	<ul style="list-style-type: none"> - Road traffic accidents (RTAs) account for less than 1% of all deaths in the UK. - In the UK, RTAs account for the highest incidence of death amongst young adults, particularly those aged between 15 and 29 years. In this group, almost 17% of deaths occur as a result of collisions on the road (Jones et al. 2008). 	<ul style="list-style-type: none"> - The relationship between lower social class and more injuries among child pedestrians is well established (Rapioppi et al. 2004). - The largest difference between the casualty rate for the most deprived and least deprived areas was for pedestrians, from a rate of 70 casualties per 100,000 population in the most deprived areas to 21 casualties per 100,000 population in the least deprived areas. (Department for Transport 2008B).

	Evidence UK and international	Mortality & Morbidity	Inequalities
Noise pollution 	<ul style="list-style-type: none"> - In a meta analysis of 43 epidemiological studies on noise pollution and blood pressure changes and/or ischemic heart disease, van Kempen et al. (2002) estimated the relative risk per 5dB noise increase of air traffic noise on hypertension of 1.26 (1.14-1.39). - In contrast, a review of the effect of air traffic noise on human health found limited evidence that environmental noise is related to hypertension but and there is evidence that environmental noise may be a minor risk factor for coronary heart disease (Stansfeld and Matheson 2003). - Noise from road intersections above 50–60 dB(A) is insufficient to lead to hearing loss but has been reported to cause annoyance and sleep disturbance; impacts on other long term health outcomes including blood pressure are less clear (Thomson et al. 2008). <p>Reflecting international evidence</p> <ul style="list-style-type: none"> - A study of the effect of airport noise pollution on reading and comprehension on 2,010 schoolchildren from England, the Netherlands and Spain showed aircraft noise exposure at school was linearly associated with impaired reading comprehension. The association was maintained after adjustment for socioeconomic variables, aircraft noise annoyance, and other cognitive abilities (episodic memory, working memory, and sustained attention) (Clark et al. 2005, see also Stansfeld et al. 2005, Haines et al. 2001A, 2001B). 	<p>There is no evidence that noise pollution from traffic contributes directly to increased mortality or morbidity but it can exacerbate existing heart disease.</p>	<p>There is no published evidence that noise pollution exacerbates health inequalities.</p>

Interventions

Provision of space to exercise.

- Strong evidence -

- The majority of the studies that have examined the relationship between convenience of local neighbourhoods and walking reported positive associations (Jones et al. 2007).
- Walking and cycling become safer when they are more common (Jacobsen 2003, Racioppi et al. 2004).
- The likelihood of someone walking for non-work purposes rose by 14% for each 25% increase in the level of street connectivity where they lived (Frank 2005 et al.).
- People walk and cycle more when destinations such as shops and schools are close by and are connected by pedestrian-friendly streets (Frank et al. 2006).
- An American study aimed at encouraging walking and cycling to school by constructing/maintaining pavements and installing traffic lights showed substantial increases in active travel - walking 64% and cycling 114% (Staunton et al. 2003).

Reductions in traffic to reduce air pollution.

- Strong evidence -

- A 10% increase in PM₁₀ (holding all other pollutants fixed) is associated with a 0.7% increase in the all cause mortality rate. Therefore, it is estimated that reducing PM₁₀ pollution from 24.8 to 20.0 µg/m³ would be associated with approximately 4,600 fewer deaths per annum in England (Janke et al. 2007: 29). The current standard is 40 µg/m³.
- A review of interventions found 'relatively prompt and sustained health benefits are derived from improved air quality'. Improvements in life expectancy during the 1980s and 1990s were associated with reductions in fine-particulate pollution (after adjustment for various socioeconomic, demographic, and proxy variables for prevalence of smoking). A decrease of 10 µg / cubic meter in the fine-particulate concentration was associated with an estimated increase in life expectancy of approximately 0.61 (±0.20 year) (Pope et al. 2009).
- Much attention was given to the air quality at the recent Beijing Olympics; however, previous Olympics had similar concerns about air quality. At the 1996 Atlanta Olympics, where traffic was reduced due to fears about air quality for the athletes, the Center for Disease Control documented a 42% reduction in acute asthma events among children that were attributable to reductions in automobile traffic and associated air pollution (Friedman et al. 2001). Peak morning traffic decreased 23%

and peak ozone levels decreased 28%, emergency visits for asthma events in children decreased 42%. During the same period, children's emergency visits for causes other than asthma did not change (CDC 2009).

Traffic interventions to reduce accidents or increase physical activity.

- Strong / Inconclusive evidence -

- **Thomson et al. (2008) provide a valuable review** of road traffic interventions aimed at populations.
- Traffic calming measures (one-way streets, roundabouts, road narrowings, chicanes, road humps, reduction speed limits) have reduce traffic accidents and injuries by between 15% and 80% (Peden et al. 2004, see also Prüss-Üstün and Corvalán 2006)
- A meta-analysis of 33 studies showed that area-wide urban traffic calming schemes on average reduced the number of injury accidents by approximately 15%. The largest reduction in the number of accidents is found for residential streets (about 25%), a somewhat smaller reduction is found for main roads (about 10%) (Elvik 2001).
- The removal of 'pedestrian safety barriers' in the renovation of Kensington High Street in London (against the advice of safety engineers) appears to have significantly reduced the accident figures for pedestrians. By increasing the apparent risks, the behaviour of both drivers and pedestrians appears to have adapted, causing both to be more engaged with their surroundings. Levels of pedestrian activity in Kensington High Street have also significantly increased. (National Heart Forum 2003)
- A study in Scotland examined the effects of a neighbourhood traffic calming scheme on walking or cycling levels found 20% of the sample of local residents reported walking more and there was a statistically significant improvement in physical health however, mental health was not affected (Morrison et al. 2004: 839).

Reducing noise from cars and airplanes.

- Anecdotal evidence -

- There is little research that reducing traffic or developing quieter road surfaces will significantly improve health outcomes.
- There are no reports that the London Congestion Charge has reduced traffic noise.

Introduction of congestion charges, car parking restrictions.

- Anecdotal evidence -

- Approximately a quarter of car users say they would cycle more 'if congestion charging was introduced' (26%), 'if it was more expensive to park' (23%) and 'if it was difficult to park [a car]' (26%) (Department of Transport 2007B)

CASE STUDY: 'Home Zones' in Dings

The area of Dings in Bristol was a network of streets that had formerly been used as a 'rat-run' route. Dings experienced high levels of traffic and was used by commuters as a car park. A door-to-door survey of Dings residents showed that:

- Almost 100% were concerned about unsafe nuisance parking;
- Around 90% of respondents were concerned that the area was unsafe for children to play outside;
- Almost 50% were concerned about the lack of personal safety; and
- Almost 40% were concerned about noise from traffic.

Sustrans worked in partnership with the residents of the streets and Bristol City Council and developed a 'home zone' in Dings. The home zone was developed to include a number of new features which promoted public health, feelings of safety and social cohesion, including:

- New cycle/walkway through the site linking to strategic routes;
- Design for uncertainty to slow drivers in shared use areas;
- Promotion of non-car travel choice (including cycle training); and
- Provision of safer routes to the nearby school.

A follow-up resident survey highlight a number of changes in the way the space was perceived following the re-design. After the home zone was introduced less than 40% were concerned about unsafe nuisance parking; around 40% were concerned the area was unsafe for children to play outside; 20% were concerned about lack of personal safety and less than 10% were concerned about the noise from traffic.

A robust evaluation that focuses on the effects of environmental change and health outcomes is currently being carried out by Bristol University (funded by the National Heart Forum).

Recommendations

Future transport plans include the added health burden from the effects of air pollution, noise pollution, road traffic accidents and sedentary lifestyles. The primary health risks from transportation are:

- heart disease
- respiratory disease
- mental health
- obesity
- increased mortality, morbidity and costs to NHS

There is strong evidence that interventions which provide safe and accessible space and reduce air pollution are more likely to have a positive impact on health outcomes.

Section 2:

Public spaces and services

Introduction

Creating healthy public spaces integrates good housing of different types and tenures with a range of land uses. The aim of including different land uses, such as housing, offices, retail, entertainment, services and green spaces, is to create 'mixed' or 'balanced' communities. The following section examines a wide range of factors affecting health in the community and public spaces, including the provision of safe, community spaces, access to food, access to health services and employment issues.

'Safe community spaces' are spaces where people can carry out a range of activities to improve their physical and mental health. These spaces can improve physical health by providing areas where people can exercise, either vigorously or moderately. Open spaces also improve mental health by providing companionship, a sense of identity and belonging (Pinder et al. 2009). Analysing the benefits of improving space is difficult, identifying disease is much easier than finding a causal relationship between space and health (Pinder et al. 2009). However, researchers are attempting to untangle this relationship. One Scottish study (after controlling for a range of socio-demographic characteristics such as age, gender, social tenure, access to a car and smoking) found that 'feeling unsafe' increased the likelihood of poor health by 40% and those who liked their neighbourhood because it was well maintained, was landscaped and had nice open spaces were more likely to engage in healthy behaviour such as walking and were less likely to smoke (Parkes and Kearns 2004).

Environmental influences on health can be divided into two categories of measurement; perception and objective. Perception measures assess 'how accessibility, opportunities for physical activity, neighbourhood aesthetics and safety are perceived, derived from surveys of individuals' (Chow et al. 2009). Objective measures are more tangible measures assessing the built environment, such as availability of spaces to exercise or the walkability of an environment.

