Health Impact Assessment of greenspace
A Guide



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About this guide

This guide has been written to help people conduct a health impact assessment (HIA) of greenspace; whether these are greenspace policies, strategies, plans, frameworks, programmes or projects. It:

- provides some background information on greenspace and current greenspace policy context in Scotland
- contains a review of international research evidence on greenspace and health
- suggests some questions to help apply this evidence to specific greenspace or greenspace-related proposals
- outlines how to use this evidence to do a HIA
- provides short case studies of some completed HIAs of greenspace
- highlights sources of data and further information on greenspace

How this project came about

Previous work by **greenspace scotland** and other partners identified important links between health and greenspace, relating to mental, physical and community health.

This project came about because both greenspace and health professionals felt that guidance on the health and equity impacts of greenspace would contribute to greater recognition of the role of greenspace in improving health, and a greater emphasis on healthy greenspace in proposals.

A steering group, with representatives from **greenspace scotland**, NHS Health Scotland, Scottish Natural Heritage, Glasgow Centre for Population Health, NHS Lothian, the Scottish Health Impact Assessment Network and Raploch Urban Regeneration Company, was formed in November 2006 to develop the project. The group commissioned a literature review from the University of York, Centre for Housing Policy, and subsequently appointed consultants from IOM to prepare the guidance on the health impact assessment of greenspace.

Scope of the literature review

This guide offers an overview of the best available international scientific evidence on the health impacts (both positive and negative) of greenspace. The focus of the review was to identify and explore the links between greenspace and physical, mental and social health and wellbeing.

Case Studies

The case studies have been identified from the grey literature of actual health impacts that have been undertaken on greenspace and greenspace-related proposals.

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Section 1: Background

Chapter 1: Greenspace in Scotland

Greenspace means any vegetated land or water within or adjoining an urban area.[1] It includes:

- 'natural' greenspace – natural and semi-natural habitats
- green corridors – paths, disused railway lines, rivers and canals
- amenity grassland, parks and gardens
- outdoor sports facilities, playing fields and children's play areas
- other functional greenspace e.g. cemeteries and allotments
- countryside immediately adjoining a town which people can access
- derelict, vacant and contaminated land[i]

Scotland's land surface is covered mostly by natural or semi-natural vegetation. Heather moorland and peatland together cover more than 70% and coniferous woodland makes up 15% of the land area.[2] Marshes, dunes and water (fresh or salt) account for only 2.5% of Scotland's land surface, the same area as that covered by urban and rural settlements (2000sq km/ 194,500 hectares).

Across the 171 urban settlements in Scotland 25.8% (37,254 ha) of the total settlement area is covered by greenspace policies. 13% (18,826 ha) is designated as green belt for its nature conservation or landscape value while semi-natural greenspace and green network policies cover 6.8% (9,928 ha).[3] With artificial surfaces removed, the total area covered by greenspace policy is 20.6%.

A survey by **greenspace scotland** in 2007 on the Scottish public's attitudes to greenspace found that 58% of people use greenspace at least once a week and over 75% visit their local greenspace at least once a month.[4] The survey found that use of greenspace had increased with only 8% of people reporting that they had never used a greenspace compared to 13% of people surveyed in 2004. Greenspace is used for a range of different activities:

- 49% of people using it for walking
- 26% for taking children out to play
- 16% to take their dog for a walk
- 11% to relax
- 9% to exercise
- 8% to spend time with the family
- 5% to pass through
- 3% to socialise with friends
- 1% to have contact with other people[ii]

When the 2007 survey is compared with an earlier **greenspace scotland** survey from 2004, it shows that people seem to be using greenspace more frequently and their expectations of what greenspace should offer are higher. The research confirms that greenspace is clearly seen as a vital component of urban communities, providing local people with space that they can use for exercise, play and relaxation. Almost 60% of respondents strongly agreed that their local greenspace is somewhere that they could relax and unwind and 56% strongly agreed that it is an attractive place and safe for physical activity.

However, there is still much to achieve. In particular, 41% did not agree that they are able to have a say in what happens in their local greenspace and 20% disagreed that their local greenspace allows them to explore nature on their doorstep. In addition, 33% agreed that the quality of their local greenspace had deteriorated in the last five years. Those most satisfied with their local greenspace tended to be more affluent respondents who used their local greenspace more, whilst the lowest levels of satisfaction were noted amongst respondents within lower socio-economic groups and living in more deprived areas.

Lastly, recent research on environmental justice in Scotland has shown the complex relationship between greenspace and deprivation:[5]

- both the least deprived and the most deprived areas in Scotland have high percentages of people living near to a local designated wildlife site
- high levels of industrial pollution, derelict land and poor river water quality are strongly associated with deprivation; people in the most deprived areas are far more likely to be living near to these sources of potential negative environmental impact than people in less deprived areas
- people living in deprived areas are also less likely to live near to areas of woodland though new woodland is generally being planted near deprived communities
- people living in the most deprived areas are more likely to experience poorer air quality than those living in less deprived areas

i this also includes development land that is temporarily green

ii the percentages add up to more than 100% as individual respondents used greenspace for many different purposes e.g. walking, exercising their dog and taking children out to play

Case Study 1: The consideration of greenspace in a regeneration/transport HIA

Raploch Urban Regeneration Company HIA on the demotion of an A Road to a B Road

Background context

Whilst Stirling is recognised as an up and coming urban area and has one of the lowest unemployment rates in the country, Raploch, on its outskirts, demonstrates that not everyone is benefiting from this general economic growth. Raploch is an area that has long term high unemployment, low quality community and educational facilities, poor housing and low economic activity. The area is skirted by a large river and it and the local greenspaces are inaccessible and rundown.

Purpose of the HIA

The HIA looked at the effects of the A84 if it was remodelled, using Home Zone design principles, and a Village Square, Pocket Park and Riverwalk were created.

Methods

The HIA used a community-led approach to assess the potential impacts of the A84 and its redesign and redevelopment. Key questions asked included:

- Will the change of the road designation impact on health?
- Will the building of 250 homes, and the new Campus, negate the reduction in heavy traffic by replacing it with a steady flow of cars? How would this be managed? Should Home Zone design principles be used?
- If there are benefits to the local community through a reduction in traffic how would this affect local businesses? Would they suffer a loss of income and passing trade?

Findings and recommendations

The HIA helped to:

- identify and assess the significance of the effects of the A84 main through road on the health of local people
- develop potential ways to improve the quality of air and environment and make the local greenspace, river and leisure facilities more accessible
- identify recommendations on the change of priority of the A84 and the adoption of a strip of land by the river for use as a cycleway and footpath

Sources of further Information

Raploch Urban Regeneration Company
http://www.raploch.com/

Chapter 2: Greenspace and health policy context

This chapter describes the key greenspace and health policy context in Scotland

2.1 Historical background

Patterns in the type and quality of greenspace and its use in Scotland are influenced by a range of factors.[6] In the 19th Century, many Scottish towns and cities were made up of tenements with treeless streets and communal back courts while, in more affluent areas, town houses tended to have private communal gardens. Hence, for a large proportion of the urban population, there was limited access to gardens or public greenspace. During the early 20th Century there was considerable suburban development with detached, semi-detached and four-in-a-block housing, most of which had gardens. This phase of urban development was also accompanied by a lot of allotment gardens. However, much of this greenspace has been lost over time.

There was a period of renovation of parks and open space, during the 1950s and up to the mid 1960s, as open space policies in Scottish New Towns became a part of post-war urban planning and development. However, since then peripheral housing schemes have often included large areas of greenspace with much of this being amenity grassland, 'green deserts' with no clear function. Many poor and socially excluded people therefore became grouped in poor quality neighbourhoods, often adjacent to more affluent neighbourhoods with high quality greenspace. This has created a sharp divide in environmental quality and access to greenspace.[5 7] The decline of heavy industry has also left a legacy of vacant and derelict land in many towns and cities, again most often in more deprived areas.

The Scottish climate, which can be cooler, windier and wetter than other parts of the UK, is also a factor in reducing outdoor activity and the use of greenspace.

These factors have been exacerbated by:

- poorly designed greenspace that is uninviting and uninteresting to those who use or wish to use it
- lack of investment in greenspace and a spiral of decline often associated with an increase in crime and anti-social behaviour
- limited community involvement in the development of greenspace leading to a mismatch with local greenspace needs
- inaccessibility of the countryside around towns and cities for those without a car
- limited biodiversity within greenspace limiting people's contact with the natural environment[8]

In the wider UK context, there have been a number of key stages in terms of greenspace policy development.[9] In the 19th Century, parks were created by the new municipalities and rich philanthropists in the overcrowded Victorian cities and were seen as a way of improving health and reducing social discontent. At the beginning of the 20th Century, Ebenezer Howard's town planning ideas and the Garden City Movement, which created 'garden cities' with high levels of space, light and vegetation, were very influential. During the 1930s and 1940s, a concern for the physical and moral welfare of the young, and the need to make them 'fit to fight', shifted the emphasis from parks to active recreation and sports grounds. In the 1970s, financially challenged councils gradually withdrew staff and other resources from parks and changing patterns of social life left parks empty. In the 1980s, Compulsory Competitive Tendering (CCT) changed councils from greenspace providers to greenspace facilitators, with many parks being managed by private sector contractors. Alongside this change, a significant urban wildlife movement emerged which sought to protect and develop access to wild places in and around towns and cities, often as restorative places to get away from the stresses of urban life. Since the 1990s, there has been a wider societal recognition of, and interest in, the value of greenspace in creating healthy, sustainable and high quality urban environments.

2.2 Influences on current greenspace policy

A number of issues are influencing the development of greenspace policy.[6]

These are:

- supporting sustainable development and mitigating climate change
- protecting and enhancing urban and rural biodiversity
- creating more cohesive and inclusive communities
- improving quality of life through improving the quality and accessibility of greenspace
- reducing social, environmental and health inequalities
- improving public health and tackling obesity

The overall Purpose of the Scottish Government is *"to focus government and public services on creating a more successful country, with opportunities for all of Scotland to flourish, through increasing sustainable economic growth"*; this is underpinned by five Strategic Objectives for a wealthier and fairer, smarter, healthier, safer and stronger, and greener Scotland (see Fig. 2.1). These Strategic Objectives are mutually interdependent and delivering outcomes around each of these contributes to attaining the other objectives. It is, therefore, important to recognise that developing a healthier Scotland is not simply about the delivery of health services but is concerned with creating an environment where people are supported to take choices that will promote and improve their health and wellbeing.

Fig. 2.1 Scottish Government's five Strategic Objectives

The *Better Health Better Care*: *Action Plan*, published in December 2007, sets out the Scottish Government's vision for health services for the next 5 years.[iii] *Better Health, Better Care* is a significant step towards a 'healthier Scotland' and its three main components are: health improvement; tackling health inequality; and improving the quality of health care.

Instead of having multiple plans and reporting streams, each Council now has one Single Outcome Agreement (SOA) with Scottish Government.[iv] Councils developed their SOAs with reference to the national outcomes, drawing on the relevant national indicators to ensure these are addressed in relation to local priorities. A menu of local indicators was also developed for the Councils to use and extend.

The SOA sits within the statutory framework of Best Value and Community Planning and will need to be underpinned using robust planning tools, evidence and local information. This guide can assist with that process.

Furthermore, developments on environment and health are now being coordinated as part of the Strategic Framework for Environment and Health in Scotland (SFEH) which has as its goal the development of better systems to pursue environments consistent with, and promoting of, human health and wellbeing in a Scotland of equal opportunity. The SFEH prototype will help identify key actions on the environment which will support health improvements in childhood asthma, obesity, unintentional injuries and mental health and wellbeing. This will include considering the suitability of and access to greenspace and how the key health outcomes of the SFEH prototype may be affected.

iii http://www.scotland.gov.uk/Publications/2007/12/11103453/0

iv http://www.improvementservice.org.uk/news/news-across-scotland/single-outcome-agreement---guidance-format-and-indicators-package-issued.html

2.3 Key greenspace policies in Scotland

Scottish Planning Policy 11 (SPP11) *Open Space and Physical Activity* (November 2007)

Scottish Planning Policies (SPP) provide statements of the Scottish Government's policy on nationally important land use and other planning matters. SPP11 sets out how the planning system should help safeguard and create new open spaces and places where people can take part in sport and recreation. Its key objectives are to:

- protect and enhance open space[v]
- ensure a strategic approach to open space and other opportunities for sport and recreation by requiring local authorities to undertake an open space audit and prepare an open space strategy for their area
- protect and support opportunities for sport and recreation
- provide guidance on the quality and accessibility of open space in new developments and on providing for its long-term maintenance and management
- provide guidance on planning for the development of new indoor and outdoor facilities for sport and recreation

The guidance states that local development plans and development management should be informed by open space audits and strategies and that there should be consistency between open space strategies, core paths plans, local transport strategies and development plans.

Factors to be taken into account when considering the quality of open space include whether it is:

- fit for purpose
- well located and connected
- easily accessible
- inclusive
- distinctive
- of high quality design
- pleasant and welcoming
- safe
- adaptable
- well maintained
- actively managed

SPP11 also states that the open space strategy, the development plan and the core paths plan must reflect community aspirations concerning the future design and use of open space. Community involvement should begin early in the process and should include the opportunity to make input to the open space audit and influence the strategy. Engagement with the community and other stakeholders should be tailored to the issues under consideration and the relevant audience, publicising information widely and using methods which fit into people's everyday lives and engage all parts of the community.

Planning Advice Note 65 (PAN65): *Planning and Open Space* (January 2003)

PAN65 gives advice on the role of the planning system in protecting and enhancing existing open spaces and providing high quality new spaces. It sets out how local authorities can prepare open space strategies and gives examples of good practice in providing, managing and maintaining open spaces. The advice relates to open space in settlements: villages, towns and major urban areas. A key aim of PAN65 is to raise the profile of open space as a planning issue and to highlight the importance of involving all sections of a community in the planning and development of open spaces.