Since the 1960s there have been substantial changes to the way food is supplied in the UK. Changes in food retailing have been driven by a number of factors, including commercial forces,

increasing car ownership and the tendency towards 'one-stop shopping'. The result has led to changes in the built environment, where large supermarkets are built in 'out-of-town' locations, and a decline in the numbers of smaller general and specialist grocery shops in town centres and suburban areas.

These changes to the way we shop for food have led to concerns about lack of access to affordable and healthy food in urban areas, popularly referred to as 'food deserts'. The concept remains difficult to define and is not necessarily based on empirical evidence (Cummins and MacIntyre 2002). For example, the Acheson Inquiry into health inequalities (1998) cited studies which claimed to show food purchased in a deprived area cost more than that in an affluent one, however Cummins and MacIntyre's (2002) analysis of the same datasets showed no difference. In the Foresight (Jones et al. 2007) review of evidence on 'obesogenic environments', studies did not show an independent or causal association between neighbourhood retail food provision, individual diet, and fruit and vegetable intake. The problem of provision is complex and detailed research is needed, for example, to consider the availability of fruit and vegetables in local shops targeting Black and Minority Ethnic populations, which may stock a wider range of produce than first appearances suggest.

Part of the reason for this interest in the availability of food is researchers attempt to explain the differences between socio-economic status and food consumption. Research is shifting away from a focus on individual and behavioural factors that influence food choice, to an examination of contextual, structural, or environmental factors and the geographical distribution of affordable healthy food retail outlets (Coveney and O'Dwyer 2009, Morland and Evenson 2009).

Access to health services also raises a number of issues for planners to consider. Whilst the NHS is responsible for established health care services, currently developers and planners are not required to inform / work with the NHS when new houses are planned. Informal discussions and relationships occur, but there is no requirement for a statutory consultation. So, for example, 500 new homes could be created, but the NHS would not be part of any discussion on the added pressures to health services this new population would bring.

Current access to primary care in England is very good (The King's Fund 2008). Primary care visits account for 90 per cent of all patient contact with the NHS, totalling 314 million contacts per year (The King's Fund 2008). 5% of all journeys made in the UK are

patient journeys, and 83% of these journeys are made by car or van (Sustrans 2004). There is capacity to improve access issues to reduce car travel (and reduce air pollution and increase physical activity) and also to reduce the need for car parking. However, planners need to be realistic when considering the role of access to health services. The needs of those with long term chronic conditions should also be considered, as they are the most frequent users of the NHS. There is also a risk that the plan for making outpatient services more accessible, by creating local health centres ('polyclinics'), may lead to primary care being *less* accessible. These risks could potentially be avoided if policies were created which required planning decision to consider the health impacts when locating buildings offering public services.

A hospital's built environment is an important factor for planners to consider. One well referenced study examined recovery rates of patients who underwent gall bladder surgery, comparing outcomes with those who looked at trees, and those who looked at a brick wall. The research found those looking at nature recovered faster, spent less time in hospital, had better evaluation from nurses, required fewer painkillers, and had less postoperative complications compared to those viewing an urban scene (Ulrich 1984).


In building public spaces and services , the mix of land use should consider open spaces, access to food and health and it also has a role in considering the effect of these decisions on local employment. Planners have the capacity to create sustainable communities where a mix of land use will help to encourage local jobs. Dame Carol Black's report on worklessness made a number of recommendations, however it failed to consider the effect of where work is located and the impact this has on health.


Unemployment, insecure employment and work offering low social support is associated with the likelihood of having poor health such as respiratory problems, circulatory problems and poor mental health (Wilkinson and Marmot 1998, Bartley et al. 2004). The most common primary health conditions among those on incapacity benefits are associated with mental ill-health (Black 2008: 85, see also McClean et al. 2005). Thus any intervention that might improve mental health, such as improving the access and quality of safe community spaces, might also bring benefits to the unemployed.


Evidence of key health risks and public spaces and services


The following section considers the following health risks associated with creating public spaces and services:

- contribution to creating sedentary lifestyles
- access to food
- access to health services
- un/employment

Health risks and public spaces and services			
	Evidence UK and international	Mortality & Morbidity	Inequalities
Safe community spaces 	<ul style="list-style-type: none"> - The greater proportion of green space in an area was associated with better levels of self-reported health in all urban areas and rural areas with low income (Mitchell and Popham 2007, Chow et al. 2009). - There is an association between greater amounts of parks and sports grounds in an area and increased levels of cycling and walking and cycling for transportation (Maller et al. 2008). - Walking for over 150 minutes per week was associated with access to a park or green space for men only (Foster et al. 2004). - Poor mental health was found to be significantly associated with damp, design and maintenance of buildings and surrounding areas, density, being dissatisfied with community facilities, fear of crime and harassment, and feeling unsafe to go out in the day and at night (Guite et al. 2006). - Women who lived near footpaths were more likely to walk than those who lived near a community centre, pub, bar, coffee shop, post office or library (King et al. 2003). <p>Reflecting International evidence</p> <ul style="list-style-type: none"> - A study of six countries in Western Europe showed a positive relationship between perceived community-based opportunities for physical activity (opportunities in the residential area, local clubs and community support), self-reported levels of physical activity and self-rated health (Edwards and Tsouros 2006: 10). 	<ul style="list-style-type: none"> - There is evidence that contact with green space can decrease mortality and improve levels of physical activity (Bird 2004). - Parks and nature can be a significant contributor to reducing premature death and disease (Maller et al. 2008). 	<ul style="list-style-type: none"> -Disadvantaged populations are less likely to have easy access to the places that encourage a healthy lifestyle, such as safe streets and sidewalks, playgrounds, parks, trails and community gardens (McNeil et al. 2006). - Socio-economic position itself does not independently influence use of green space if it is readily available (Mitchell and Popham 2008).

	Evidence UK and international	M / M	Inequalities
Access to food 	<ul style="list-style-type: none"> - In the UK, empirical studies of urban areas found no independent association between food supply within the neighbourhood and fruit and vegetable intake (Cummins and MacIntyre 2005). - Pearce et al. (2009) found access to locally operated fast-food outlets was not associated with the consumption of the recommended fruit and vegetables or being overweight. - 13 wards in London boroughs have been identified as ‘food deserts’ (Barrett and Keech 2004). Over two-thirds of Newham residents live more than 500 metres from the nearest shop selling fresh fruit and vegetables. The implications of these findings are unknown. - Gujarati-Indian migrants settling in Sandwell are at greater risk of CVD compared to their counterparts who remain in India. They found urban lifestyles in the UK involved a greater fat and calorie intake than would be typical in Gujarat and pointed to the increase in obesity levels, including the prevalence of processed and convenience foods and red meat. Levels of physical activity did not differ (Patel et al. 2006). <p>USA evidence identifies more associations between access and obesity.</p> <ul style="list-style-type: none"> - In their review of US literature, Larson et al. (2009) found a number of studies that showed residents who have better access to supermarkets and limited access to convenience stores tend to have healthier diets and lower levels of obesity. - A sample of 1,295 adults in the US found the prevalence of obesity decreased by 0.73 in areas that had at least one supermarket. A higher prevalence of obesity was found in areas with at least one independently owned grocery store and at least one fast food outlet (Morland and Evenson 2009). - A study of fast food outlets in Chicago were statistically significantly clustered in areas within a short walking distance from schools, with an estimated 3-4 times as many fast-food restaurants within 1.5 km from schools than would be expected if the restaurants were distributed throughout the city in a way unrelated to school locations (Austin et al. 2005). 	<p>There is no published evidence that access to food increases morbidity or mortality.</p>	<ul style="list-style-type: none"> - Study of fast food outlets in England and Scotland found statistically significant increases in density of outlets in more deprived areas (MacDonald et al. 2007) - Lower socio-economic groups are less likely to exercise and consume fewer fruits and vegetables (Carlijn et al. 2007, Butland et al. 2008). Possible barriers include: accessibility and proximity of neighbourhood facilities, safety, lack of money, lack access to transportation and inconvenient access to facilities (Carlijn et al. 2007).

	Evidence UK and international	Mortality & Morbidity	Inequalities
Access to health 	<ul style="list-style-type: none"> - The National Transport Survey in 2007 (Department of Transport 2007A) showed the proportion of households within 15 minutes (by walk or public transport) of GP and hospital services. - London boroughs: GP-91%, Hospital-35%; - Metropolitan built-up areas: GP-84%, Hospital-25%; - Large urban areas: GP-82%, Hospital-21%; - Rural areas: GP-52%, Hospital-9%. - Accessibility of GPs by car and public transport were investigated in rural East Anglia. 10% of residents faced a car journey of more than 10 minutes to a GP. 13% of the population could not reach general medical services by daily bus (Lovett et al. 2002). The effect of these travel times is unknown. - Over 1.4 million people say they missed appointments, turned down or chose not to seek medical help due to travel difficulties (Wanless 2004). - According to Carr-Hill et al. (1997) patients are deterred from using primary care as travel distances rise. However, a systematic literature review of the impact of travel on cancer patients' perception of treatment showed inconclusive evidence that travel distance and travel difficulty increase psychological distress and reduce treatment compliance. The review did highlight that travel to treatment is described as 'inconvenient' and a practical hardship for cancer patients (Payne et al. 2008). - A study in a rural setting found to be low take-up of a cardiac rehabilitation service (39% of eligible patients attended and 23% completed it). The major reason identified for under-utilisation was problems with access, in particular limited public transport and parking facilities (Harrison and Wardle 2005). - The impact of the centralisation of services on residents in Wales over 75 years of age, found centralisation reduced geographical access for the most deprived districts and residents in rural areas (Christie and Fone 2003). 	<ul style="list-style-type: none"> - Patients with respiratory emergencies showed the greatest association between distance and mortality. Increased journey distance to hospital appears to be associated with increased risk of mortality. The data suggest that a 10-km increase in straight-line distance is associated with around a 1% absolute increase in mortality (Nicholl et al. 2007). 	<ul style="list-style-type: none"> - The relationship between geographical proximity to GPs and socio-economic status (SES) was recently studied by Adams and White (2005) in the North East of England. The results showed that those with lower SES lived closer to general practices than people with higher SES.

	Evidence UK and international	Mortality & Morbidity	Inequalities
Un/employment 	<p>- In a study of sick notes in Merseyside, mental ill-health accounted for over 40% of the total time covered by sick notes. The average time certified for a person with mental ill-health (15 weeks) was nearly twice as long as the average for all conditions (8 weeks) (Black 2008).</p> <p>- The Commission for Rural Communities (2007) states that whilst there were more working age Job Seekers Allowance claimants in urban England than in rural England in 2006, rural England had proportionately more claimants of Incapacity Benefit and also of carer, disabled and bereavement benefits. In contrast, a map of worklessness in urban areas shows that 42 percent of the UK's population live in urban areas, yet they contain 49 percent of the workless and 59 percent of those claiming benefits (Shaheen 2008).</p> <p>Reflecting International evidence</p> <p>- In a study of employment/unemployment, depression and alcohol use in Finland, a study of 5,993 people showed current unemployment was associated with major depressive episode (Hamalainen et al. 2005).</p>	<p>- There is a strong association between increased mortality and unemployment at an aggregate level (McClellan et al. 2005, Morris et al. 1994). Those who were unemployed but not ill at census time showed a 37% excess mortality over the following 10 years (Moser et al. 1987).</p> <p>- A time-series analysis between 1966 and 1996 found a significant relationship between unemployment and mortality, with suicide increasing within a year of job loss, cardiovascular mortality accelerating after two or three years and continuing for the next 10-15 years (Brenner 2002).</p> <p>- Redundancy or periods of unemployment increase the risk of mortality or morbidity from a range of physical diseases, notably heart disease (Curtis et al. 2002).</p>	<p>Studies into the health impacts of spatial planning on employment and the relationship with health inequalities are included in the general evidence.</p>

Interventions

Green spaces improve mental health.

- Strong evidence -

- A review by Mitchell and Popham (2008) found contact (either by presence or visual) with green spaces may be psychologically and physiologically 'restorative', reducing blood pressure and stress levels, and may promote faster healing in patients' post-surgical intervention. Research on green space and health is more consistent in demonstrating an amelioration of stress than it is in detecting an independent influence on physical activity levels.
- The health effects of participating in 'green exercise' such as walking, cycling, horse-riding or fishing in 263 people were studied. They showed statistically significant improvements in self-esteem. There was also a statistically significant reduction in 'total mood disturbance' (anger, depression, confusion, depression, fatigue and tension) following green exercise (Pretty et al. 2007).
- The design and management of housing can play a part in the nature and extent of criminal activity and crime and fear of crime can affect health by reducing social interaction and increasing stress (Bardsey et al. 2004).

Moderate exercise improves health outcomes.

- Strong evidence -

- Physical activity and the risk of stroke were examined within a sample of 72,488 women aged 40 to 65 years who did not have heart disease at baseline in 1986. They were followed up in 1988 and 1992. After 8 years, there were 407 stroke cases and further analysis of this showed that walking was associated with reduced risk of total stroke. Brisk or striding walking pace was associated with lower risk of total and ischemic stroke compared with average or casual pace. Thus even moderately intense physical activity such as walking was associated with a reduced stroke risk (Frank et al. 2000).
- **The benefits of physical activity can be gained from activities that can be incorporated into everyday life**, such as regular brisk walking, using stairs, or cycling. Physical activity does not need to be vigorous to confer protection (Department of Health 2004).
- **Gardening is a good form of moderate exercise for the elderly.** 'The lifting and reaching motions of gardening can strengthen weak muscles and increase limited joint flexibility ranges. Physical stamina and skills such as balance and

coordination can be improved' (Rothert 2007: 26, see also Caspersen et al. 1991).

Green spaces improve rates of physical activity.

- Strong / Inconclusive evidence -

- Takano et al. (2002) studied elderly people and found 'walkable' green streets and spaces near the residence showed significant predictive value for the survival of the urban citizens over the following five years.
- Access to large, **public open space is associated with higher levels of walking**. People with very good access to large, attractive public open spaces were 50% more likely to achieve high levels of walking (Giles-Corti et al. 2005).
- Community gardening can also improve mental health and well-being (Maller et al. 2008).
- A 'meta-analysis suggests that, in general, our perceptions of the environment have significant but modest associations with physical activity' (Butland et al. 2008). Hillsdon et al. (2006) found no statistically significant association between access to green space and physical activity and concluded accessibility of public open spaces weakly associated with increased walking (see also Brug and van Lenthe 2008).
- Simply providing spaces is not adequate and planning has a role in helping to create accessible and quality spaces. **Access and quality are key issues in the provision of green space** (Giles-Corti et al. 2005, Maller et al. 2008, McGinna et al. 2007).
- In a study of play areas in Glasgow, the supply of play areas was greater in deprived areas but there were issues with how they are perceived by the local community, as they were poorer quality of play areas (Ellaway et al. 2007).
- The following characteristics were positively associated with physical activity in adults: aesthetics, safety from traffic, residential density, land use mix, and street connectivity, well maintained footpaths and street lighting, the presence of facilities that function as destinations, e.g. shops, access to facilities for physical activity, e.g. parks and recreation centres and accessible, safe green spaces (Millington et al. 2009).
- **Recreational spaces need to be accessible**, which is extremely important to parents in making decisions about where their children play. Functionality and overall appeal of a park are also important and parents will travel distance to select a 'quality' park (Tucker et al. 2009).
- The impact of the environment on children's likelihood to exercise is less well understood and '(o)ther factors may also be relevant, such as the increased fears of parents about unsupervised outdoor play for children' (Butland et al. 2008: 48).

Local access to healthy food may improve health.

- Anecdotal evidence -

- In an uncontrolled 'before/after' study following the opening of a new supermarket in Leeds, Wrigley et al. (2003) found small improvements in fruit and vegetable consumption, with larger improvements observed amongst those who originally only consumed two (or fewer) portions a day.
- In a controlled 'before/after' study following the opening of a new supermarket in Scotland, Cummins et al. (2005b) observed no difference between the control and experimental groups (that is, they both increased daily intake of fruit and vegetable portions). Retail provision did not improve diets, but local provision encouraged walking and increased working opportunities.
- Access to and quality of shops is more important than distance (Coveney and O'Dwyer 2009).
- The London Agency established sustainable food distribution hubs to supply independent food retailers, restaurants, and city-based institutions. This has since developed into six wholesale markets in London and the target customers are envisaged as restaurants, the public sector and local independent retailers in deprived communities (Dixon et al. 2007).

CASE STUDY: Food Policy Team at Sandwell PCT

For the past ten years there has been a Food Policy Team within Sandwell PCT. Their remit incorporates various programmes to improve the community's access to and consumption of healthy food, such as training on growing fruit and vegetables, teaching healthy cooking and working with local schools. Working within the team is a Food Access Manager whose previous work, in conjunction with the University of Warwick, established there was a proliferation of smaller retail outlets that sold a limited amount of fresh fruit and vegetables and little access to supermarkets which provide a wider variety of fresh produce.

The Food Access Manager is currently working with the Government Office in West Midlands and the council planning and transport teams to produce a regional 'Healthy Food Physical Accessibility Standard'. They are working together to define what reasonable access is and what constitutes a variety of fresh fruit and vegetables. It is planned that this work will conclude in August 2009 and the standard will be used in the next local transport plan (2011). The transport plan would then include a statement based on the standard that stipulates the proportion of houses that should have reasonable access to fresh fruit and vegetables.

Based on the premise that showing people how to make informed choices can lead to healthier eating patterns, Sandwell will begin to operate 'supermarket tours'. People will be referred to the programme by a primary health care practitioner and they will then be taken to a supermarket, which has a wider range of healthy food available, and a health practitioner will discuss the nutritional content of various products. There has been a positive response from health practitioners and it is also planned that local volunteers and supermarkets will participate in supermarket tours. The programme will be evaluated by the University of Bristol.

Recommendations

Future planning about public spaces and services to include the added health burden associated with effects of failure to provide safe community space or spaces with poor access. Future planning to consider good and safe access to a range of food shops and health services. Plan for good access to local health centres either through adequate parking or good links to local transportation. Future planning to consider the land use mix to encourage local employment opportunities. The primary health risks from poor public spaces and services are:

- Obesity
- Mental health

There is strong evidence that green spaces improve mental health and that moderate exercise improves health outcomes.