PAN65 sets out a typology of open space that can be helpful in preparing open space strategies and in setting development plan policies (see Table 2.1 below). The typology categorises open spaces according to their function and distinguishes between spaces of strategic, local and neighbourhood importance. PAN65 suggests a wide typology for greenspace, including: parks; private gardens; natural and semi-natural greenspaces; green corridors; play space for children and teenagers; amenity greenspace; and, other functional greenspaces.
The typology is useful in that it clearly indicates the need to recognise the diversity of types of open space and create strategies that are appropriate and closely tailored to needs and circumstances of the available spaces and of the communities that may use them.

v 'open space' is a term which includes both greenspace and 'civic space' consisting of squares, market places and other paved or hard landscaped areas with a civic function

Table 2.1: PAN65 Open Space Typology[vi]

PAN65 Category	Description
Public parks & gardens	Areas of land normally enclosed, designed, constructed, managed and maintained as a public park or garden.
Private gardens or grounds	Areas of land normally enclosed and associated with a house or institution and reserved for private use.
Amenity greenspace	Landscaped areas providing visual amenity or separating different buildings or land uses for environmental, visual or safety reasons e.g. road verges or greenspaces in business parks, and used for a variety of informal or social activities such as sun bathing, picnics or kick-abouts.
Play space for children & teenagers	Areas providing safe and accessible opportunities for children's play, usually linked to housing areas.
Sports areas	Large and generally flat areas of grassland or specially designed surfaces, used primarily for designated sports i.e. playing fields, golf courses, tennis courts, bowling greens; areas which are generally bookable.
Green corridors	Routes including canals, river corridors and old railway lines, linking different areas within a town or city as part of a designated and managed network and used for walking, cycling or horse riding, or linking towns and cities to their surrounding countryside or country parks. These may link greenspaces together.
Natural & semi-natural greenspaces	Areas of undeveloped or previously developed land with residual natural habitats or which have been planted or colonised by vegetation and wildlife, including woodland and wetland areas.
Other functional greenspaces	Allotments, churchyards and cemeteries.
Civic space	Squares, streets and waterfront promenades, predominantly of hard landscaping that provide a focus for pedestrian activity and make connections for people and for wildlife, where trees and planting are included.

vi 'open space' is a term which includes both greenspace and 'civic space' consisting of squares, market places and other paved or hard landscaped areas with a civic function.

PAN65 suggests three approaches to assessing current and future requirements for open space provision. The assessment of existing settlement areas requires a combination of the three approaches to act as a guide for reasonable decision making.

Supply-led approach

Spaces most suited to a supply-led approach are urban parks and gardens, civic spaces, woodlands and other natural spaces. This approach assesses the existing size and distribution of spaces against their current and future role and allow for the formulation of a strategy that protects and enhances these spaces.

Demand-led approach

This approach is suited for those spaces for which a quantifiable demand can be identified, for example, sports facilities, green corridors and functional greenspace. This should allow the local authority to consult with relevant user groups or carry out necessary survey work in order to establish the demand for facilities.

Standards-based approach

Where the need for a type of space is broadly the same everywhere, or where the demand for a particular use is difficult to quantify, it may be appropriate to use a standards-based approach, for example children's play areas and amenity open space. Standards should contain the following three elements:

- *quality* – a benchmark against which quality can be measured
- *quantity* – the amount of space per house unit or head of population
- *accessibility* – an amount of particular types of open space within a specified distance i.e. a distance threshold

Lastly, the guidance states that local authorities should aim to maintain or form networks of green and civic spaces, which are:

- *well located* – linking into the open space network, connecting into well-used routes and overlooked by buildings, helping to foster a feeling of safety and discouraging anti-social behaviour as well as being easily accessible to all
- *well designed* – designed to reduce vandalism and, where appropriate, with plans for maintenance, with the use of high quality durable materials and incorporating elements of interest, for example, through public art
- *well managed* – covered by a management and maintenance regime attuned to the type of space, durability, wildlife habitats present, level of usage and local interests
- *adaptable* – capable of serving a number of functions and adapting to different uses while promoting a range of benefits such as biodiversity, flood control or environmental education

Scottish Planning Policy 21 (SPP21) *Green Belt* (April 2006)

SPP21 sets out the objectives of green belt policy and the way in which it should be used and enforced. A green belt is an area of land designated for the purposes of managing the growth of a town or city in the long term. It should be used to direct development to suitable locations, not to prevent development from happening in general. It is a key part of a long-term settlement strategy to achieve the following three objectives:

- to direct planned growth to the most appropriate locations and support regeneration
- to protect and enhance the character, landscape setting and identity of towns and cities
- to protect and give access to open space within and around towns and cities, as part of the wider structure of greenspace

There is, therefore, a strong presumption against inappropriate development in the green belt.

Land Reform (Scotland) Act 2003

The Land Reform Act introduces a statutory right of responsible access to most land and inland water, and creates a climate for better management of recreation opportunities in the outdoors. This legislation requires local authorities to prepare core path plans. These plans list and map all the main paths in an area that enable people to get around. These core paths can be grass paths, rights of way, well-lit 2 metre wide tarmac paths or established routes on land and watercourses. The plans should aim to ensure that the main path network takes account of the needs of different types of potential users.

Scotland's Biodiversity: it's in your hands (May 2004)

This is a strategy for the conservation and enhancement of biodiversity in Scotland. It represents Scotland's response to its obligations under the Convention on Biological Diversity, the European Union's 6th Environmental Action Programme and the UK Biodiversity Action Plan, along with the Scottish Government's stated desire to put biodiversity at the heart of our national identity and culture. Delivery of the strategy is pursued through partnership working (Scottish Government, Scottish Natural Heritage, Forestry Commission, Scottish Environment Protection Agency, RSPB, Scottish Wildlife Trust, etc). The strategy sets out three main areas of work:

- species and habitat work which are also part of a UK plan
- existing work on National Nature Reserves etc
- Biodiversity Implementation Plans (2005-2007 and 2008-2010)

Nature Conservation (Scotland) Act 2004

This Act places a legal obligation on all Scottish public bodies to further the conservation of biodiversity in the course of carrying out their functions. In exercising the duty, public bodies must have specific regard to the 1992 Rio Convention on Biological Diversity and to any Scottish Biodiversity Strategy designated by the Scottish Ministers. Whilst compliance with the duty is obligatory, public bodies have significant discretion in relation to the particular action which they consider to be necessary in any particular situation. The duty is not intended to be narrow or prescriptive, rather its purpose is to place the onus on public bodies to take direct responsibility for the impacts which their policies and operations may have on the natural environment.

Changing our Ways – Scotland's Climate Change Programme (March 2006)

Amongst the key aims of this programme are to integrate climate change considerations routinely into policy development across all sectors and at all levels; consider the wider environmental, social and economic implications of different courses of action; influence and contribute to UK, European and global efforts to respond and adapt to climate change and maximise opportunities for both mitigation and adaptation (e.g. green jobs, technology development, renewables, biomass, sustainable flood management).

Case Study 2: How HIA can be used in a greenspace policy context

The development of a health and wellbeing impact assessment (HWIA) tool by the Countryside Council of Wales

Background context

As part of an internal review of their mission and work, the Countryside Council of Wales (CCW) commissioned the Institute of Rural Health (IRH) to conduct a 12 month study into the impact of the natural environment on health and wellbeing.

Purpose of the HIA

During the internal review the issue of health and wellbeing came to the fore and it became clear that this was an area of policy and practice that needed to be embedded into the mainstream work of the CCW.

Methods

CCW asked IRH to develop an appropriate tool to estimate, quantify and communicate the contribution of CCW's activities to the health and wellbeing of the people of Wales. This was done in conjunction with the Welsh Health Impact Assessment Support Unit (WHIASU).

The development of the tool involved a review of existing HIA tools, interviews with CCW staff, development of a draft HIA Tool and a consultative workshop on the draft tool.

The CCW is mainstreaming the tool as part of its assessment of its work programme. The tool categorises the contribution of the CCW in terms of its influence on local populations and the wider determinants of health, taking into account:

- vulnerable groups
- individual lifestyles
- social and community influences on health
- living/environmental conditions affecting health
- economic conditions affecting health
- integrated service delivery
- macro-economic, environmental and sustainability factors

Mainstreaming of the tool

The tool is intended to be used by CCW staff on new greenspace plans, programmes and projects that CCW are in the process of developing and implementing.

The tool is also of benefit to other people who may be involved in the development and implementation of greenspace or greenspace-related plans, programmes and projects.

Sources of further Information

Countryside Council for Wales
www.ccw.gov.uk

Welsh Health Impact Assessment Unit
www.whiasu.wales.nhs.uk

Tool can be found at:
www.wales.nhs.uk/sites3/news.cfm?orgid=522&contentid=8389

Section 2: Evidence

This section presents a summary of a critical literature review of the current evidence on the health impacts of greenspace.[10] The detailed literature review ***The links between greenspace and health: a critical literature review*** was developed by Karen Croucher, Lindsey Myers and Jo Bretherton from the University of York.

The studies reported here are drawn from a variety of disciplines, and most, although not all, utilise a cross-sectional design. The implication of this is that these types of studies cannot demonstrate causality. Cause and effect cannot be firmly established because confounding factors such as people's social class, income, education and personal lifestyles factors could not be taken into account. Having said this, cross-sectional studies are useful in providing insights into the likely relationships between health effects and their causes.

The studies described in this section address the different influences that greenspace has on physical, mental and social health and wellbeing. There is also a substantial body of qualitative work that has primarily been conducted to explore people's perceptions and experiences of nature and greenspace, and the lay values assigned to such places. This literature is fast developing, as is demonstrated by the increasing number of studies and reviews that have been undertaken in the last five years.

Scope of the research reviewed

There is no single definition of greenspace used in the literature, and authors of various studies and reviews propose various definitions. For the purposes of this review, we used the definition described in Chapter 1, i.e. that greenspace is any vegetated land or water within or adjoining an urban area, and the literature review team sought papers that addressed various types of greenspace, but with a particular emphasis on greenspace in urban areas. As noted above, the requirement was to consider the impact of greenspace not just on physical health, but on all aspects of physical, mental and social wellbeing.

In undertaking this critical review, a number of the methods associated with systematic reviewing – notably rigorous and transparent searching techniques, the application of inclusion and exclusion criteria, as well as the application of a simple quality assessment tool – were applied (see Appendix 2). Further details can be found in the separate literature review report ***The links between greenspace and health: a critical literature review*** by Karen Croucher, Lindsey Myers, and Jo Bretherton, **greenspace scotland** (2007).

The application of these techniques makes this review more robust than a traditional literature review. The intention was to locate key studies published since 1990 (in English) and to synthesise the main messages that could be drawn from robust evidence. We are confident that the search is rigorous but cannot be certain that all studies have been identified. Though general search terms were used, see Appendix 2, the detailed review did not specifically search for the negative health impacts of greenspace and the direct protection from physical environmental exposures such as heat, cold, and flooding. These are also relevant to health impact assessment and so are worth reviewing. A short review is included in the following chapter which provides a general overview of the evidence and then a more detailed consideration of specific causal pathways linking greenspace with health and wellbeing impacts.

Limitations of the review

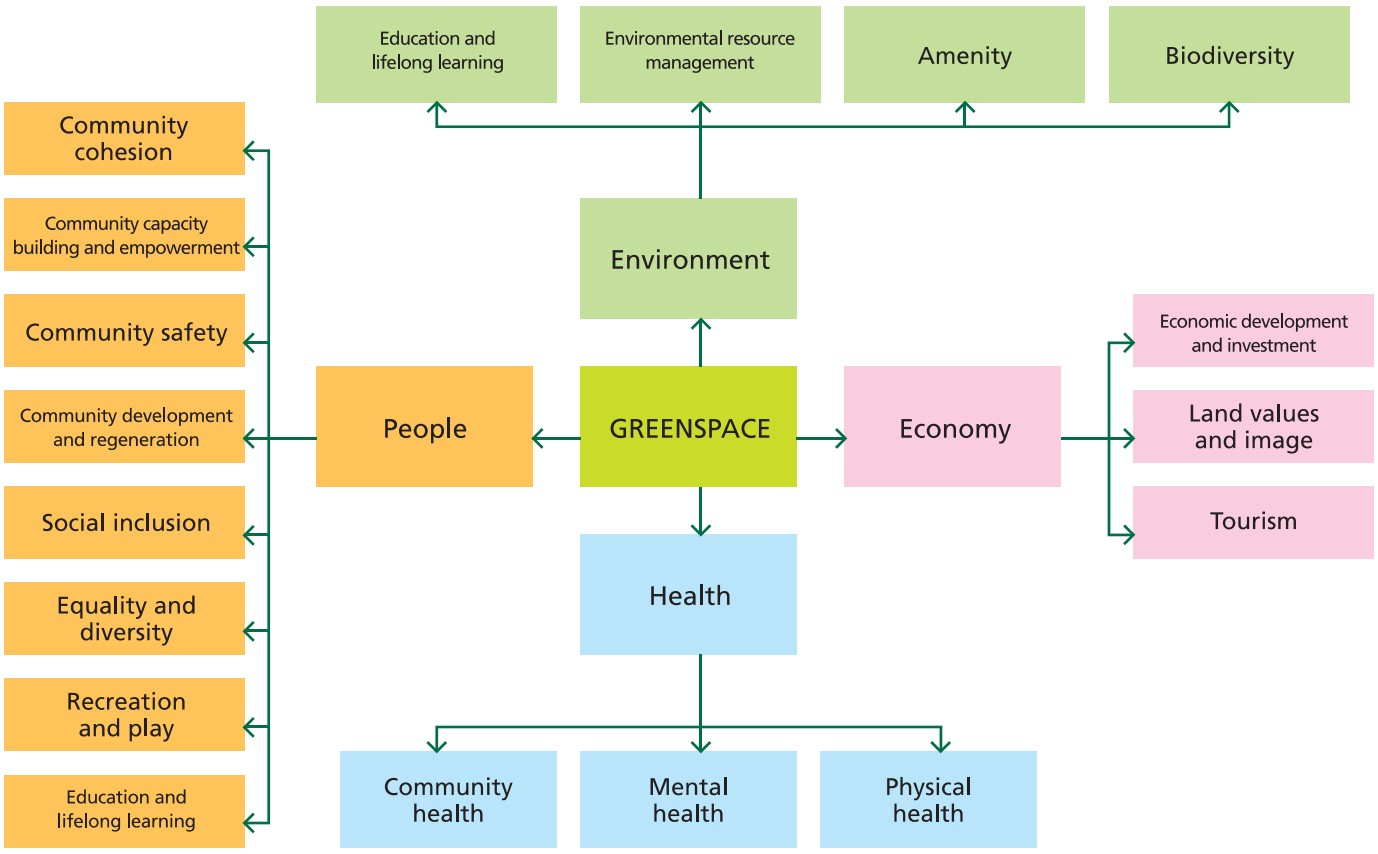
There is a wider literature covering many different aspects of greenspace and there are particular challenges for those conducting reviews in complex health and social policy areas where many different disciplines and agencies are investigating a variety of related themes and topics. This has meant that not every area of greenspace research has been examined such as the health benefits of viewing and looking at nature and greenspace.[11 12] The topicality of greenspace, as is evident from the number of studies and publications undertaken very recently, means that the evidence base is also fast developing and highly variable, ranging from large scale, in-depth studies to many smaller, less robust evaluations. In the context of this review, the grey literature was particularly hard to systematically identify and locate.