Future research, including longitudinal studies, on:

- the impact of food availability and cost on obesity and wider health outcomes;
- the impact of density of fast food outlets on children's health;
- evaluate of the effects of location of local health centres on health outcomes, particularly those with long term conditions.
- evaluate access to local health centres and the availability of parking and links to local transport.

Section 3: Housing

Introduction

There are 20 million homes in the UK with new houses slowly replacing older housing stock, but at a very slow rate. House ownership is increasing, between 1971 and 2007 the proportion of households owning their home rose from 49 per cent to 71 per cent (GHS 2007). At the same time, the percentage of rented council homes and housing association homes fell. There is a range of housing stock in the UK, with a third of all properties failing to meet the Decent Homes standard (warm, weatherproof and with reasonably modern facilities) (Gilbertson et al. 2008: 8).

Housing affects health in many ways, through the structure of housing; internal conditions such as damp, cold, and indoor contamination. Figure six demonstrates the range of impacts housing can have on public health.

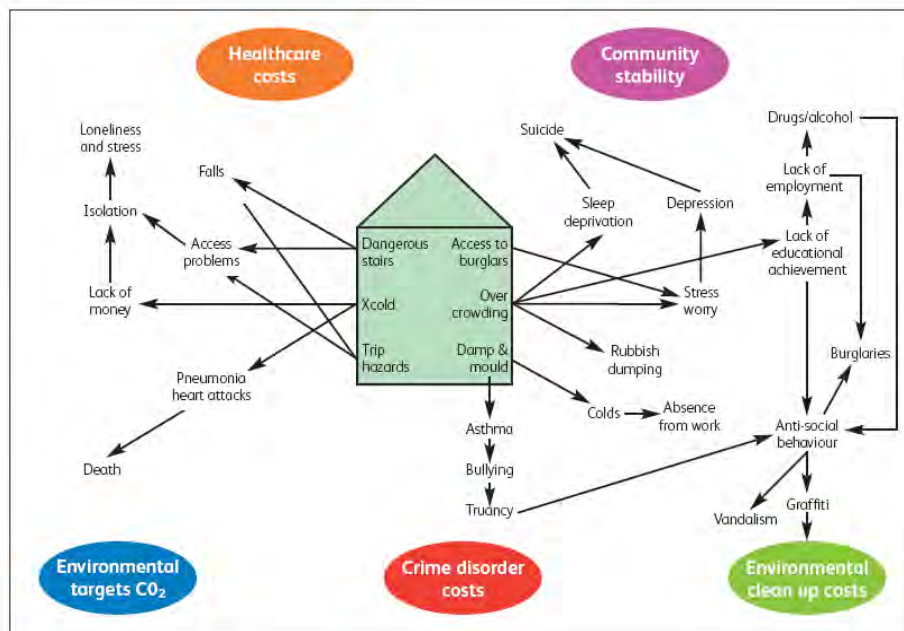


Figure 6 The links between public health and housing (Chartered Institute of Environmental Health 2008)

Whilst the effects of housing on health may seem numerous, the actual effects of housing and regeneration initiatives are difficult to isolate and measure (NICE 2005, Curtis et al. 2002). Evidence is

undecided as to whether poor housing or poor health comes first, therefore, it is unclear whether there is an *association or effect* between housing and health (Douglas et al. 2003). The complex relationship is reflected in Figure six. For example, levels of mould spores, temperature and dampness may vary widely by room and by day of assessment and not just by house (Douglas et al. 2003). Nonetheless there is a growing field of international evidence suggesting good quality housing and health are related. This section examines two of the most common impacts of housing on health - damp and cold homes and the structures of homes and neighbourhoods. It also briefly examines the prevalence of accidents due to poor design.

The temperature of the indoor environment affects health. Indoor housing temperatures are recommended by the WHO to be no lower than 18° and 20° for the very old and very young.

‘There is strong evidence that there is a narrow comfort zone for humans with mortality rates lower on days in which the average temperatures range is between 15° to 25° and rising progressively as the ambient temperature becomes hotter or colder. Below these moderate temperatures there is some evidence that cold is a risk factor in increasing asthma severity and COPD and may also delay recovery after discharge from hospital’ (Howden-Chapman 2004: 163).

Reflecting the debate above, it is difficult to isolate the effect of cold housing on health due to confounding variables, such as poverty (Evans et al. 2000). Unwillingness or the inability to raise the temperature in the home is known as ‘fuel poverty’. Fuel poverty is defined as spending more than 10% of household income to obtain adequate energy services, including heating. There were 2.4 million households in fuel poverty in England in 2006.

Some researchers argue there is an ‘inverse housing law’ in the UK, in that those who live in the relatively cold areas are also more likely to live in worse quality housing (Mitchell et al. 2002). Climate data showed the coldest areas were concentrated in the north east of England, the Midlands, central Southern England and Scotland. Analysis of 5,663 participants from the Health and Lifestyle Survey (England, Scotland and Wales) showed those with greater exposure to colder climate are more likely to live in poorer quality housing than those with less exposure to cold (Mitchell et al. 2002).

Cold housing is a serious problem in the UK: 1 in 5 homes in England and 3 in 10 in Scotland suffer from damp, condensation or mould (Bardsley et al. 2004). Compared to other European nations

with colder climates, UK housing has poor thermal standards. It is estimated that the average terraced house built before 1974 loses heat 84 per cent more quickly than houses built to current standards (BMA 2003). 26% of the total housing stock fails to meet the thermal comfort criterion (Gilbertson et al. 2008: 8).

The conventional measure of cold housing is the rate of excess winter deaths (EWDs). EWD is calculated by comparing the number of deaths from December to March and the average number of deaths occurring in August - November and April - July. It is possible to predict when excess deaths occur after a cold day: heart attacks after 2 days, strokes after 5 days and respiratory disease after 12 days. Conditions directly relating to cold, such as hypothermia, are not the main causes of EWDs (Office of National Statistics 2008). The majority of EWDs are preventable; the elderly need to be able to keep warm in their homes during the winter months. Rates of EWD have fallen continually since 1950s but there are still over 20 000 preventable deaths in the UK. Rates of EWDs in the UK are relatively higher than those in Scandinavian countries, which are attributed, to the age and condition of the housing stock (Wilkinson et al. 2001; Healy 2003; Howden-Chapman 2004). In an English study, Wilkinson et al. found 28% of EWDs occurred in housing predating 1850, compared to 15% of EWDs in housing built afterwards. However, it is important to note that this study did not show a significant increase in EWDs in houses with no central heating. Furthermore, older houses were more likely to be occupied by elderly people, thus increasing their vulnerability to cold.

Keeping warm and damp have different effects. In a sample of 8,889 participants, not being able to keep the home warm enough was more strongly associated with health outcomes than damp (Evans et al. 2000).

There is **no formal definition of a heat wave in the UK**. In the Netherlands, a heat wave is defined as at least 5 days with at least a temperature of at least 25°C and at least three days reaching 30°C. In contrast, Hajat et al. (2002A) found **an increase in deaths in London occurring at 19°C**. Donaldson et al. (2003) argue heat-related mortality starts in the UK when the mean daily temperature exceeds 18°C. Heat related deaths in London begin at lower temperatures than in the rest of England (Hajat et al. 2002B). Hot days occurring in the early part of any year may have a larger effect than those occurring later on; and analysis of separate heat wave periods suggest that episodes of long duration and of highest temperature have the largest mortality effect. There is also 'no widely accepted criteria for determining heat-related death, and

heat may not be listed on the death certificate as causing or contributing to death' (Basu and Samet 2002). In addition, deaths from heat may be under-reported as it is similar to other more familiar causes of death (Keatings et al. 1986).

High temperatures increase cardio/cerebro-vascular *mortality* but do not increase cardiovascular *morbidity* (Michelozzi et al. 2009). This difference is not well understood but researchers suggest the difference is explained by the fact that deaths from circulatory disease occur rapidly in isolated people before they reach a hospital, due to chance, or bias (Schwartz et al. 2004).


Most interventions to reduce mortality during heat waves are aimed at individuals - such as drinking liquids, staying indoors, and the use of heat warning systems. But there is scope for population-based interventions to reduce heat stress in indoor and outdoor environments. Cooling the built environment and, in particular, reducing the effects of urban heat islands, are key interventions. For example, the Department of Health (2008A) recommends building green space to cool the environment. There is no evidence concerning the effectiveness of interventions to reduce the impacts of heat wave in the UK.

With the projected rise in temperatures due to climate change, the frequency and temperatures of heat wave are likely to increase.

Evidence of key health risks and housing


The following section considers the following health risks associated with housing:

- cold and damp housing;
- excess heat;
- poor design.