Chapter 3: Health impacts of greenspace

3.1 Introduction

There is a general intuitive understanding that greenspace is good for individuals, communities and society at large.[13] There is also a growing recognition of the links between sustainability, environment, health and wellbeing.[14] Fig. 3.1 shows how greenspace can potentially influence a wide range factors in society. For example, it can influence the economy through land values, tourism and economic development and enhance communities by building community cohesion and regeneration.[15]

Fig. 3.1 How greenspace relates to other aspects of the natural and built environment (Source: *Making the links: greenspace and quality of life,* Scottish Natural Heritage commissioned report No 60)



The relationship between greenspace and health is complex and multi-dimensional. Greenspace may impact upon people's health and wellbeing through many different pathways. This chapter examines the relationship between greenspace and general health, and then looks in more detail at the four potential mechanisms by which greenspace could be positively influencing health and wellbeing.[16] Greenspace:

1. provides direct protection from environmental exposures
2. promotes restoration, relaxation and reduction in stress
3. promotes physical activity
4. promotes social interaction and cohesion

This chapter also looks briefly at hazards and risks – the potential negative health impacts of greenspace.

3.2 Greenspace and general health and wellbeing

Five epidemiological studies have specifically investigated the role of greenspace with regard to population health and, overall, found a positive relationship between greenspace and health.[17-21] Other studies have reported secondary analysis of European cross sectional data relating to graffiti, greenery, obesity in adults, the impact of a range of socio-economic and environmental variables on morbidity, and the links between the quality of neighbourhood parks and neighbourhood health indicators.[22-24]

A study conducted in England found that, in general, neighbourhoods with a greater proportion of greenspace were associated with better health, however the strength of the association varied according to the combination of the amount of income deprivation and the level of urbanisation in an area.[19] This held in all urban areas and rural low-income areas, but there was no significant association between greenspace and health in higher income suburban and higher income rural areas. The authors cite one possible explanation for this, residents in these areas have their own domestic gardens, and municipal greenspace is thus less important to them. Paradoxically, they found that a greater quantity of greenspace was associated with worse health in low-income suburban areas. Their explanation for this was that there is some limited evidence to suggest that lower income suburban areas may have a larger proportion of poor-quality greenspace, which is not accessible and is aesthetically poor.

Of two studies carried out in Holland, one found that living in a greener environment was positively associated with the three health indicators used in the study, with a slightly stronger association for housewives and older people.[17] The three health indicators were: perceived general health measured on a five point scale; the score on the Dutch version on the General Health Questionnaire; and the number of health problems experienced in the previous 14 days. The second study also found that perceived general health was better for people living in greener environments, with the greater beneficial effects found for older people (65 and over) and younger people (0-24 years) in urban areas.[vii 18]

Of two studies carried out in Japan, one found that a wide range of environmental, living conditions and socioeconomic factors were related to morbidity and that there were significant differences in how men and women were affected by these factors.[24] In particular there was a significant association between female mortality rates and living in an area with less vegetation. The other study found that living in areas with walkable greenspace had a positive influence on the longevity of older people in Tokyo, independent of age, sex, marital status, baseline physical health and socio-economic status.[21]

vii in urban areas, the proximity of greenspace was also found to be an important factor

A Danish study found that greater distance from home to greenspace was a better predictor of higher stress levels for all groups and of obesity in younger respondents (aged 25 or below) than reported use of greenspace.[20] It also found that having access to a private garden or green area near the home was also associated with reduced levels of stress and obesity. The study's authors suggest that distance to greenspace might be correlated with the characteristics of neighbourhoods and whether or not they are conducive to outdoor activities and healthy modes of transport.

A Canadian study found that parks in communities with poor health status had more limited physical activity facilities, pronounced concentrations of physical incivilities (graffiti, presence of boarded up or vacant buildings) and were bordered by industrial sites or multi-lane roads.[22] The authors suggest that the study provides further evidence for what has been termed 'deprivation amplification', where people who are poorer, of lower health status, and with fewer personal resources have poorer quality local facilities to facilitate recreation and physical activity.[25]

A European level study found that in residential areas with high levels of greenery the likelihood of residents being more physically active was more than three times higher and the chance of being overweight and obese was about 40% lower than for similar areas with low levels of greenery.[23] However, the study also found that in residential areas with high levels of social incivilities (anti-social activities), the likelihood of being more physically active was less and the likelihood of being overweight or obese was higher. The study used a measure of greenspace that included the level of vegetation and greenery visible on houses and the streets immediately surrounding it.

Overall assessment: greenspace and general health and wellbeing

There is evidence of a positive relationship between greenspace and general health i.e. that greenspace improves health and wellbeing.

By controlling for socio-economic status, the studies indicate that better health is related to greenspace regardless of socio-economic status.

The quantity and quality of greenspace is important. Poor quality greenspace may have a negative health impact.

The studies do not explain the mechanisms by which greenspace has a positive effect on population health nor do they demonstrate whether different types of greenspace have a greater or lesser impact.

Other neighbourhood factors such as anti-social behaviour influence quality of, access to and use of greenspace.

These population studies may not necessarily transfer into different cultures and countries.

3.3 Direct protection from physical environmental exposures

Greenspace may provide direct protection against physical environmental exposures. For example trees and other foliage may protect against air pollution, noise, wind, soil erosion, flooding, heat, etc.

There is some evidence of the potential value of greenspace in reducing the risks of flooding in urban areas susceptible to flooding. Trees, grass and vegetation can reduce the amount of water run off and soak up rainfall and floodwater compared to hard landscaped urban areas.[26-28]

There is also some evidence on the potential of vegetation to filter airborne particulates, absorb harmful gases and reduce carbon emissions.[29-31] Trees in particular may be useful in trapping small airborne particles, as well as absorbing sulphur dioxide, nitrogen oxides and carbon monoxide.

However, there is also the potential for streets covered by a canopy of trees to trap and amplify the levels of pollution on a street. Key factors that influence these protective or harmful effects are pollutant concentrations, leaf conductance, ambient temperature, and the size, health and age of the vegetation.

Research also suggests that vegetation influences and regulates local microclimates. Trees and other vegetation can provide shelter from the sun, wind and rain, as well as helping to reduce ambient temperatures, the 'urban heat island' effect and the development of 'dust domes' introducing cooler, fresher air into urban areas.[viii 26 28 29 31]

Similarly, there is research to suggest that vegetation can attenuate noise. The ability of vegetation to reduce noise pollution is dependant on the size and density of planting.[29 32]

Overall assessment: greenspace provides direct protection from physical environmental exposures

Greenspace, particularly trees and large shrubs, can protect people from the harm of key environmental exposures such as flooding, air pollution, noise and extremes of temperature in urban environments.

However, there is a possibility that, in certain contexts, greenspace may amplify the effects of pollution by creating an enclosed space.

viii the characteristic shape taken by the large quantities of dust and gaseous pollutants in a city's atmosphere

3.4 Restoration, relaxation and reduction in stress

Greenspace, although very often highly managed and modified, is where the majority of the urban population experiences day-to-day contact with nature.

There are three main theories that underpin studies of the impact of nature on mental health and wellbeing and, in particular, the ability of natural and greenspaces to foster relaxation, reduction of stress and restoration.

The first theory, *biophilia*, argues that human beings subconsciously seek contact with other species (plants and animals) through a pre-determined biological need developed through the evolutionary process reflecting man's close relationship with the natural world.[33]

The second theory, the *stress reduction theory*, postulates that natural environments promote recovery from any form of stress, both mild short-term stress, and longer term problems (not just attention fatigue). This is understood to be a consequence of a psycho-evolutionary process whereby particular types of environments produce certain types of effects. Thus, positive emotional and physiological responses are triggered by the perception of certain types of environments as safe.[34]

Finally, the *attention restoration theory* postulates that nature assists with recovery from attention fatigue which occurs as a consequence of performing tasks that require prolonged maintenance of attention and focus. Natural environments assist with recovery by allowing individuals to distance themselves from routine activities and thoughts ("being away"), and attract the attention without requiring concentration or effort.[35]

Six studies have investigated the impact of greenspace on mental health and wellbeing. Of the two English studies, one found that dissatisfaction with local greenspace was associated with poorer mental health.[36] The other found that participating in an outdoor greenspace exercise programme improved levels of confidence, self-esteem and lifted mood.[37]

The Swedish study found that the more time people spend in outdoor public greenspace the less stressed they feel, regardless of age, gender and socio-economic status.[38] Those people who visited urban greenspace more frequently reported fewer stress related illnesses. The same relationship was also noted for length of time spent in greenspace. The study also showed that distance to urban greenspace is associated with amount of use and that those who had access to a private garden at their place of residence visited public greenspace more often than those who did not have a private garden. The authors identified the following factors which could individually or in combination impact on levels of stress: outdoor activity and exercise; natural daylight; stimulation of the senses (sight, sound, scent, temperature, touch, balance and hearing); and aesthetic experience.

Of three US studies, one found that recreation in a park and at home had a positive impact on mood, with no significant difference between the two settings.[39] This was contrary to the authors' expectations. The second found that residents who lived in public housing with nearby nature (for example, with views of trees or open space) showed greater capacity to cope with stress than those who lived in dwellings without nearby nature.[40] The third found that stress levels of older people could be reduced by the use of urban parks.[41]

Compared to this review, a review by the Health Council of the Netherlands (HCN) identified a greater number of studies investigating the role of nature in reducing stress and attention fatigue.[42] Overall, the Council concluded that there was strong evidence from both experimental and quasi-experimental research performed in both laboratory and field settings that nature has a positive effect on recovery from stress and attention fatigue. Effects occur even after brief exposure to a view of nature, although less is known about the impact of long-term exposure to nature (and whether this may be stronger or weaker), or the influences of different types of nature.

Overall assessment: greenspace promoting restoration, relaxation and reduction in stress

Experiencing greenspace has a positive impact on levels of stress i.e. it both reduces and aids recovery from stress and attention fatigue. [ix]

Aspects of greenspace that may reduce stress include: outdoor activity and exercise; natural daylight; stimulation of the senses (sight, sound, scent, temperature, touch, balance and hearing); and aesthetic experience.

Though effects occur even after short exposure to greenspace, it is unclear whether long term exposure has a cumulative effect.

Although some studies clearly demonstrate the wellbeing effect of nature, the degree to which the naturalness of greenspace influences wellbeing is unclear.

ix note those studies that measured changes in psychological state used many different measurement tools

3.5 Promoting physical activity

Seventeen studies have investigated the role of greenspace in promoting physical activity. Of these, nine studies addressed whether access or proximity of greenspace promoted greater levels of physical activity, whilst eight were concerned with specific projects or initiatives such as green exercise programmes or the introduction of urban trails and green pathways.

No studies were identified that explored access to greenspace from the workplace. However, the HCN review did identify three Dutch studies that explored why workers took exercise in their break periods. 'Being outside', and 'getting fresh air' were primary motivations, and one study reported that the presence of footpaths, a park, and pleasant walks were the most cited motivating factors for workers taking exercise in the lunch break.

Some, but not all, of the studies support the association that people who use greenspace most regularly usually live close to greenspace and that those who use greenspace regularly are more likely to exercise.[43] The studies also show that levels of physical activity are mediated by a number of different factors, in particular, those related to self-efficacy[x] and motivation.[44-46] However, many greenspace activities are quite passive. Although park users often report that they walk to the park, people do not just visit the park to walk, run or jog, or take part in sports; many go to sit and relax, or undertake passive activities. So park use was not significantly associated with achieving recommended levels of physical activity.[43 44 47 48]

The studies also found that access to greenspace was not only influenced by distance but also by the ease of access, size, quality and attractiveness of greenspace, as well as the connectivity to residential areas and other greenspace.[43 49 50]

In terms of attractiveness, the presence of different types of flora and fauna have been found to be important.[47] An example of this is mothers taking their children to a more distant park because there was a pond with ducks that was more interesting for the children. Trees, planted areas, water features, and wildlife are seen as particularly attractive.

In terms of the use of greenspace, access to safe greenspace, such as parks and playgrounds, and recreational facilities are particularly important for children and young people. Children who have access to safe greenspace are more likely to be physically active and less likely to be overweight.[51] Greenspace is, therefore, most valuable as a resource for physical activity when it is multi-functional (enabling a range of active and passive activities) and used by high volumes of people.

Four US studies have investigated the use of trails and greenways and their users. One found that the perceived benefits of trails included the opportunities to exercise, the provision of green areas and accessible recreation spaces, decreasing levels of pollution, along with increased pride in the community and more opportunities for social connections. The study also found that the connectivity of trails to residential and commercial areas was a key influence on patterns of use and was perceived to contribute most to the 'liveability' of an area.[52] The second found no relationship between a new trail and levels of physical activity.[53] The third found that trail users were more likely to be regularly physically active than non-trail users, to be fitter generally and to be men.[54] Trails were used for both recreational and non-recreational journeys. A fourth found that trails in poorer neighbourhoods and neighbourhoods with higher proportions of older residents or young children were less well used.[55]

x self-efficacy is people's confidence in their ability to achieve a specific goal in a specific situation

There is increasing interest in using greenspace as locations for exercise programmes. While there is evidence that exercise programmes can promote and increase physical activity (and the associated benefits of improvement in physical and mental health), it is more difficult to prove that greenspace plays a particular, significant or additional role in such programmes. However, evidence does suggest that the attractiveness of green settings does provide additional incentive to continue exercising.[xi] *The Walking the Way to Health* walks started in 1995 in Oxfordshire. There are now more than 350 similar volunteer-led schemes, collectively known as the *Walking the Way to Health* Initiative, co-ordinated by the British Heart Foundation and the former Countryside Agency (now Natural England). In Scotland, similar programme is known as *Paths to Health*. Three evaluations of the *Walking the Way to Health* Initiative were identified including a survey of walk participants undertaken at a relatively early stage of the programme.[xii 56-58] They found that the opportunity to spend more time in the countryside and the opportunity to socialise were important motivating factors to continuing on the programme.

A UK study evaluated ten different examples of green exercise initiatives including walking groups, riding, boating, fishing and conservation work. The study found that there were overall increases in self esteem and improvements in mood after taking part in an activity, regardless of the level of intensity, duration or type of greenspace activity.[59]

Overall assessment: greenspace promoting physical activity

Physical activity seems to be influenced by a number of different factors, including personal aspects such as self-efficacy and motivation. In relation to the use of greenspace the key influences are:

- *distance of residence from a greenspace* – the nearer the greenspace, the more likely it is to be used regularly
- *ease of access* – the more accessible in terms of routes and entrances, and disability access, the more likely greenspace is to be used for some form of physical activity
- *size of the greenspace* – the larger the size of the greenspace, the more people are likely to use it
- *connectivity to residential and commercial areas* – the greater the degree of connectivity and links to residential and commercial areas, the more likely it is to be used e.g. people walking and cycling through greenspace to and from work
- *attractiveness* – the more biodiverse the flora and fauna found within the greenspace and the less litter and graffiti there is, the more likely it is that the greenspace will be used
- *multi-use* – the wider the range of amenities (e.g. children's play area, quiet garden with seating, playing areas for team games and picnic areas), the more likely the greenspace is to be used by different kinds of people

Greenspace has the potential to increase physical activity by both providing an attractive area to exercise and the opportunity to undertake group-based physical activity with other people.

xi Note that Natural England and the National Institute for Clinical Excellence are currently working on the development of a single measurement tool for the evaluation of green exercise activity.

xii Note that there have been more than 50 local evaluations of different *Walking the Way to Health* initiatives. These are summarised on the WHI website, along with a number of case studies. While of interest, these studies and evaluations are not of sufficient quality to be included in this guide.

3.6 Social interaction and cohesion

Various surveys show that greenspace, particularly urban parks, can have a wide range of uses and high numbers of users.[47 48 60 61] Studies also show that there may inevitably be some tension between different groups of greenspace users, for example, people walking their dogs, people playing sport, children, street drinkers and older people. This is especially the case for urban parks, which are generally accessible to all and free to use.

There are also different patterns of use among people from different socioeconomic backgrounds and cultures. Almost three quarters of adults from higher social classes in England reported that they had visited a park in the previous 12 months, compared to only half of those from the lower social groups.[60] People in higher social classes were also more likely to visit country parks, formal gardens and heathland while people from black and minority ethnic communities, and disabled people, are less frequent visitors to urban greenspace, woodlands and country parks.

Four studies have explored the nature of social contact in public spaces, including greenspaces.[62-65] Of the three studies in England, one found that parks, and other types of public spaces, such as street markets, were a means of bringing different communities together as they offered opportunities for regular informal contacts between different groups and individuals.[62] A second found that the use of greenspace was most affected by the season, time of day and weather conditions and that people using the municipal parks and canal towpaths were seen to behave in more informal and sometimes more informal and intimate ways.[63] These can include kissing, hugging and sexual activity as well as 'hanging out' with friends, boisterous play and anti-social behaviour. It also found that, as these spaces were free and not highly regulated, they made some people uncomfortable but attracted others, particularly those who might have been "excluded" from town centre or commercial meeting places e.g. certain groups of young people, street drinkers, homeless people and the unemployed used the municipal park all year round. The third found that a positive impression of the local environment and meaningful participation in it can play a part in helping refugees integrate into a new society.[65] It also found that recognition of landscape elements that are similar to a refugee's country of origin can provide a conceptual link between their former and new homes. The US study found that the presence of other women in greenspace promoted feelings of safety and enjoyment in women users as well as providing opportunities for social interaction and mutual support for undertaking physical activity.[64]

The HCN review identified three papers that address the social impact of shared greenspace. These found that the presence of greenery increased the use of public spaces; that the presence and views of green common space correlates positively with social ties in a neighbourhood; and that there is a positive link between the social integration of the elderly in a neighbourhood and their exposure to green common spaces.[42] Despite acknowledging the methodological rigour and interest of these studies, the HCN is cautious about its interpretation as other factors (such as design of the buildings, maintenance, individual factors) may also play a role in facilitating social contact.

Urban or community gardening is often seen as a means of improving local neighbourhoods, enhancing leisure and recreational resources and improving access to fresh food.[66] It is also seen to be instrumental in building community capacity. The overarching principle seems to be that these spaces are public in terms of ownership, access, and control.

Two studies, one from the US and one from the UK, have examined the health benefits of community gardening.[67 68] The first study found that self-reported motivations for participating included wanting access to fresh/better tasting food, to enjoy nature and improve health and wellbeing.[67] Community gardens were also reported to improve attitudes of residents toward their neighbourhood, to promote more organisation within communities and to improve social networks. The second study in the UK found that, while older people recognised the value of greenspace and community gardening, their fear of crime meant that contact with nature in public spaces was limited and the domestic garden assumed greater importance.[68] Allotments, through the sharing of work, were seen to contribute to the social inclusion of older people by offering opportunities to reduce social isolation and create supportive social networks. Allotments also provided opportunities for them to gain a sense of achievement and satisfaction, as well as pleasure from engaging with nature.

Overall assessment: greenspace promoting social interaction and cohesion

Greenspace may increase and enhance social interactions and the use of public spaces.

However, minority ethnic communities and people with disabilities are less likely to visit and use greenspace.

As greenspaces, particularly parks, are generally free, they are open to everyone and hence are used by different groups of people in many different ways.

Communal greenspace activities e.g. allotments and community gardens can enhance community interactions and build local capacity and self-esteem.

3.7 Hazards and risks of greenspace

Six studies have examined the hazards and risks associated with greenspace. Of two English studies, one found that there is a risk to park workers and park users of contracting blood born viruses, Hepatitis B and Hepatitis C, from discarded syringes.[69] The second study found that park workers and, to a lesser extent park visitors, are at risk of contracting Lyme disease as a result of being bitten by ticks.[70] A study in the Czech Republic and another in the US also examined the potential risks of contracting Lyme disease.[56 57] A Spanish study investigated the level of human-related microsporidia in pigeon droppings in seven parks in Spain.[58] Lastly, an Australian study has explored sun-protection behaviour among zoo visitors.[71]

Additionally, as described in the previous section, crime and anti-social behaviour are a concern to park users and a barrier to the use and enjoyment of greenspace.[68] There is also the potential for riskier behaviour, e.g. unprotected sexual activity and unintentional injuries in greenspace through structured sporting activity or unstructured play, although studies in this area are lacking.

The above studies show that there are some potential negative health impacts to being in, using and working in greenspace.

Overall assessment: hazards and risks of greenspace

There are potential risks of catching diseases from wildlife resident in greenspace.

There is also the potential for crime and anti-social behaviours in greenspace because of its relative isolation, lack of people and unsupervised nature.

There is also the potential for an increase in unprotected sexual activity and in unintentional injury from structured physical activity/sports and unstructured play.

3.8 Public perceptions of greenspace

A large number of surveys and studies from around the world show that lay perceptions of greenspace are, on the whole, very positive, though there are some concerns about personal safety and security, and some people do perceive wilder greenspace as more dangerous, dirty and uncomfortable places than more managed and formal greenspace.[47 48 60-62 72-84]

Green and open spaces are perceived to improve quality of life, wellness and wellbeing by enabling people to be in contact with nature and to have fresh air, to be outdoors, to be close to plants and animals. Greenspace is seen to promote positive emotional experiences.[48 61 62 85] Though studies show that greenspace is valued as a setting for exercise and physical activity, many people also value greenspace for its restorative and de-stressing capacity and the opportunity if affords to escape the dirt, noise, and visual hardness of the built environment.

Greenspace, including forests and woodland, is also frequently perceived as a place of attachment and affection, for individuals and communities, and as a distinct feature of neighbourhoods and local areas.[47 80] It is seen as a marker of different periods in people's lives: places where they played as children; places where they let out their frustrations and had their first romantic encounters as teenagers; places they visited with loved ones in adulthood; places where they brought children and grandchildren; and places where memorials can be placed for loved ones.

Additionally, greenspace is seen to enhance local areas, making neighbourhoods more attractive and bringing people together.[75 78] Urban parks are seen as particularly important for children's mental and physical development, as places where they can enjoy greater freedom and be away from urban traffic and pollution.[83 86] Similarly, accessible urban woodlands or more wild spaces are perceived to be important for children.

The surveys and studies suggest that spaces with different features, attributes and areas of interest are generally preferred over spaces that are featureless or single-purpose.[49 72 84] Though this does not always equate with greenspace professionals notions of biodiversity.[73]

Some findings also suggest that, though there are some core perceptions about the value of greenspace for enhancing health and wellbeing, different ethnic groups and people with physical disabilities have somewhat different perceptions of greenspace which generates different, less frequent, patterns of use.[87]

Personal safety and fear of crime feature are key concerns.[68 79 81] Such fears and concerns act as barriers to the use of greenspace and are negatively associated with usage patterns. Apart from fear of personal assault, incivilities such as debris from drug use, dog fouling, litter, graffiti, vandalism, poor maintenance, and - in country parks and woodlands - fly tipping, use of off-road motorbikes and 4x4 vehicles are also seen as negative. People rarely use parks alone, unless they are walking a dog, and women in particular are highly unlikely to visit greenspace unless they are accompanied by other people or there are park wardens/managers. Despite the perception that greenspace is particularly important for children, parents frequently express concerns about allowing children to go to greenspace alone or unsupervised by an adult. Note too that many of those participating in organised group health walks are often fearful of walking alone, in part due to a fear of crime.

Summing up

This section considers the main messages that can be drawn from the literature regarding the links between different aspects of health and wellbeing and different aspects of greenspace. Overall, greenspace can have positive and negative health impacts and well designed, well maintained and easily accessible greenspace is likely to provide the greatest health benefits.

Currently, the evidence base on the relationship between greenspace and health and wellbeing is weak both in terms of the types of greenspace that impact on health and the types and levels of impact on different social groups. Nevertheless, the evidence base does currently give some clear indications regarding the links between health and wellbeing and greenspace.

General health and wellbeing

With regard to population health, the evidence quite clearly demonstrates a positive relationship between greenspace and health. However the mechanisms which generate these positive effects are not entirely clear. Studies use different indicators of population health, including standardised morbidity rate, self-rated health, mortality body mass index and experienced stress.

Is it enough to simply live near a greenspace, or have a view of greenspace, or do people need to experience greenspace more directly by exercising, working, playing or simply being in a park or other greenspace? Does the type of greenspace matter? Does living near a well-maintained urban park have a different impact from living near a more modest greenspace, such as a private garden? Thus far there is limited evidence on these more subtle questions.

A further question here is whether the findings of studies undertaken in different countries, where there may be different underlying environmental, cultural and socio-economic factors that influence health (for example, levels of pollution, attitudes to exercise, diet, transport, family and social structures), are transferable to the UK context. It is likely that, in qualitative terms, they are.

Physical health

With regard to physical health, the value of greenspace as a place to exercise is strong and people who use parks regularly appear to take more exercise. Access to greenspace is just one variable for explaining levels of physical exercise. Surveys of park users in the UK show, however, that taking exercise is not the primary motivation for the majority of park users and many park activities are quite sedentary or involve gentle exercise such as walking.

Studies of green exercise programmes conducted in the UK thus far are limited in scope and, although evidence indicates consistent, small, short term benefits from exercising in greenspace they do not, as yet, demonstrate any longer term effect. They also do not show how such interventions work across different sections of a population or indicate that greenspace has an “added bonus” effect compared to exercising in any other type of environment. There is a small amount of evidence that the pleasurable sensory experience of greenspace gives people more incentive to continue with walking programmes but other aspects of the programmes, particularly the social aspects, were equally motivational. It is, of course, worth noting that greenspace is generally free to users. A walk in the park costs nothing compared to the costs, for example, of joining a gym or going swimming.

Mental health and wellbeing

While the diseases consequent to lack of exercise and sedentary lifestyles remain such a public health concern, it might be easy to give less attention to impacts of greenspace on general mental health and wellbeing. However, it is the restorative effects of greenspace and contact with nature where the evidence appears to be most compelling. Experiencing greenspace appears to have a positive effect on levels of stress. Again, it is difficult to unravel whether different types of nature impact on different people in different ways.

The evidence base, as yet, is insufficient to answer more detailed questions about the impacts of different types of greenspace on different types of people and indeed questions around the impact of experiencing greenspace over prolonged periods of time. However, there is some evidence that suggests that people's perceptions of formal parks and gardens and wilder, more 'natural' spaces, such as woodlands and country parks, are different. People perceive 'nature' or 'natural' in two ways in different contexts: as the opposite of formal in a parks context and as the opposite of the built-up environment in a town/city-wide context. Some people do not respond to natural landscapes in a positive way and see them as untidy, valueless and even frightening. They prefer the neat and tidy design of formal and ornamental parkscapes. People seem to prefer both types of natural areas in an urban setting for different reasons, with the design of formal greenspace seeming to have an influence on their preferences.

Social health and wellbeing

Evidence from surveys conducted in the UK demonstrates that greenspace has a wide variety of uses and users. Parks and greenspaces are usually free to use and not highly regulated. They are perhaps one of the few remaining spaces that are available to all and neutral spaces where people from different communities and backgrounds can be together. Much of the promotional literature lists an enormous range of educational and community events and activities that take place in parks, although some 'special' events are not always welcomed by regular park users or nearby residents. Surveys also show that individuals and families undertake a range of activities when they go to parks or other greenspaces.

Studies of lay perceptions of greenspace show how they are important as places of memory and are closely associated with neighbourhood, and even national, identity. Greenspace is often the focus for conservation or volunteering activities which offer opportunities to meet others, develop interests and share goals. Importantly, studies that report lay perceptions of greenspace indicate almost entirely positive attitudes and perception.

On a more negative note, studies also consistently show that people from Black and Minority Ethnic (BME) communities and people with disabilities are less frequent users of greenspace. In addition, crime and personal security are concerns for many people and fear of crime is a barrier to using greenspace.

Table 3.1: Summary findings of the evidence review

Topic	Overall assessment of health impacts
Direct protection against physical environmental exposures	• Greenspace, particularly trees and large shrubs, can protect people from the harm of key environmental exposures such as flooding, air pollution, noise and extremes of temperature in urban environments. • However, there is a possibility that, in certain contexts, greenspace may amplify the effects of pollution by creating a enclosed space.
Restoration, relaxation and reduction in stress	• Experiencing greenspace has a positive impact on levels of stress i.e. it both reduces and aids recovery from stress and attention fatigue. • Aspects of greenspace that may reduce stress include: outdoor activity and exercise; natural daylight; stimulation of the senses (sight, sound, scent, temperature, touch, balance and hearing); and aesthetic experience. • Though effects occur even after short exposure to greenspace, it is unclear whether long term exposure has a cumulative effect. • Although some studies clearly demonstrate the wellbeing effect of nature, the degree to which the naturalness of greenspace influences wellbeing is unclear.
Physical activity	Physical activity seems to be influenced by a number of different factors including personal aspects such as self-efficacy and motivation. In relation to the use of greenspace the key influences are: • Distance of residence from a greenspace – the nearer the greenspace, the more likely to it is to be used regularly. • Ease of access – the more accessible in terms of routes and entrances, and disability access, the more likely it is to be used for some form of physical activity. • Size of the greenspace – the larger the size of the greenspace, the more people are likely to use it. • Connectivity to residential and commercial areas – the greater the degree of connectivity and links to residential and commercial areas, the more likely it is to be used e.g. people walking and cycling through greenspace to and from work. • Attractiveness – the more biodiverse the flora and fauna found within the greenspace and the less litter and graffiti there is, the more likely it is that the greenspace will be used. • Multi-use – the wider the range of amenities e.g. children's play area, quiet garden with seating, playing areas for team games and picnic areas, the more likely the greenspace is to be used by different kinds of people. Greenspace has the potential to increase physical activity by both providing an attractive area to exercise and the opportunity to undertake group-based physical activity with other people.