Health risks and Housing			
	Evidence UK and international	Mortality & Morbidity	Inequalities
Damp and Cold homes 	<ul style="list-style-type: none"> • In December-March of 2007/08, there were a total of 23,800 EWDs in England.⁶ • Two thirds of Early Winter Deaths are due to cardiovascular or respiratory diseases (Office for National Statistics 2008). • Cold housing exacerbates poor health (National Heart Forum 2003). • Damp and mould impact more strongly on children than adults. It is estimated that children living in damp mouldy homes are 1.5 to 3 times more prone to cough and wheeze than children in dry homes (Strachan 1991). Asthmatics are two to three times more likely than the general population to live in damp properties (Department of Health 1999). Home warmth has also been associated with the exacerbation of Chronic Obstructive Pulmonary Disease amongst elderly people in Scotland (Osman et al. 2008). • Indoor exposures to dampness, dust mites and fungal allergens accounting for 20% of asthma prevalence (Prüss-Üstün and Corvalán 2006). • Strength and dexterity decrease as temperatures drop, increasing the risk of non-intentional injuries. A cold house increases the risk of falls in the elderly (Regional Public Health Group in the South East 2007). 	<ul style="list-style-type: none"> - Donaldson and Keatinge (1997) studied EWDs in South East England between 1976-92 and concluded personal exposure to cold had a large role in the excess mortality of winter. 	<ul style="list-style-type: none"> - The majority of deaths occur among the elderly (aged 75 and over) (ONS 2008). This risk appears to be widely distributed across the elderly and the same risk applies to all regardless of socio-economic status (Wilkinson et al. 2001). - In a review of housing and health, Bengali people living in cold homes in London were twice as likely to have poor chest health (Hyndman 1990 in BMA 2003).

⁶ www.statistics.gov.uk/statbase/Expodata/Spreadsheets/D7089.xls (accessed on 12 March 2009).

	Evidence UK and international	Mortality & Morbidity	Inequalities
Damp and Cold homes (con't)	<ul style="list-style-type: none"> • Various reports claim a correlation between fuel poverty and mental health, however there is little evidence of this relationship. Research attempting to find a relationship and cold houses identifies the stigma of being unclean, arising from mould causes depression and stress. Most research finds the impact of cold, damp housing on mental health is often linked to worries over fuel bills (Raw et al. 2001, Howden-Chapman 2004). • Elderly people in rural areas face greater difficulty in keeping their houses warm because of lack of access to gas networks, living in larger detached dwellings and high levels of owner occupation (Lawlor et al. 2002). Fuel poverty rates are slightly higher in rural areas. Fuel poverty in rural settings (village, hamlet, or isolated dwelling) is 21%, this is a rise from 15% in 2005 (Regional Public Health Group in the South East 2007). <p>Reflecting international trends</p> <ul style="list-style-type: none"> • Children aged 9-11 living in Canada and the USA reported significantly higher odds ratios for lower respiratory problems in older houses and houses with damp (Spengler et al. 1994, see also Brunekrref et al. 1989). • A longitudinal study in Finland examined the onset of asthma within a sample of children who did not have asthma at baseline (n=1,984). Five years later, 138 children had developed asthma resulting in an incidence rate of 125 cases per 10,000 person-years. As well as parental atopy, the presence of mould odour in the home reported at baseline was an independent determinant of asthma incidence (Jaakkola et al. 2005). 		

	Evidence UK and international	Mortality & Morbidity	Inequalities
Excess heat 	<ul style="list-style-type: none"> • In the last large heat wave in 1995, an estimated 619 extra deaths occurred in England and Wales. There was an 11% increase in deaths of women from cerebrovascular disease (stroke) during the 1995 heat wave (Rooney et al. 1998). There was a 12% increase in deaths of women from respiratory disease during the 1995 heat wave and up to 62% of the excess mortality in England and Wales during the heat wave may be attributable to concurrent increases in air pollution (Rooney et al. 1998). • The 2003 heat wave in England (maximum temperatures exceeded 32°C (89.6°F) on three consecutive days and then on five consecutive days) caused a 1% increase in hospital admissions and a 16% increase in hospitalisation amongst people over 75 in London (Johnson et al. 2005). It led to 2091 excess deaths in England and Wales (Office for National Statistics 2005). • The 2006 heat wave caused 680 excess deaths in England and Wales (Department of Health 2008). • Urban environments are significantly warmer than their surroundings and as such, excess deaths during heat waves are more likely in urban areas (Department of Health 2008A). • The risk of suicide increases during hot weather. Above 18°C, each 1 °C increase in mean temperature was associated with a 3.8 and 5.0% rise in suicide and violent suicide respectively (Page et al. 2007). 	<ul style="list-style-type: none"> • In the 1995 heat wave, in Greater London, mortality increased by 16.1% during the heat wave (Rooney et al. 1998). • In the 2003 heat wave, excess mortality in southern England was 33% in those aged 75 and over and 13.5% in the under 75 age group. Among those aged 75 and over, deaths at home increased by 33% and deaths in nursing homes increased by 42% (Kovats et al. 2006). 	<ul style="list-style-type: none"> • The elderly are particularly vulnerable to heat-related illness and death and this is also a problem for those with existing cardiovascular problems.

	Evidence UK and international	Mortality & Morbidity	Inequalities
Excess heat (con't)	<p>Reflecting international trends</p> <ul style="list-style-type: none"> • In the 2003 heat wave in Europe, there were thousands of excess deaths, the majority of these affected the elderly: Italy 3,134 deaths; France 14,802 deaths; Portugal 1,854 deaths; Spain 4,151 deaths; Switzerland 975 deaths; Netherlands 1,400-2,200 deaths; and Germany 1,410 deaths (Haines et al. 2006). • A study of the effect of high temperature on hospital admissions in 12 European cities found for every 1°C increase in maximum apparent temperature above a threshold, respiratory admissions increased by 5% and 3% in the 75+ age group in Mediterranean and North-Continental cities, respectively (Michelozzi et al. 2009). 	<ul style="list-style-type: none"> • Numerous studies show an increase in mortality, particularly among the elderly during heat waves, and that 'ambient heat exposures, primarily indexed by temperatures, are positively associated with mortality' (Basu and Samet 2002). Those 'with pre-existing cardiovascular and respiratory diseases have increased risk of death associated with ambient heat exposure' (Basu and Samet 2002). 	

	Evidence UK and international	Mortality & Morbidity	Inequalities
Poor design 	<ul style="list-style-type: none"> • It is estimated that 480 deaths occur as a result of design-related accidents in the home in the UK (Bardsey et al. 2004: 108). • In a sample of 407 residents living in high-rise accommodation in Liverpool, 24% were not satisfied with their housing and people in this sample were more likely to perceive a recent crime increase and report greater stress. Those who reported feeling safe when out on their own in the dark scored higher on health outcomes (Green et al. 2002). • There is no conclusive evidence that the height of a dwelling above the ground is associated with reduced health. High-rise flats have been linked to poor mental health, social isolation and crime, however, reviews have been unable to identify a causal link due to the poor quality of research in this area (Douglas et al. 2003, Weich et al. 2001, Evans et al. 2001). 	<ul style="list-style-type: none"> • See Evidence in UK and international. 	<ul style="list-style-type: none"> • Poor design and material mainly affects children and the elderly and it is estimated that 11% of accidents to children were associated with unsafe architectural features (Department of Trade & Industry: 1995).

Interventions

Improving insulation and heating improves health.

- Strong / Inconclusive evidence -

- **Home insulation, improving heating and subsidising power has shown to be effective** in improving health and well-being (Thomson et al. 2001, Keatinge et al. 1989, Hopton and Hunt 1996, Thomson and Petticrew 2005).
- The **NICE (2005) review** found 'review-level evidence that housing interventions involving improvements to energy efficiency measures, such as installation of new windows, can positively affect health outcomes'.
- The health impact of improving the heating of four blocks of flats was examined by Lloyd et al. (2007). Improvements included 'double skinning' of walls (to stop penetrating damp, for insulation and to prevent interstitial condensation), insulation, draught proofing, double glazing, gas central heating, solar panels, dual-purpose heat recovery system, and inclusion of front and back verandas within the internal living area of the flat. The health of a sample of 75 residents in the experimental condition was compared to a control group of 40. There was an **improvement in general health** as reported subjectively, and as indicated by a reduction in the use of medication and in hospital admissions. None of these changes were observed within the control group (see also Howden-Chapman et al. 2008 for a similar study in New Zealand).
- Shortt and Rugkasa (2007) evaluated the fuel poverty programme in Northern Ireland and found 'energy efficiency intervention can lead to improvements in health and well being, increased comfort levels in the home and a reduction in the use of health services, therefore having potential cost savings for the NHS. **Some households, however, remain in fuel poverty after having full central heating installed**, reflecting the significant contribution of low income on the production of fuel poverty. The article concludes by suggesting that interventions in this area require commitment from multiple sectors of society, including health professionals and local communities.
- In terms of **respiratory disease, energy efficiency improvements have led to small improvements** in general health and respiratory health amongst asthmatic children (Thomson and Petticrew 2005). In their review of housing improvements and health, Thomson et al. (2001) identified one study which reported fewer school days lost from asthma (Somerville et al. 2000).

- Home energy improvements have decreased school sickness absences by 80% in children with asthma or recurrent respiratory infections (Regional Public Health Group in the South East 2007).
- NICE (2005) stated there is 'a **lack of review-level evidence** of the effectiveness of interventions involving general refurbishment initiatives in improving health outcomes'. Research for the WHO (Thomson and Petticrew 2005) found a paucity of research studies on interventions to improve health through housing interventions, and found the quality of the studies also poor (see also Gilbertson and Green 2008).
- A study undertaken on a Glasgow housing estate found that **installing central heating into homes prevented further deterioration in health, but did not improve it** (Hopton and Hunt 1996).
- A review examined the Scottish Government's Central Heating Programme, an initiative to provide modern central heating systems in Scotland. Over 3800 households were interviewed and 30 health outcomes examined. There were small positive effects on cardiovascular health (with some reservations as the research was looking at short term effects). The positive effects were small and the effects of **disease prevention programmes 'may be fewer than anticipated', especially in the short-term** (Walker et al. 2009).
- There may be a limit effect on reducing damp, mould and mites on asthma as asthmatics are generally allergic to other allergens (MRC Social and Public Health Sciences Unit 2002). Improvements in respiratory health following housing improvement can therefore not be assumed.
- Thomson and Petticrew (2005), in their review of evidence on the impact on health of housing interventions, found no studies on the health impact of reduced exposure to mould.