Topic	Overall assessment of health impacts
Social interaction and cohesion	• Greenspace may increase and enhance social interactions and the use of public spaces. • Minority ethnic communities and people with disabilities are less likely to visit and use greenspace. • As greenspace are generally free they are open to everyone and hence are used by different groups of people in many different ways. • Communal greenspace activities e.g. allotments and community gardens can enhance community interactions and build local capacity and self-esteem.
Hazards and risks	• There are potential risks of catching diseases from wildlife resident in greenspace. • There is also the potential for crime and anti-social behaviours in greenspace because of its relative isolation, lack of people and unsupervised nature. • There is also the potential for unintentional injury from structured physical activity/sports and unstructured play.

Case Study 3: Use of the health impact literature in a greenspace project HIA

Plymouth Gardens for People Project HIA

Background context

Plymouth Health Action Zone coordinated a HIA of a community garden project called *Gardens for People*. The project was a partnership between Plymouth City Council's Housing for People Project and Groundwork (an environmental regeneration charity). The *Gardens for People* project aimed to train and advise residents so that they had the skills and confidence to maintain a community garden.

Purpose of the HIA

The HIA was seen by the partners in the project as a tool to:

- inform the planning for any change to the garden
- ensure that good health was promoted by the plans
- support capacity building with local people to encourage them to use the garden
- encourage residents' involvement with planning and maintenance and build on the work of existing volunteers
- develop the capacity of local people to influence decision-makers now and in the future

Methods

The assessment used qualitative data and was based on the findings from two workshops with a wide range of local stakeholders. The focus of the HIA was on the potential positive and negative impacts on the residents living around the proposed community garden.

The evidence base for direct links between less formal community gardening and health was patchy in the UK. However, the USA had conducted substantial research into the benefits of community gardens. The literature search concluded that community gardens have an overall positive effect on health. The most direct positive physical health benefits, such as physical exercise, healthy eating and routes to employment, are to be gained from regular active participation in gardening. Volunteering and involvement in maintaining community gardens offers the opportunity to build community networks and develop a more formal interest in horticulture. An interest in gardening has also led to a number of small business start-ups. Some community gardens derive significant income from sale of produce. Significant health benefits are also evidenced from a less physically active use of community gardens. Older people may be encouraged to exercise more regularly and increase their mobility. Younger children gain access to safe play space. More passive use of gardens was found to benefit health, especially mental health, through social interaction, relaxation and stress reduction. This was most successful through the opportunity to experience nature, obtain some privacy and relaxation and the choice to mix with others.

Potential negative health impacts identified were on physical and mental health. Negative impacts on physical health were from: increased risk of injury or fatality arising from improper use of equipment; storage of hazardous materials; ingestion of toxic plants or drowning (especially of children); and, the potential for unprotected exposure to the sun to increase the risk of skin cancers. Negative impacts on mental health were from: conflicts over use; gardens deteriorating and becoming unkempt; and, potential for vandalism.

Findings

The positive health impacts identified were:

- improvement in mental health by providing a place to relax, a place to escape, a nicer view and for those involved in maintaining the garden a sense of achievement
- improvement in physical health through reducing smells and noise pollution, the physical activity of gardening and of recycling some household waste through composting
- improvement in social wellbeing by bringing residents together, creating a meeting place and in skilling local people to potentially gain employment in horticultural jobs

The major negative impacts identified were:

- injuries due to gardening activities and the use of the garden
- conflicts between the users of the garden
- crime and anti-social behaviour if the garden attracts drug users, is disused or not maintained

Recommendations

A total of 44 stakeholder suggestions were made to reinforce positive impacts and reduce negative impacts. These fell into two categories: landscape design issues and sustainability issues in terms of the long term management and maintenance of the garden project. This HIA was conducted before any plans for the garden had been drawn up and the suggestions were tabled as action points, by the HIA sub-group and the Plymouth Health Action Zone partners, to the local authority.

Sources of further information

Groundwork
www.groundwork.org.uk/

Report available at
www.apho.org.uk/resource/item.aspx?RID=44187


PLAIN LAZY

Section 3: Applying the Evidence

Chapter 4: Doing a health impact assessment of greenspace

The international Gothenburg consensus definition of health impact assessment (HIA) is: "A combination of procedures, methods and tools by which a policy, program or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population."

HIA involves systematically identifying the differential health and wellbeing impacts of proposed plans, programmes and projects so that positive health impacts are maximised and negative health impacts minimised (within a given population). It works within an explicit value framework that promotes an assessment process that is democratic, equitable, sustainable and ethical in the use of evidence. HIA is, therefore, about both health protection and health improvement. HIA uses a range of structured and evaluated sources of qualitative and quantitative evidence that includes public health, epidemiological, toxicological and medical knowledge, as well as public and other stakeholders' views and experiences. HIA aims to inform the policy and decision-making process and is therefore best carried out prospectively at a stage when a proposal is clear enough to be assessed and there is still an opportunity to make changes to the proposal. In some instances, HIA may be done concurrently or retrospectively. In these cases, it is important to ensure that there is still an opportunity to influence the proposal. A health impact assessment should not be an evaluation.[xiii]

The depth of analysis in HIA also varies depending on the scale of the proposal being assessed, the potential health impacts and the resources available for the work. There are three generally recognised levels of HIA.

- *Screening* – a short, structured discussion of a proposal seeking to identify affected populations and potential impacts. Screening is a necessary prelude to more detailed forms of HIA but can suffice if there is no concern about significant negative health impacts on the population. This should be a group activity and should involve people with relevant expertise and experience.
- *Rapid appraisal* – more detailed assessment of affected populations usually including a community profile. Appraisal of health impacts will require reference to the research literature and evidence base. It usually incorporates input from stakeholders and key informants.
- *Detailed/comprehensive HIA* – includes detailed community profiling, systematic literature review and evidence review and extensive stakeholder and community consultation. Primary data gathering may be part of this type of HIA.

All HIAs use research evidence and apply it to a specific proposal and local context. For example, in the case of greenspace issues, it is the application of the evidence in a specific local social, economic and environmental context at a particular point in time that distinguishes a HIA of a greenspace proposal from a general review of the health impacts of greenspace and the general recommendations that emerge from it.

xiii evaluations are retrospective assessments of the effectiveness of a plan, programme or project in achieving its aims and objectives

The steps to carry out in a HIA are now well established and are generally described as follows:

	Step	Purpose
Step 1	Screening	Decide whether you need to do a HIA
Step 2	Set up a team to do HIA	Ensure appropriate expertise is included
Step 3	'Scoping'	Set the geographical, population and time boundaries over which to predict impacts. Identify affected population groups
Step 4	Local profile	Collate relevant data on the local population and features of the local area(s)
Step 5	Involve stakeholders	Engage with local people and other stakeholders to identify their views on possible impacts
Step 6	Identify and assess impacts	Identify likely health impacts from the proposal. Carry out further review or research if this will help in assessing impacts or in making recommendations
Step 7	Make recommendations	Use findings to recommend changes to the proposal or other changes that would improve health impact
Step 8	Monitor impacts	Monitor actual impacts that arise after implementation of the proposal

Source: adapted from Health Impact Assessment: a guide for local authorities (CoSLA/PHIS 2001)

Though the steps above are presented as linear, HIA is usually an iterative process where findings and issues that emerge in later steps may mean that earlier steps need to be revisited and the scope and analysis amended accordingly.

This section describes general considerations and uses the case study of the Glasgow East End Local Development Strategy to illustrate the various steps involved in a HIA.

Step 1: Screening

Those authorising, or developing, a proposal hold primary responsibility for deciding whether a HIA should be done. Sometimes the initial interest comes from elsewhere but it is important that findings and recommendations are fed into the decision-making process. So it is useful to involve policy makers in screening. Often screening may identify potential impacts that were not previously considered, which may in itself inform changes without the need for a more detailed assessment.

Screening should include a consideration of:

- ***Who may be affected by a greenspace proposal?***
  Even if a greenspace proposal has a stated target group it may affect other people who are not part of this intended target. So it is vital to identify and consider the range of people that might be affected and in what way, positive or negative, they might be affected.
- ***What determinants of health and wellbeing could be affected?***
  You can do this using information in Chapter 3 on the health effects of greenspace and developing a checklist to help you to think broadly and systematically about all the possible ways that the proposal might affect people.
- ***What further evidence is needed to inform recommendations?***
  You will need to use your judgment to decide if further assessment would be useful in informing or changing the proposal or other actions.

Some key questions to ask when screening:[xiv]

- What population subgroups will be affected by the greenspace proposal?
- Who might be disadvantaged by the proposal?
- Will there be differential impacts as a result of the proposal? Does it affect population sub-groups in different ways?
- What is the geographical and population scale of the proposal?
- Will any of the results of the proposal be irreversible?
- Is there conflict or disagreement about the proposal? If so, would a HIA help to resolve it?
- Are there time, money and expertise to do a HIA?
- Is it possible to change the proposal in light of the HIA findings?

A screening tool may be useful in carrying out this step. The tool shown in Table 4.1 could be used for this purpose. It should be used in a group exercise with a range of people representing different perspectives/ interests e.g. environment, health and planning professionals and members of the public, to generate discussion and dialogue on potential impacts and the likely people to be affected.

The possible outcomes of screening are:

There are no likely significant health impacts	>	No further action required
There are likely health impacts but recommendations to gain maximum benefit from the proposal are already obvious and no further assessment is required	>	Decide who should make and implement the recommendations
There are possible significant health impacts and uncertainty about which impacts are most significant and how, or if, the proposal should be adjusted	>	Go to step 2 (see table opposite)

xiv Source: adapted from Scottish Needs Assessment Programme Health Impact Assessment: piloting the process (2000) and Netherlands School of Public Health Checklist for Health Impact Screening (1998)

Table 4.1: Screening checklist for potential impacts

Which groups of the population do you think will be affected by this proposal?

- minority ethnic people (incl. gypsy/travellers, refugees & asylum seekers)
- women and men
- people in religious/faith groups
- disabled people
- older people, children and young people
- lesbian, gay, bisexual and transgender people
- people of low income
- people with mental health problems
- homeless people
- people involved in criminal justice system
- staff
- other groups (specify)

(The word proposal is used below as shorthand for any policy, procedure, strategy or proposal that might be assessed)	**What positive and negative impacts do you think there may be?** **Are there any impacts about which you feel uncertain?** **Which groups will be affected by these impacts?**
What impact will the proposal have on lifestyles? • diet and nutrition • exercise and physical activity • substance use: tobacco, alcohol or drugs • risk taking behaviour • education and learning, or skills	
What impact will the proposal have on the social environment? • social status • employment (paid or unpaid) • social/family support • stress • income	
What impact will the proposal have on equality? **How will communication issues be addressed?** • discrimination • equality of opportunity • relations between groups	
What impact will the proposal have on the physical environment? • living conditions • working conditions • pollution or climate change • accidental injuries or public safety • transmission of infectious disease	
How will the proposal impact on access to and quality of services? • health care • transport • social services • housing services • education • leisure	

Case Study 4: The consideration of greenspace health impacts in a spatial plan

Glasgow East End Local Development Strategy

Project Background

Glasgow City Council's vision for the draft East End Local Development Strategy (LDS) entitled *Changing Places: Changing Lives* was to create a vibrant, new city district, through a regeneration process based on reinvention and reconnection. Existing and new communities would benefit from a new approach to living in cities, as regeneration in the East End would be a model of sustainable development, addressing issues of population health, environmental quality and meeting people's needs.

Screening for the Glasgow East End LDS HIA – is a HIA needed?

It was decided by the Glasgow Centre for Population Health to undertake a HIA of the draft LDS. There were four main drivers behind the rationale for this decision:

1. the commitment by Glasgow City Council to integrate health into the strategic planning process
2. this local development strategy setting out the regeneration framework for part of the Clyde Gateway, which is a national regeneration priority
3. the health of the population of the East End is amongst the poorest in the UK
4. the need to meet objectives under Phase IV of the World Health Organisation's (WHO) Healthy Cities Programme of which Glasgow is a member

This case study is revisited after each step in the HIA process.

Step 2: The health impact assessment team

A team should be set up to carry out the HIA. The team's role will include:

- scoping the work (see below)
- brainstorming to identify likely impacts
- reviewing the health impact evidence and its local relevance
- consulting stakeholders
- doing any further assessment that might be required, for example prioritising the impacts and estimating how many people will be affected by the different impacts
- debating and agreeing the recommendations

The HIA team should report to a steering group with the authority to agree terms of reference for the HIA and to implement the recommendations. The team should include people with knowledge of:

- the specific proposal
- greenspace policy and practice
- the local area and population
- health

This HIA team also often includes a decision-maker and members of the team that developed the proposal.

HIA team for the Glasgow East End LDS HIA

The Glasgow Centre for Population Health coordinated the HIA and, in this instance, commissioned an external HIA consultant to support the HIA process and write the HIA report.

Step 3: Scoping

Scoping defines the nature and extent of the HIA that will be carried out. Decisions about scope should be debated and agreed by the HIA team. The terms of reference for the HIA should define the different population groups to be considered, the geographical scope and the timescale over which to try to predict impacts. Sometimes later in an assessment it becomes clear that impacts will be spread more widely than originally thought, and the scope has to be reconsidered.

Scoping for the Glasgow East End LDS

The elements of the draft Local Development Strategy (LDS) that were appraised by stakeholders at the scoping workshop were:

- strategic objectives
- regeneration zones
- developing a strategy for integrated transport networks
- developing a strategy for integrated infrastructure
- developing a strategy for access to services
- developing a strategy for economic development
- developing a strategy for housing choice
- neighbourhood design objectives
- design principles for neighbourhoods

Glasgow City Council planned to incorporate many of the suggestions from the HIA, as well as comments from a wider consultation, into the final strategy.