Mental health might improve even if physical health does not.

- Strong / Inconclusive evidence -

- The 'Warm Front' government scheme which provides a grant for insulation and/or heating measures was evaluated by Green and Gilbertson (2008). GHQ scores only showed significant improvements in mental health scores - not physical health per se. Physical health improvements may continue to improve after the conclusion of the evaluation and 'there is evidence of an indirect pathway via the alleviation of fuel poverty stress' (p. 16).
- The mental health of residents before and after a neighbourhood renewal programme found improvements occurred in both adults' and children's levels of mental health. This was associated with improved community safety and a reduction in serious draughts within dwellings. There was no significant reduction in use of

general practitioner or hospital services (Blackman and Harvey 2001).

The evidence base evaluating planning interventions to reduce the health effects of heat wave is extremely small.

Recommendations

Future planning decisions to include the health burden from the effects of cold and damp housing, heat waves and design on:

- heart disease
- respiratory disease
- mental health
- injuries
- increased mortality, morbidity and costs to NHS.

Interventions to reduce the health risks of cold and damp housing and heat waves should be targeted at elderly populations, such as improving residential care homes.

Section 4:

Flooding

Introduction

In England and Wales, approximately 5 million people, in 2 million properties, are at risk from 'inland flooding'.⁷ There are an estimated 80,000 properties in towns and cities across the UK at risk from flooding caused by heavy downpours that overwhelm urban drains ('intra-urban flooding') (Department of Health and Health Protection Agency 2008). There is a potential health consequence of intra-urban flooding as urban flood waters are 'invariably' mixed with sewage (Foresight 2004). Overall, flooding affects substantially more properties along floodplains (by rivers and coasts) than urban areas.

In the UK, there are two main health risks of flooding: drowning and mental health.⁸ Gastrointestinal problems are common after flooding in other countries but rarely occur in the UK. There are a very limited number of robust studies on the health impact of flooding in England.

Flooding is likely to become more frequent. Flooding linked to sustained autumn and winter precipitation is likely to become more frequent and it is likely there will be an increase in the frequency of 'heavy precipitation', with the greatest increases in frequency occurring in short-duration and high-intensity events (Department of Health and Health Protection Agency 2008). The number of people at high risk from flooding could rise from 1.5 million to 3.5 million by 2100 (Foresight 2004).

Evidence of key health risks and flooding

The following section considers the following health risk associated with flooding:

- mental health.

⁷ www.environment-agency.gov.uk/research/library/data/34297.aspx (accessed 16 March 2009).

⁸ The effects of dampness are examined in the previous chapter.

Key health risks and flooding			
	Evidence UK and international	Mortality & Morbidity	Inequalities
Flooding ★	<ul style="list-style-type: none"> Two case study areas affected by flooding in England found a higher association with mental health than physical health (Fewtrell and Kay 2008). Using data from 30 locations in England and Wales, the health impacts on 1,510 people who had been flooded or were at risk of flooding were assessed. The data suggested that some flood victims suffered long-term mental health effects as a result of their experience of flooding. 23% of the sample consulted a doctor about illnesses, injuries or psychological problems which they attributed to the flooding and 20% received treatment from their doctors (Tunstall et al. 2006, see also Tapsell and Tunstall 2008 and Reacher et al. 2004). Three major flooding instances in England resulted in five drowning deaths between 2003 and 2007. Three people drowned in floods in Scotland in 2005. <p>Reflecting international trends</p> <ul style="list-style-type: none"> According to WHO data from 2002, in the decade 1992-2002 there were 2,179 drowning deaths in European countries (not including the UK)⁹. 	<ul style="list-style-type: none"> There are relatively low numbers of drowning deaths in the UK. 	Unknown.

⁹ www.who.int/violence_injury_prevention/other_injury/drowning/en/ (accessed 7 April 2009).

Interventions

There are no known peer reviewed interventions to reduce the health effects of flooding in the UK.

Recommendations

Future planning decisions to consider the health burden of the effects of flooding on:

- mental health, particularly long-term effects.

Future planning decisions should avoid planning health centres, acute trusts and residential care homes in flood zones.

Section 5:

Costs to the NHS & Government Targets

This section considers the costs to the NHS of the health risks listed in Sections one to four; transportation, public spaces and services, housing and flooding. It is difficult to quantify whether, and by how much, interventions will reduce costs to the NHS as little research evaluates interventions. Nonetheless, these massive costs demonstrate the impact spatial planning could have, even if it improved health by small amounts.

Following the costs to the NHS is a list of government targets related to either the health risks or spatial planning issue.

Costs to the NHS

The health risks listed in the previous sections all contribute significantly to costs to the NHS. These costs to the NHS may be relevant for planning to consider.

- It is estimated that **reducing air pollution** emissions could lower hospital admissions for respiratory problems, therefore **saving the NHS £1400-£2500 per admission**¹⁰ (Ad-Hoc Group on the Economic Appraisal of the Health Effects of Air Pollution, Department of Health 1999).
- In 2004, 2,978 fatal accidents, 26,748 serious accidents and 177,684 slight accidents were reported. In cost-benefit terms the value of prevention of these 207,410 **road injury accidents is estimated to have been £12,900,000,000**¹¹ (Department of Transport 2008B).
- In Dame Carol Black's review (2008), the **cost of worklessness** to the government (including benefit costs, health costs and foregone taxes) was estimated at **over £60 billion**.
- In 1997 it was estimated that the **cost to the NHS of treating ill health resulting from substandard housing was £2.4 billion**

¹⁰ Per admission is calculated by taking the total cost the NHS spends on a disease divided by the number of patients treated for this disease.

¹¹ In 2004 prices and values.

a year. It was estimated at this time that it would cost £4 billion to bring all houses in London up to acceptable standards (Bardsley et al. 2004).

- In 2005/06 it was estimated to cost **£4,993 to remedy excess cold in a home and £11,075 to remedy damp** (Chartered Institute of Environmental Health 2008). If **5% of cold related illness admissions were averted this would save £40 million** (Regional Public Health Group in the South East 2007). It is estimated that the cost of eliminating fuel poverty in England for all but the poorest households is £9.2 billion (Preston et al. 2008).
- **Heart disease** is estimated to cost the NHS **£6.4 billion per year** with £1.6 billion attributed to physical in-activity. (Heart stats 2009).
- Asthma UK (2004) estimate the **cost of asthma to the NHS is £680 million a year**; with emergency admissions costing £45.8 million a year. **COPD was estimated to cost the NHS £500 million a year** (Pride and Soriano 2002).
- In 2007 it was estimated that **obesity cost the NHS £4.2 billion** (Department of Health 2008). If the rate of obesity continues to rise to 60% of the population by 2050, it is estimated this would directly cost the NHS £10 billion per year (Butland et al. 2008).
- In 2004 the Department of Health estimated the **cost of inactivity in England to be £8.2 billion a year** (Heart stats 2009). Other estimates put the cost of physical inactivity to NHS at £1.06 billion (Allender et al. 2007).
- **Current NHS expenditure on mental health is £22.5 billion.** This is predicted to rise to £32.6 billion by 2026 (at 2007 prices) primarily due to increased costs associated with dementia (The King's Fund 2007).

Government targets

Planners and public health professionals can work together to address existing health targets, such as the following.

- Halt the year on year increase in **obesity** among children under 11 by 2010, in the context of a broader strategy to tackle obesity in the population as a whole (Joint target with Department for Education and Skills and Department of Health).
- The target for mortality from **accidental injury** (all ages) - by 2010 to reduce mortality rates for England by at least 20%, from a 1995/6/7 baseline. It is not anticipated that this target will be met.
- In 2001 the government set a target to **eradicate fuel poverty** by 2010, however, this is unlikely to be met and DEFRA estimates 1.2 million households will still be in fuel poverty in England in 2010.
- The 2007 Air Quality Strategy for England, Scotland, Wales and Northern Ireland contains specific targets for **reductions in the concentrations of nine major pollutants**, to be achieved between 2010 and 2020 (Defra 2007).
- By 2010, the target set by the government is to reduce by 40% the **number of road users killed or seriously injured** from a 1994 to 1998 baseline (Department of Health 1999). In the same period, the number of children killed or seriously injured was targeted to reduce by 50%. In 2007 both of these targets were on track. In 2002, a new target was developed - secure a greater reduction in the overall number of road casualties in the 88 Neighbourhood Renewal Fund areas in England than for England as a whole, comparing the figure for 2005 with the average for 1999 to 2001. This was met in 2005. The government proposed new targets in a recent consultation, to further reduce deaths by a third and serious road injuries by 33% by 2020.

Section 6:

Discussion and Conclusions

This report has aimed to analyse the evidence on spatial planning and health outcomes. Each section has identified the health impact of a range of planning issues. The evidence base is stronger in certain areas (see Table 2). For example, excess winter deaths increases mortality and morbidity and the evidence base is strong that showing a relationship with heart disease, respiratory disease and mental health. Similarly, low levels of physical activity increases mortality and morbidity and evidence demonstrates a link with heart disease, obesity and mental health. Therefore, spatial planning decisions which impact on excess winter deaths will have effects on rates of heart disease, respiratory disease and mental health.

The interventions demonstrated that there are a number of opportunities for planners to make the built environment a healthier place to live, work, play and travel in. Most interventions cannot be carried out by individuals and require structural changes. Reducing air pollution by redirecting traffic flows, for instance, requires actions by government at national and regional levels. To make optimum progress on reducing the burden of disease, those working in local, regional and national planning departments need to regard health as a part of their responsibilities. Planning decisions have a great capacity to overtly change environments, but also to create new environments which encourage people to lead healthier lives.

With planning and health sitting in two different local organisations, integrated and consistent strategies across government departments are required to capture the range of possible interventions to improve health and reduce inequalities. Many Directors of Public Health are now jointly appointed with their local authority, and this can provide opportunities to work together. Public Health support officers might also be part of the answer as the following case study highlights.

	Health risk				
	Heart disease	Respiratory disease	Obesity	Mental Health	Increased mortality, morbidity
Excess winter deaths	Strong evidence	Strong evidence		Strong evidence	Strong evidence
Physical activity	Strong evidence		Strong evidence	Strong evidence	Strong evidence
Excess heat	Strong evidence	Strong evidence			Strong evidence
Air pollution	Strong evidence	Strong evidence			Strong evidence
Safe Comm. sp.	Anecdotal evidence	Anecdotal evidence	Anecdotal evidence	Strong evidence	Anecdotal evidence
Traffic accidents					Strong evidence
Noise pollution	Anecdotal evidence			Anecdotal evidence	
Flooding				Anecdotal evidence	Strong evidence
Access to food			Anecdotal evidence		
Access health ser.				Anecdotal evidence	
Un/employment				Anecdotal evidence	

Table 2. Evidence of planning and health relationship.



Anecdotal evidence



Strong evidence

The final section revisits the findings from Sections 1, 2, 3, and 4, which examine the health risks related to transport, public spaces and services, housing and flooding.

FINDINGS- Transportation

KEY HEALTH RISKS: heart disease, respiratory disease, mental health, obesity

- Air pollution increases heart and respiratory disease.
- Air pollution does not cause asthma, but it does aggravate existing respiratory conditions.
- Rural and urban areas are both affected by air pollution.
- Increased morbidity and mortality is associated with air pollution.
- Levels of air pollution are higher in lower socio-class neighbourhoods. These findings reflect European data.
- Reductions in traffic reduce air pollution.

- Car owners walk less.
- Very few children walk or cycle to school. Very few commuters cycle.
- Early deaths could be prevented if people did moderate exercise.
- Provision of space to exercise needs to be safe and easily accessed.

- Road traffic accidents are falling but over 3000 people die each year in the UK. The rate of road traffic injuries and deaths are higher in lower socio-class neighbourhoods.
- Traffic interventions – reduce accidents but do not always increase physical activity.

- There is some evidence that noise pollution evidence negatively affects mental health, particularly children’s ability to concentrate. Noise pollution is related to hypertension, but there is little or only anecdotal evidence that noise pollution has any further impacts on health.

FINDINGS - Public spaces and services

KEY HEALTH RISKS: obesity, mental health

- Socio-economic status affects access to and quality of safe spaces.
- The greater proportion of green space in a district is associated with better levels of self-reported health
- Safe and accessible green spaces improves mental health.
- There is contradictory evidence that green spaces improve rates of physical activity.
- Moderate exercise improves health outcomes.

- Food deserts have been identified in England, but no causal associations with health outcomes have been identified.
- Fast food outlets cluster around schools but the effect on obesity is uncertain.

- Urban areas are best served in terms of access to both GPs and hospitals.
- Locally based health centres do not necessarily reduce waiting times or A&E attendance.

- On average, seven days are lost to sickness for each working person in the UK and approximately 7% of the working age population are unemployed because of long-term health conditions or disabilities.
- Unemployment increases morbidity and mortality.

FINDINGS - Housing

KEY HEALTH RISKS: heart disease, respiratory disease, mental health, injuries

- Damp homes are common in the UK and lead to thousands of Excess Winter Deaths.
 - Asthmatics are two to three times more likely than the general population to live in damp properties
 - Cold houses increase the number of injuries.
 - There is little evidence of the relationship between fuel poverty and mental health.

 - Deaths from heat occur at 19°C.
 - In the UK, hundreds have died from increases in temperature over 19°C

 - Poorly designed homes cause injuries and affect mental health.
 - There is contradictory evidence that high-rises are associated with poor health.

 - The impact of prevention programmes to improve health in cold and damp homes may be smaller than anticipated, especially in the short-term. Any interventions need to plan for long-term effects.
-

FINDINGS - Flooding

KEY HEALTH RISKS: mental health

- There are a very limited number of robust studies on the health impact of flooding in England.
- Millions of UK homes are at risk of flooding.
- Flooding is likely to become more frequent.

- The risk to mental health is largest.
- Drowning is a low risk.

This report recommends that future planning decisions:

1) Include the added health burden from the effects of air pollution, noise pollution, road traffic accidents and sedentary lifestyles. The specific health risks from transportation are:

- heart disease
 - respiratory disease
 - mental health
 - obesity
 - increased mortality, morbidity and costs to NHS
- There is strong evidence that interventions to reduce air pollution and provide safe and accessible space will influence health outcomes. There is strong evidence that interventions which provide safe and accessible space and reduce air pollution are more likely to have a positive impact on health outcomes.

2) Include the added health burden associated with effects of failure to provide safe community space or spaces with poor access. The specific health risks from poor provision of public spaces and services:

- mental health
 - obesity
- Consider safe and good access to a variety of food shops and health services. Consider the land use mix to encourage local employment opportunities. Plan for good access to local health centres either through adequate parking or good links to local transportation. Plan safe community spaces to help improve mental health.

3) Include the health burden from the effects of cold and damp housing, heat waves and design. The specific health risks from cold and damp housing, heat waves and poor design are:

- heart disease
 - respiratory disease
 - mental health
 - injuries
 - increased mortality, morbidity and costs to NHS.
- Interventions to reduce the health risks of cold and damp housing and heat waves should be targeted at elderly populations, for example, improving residential care homes.

4) Consider the health burden of the effects of flooding on:

- mental health, particularly long-term effects
- Avoid planning health centres, acute trusts and residential care homes in flood zones.

Future research, including longitudinal studies, on:

- the impact of food availability and cost on obesity and wider health outcomes;
 - the impact of density of fast food outlets on children and adult health;
 - the location of local health centres on effects on health outcomes, particularly those with long term conditions;
 - the access to local health centres and the availability of parking and links to local transport;
 - the long-term effects of flooding on mental health, both in children and adults.
-

Case study: Public Health Support Officers

Since 2008, there are examples in England of public health support officers (PHSOs) being placed in or seconded to transport planning teams within local authorities to ensure public health is embedded into transportation and planning policies. This is carried out in a number of ways, such as providing information and evidence on the health impact of planning; networking between health and planning departments; and being consulted about plans for local transport or spatial development.

In Coventry, examples of the PHSO's objectives are to ensure planners consider the protection of open spaces for physical activity; keeping housing planning to an optimum to minimise the stressful effects of overcrowding; and placing jobs, education and leisure services within easy reach of neighbourhoods. Currently the PHSO is working with the Strategic Transportation Team on the 'Active Travel' project to encourage the local community in Stoke Old Moor to use alternatives to car travel. This will involve producing a map of walking routes to access the local hospital. This follows on from a similar initiative in another area of Coventry which increased levels of walking amongst the local population (to obtain report details).

Similarly in Bristol, the 'Active Bristol' initiative was launched in April 2008 to promote and increase levels of physical activity which were found to be low in a local Quality of Life Survey. Active Bristol aims to raise awareness about and promote active travelling through programmes such as 'Bike It' and the reduction of traffic speed.

Appendix

The appendix includes further information on the four key health risks associated with spatial planning issues: heart disease, respiratory disease, mental health and obesity.

Heart disease

Heart disease is the main cause of death in the UK and around the world. Cardiovascular disease is influenced by lifestyle factors as well as family history. It is preventable. At least 80% of premature deaths from heart disease and stroke could be avoided through healthy diet, regular physical activity and avoiding tobacco smoke (WHO 2007B).