Step 4: Local profile

The purpose of this profile is to inform the identification of impacts, the relevant population groups who may bear these impacts, and to provide the background information needed to help you apply the evidence on the health impacts of greenspace to your own specific context. This involves collating available data on:

- demographic make-up of the local population: including, especially, any particularly vulnerable groups, as identified in your scope
- health status of the local population: again, consider vulnerable groups
- features of the local area
- current greenspace provision
- environmental challenges facing the area

Some key questions to ask when profiling:

Define the population

1. What is the demographic make-up of the local population, including any particularly vulnerable groups, as identified in your scope? Are there any potential demographic changes likely to occur because of other/wider social, economic and environmental changes?
2. What is the health and wellbeing status of the local population? Again, consider vulnerable groups, health inequalities and deprivation.
3. What are the social, cultural, economic features of the local area covered by the proposal?

Define the local area

4. What is the geographical area affected or covered by the proposal?
5. What are the key features of the area?

- Is it urban or rural?
- What facilities and amenities are there that people need to access?
- What are the current environmental challenges facing the area?

Define the proposal

6. What is the nature and extent of the proposal being assessed?

- What are the overall aims and objectives of the proposal?
- What are the specific greenspace-related changes being proposed?
- How will the proposal be implemented?
- What phases of implementation are there, for example, consultation, implementation/construction and maintenance?

Define the greenspace (including waterways)

7. What greenspace infrastructure currently exists and how is it used?
8. What are the existing barriers and facilitating factors to access this greenspace and for which types of users/community groups?
9. What have local people identified as their greenspace needs/ requirements?
10. How do these relate to the supply side, demand side and standard based greenspace needs assessment that might have been carried out by the local authority?

Local Profile for the Glasgow East End LDS

The Glasgow Centre for Population Health provided a summary of self-reported health status for the community living in the East End – *Health Indicators for the East End* – which acted as a baseline against which to judge the potential impacts on health of existing communities.

Step 5: Involve stakeholders

Stakeholders to be involved include potentially affected people and people with relevant knowledge of the local area or of greenspace. They may give insights into, for example, different ways the proposal could affect health; whether mitigating measures are likely to work in the local context; and what values are placed on different impacts. Focus groups, questionnaires, open meetings, etc. can all be used as methods of consultation. The screening checklist can be used to structure discussions. Try to include the different population groups included in your scope.

HIA Method/Approach for the Glasgow East End LDS

It was decided to use rapid appraisal techniques for this pilot HIA and a participatory stakeholder workshop was held for two days which included a half-day site visit to the development area in the East End.

Stakeholders were divided into work groups for the two days. To help identify potential impacts on health, stakeholders were given a list of health determinants that had been prioritised according to the contents of the LDS.

Step 6: Identify and assess possible health impacts

The aim is to identify all the potential health impacts, to define them and decide which might require further assessment. Screening should already have identified some likely impacts, but for a more detailed assessment a systematic analysis should be done. As HIA means looking for unintended impacts, you should be systematic, open and transparent about how they are identified. It is important to think broadly, as impacts often arise in an indirect way, and can occur at different stages of a causal pathway.

Identifying impacts

Impacts may be identified:

- during the screening stage, particularly if you have used the tool with the checklist of health determinants; and by
- reviewing the evidence on health effects of greenspace
- findings from consulting with stakeholders
- the HIA team brainstorming other possible effects of the proposal

Some key questions to ask when identifying and assessing impacts:

1. Do the overall aims and objectives of the proposal promote health and wellbeing?
2. Will the proposal create new greenspace (including waterways)?

   If yes:

- has the new greenspace been designed in terms of accessibility for all, multi-functionality, biodiversity and sustainability?
- is this new greenspace in a neighbourhood with good or poor access to existing greenspace?
- is this new greenspace located in an affluent or a poor/deprived neighbourhood?

3. Could the proposal affect existing greenspace (including waterways)?

- could it affect the amount of greenspace i.e. will it increase or reduce it?
- could it affect the quality of greenspace i.e. biodiversity, naturalness, wildness?
- could it affect the maintenance of greenspace?
- could it affect the multifunctional nature of the greenspace?
- could it affect access to and usability of greenspace for all or some users e.g. sensory impaired, physically disabled, women with children, older people, etc.?
- could it affect core paths and other networks?
- is the affected greenspace located in an affluent or a poor/deprived neighbourhood?

4. How does the proposal affect the wider determinants of health e.g. employment, education, access to services and amenities, social capital and community cohesion, etc? (These can be identified using the screening tool and/or by interviews with key informants.)
5. Why and how would the proposal do any of the above?
6. Will these effects be temporary or permanent/short or long term e.g. only during a period of construction and redevelopment?
7. What is the research evidence that the proposal is likely to have the intended health impacts? (positive or negative)?
8. What is the research evidence that the proposal could have unintended health impacts (positive or negative)?
9. Which of the health impact pathways is the proposal likely to act through?

- provides direct protection from bio-physical environmental exposures
- promotes restoration, relaxation and reduction in stress
- promotes physical activity
- promotes social interaction and cohesion

10. What population groups are likely to be affected by the changes?

- are there any vulnerable population groups affected?
- for each impact identified, who will be affected positively?
- for each impact identified, who will be affected negatively?

11. What are the fairly certain impacts and what are the uncertain impacts?
12. Which are likely to be the most important pathways?
13. Will the impacts be distributed equally in different socio-economic groups? By gender? By ethnic background? If not, this could have implications for health, social and environmental inequalities.
14. How does this relate to what the affected population/community groups consider to be the likely and important impacts?

One way to present the findings is to prepare a matrix showing impacts and population groups. This should help make explicit who will bear what impacts and indicate the overall balance of positive and negative impacts on each population group.

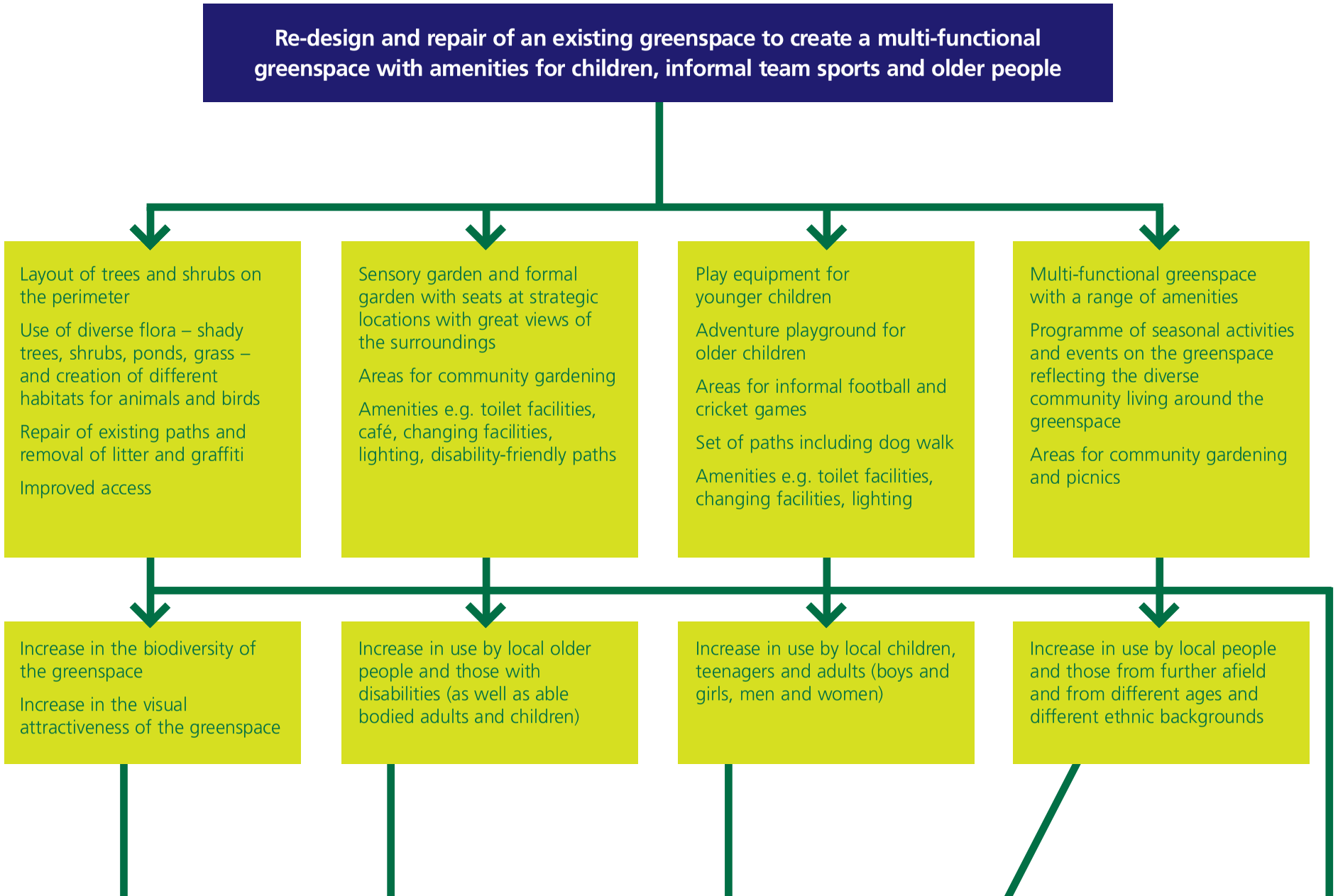
Sometimes, simply identifying impacts is enough to inform recommendations. For larger and more complicated projects there will be a need to investigate impacts in more detail in order to develop recommendations. This will include cross-referencing the assessment of impacts with the local profile and investigating the mechanisms and causal pathways through which actions may lead to impacts.

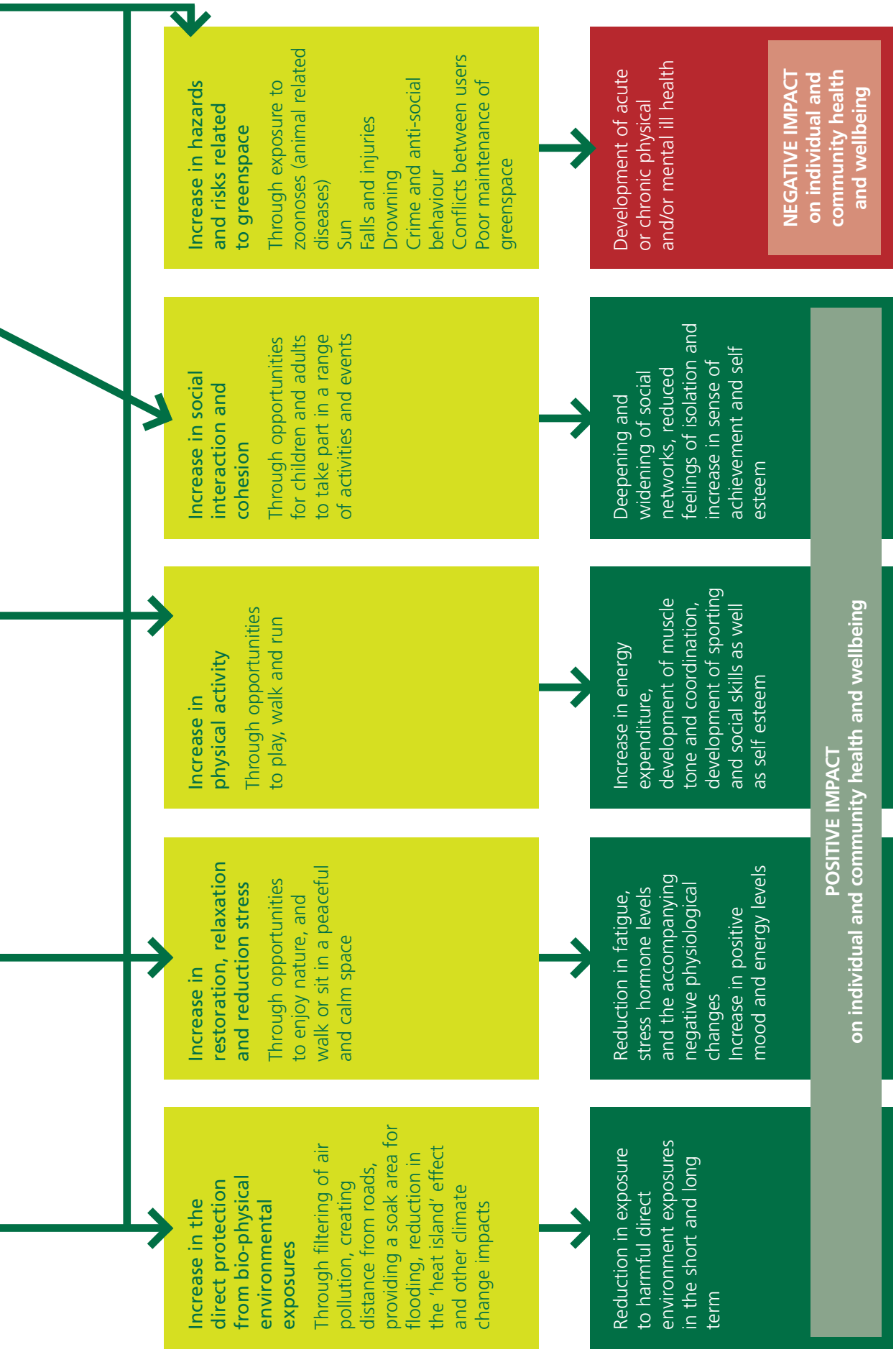
Identifying pathways of health impact

It is often helpful to map the causal pathway by which impacts are expected to arise. This can be achieved by using a diagram, such as Figure 4.1. Alternatively, you can outline in words the links between a proposal and its impacts. This mapping process is likely to start at the scoping stage. Mapping the causal pathway helps you to think critically about the likelihood of the impacts and the evidence base for each step in the pathway. It can also be a useful way to demonstrate to others the links between the proposal and health. It may also help inform the recommendations by identifying points in the pathway where changes could be made to improve the health impacts.

Given the complex relationships between greenspace and health, it is essential in a HIA to consider the pathways through which greenspace-related actions might lead to health impacts. Figure 4.1 shows a causal pathway diagram of the potential positive and negative health impacts of re-designing and repairing an existing greenspace. By being explicit about how health impacts could come about it is likely to be easier to identify which health impacts can be supported by evidence and where there is a need to look for additional support for a hypothetical or uncertain health impact.