- Coronary heart disease (CHD) kills more than 110,000 people in England every year and more than 1.4 million people suffer from angina and 275,000 people have a heart attack annually (Heart Stats 2009).
- CHD accounts for one in five male deaths and around one in six female (ONS).
- In 2006, 14% men over 16 and 13% women over 16 reported having been diagnosed with a heart condition (NHS The Information Centre 2008).
- More men than women die from heart disease. Between 1996 and 2005, 12.5 out of 100,000 women aged between 45 and 49 died from heart disease. Out of 100,000 men this age, 61 died from heart disease (Allender et al. 2007).
- Deaths from diseases of the circulatory system, including hypertensive disease, coronary heart disease and cerebrovascular disease, have seen a dramatic decrease of 60% in the UK since 1980. Despite this, 198,287 deaths, 35% of all deaths registered in the UK in 2006, were due to diseases of the circulatory system (OHE i-Compendium 2009).
- Prevalence of heart disease is increasing as people are living longer with heart disease.
- An estimated 17.5 million people died from CVDs in 2005, representing 30% of all global deaths. Of these deaths, an estimated 7.6 million were due to coronary heart disease and 5.7 million were due to stroke (WHO 2007).
- CVD mortality rates are associated with socioeconomic status (e.g. LHO 2006, NHS The Information Centre 2008A, Smith et al. 1998). South Asians have the highest overall and premature CHD mortalities of any UK ethnic group. Mortality rates are doubled in the 30-40 age group and tripled in the 20-30 age group (Patel 2006).

Respiratory disease

Two chronic respiratory diseases, asthma and chronic obstructive pulmonary disease (COPD), are associated with factors planning can influence, such as outdoor air pollution, housing and transport.

- In the UK 5.4m people current receiving treatment for asthma and 1.1m children currently receives treatment for asthma (Asthma UK 2009). 13% of people over 15 in the UK have had asthma at some point in their lives. (LHO 2009).
- In a four-year study between 1997 and 2001, respiratory conditions (acute and chronic) were the single main cause of emergency admissions in London (Damiani & Dixon 2002). These numbers fell in each consecutive year (LHO 2009).
- In a survey of 16 European Union countries, 13% of UK citizens said they had asthma, the highest amongst Union member states (LHO 2009).
- An estimated 3 million people have COPD in the UK although only 1.5% of that number are correctly diagnosed (British Lung Foundation 2009).
- The incidence of asthma is increasing, but the reasons for this increase are unclear. Between 1955 and 2004, the prevalence of childhood asthma increased by 2 to 3-fold, but this increase has tapered off recently, particularly in adult asthma prevalence (Anderson et al. 2007).
- In 2002, asthma caused 1400 deaths, more than two thirds were in people over 65 (Asthma UK 2004A).
- COPD causes 30,000 deaths a year (NHS Choices 2009). Between 1970 and 2000 in the UK, there was a 'steady and continuing' decline in COPD mortality amongst men but an increase amongst women (Pride and Soriano 2002).
- There are a number of differences between ethnic groups; more black children consult for asthma, more South Asians consult for respiratory infections and migrants from East Africa have a high mortality rate (Lung and Asthma Information Agency 2001).
- There is some evidence that socioeconomic status influences asthma prevalence. The relationship between socioeconomic status, local air quality, and combined effects on respiratory health were studied using data from the Health Survey for England (Wheeler and Ben-Shlomo 2005). Urban lower social class households were more likely to be located in areas of poor air quality (Court et al 2002).
- After cardiovascular diseases, respiratory disease is the second biggest global killer (British Lung Association 2009).

- Over two-thirds of men and over half of women are overweight or obese (NHS Information Centre 2009).
- Obesity increases the risk of a many health risks: developing Type II diabetes, asthma, cardiovascular disease and affects mental health (increasing negative self image, low self esteem).
- Just less than one third of boys and girls aged 2-15 were classed as either overweight or obese (31% and 30% respectively) (NHS Information Centre 2009).
- The prevalence of overweight, including obesity, increased in men from 58% in 1994 to 67% in 2006 and among women from 49% to 56%, respectively. (NHS Information Centre 2009).
- There were over 5,000 NHS hospital admissions with a primary diagnosis of obesity in 2007/08, almost seven times greater than the number ten years earlier. (NHS Information Centre 2009).
- The UK has the highest rate of obesity in the EU-15 countries, and one of the highest in the wider cohort of OECD countries (Department of Health 2009).
- The WHO estimates that the number of overweight people globally will increase to 2.3 billion and more than 700 million will be obese by 2015.
- The *Foresight* report (Butland et al. 2008) predicted 60% of England's population could be obese by 2050. One in three UK adults (or 13 million people) will be obese by 2012, and it is estimated that almost half are from low income and disadvantaged communities, widening the health inequalities gap even further (Zaninotto et al. 2009).
- Obesity on average reduces life expectancy by six to seven years (Peeters et al. 2003).
- There is a marked social gradient in the prevalence of obesity in both women and men. 'The prevalence of obesity among men in 2004 was about 18% in Social Class 1 and 28% in Social Class V. For women, the gap is larger, with 10% prevalence in Social Class 1 and around 25% in Class V in 2004' (Butland et al. 2008: 30). Similar differences in social gradients exist in children. Asians were almost four times as likely to be obese as the white population.

There is a strong relationship between physical activity and heart disease.

- Inactive and unfit people have almost double the risk of dying from coronary heart disease compared with more active and fit people (Department of Health 2004).
- 37% of chronic heart disease (CHD) deaths are related to inactivity, compared to 19% of CHD deaths related to smoking¹².
- Physical inactivity is the most prevalent risk factor for CHD with 70% of women and 60% of men in the UK not active enough to achieve the health benefits from physical activity.
- Physical inactivity causes an estimated 600 000 deaths per year in the WHO European Region and leads to a loss of 5.3 million years of healthy life expectancy per year (WHO 2002A).
- The Global Burden of Disease Study estimated that physical inactivity is responsible for 3% of deaths and 19 million disability-adjusted life-years (DALYs) worldwide.
- Physical inactivity was directly responsible for 3% of disability adjusted life years lost in the UK in 2002 (Allender et al. 2007).

¹² The British heart Foundation recognises the importance of the relationship between the built environment and heart disease and since 2002 have funded the British Heart Foundation National Centre for Physical Activity and Health (BHFNC). This Centre promotes the 'beneficial role of physical activity in preventing and managing other medical conditions and in improving people's quality of life'.

- Around one-in-four people in England experience significant mental health problems during the course of their life. In the most recent national psychiatric morbidity survey of households in England, 23% of adults met the diagnostic criteria for at least one mental health problem, and 7% had two or more disorders (McManus et al. 2007).
- Mental health problems are the biggest source of health-related disability and suffering in high-income countries. If measured in terms of lifetime suffering rather than mortality alone (e.g. using 'Disability Adjusted Life Years' (DALYs) or 'Years Lost due to Disability'), mental ill health is a bigger problem than any other disease group. The most common mental health problem, unipolar depression, accounts for a bigger proportion of the total disease burden in high-income countries (in terms of DALYs) than any other single condition (WHO 2008).
- The majority of this is accounted for by so-called 'common mental disorders' - various forms of depression and anxiety. Prevalence of common mental disorders amongst adults is 16%, and is higher amongst women (20%) than men (13%) (McManus et al. 2007). Around 30 percent of GP consultations were related to mental health problems in 2002 (Sainsbury Centre 2002).
- Nearly 10% of all children aged 5-16 in Great Britain have a clinically diagnosable mental health problem (Green et al. 2005). These include 4% with an emotional disorder, 6% with a conduct disorder and 3% with other problems. Some children have more than one type of disorder.
- The prevalence of most adult mental health problems has remained broadly static over recent decades. However, the prevalence of mental health problems among children and young people has increased significantly since the mid-1970s (Collishaw et al. 2004). The number of people with mental health problems in England is predicted to rise by 14% 2026, largely as a consequence of population growth (The King's Fund 2008).
- Mental health problems are distributed unevenly amongst the population. Studies have consistently found that many kinds of mental health problems are more common amongst people who are unemployed, who live in poorer material circumstances, or who have lower educational attainment, lower income; or lower social status (Melzer et al. 2004).

Additional references

Climate change and flooding

Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments

Available at:

www.cses.washington.edu/db/pdf/snoveretalgb574.pdf

<http://www.dartmouth.edu/~floods/index.html>

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Available at:

www.biomedcentral.com/content/pdf/1471-2458-8-339.pdf

Manual for Streets

Available at: www.dft.gov.uk/pgr/sustainable/manforstreets/

Physical activity and obesity

www.sustrans.org.uk/default.asp?SID=1091694766555 provides a link to a Sustrans page called 'the evidence' which lists research on planning and physical activity.

www.foresight.gov.uk/OurWork/ActiveProjects/Obesity/Obesity.asp (Foresight)

www.lhhl.uiuc.edu/index.htm -University of Illinois at Urbana – Champaign – Landscape and Human Health Laboratory

Heart disease

www.heartstats.org

www.bhfactive.org.uk/downloads/BuildingHealth_full.pdf

Respiratory disease

www.asthma.org.uk/ (Asthma UK)

www.laia.ac.uk/ (Lung and Asthma information agency)

www.brit-thoracic.org.uk/ (British Thoracic Society)

www.lunguk.org/ (British Lung Foundation)

Mental health

www.scmh.org.uk/ Sainsbury Centre for Mental Health

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What is HUDU?

The London Healthy Urban Development Unit was created in 2004 to assist in achieving more effective engagement between the health and the spatial planning sectors. The aim of doing this is to secure improvement in the health of Londoners and the reduction of health inequalities. It provides guidance, advice and support to the health sector in London, primarily the PCTs and to the boroughs. It follows three main themes

- Influencing planning policy – national, regional and local
- Influencing the quality of development
- Encouraging partnerships and collaboration for health

The team was awarded the Royal Town Planning Institute's National Planning Award in 2008.

Further information on HUDU and its work is available from its website
www.healthyurbandevlopment.nhs.uk

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