Figure 4.1 Causal pathway diagram of the impacts of greenspace on health and wellbeing (developed from the literature review in Chapter 3)




Increase in the direct protection from bio-physical environmental exposures
Through filtering of air pollution, creating distance from roads, providing a soak area for flooding, reduction in the 'heat island' effect and other climate change impacts
Increase in restoration, relaxation and reduction stress
Through opportunities to enjoy nature, and walk or sit in a peaceful and calm space
Increase in physical activity
Through opportunities to play, walk and run
Increase in social interaction and cohesion
Through opportunities for children and adults to take part in a range of activities and events
Increase in hazards and risks related to greenspace
Through exposure to zoonoses (animal related diseases)
Sun
Falls and injuries
Drowning
Crime and anti-social behaviour
Conflicts between users
Poor maintenance of greenspace
Reduction in exposure to harmful direct environment exposures in the short and long term
Reduction in fatigue, stress hormone levels and the accompanying negative physiological changes
Increase in positive mood and energy levels
Increase in energy expenditure, development of muscle tone and coordination, development of sporting and social skills as well as self esteem
Deepening and widening of social networks, reduced feelings of isolation and increase in sense of achievement and self esteem
Development of acute or chronic physical and/or mental ill health
POSITIVE IMPACT
on individual and community health and wellbeing
NEGATIVE IMPACT
on individual and community health and wellbeing

Applying research evidence: certainty and uncertainty

The previous chapters presented a review of the best available international research evidence on the health impacts of greenspace. A number of factors need to be considered when applying this evidence base in a HIA.

There are still many gaps in the greenspace and health evidence base. However, absence of, or insufficient, evidence must not be confused with evidence of no effect or no link between greenspace and a hypothesised health impact. Therefore, where there is no evidence concerning a link between an action and a plausible impact, the link will remain uncertain.

- An effect is plausible, even if there is no observational evidence that it has occurred, if there are theoretical grounds for thinking it might happen but relevant studies to confirm or disconfirm this have not been done.
- On the other hand, there are many examples for which preliminary research or 'common sense' suggests that an action will lead to a specific beneficial impact. However, when the action is evaluated, or further, more comprehensive research is undertaken, no such benefit occurs or, in some cases, the actual impact is opposite to the predicted impact. For this reason, where there is no or insufficient evidence, it cannot be assumed that a hypothesised or predicted impact will definitely occur.
- These impacts should be included but it should be made clear that these predicted effects, in the absence of sufficient evidence, are uncertain - even if they are plausible.

In other cases there may be research evidence of a link between an action and an impact, but no evidence that a proposal will achieve the desired action. For example regular brisk walking improves people's health, but the actual impacts of a greenspace proposal on levels of greenspace use and walking have not been investigated. In this case, the hypothesised impacts remain uncertain but have a stronger grounding in terms of research evidence. Where predicted impacts are uncertain, it is recommended that the HIA is accompanied by prospective monitoring to confirm whether the predicted impacts did or did not emerge.

Incorporating local evidence

Impacts in a specific research setting or location may differ from those that arise in other settings. For example, promoting the use of greenspace in Australia may be easier than in Scotland because of differences in the climates and cultures. When carrying out a HIA the research evidence should be integrated with other kinds of evidence about the local context as the local context may influence whether findings from research are transferable and wholly applicable. This would include a local community profile and qualitative evidence from key informants who have knowledge of the local context and how previous proposals have affected the local area.

Assessing significance

Often you may have a long list of impacts and want to focus on and prioritise the impacts that are most significant. The matrix should help with this. 'Significant' impacts may be:

- potentially severe or irreversible negative impacts
- impacts affecting a large number of people
- impacts affecting people who already suffer poor health or are socially excluded
- positive impacts with potential for greater health gain

Sometimes, more information is needed to inform recommendations, for example, to help decide which impacts are 'significant' as defined above, to weigh up benefits and harms or to suggest ways to mitigate adverse impacts. Before carrying out a further assessment of the identified impacts, decide the aims of that assessment and what questions you need to answer in order to inform recommendations. For example, you may need to know:

- how many people will be affected by each impact
- the pathways by which impacts occur
- what value people place on each impact
- how do residents/local people perceive the risks and benefits
- what priority to give to each impact, compared with the other impacts or other factors

HIA does not require new methodologies. The methods and evidence used will depend on exactly what information you need to inform decision making, the kinds of impacts identified and the scope of the proposal. Both quantitative and qualitative methods may be appropriate. Sometimes you may need to commission the work externally. Remember to involve affected communities, especially when trying to value or prioritise impacts.

Findings for the Glasgow East End LDS

In most cases, responses to the elements of the LDS that were appraised were presented under a consistent group of headings. Stakeholder responses were supported where possible by information from the published health impact literature, often referred to as 'the evidence base'. It was noted that where it was not possible to cite supporting evidence for stakeholder suggestions, this may reveal a specific gap in the literature, or deficits in the generalisability of the literature, such that it may not be applicable at a local level when dealing with specific localised conditions or circumstances. A specific literature review was not undertaken to inform this HIA – instead, a number of key existing reviews of evidence about healthy urban planning and sustainable communities were used. It is generally more efficient and effective if a HIA can use an existing, or set of existing, and relevant reviews of the evidence on health impacts.

Step 7: Make recommendations

Recommendations should aim to mitigate any adverse impacts arising from the proposal and maximise the benefits. Recommendations may be broader than the proposal being assessed. For example, the assessment of a greenspace proposal may make recommendations for changes to the Local Development Plan or Strategy. The HIA team is responsible for developing and agreeing the recommendations based on the available information. Recommendations should be reported to a group with the appropriate authority to implement them.

Key questions to ask when developing recommendations:

1. How could the proposal be modified to minimise the potential negatives and maximise the potential positives?
2. What greenspace and non-greenspace measures could be implemented to reduce or eliminate the potential negative health impacts?
3. What greenspace and non-greenspace measures could be implemented to enhance the potential positive health impacts?
4. What data/indicators could be used to monitor the potential health impacts of the proposal?

Recommendations from the Glasgow East End LDS HIA

There were two types of suggestions made by stakeholders:

- suggestions aimed at those responsible for the LDS, some of which mention joint planning with several public sector organisations
- suggestions that require liaison with other organisations and agencies for effective implementation

Step 8: Monitor impacts

Monitoring should be meaningful. This means defining the population(s) to monitor, deciding in advance the aims of monitoring and defining the outcomes that should be monitored. It also means designing the monitoring so that there are reasonable chances of identifying changes in behaviour and health, and attributing them to the proposal, once it is implemented. This may not be easy, e.g. if the expected changes are small, or the outcomes are affected by other factors, especially if these are also changing over the period when the proposal is being implemented.

Monitoring should feed into the future implementation and review of the proposal and, ideally, be part of standard/routine monitoring processes. The aims of monitoring may be to:

- monitor implementation of the recommendations of the HIA team
- identify impacts that were not foreseen in the HIA
- inform the evidence base for future assessments, particularly when there has been uncertainty over the likely impacts

Case Study 5: A HIA of a multi-functional and multi-use greenspace project

Connswater Community Greenway HIA

Background context

In East Belfast, there are affluent neighbourhoods adjacent to poor neighbourhoods where residents experience deprivation and higher levels of ill health. Access to green and open space was limited and key problems relating to the environment included: litter and rubbish dumping, general graffiti, sectarian graffiti (including painted kerbs), vandalism, dog fouling, scruffy or neglected gardens, scruffy or neglected buildings and vacant or boarded-up buildings.

The East Belfast Partnership (EBP) developed a proposal for a greenway made up of a range of leisure and recreation amenities including a 10 km linear park, 20 km of pedestrian and cycle paths, protected habitats for wildlife, community facilities and education programmes.

Purpose of the HIA

The aims of the HIA were:

- to identify the potential impacts on health and wellbeing of the introduction and ongoing management of the Connswater Community Greenway
- to suggest ways to increase overall health gain from the introduction and ongoing management of the Connswater Community Greenway

Methods

Belfast Healthy Cities coordinated the HIA and a HIA management team was set up. Rapid appraisal techniques involving a desk-top appraisal, a participatory stakeholder workshop and data from evaluative consultations were used in the HIA. A specific literature review was not commissioned and, therefore, evidence from existing reviews was used.

Findings

Key findings of the HIA were:

Park and foot/cycle paths – Improved natural environment and increased physical activity and community/family cohesion leading to improved physical and mental health and wellbeing and increased social cohesion through the use of the park and foot and cycle paths. Potential for social and psychological aggression, criminal activity and drug abuse.

Protected habitats for wild life – Improved natural environment and potential for increase in education and awareness about local wildlife leading to improved wellbeing and increased educational attainment.

Weir – Reduce the potential for flooding and subsequent property damage, disruption and flood-related disease and ill health.

Social and community projects (heritage/eco trails, art and public events) – Increased number of visitors to the area could stimulate the local economy and increase new businesses and employment opportunities leading to greater self esteem and personal/family incomes. Visitors would gain pleasure and enjoyment from the improved aesthetics and the art and heritage.

Allotments – Increased access to affordable, nutritious food and increased opportunities for education and social cohesion leading to improved physical and mental health.

Recommendations

Nine key recommendations were made in relation to:

- increasing community engagement and ownership of the greenway by working on the design and development with local people especially children
- engagement of policy-makers and service providers at all levels to enhance the synergies between other policies and plans and the greenway
- active marketing and encouragement of uptake and use of the Greenway by all sections of the community
- appropriate and accessible design of the Greenway for people with disabilities and for varied uses
- appropriate management of the Greenway
- maximising the health promotion and health improvement potential of the Greenway
- maximising the education opportunities provided by the Greenway
- development of heritage trails and conservation along the Greenway
- monitoring the health impacts of the Greenway

Sources of further information

Belfast Healthy Cities
www.belfasthealthycities.com/

The report can be found at
www.belfasthealthycities.com/?pageid=18

Chapter 5: List of greenspace health impact assessment tools and reports

This chapter gives brief summaries of completed HIAs of greenspace initiatives and proposals. Some of these HIAs are listed on the UK HIA Gateway website and were available in November 2007. They are included here to show the methods and evidence used, the impacts identified and the recommendations made in greenspace-related HIAs. They range from rapid desktop appraisals to detailed assessments. In most cases the reports are available online and the links to these are given.

The HIA Gateway website is at www.hiagateway.org.uk.

The Scottish HIA network site is at http://www.healthscotland.com/resources/networks/shian.aspx.

The Welsh Health Impact Assessment Support Unit website is at www.whiasu.wales.nhs.uk.

Greenspace tools

- Countryside Council of Wales (CCW) health and wellbeing impact assessment tool, CCW, 2007
- Path Network HIA Draft Tool, Paths for All, 2004

Greenspace-dominant HIAs

- Gardens for people project HIA - Groundwork Plymouth, England (2002)
- National Botanical Gardens of Wales HIA - Welsh Combined Centres for Public Health, Wales (2000)
- Connswater Community Greenway HIA – Belfast Healthy Cities, Northern Ireland (2007)
- Atlanta Beltline HIA – Georgia Tech/CDC, USA (2007)
- East Bay Greenway HIA – Human Impact partners, USA (2007)
- HIA of the 'Garden City project' Yala City – Research and Development programme on Healthy Public Policy and Health Impact Assessment, Thailand (2004)

Greenspace-elements HIAs

- East End Local Development Strategy HIA – Glasgow City Council/Glasgow Centre for Population Health (2006-7)

Greenspace and health evaluations

- Ardler Village: demonstrating the links evaluation, Dundee City Council, Scotland (2007)

Chapter 6: Sources of information and good practice on greenspace

Sources of data

greenspace scotland
http://www.greenspacescotland.org.uk

Scottish Environment Statistics Online
http://www.scotland.gov.uk/Topics/Statistics/Browse/Environment/seso

Scottish Health Profiles
http://www.scotpho.org.uk/web/site/home/Comparativehealth/Profiles/profiles_intro.asp

Scottish Neighbourhood Statistics
http://www.sns.gov.uk

Scottish National Statistics
http://www.scotland.gov.uk/Topics/Statistics/About/NationalStatistics

Office of National Statistics
http://www.statistics.gov.uk

Good practice guides

Building Health: Creating and enhancing places for healthy, active lives, National Heart Forum, Living Streets and CABE, 2007

This report is a collection of papers by leading experts and campaigners which examine how the design of towns, cities and buildings might encourage physical activity. Building Health covers issues ranging from strategic and urban planning, to walking and cycling, to urban greenspace and building design.

New pathways for health and well-being in Scotland, Forestry Commission Scotland, 2007

This report presents research aimed at understanding and overcoming barriers to accessing woodlands in Scotland.

Cemeteries, churchyards and burial grounds, CABE, 2007

This briefing looks at current concerns about cemeteries and whether they are facing a crisis. It considers their legal status, heritage value and their contemporary benefits, while also addressing the problems arising from the way that cemeteries are currently maintained by local authorities. It includes a useful bibliography and contact list.

A natural estate, Neighbourhoods Green, 2007

Neighbourhoods Green aims to highlight the importance of greenspaces for the residents of social housing, and to raise the quality of their design, management and safe use within social housing providers. It is a three year partnership project which will provide guidance, support and tools for housing associations, local authority housing departments, Arm's Length Management Organisations (ALMOs), tenants' associations, and their partners.

Urban parks: do you know what you're getting for your money?, CABE, 2006

This report assesses the links between local authority expenditure and urban greenspace quality. It examines issues such as the financial decision making framework, the influence of politicians, and how quality is measured locally.

Green space strategies: a good practice guide, CABE, 2004

This good practice guide aims to help local authorities to undertake robust assessments of their greenspace provision, setting out a vision for the whole of their greenspace and the goals they want to achieve. Local authorities that have already prepared strategies have found that greenspace strategies are crucial to bringing extra investment for greenspace, as well as ensuring greenspace meet the needs of the community.

Decent homes, decent spaces, Neighbourhoods Green, 2004

This report serves as an introduction to the project, and features some case studies first highlighted at the Neighbourhoods Green conference.

What would you do with this space? Involving young people in the design and care of urban spaces, CABE, 2004

This publication aims to provide an inspiring and practical guide for practitioners. Through the stories of sixteen different projects, it explores creative and constructive ways to involve children and young people in public space and sets out some of the key issues that projects may face. It does not aim to have all the answers, but hopes to provide a useful and inspiring starting point for projects, however big or small.

Green space strategies: making the most of your parks and green spaces, CABE, 2004

This guide is designed to steer authorities through the process of drawing up effective strategies based on clear assessments of stakeholders' needs and wishes. It will help provide a blueprint for working in partnership with other landowners and managers and with local communities to deliver excellent parks and greenspaces now and in the future. It is aimed primarily at local government but its good practice advice will be useful to anyone with responsibility for the planning, design and maintenance of greenspaces.

A guide to producing parks and green space management plans, CABE, 2004

This guide has been produced to enable anyone involved in the management of publicly accessible parks and greenspace to write management plans that help them to manage, maintain, develop and improve their greenspace in the most appropriate way.

Is the grass greener? Learning from international innovations in urban green space management, CABE, 2004

This guide showcases how 11 cities from Melbourne in Australia and Minneapolis in the USA to Curitiba in Brazil are improving their residents' health, wealth and quality of life by investing in parks.

Guide to preparing play strategies: planning inclusive play spaces and opportunities for all London's children and young people, Greater London Authority, 2005

This guide is a practical tool to assist local boroughs to meet the play and leisure needs of children and young people living in London. It sets out the basis for providing children with accessible spaces offering free, high quality, inclusive play opportunities throughout their environment - a need commonly identified by parents/carers as well as children and young people.

Best Play: what play provision should do for children, National Playing Fields Association, PLAYLINK and the Children's Play Council, 2000

This report looks at how children benefit from play opportunities; how play services and spaces can provide these benefits; and how they can show that they are providing them.

Useful greenspace and health websites

BHF National Centre for Physical Activity and Health (BHFNC)

BHFNC provides a resource for professionals and communities to develop and promote initiatives that will help stimulate more people to take up physical activity.

http://www.bhfactive.org.uk

Commission for Architecture and the Built Environment (CABE)

CABE is a statutory body that is a resource for good urban design and the creation of healthy and sustainable built environments.

http://www.cabe.org.uk

Forest Research

The research agency of the Forestry Commission and a leading international centre for research into woodlands and forestry and their role in health and wellbeing.

http://www.forestresearch.gov.uk

GreenSpace

GreenSpace is a charity that works to improve parks and green spaces by raising awareness, involving communities and creating skilled professionals.

http://www.green-space.org.uk/

greenspace scotland

greenspace scotland is an independent charitable company, receiving funding from the Scottish Government. **greenspace scotland** works with a range of national and local partners to improve the quality of life of people living and working in urban Scotland through the planning, development and sustainable management of greenspaces. Activities include policy advocacy, partnership development and support, research and knowledge management, enabling and sharing practice.

http://www.greenspacescotland.org.uk

National Institute of Health and Clinical Excellence (NICE)

NICE is an independent agency responsible for providing guidance on promoting good health and preventing and treating ill health. It has published Public Health Programme Guidance on promoting and creating built or natural environments that encourage and support physical activity. The website holds both the guidance and literature reviews on this topic.

http://www.nice.org.uk

Natural England

Natural England works for people, places and nature to conserve and enhance biodiversity, landscapes and wildlife in rural, urban, coastal and marine areas.

http://www.naturalengland.org.uk

OPENspace

OPENspace is a research centre that focuses on inclusive access to outdoor environments.

http://www.openspace.eca.ac.uk

Physical Activity and Health Alliance (PAHA)

PAHA supports physical activity and health practitioners in Scotland in the implementation of the Scottish Physical Activity Strategy *Let's Make Scotland More Active*.

http://www.paha.org.uk

Play Scotland

Play Scotland is a charity that works to promote the importance of play for all children and young people, and campaigns to create increased play opportunities in the community.

http://www.playscotland.org

Scotland and Northern Ireland Forum for Environmental Research (SNIFFER)

SNIFFER is a not for profit organisation that promotes, commissions and disseminates environmental research, particularly in relation to air, land, water and waste.

http://www.sniffer.org.uk

Scotland's Census Results Online

SCROL is the easy and free way to access all of the results from the 2001 Census in Scotland.

http://www.scrol.gov.uk/scrol/common/home.jsp

Scottish Government

Scottish Government website with key information on Scotland and its social, environmental and economic context.

http://www.scotland.gov.uk

Scottish Public Health Observatory

Portal to public health information and data on Scotland and its population.

http://www.scotpho.org.uk/

Scottish Natural Heritage

Scottish Natural Heritage's role is to look after the natural heritage of Scotland and to help people to enjoy and value it and encourage them to use it sustainably.

http://www.snh.org.uk

Sustrans

Sustrans is a sustainable transport charity and develops cycle networks and footpaths across the UK.

http://www.sustrans.org.uk

Appendix 1: Glossary of terms

biodiversity

Biodiversity is about the variety of life, protecting and enhancing a diverse range of plants, birds, animals and the habitats upon which they rely.

The Biodiversity Convention agreed at the Rio Earth Summit recognised the importance of conserving 'biodiversity' (biological diversity - in other words all the different species and sub-species of living things on Earth, and the many interconnections between them).

greenspace

Any vegetated land or water within or adjoining an urban area.

environmental justice

Environmental injustice is said to exist when some groups, and in particular those living in more deprived communities, are unfairly or disproportionately more likely to suffer poor environmental conditions; and when one or more groups do not have adequate access to the information and decision making structures that affect their local environment.

HIA

The international Gothenburg consensus definition of health impact assessment (HIA) is: "A combination of procedures, methods and tools by which a policy, program or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population."

open space

Open space is defined according to a typology of different space types in Planning Advice Note 65 (2003). This includes all types of greenspace, and also includes civic space (defined as squares, streets and waterfront promenades, predominantly of hard landscaping that provide a focus for pedestrian activity and make connections for people and for wildlife, where trees and planting are included).

SPP11

Scottish Planning Policy 11 on *Open Space and Physical Activity*. This emphasises the importance of quality open spaces and sets out national planning policy on the provision and protection of open space within and on the edges of settlements and on sports and recreation facilities in urban and rural settings.

sustainable development

In the UK, the UK Government and Devolved Administrations have set out a new Shared Framework on sustainable development, defining it as:

"The goal of sustainable development is to enable all people throughout the world to satisfy their basic needs and enjoy a better quality of life, without compromising the quality of life of future generations"

urban

Based on the Scottish Executive's Rural Urban Classification, urban settlements are those with a population of 3000 or more people.

wellbeing

A positive physical, social, mental and emotional state where an individual or communities basic needs are met and individuals and communities are able to achieve personal fulfillment and be an active and respected part of a society.

Appendix 2: Literature review questions and search strategy

Full details can be found in *The links between greenspace and health: a critical literature review* by Karen Croucher, Lindsey Myers and Jo Bretherton.

Questions addressed in the literature review

This review was intended to identify and explore the links between physical health, health behaviours (i.e. physical activity), mental health and general wellbeing, and social health and different aspects of greenspace, including:

- the physical aspects of greenspace
- the perception of greenspace
- social aspects of the use of greenspace
- the process of being involved in greenspace activity
- the context of greenspace in the local area

Definition of key terms

We recognise that there is no single definition of greenspace, and various authors propose various definitions (see, for example, Swanwick et al, 2003 for a definition and typology of open space). For the purposes of this review, we sought papers that addressed various types of greenspace, but with a particular emphasis on urban greenspace (see the inclusion and exclusion criteria below). As noted above, the requirement was to consider the impact of greenspace not just on physical health, but on all aspects of physical, mental and social wellbeing.

Review methods

In undertaking this critical review, we have applied a number of the methods associated with systematic reviewing – notably rigorous and transparent searching techniques, the application of inclusion and exclusion criteria, as well as the application of a simple quality assessment tool. The application of these techniques makes this more than a traditional literature review. The intention was to locate key studies published since 1990 (in English), and to synthesise the main messages that could be drawn from robust evidence to address the review questions.

Search strategy

The following databases were searched for relevant published literature:

- MEDLINE
- EMBASE
- PsycINFO
- HMIC: Health Management Information Consortium
- Cochrane Database of Systematic Reviews
- Social Science Citation Index
- Science Citation Index
- Sociological Abstracts
- Social Policy and Practice
- Planex
- Environline
- Architecture Database
- ICONDA

Complex search strategies were developed by an information scientist (Lindsey Myers), and agreed with the Project Advisory Group (see Appendix A, of the full report, for list of members). The full strategies and descriptions of the searches undertaken are presented in Appendix B (of the full report). In addition to electronic databases, searches of relevant organisational websites were also carried out. These organisations are listed in Appendix C (of the full report). All searches were carried out in April and May 2007. Some additional references were also provided by the Project Advisory Group. This review was also informed by the findings of an earlier critical literature review on the physical characteristics of neighbourhoods and health commissioned by the Glasgow Centre for Population Health (Croucher et al, 2007).

In all, over 550 references were retrieved and initially scanned using abstracts or summaries for relevance. The references were managed in the Endnote library greenspaceMASTER.enl.

Note that time and resources available for the review did not allow for citation searching (i.e. where citations from retrieved studies are checked and in turn retrieved to be included in the review). It became clear, however, that our searches, although rigorous, had not identified all key studies that were referenced by other authors.

Table A2.1: Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
Studies reporting the impact of greenspace on: • physical health • health behaviours • mental health and wellbeing • social health	Studies reporting the impact of greenspace on other topics, for example: levels of pollution
Greenspace to include: • public parks and gardens • community gardens and allotments • urban planting and landscaping • cemeteries • sports fields • green path/routes and trails • brownfield sites • national parks and other wilderness environments in UK only	Greenspace to exclude: • private and domestic gardens • national parks and other wilderness settings outside the UK
Studies undertaken in developed countries	Studies undertaken in developing countries
Studies focusing on impact of urban greenspace, and/or greenspace that are near and/or accessible to urban areas (for example, greenbelt, country parks) Note: Urban settlements defined within Scottish context as settlement with more than 3,000 people	Studies focusing on greenspace in a rural context
Papers reporting evaluations and empirical studies	Papers not reporting empirical studies, for example, editorials, think-pieces, theoretical and methodological discussion papers Papers reporting primary studies that have been previously included in earlier, methodologically robust reviews Theses and dissertations*
Literature reviews on relevant topics with adequate reporting of review methods	Literature reviews not reporting review methods
Papers published in English	Papers published in languages other than English
Papers published since 1990	Papers published before 1990

*note that theses and dissertations were primarily excluded for practical reasons as these documents are often difficult to locate and costly to retrieve

Inclusion and exclusion criteria

Papers identified by the search strategies were considered for inclusion in the review in they met the inclusion criteria presented in Table A2.1.

Quality appraisal

There is an ongoing methodological debate regarding the relative value and mechanisms for appraising evidence from a range of research paradigms. Papers were only included in this review if they met the quality criteria developed by Croucher et al (2003). This tool was designed to be relatively transparent and simple to use across a range of study designs. It allows the inclusion of robust studies, and the exclusion of studies that are not considered to be sufficiently robust to generate confidence in the reported findings.

Search terms used

The core search used were:

1. (greenspaces or green spaces).ti,ab.
2. (urban nature or urban biodiversity).ti,ab.
3. open spaces.ti,ab.
4. (parklands or park lands).ti,ab.
5. ((public or municipal or botanics or community or urban or suburban or city) adj (park or parks)).ti,ab.
6. ((public or municipal or botanics or community or city) adj (garden or gardens)).ti,ab.
7. (green adj (paths or trails)).ti,ab.
8. (greenways or greenbelts or green belts).ti,ab.
9. (allotments adj6 (gardens or vegetables)).ti,ab.
10. (urban adj2 (planting or landscaping)).ti,ab.
11. (common lands or heathlands or strays).ti,ab.
12. (sports adj (fields or grounds)).ti,ab.
13. (cemetries or cemeteries or cemetry or cemetery).ti,ab.
14. (brownfields or brown fields).ti,ab.
15. ((railways or railroads or canals or highways or roads) adj2 embankments).ti,ab.
16. (urban adj (woods or woodlands)).ti,ab.
17. urban wilderness.ti,ab.
18. or/1-17
19. Health Status/
20. suburban health/
21. urban health/
22. Health Behavior/
23. ((benefits or changs or effects or enhancs or gains or improvs or increass or maintains or maximiss or maximizs or promots or raiss or sustains or influences or impacts or affects) adj6 health).ti,ab.
24. (health status or health states).ti,ab.
25. levels of health.ti,ab.
26. (health adj (behaviours or behaviors)).ti,ab.
27. ((self-rated or selfrated or self-assesss or selfassesss or self-reports or selfreports or self-perceived or selfperceived) adj2 health).ti,ab.
28. (self-perceptions of health or selfperceptions of health).ti,ab.
29. or/19-28
30. Mental Health/
31. ((benefits or changs or effects or enhancs or gains or improvs or increass or maintains or maximiss or maximizs or promots or raiss or sustains or influences or impacts or affects) adj6 mental health).ti,ab.
32. levels of mental health.ti,ab.
33. ((self-rated or selfrated or self-assesss or selfassesss or self-reports or selfreports or self-perceived or selfperceived) adj2 mental health).ti,ab.
34. (self-perceptions of mental health or selfperceptions of mental health).ti,ab.
35. or/30-34
36. "Quality of Life"/
37. Self Concept/ or morale/
38. Loneliness/ or Anxiety/ or stress, psychological/ or mental fatigue/
39. ((benefits or changs or effects or enhancs or gains or improvs or increass or maintains or maximiss or maximizs or promots or raiss or sustains or influencs or impacts or affects) adj6 (wellbeing or well-being or wellness)).ti,ab.
40. quality of life.ti,ab.
41. (levels of wellbeing or levels of well-being or levels of wellness).ti,ab.

42. ((self-rated or selfrated or self-assesss or selfassesss or self-reports or selfreports or self-perceived or selfperceived) adj2 (wellbeing or well-being or wellness)).ti,ab.
43. (self-perceptions of wellbeing or selfperceptions of wellbeing or self-perceptions of well-being or selfperceptions of well-being or self-perceptions of wellness or selfperceptions of wellness).ti,ab.
44. ((benefits or changs or effects or enhancs or gains or improvs or increass or maintains or maximiss or maximizs or promots or raiss or sustains or influencs or impacts or affects) adj6 (self esteem or life satisfaction or purpose in life)).ti,ab.
45. ((benefits or changs or effects or enhancs or gains or improvs or increass or maintains or maximiss or maximizs or promots or raiss or sustains or influencs or impacts or affects) adj6 (personal growth or morale or positive outlook or positive mental)).ti,ab.
46. ((prevents or reducs or minimiss or minimizs or restricts or limits or combats) adj6 (dependence or discrimination or loneliness or exclusion or anxiety or distress or stress or mental fatigue)).ti,ab.
47. social support/ or social support.ti,ab.
48. or/36-47
49. 29 or 35 or 48
50. 18 and 49
51. limit 50 to (english language and yr="1990 - 2007")
52. (letter or editorial or historical article).pt.
53. 51 not 52
54. Animals/
55. Humans/
56. 54 not (54 and 55)
57. 53 not 56

This search term strategy was designed for searching MEDLINE through the Ovid interface and was adapted as appropriate for all other databases searched, taking into account differences in indexing terms and search syntax for each database.

Mindful of the time and resources available for this review, the searches were limited to identify papers in English and papers published from 1990 onwards.

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