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Contents

Introduction 4
Summary 5
Recommendations 7
Update on recommendations from 2013 annual report 9
Section 1: Human impact on the environment 11
Section 2: Environmental effects on human health 22
  2.1 Home environment 22
  2.2 Work and health 29
  2.3 The built environment 32
  2.4 Air and water quality 38
  2.5 The natural environment 41
  2.6 Environmental hazards 46
  2.7 Unintentional injuries 51
  2.8 The impact of extreme weather 58
  2.9 Impact assessment 60
References 63
Introduction

In my last report, I discussed the health of children and young people in NHS Highland and I’m pleased to report that we have made some progress in delivering its recommendations. However, children and young people are growing up in a world that is changing rapidly. If improvements to health and well-being are to be sustained, then we must be aware of our changing environment and adapt our lifestyles and our public services to maximise the benefits and minimise the harms from these changes.

Environmental influences on human health are conventionally seen as mediated through the quality of the air we breathe, the water we drink, the food we eat and the buildings in which we live and work. The natural environment has often been seen as a source of harm to human health from natural disasters and other hazards, but it is increasingly recognised as potentially beneficial through opportunities to increase physical activity and general enjoyment of the outdoors. However, all of these influences and activities are changing as a result of the changing climate.

The climate of the Earth is going through the most rapid period of warming that has ever been recorded, with 13 of the 14 warmest years on record occurring in the 21st century.\(^{(1)}\) It is now widely accepted that human activity, particularly the burning of fossil fuels, contributes to climate change, but even if all such burning stopped immediately, the climate would continue to warm for some decades. Therefore, adapting our lifestyles and services to a changing climate is essential. Recognising, and adapting to, the likely impacts of climate change in all policies and plans helps us take advantage of the potential benefits to health far more effectively than if we do not.

This is my last report as DPH for NHS Highland. I hope it promotes discussion of, and action on, what and how we need to change to adapt sustainably to climate change.

Dr Margaret Somerville, Director of Public Health and Health Policy
**Summary**

Climate change is already affecting the natural environment in Highland, just as it is across the UK and the rest of the world. Current predictions for Highland suggest that in another 25 years, Highland’s climate will resemble that of the south west of England, with warmer annual average temperatures and more frequent extreme weather events. The warmer average temperatures will largely be the result of warmer, wetter winters rather than hot summers. Rainfall is likely to increase, with less rainfall in summer and more in winter.

The Intergovernmental Panel on Climate Change tells us we can slow the rate of climate change by reducing the amount of fossil fuel that we burn or by trapping the carbon dioxide that burning produces. Nevertheless, even if we were to stop burning carbon today the climate would continue to warm for some decades. Everybody can do their bit to reduce the consumption of fossil fuels in the Highlands, but action is also needed on a global scale to maximise the impact on climate change.

Adaptation to the likely effects of climate change is therefore essential. **Providing sustainable public services**, particularly healthcare, is a key element of both mitigation of and adaptation to climate change.

Warmer winters may help with the continuing decline in excess winter deaths in Scotland, which have been amongst the highest in Europe. Many people in Highland are living in fuel poverty, which might reasonably be thought to be alleviated by warmer temperatures. However, **fuel poverty is likely to remain a major concern for remote and rural communities** unless specific action is taken to contain fuel costs, improve home energy efficiency and make best use of local renewable energy sources.

Design and planning of the built environment can support health and well-being through promoting safe active travel, physical activity and access to green space. Warmer temperatures may provide more opportunities for outdoor activities, making more and better use of local greenspace and walkable neighbourhoods. These benefits can improve mental health and well-being and help reduce **our current high levels of overweight and obesity**.
Private water supplies are more prone to failure than the mains supply, often due to contamination of the raw water by animal waste, and lack of adequate treatment. Climate change will increase the likelihood of contamination due to increased levels of runoff as a result of changed rainfall patterns.

A changing climate also offers significant opportunities to improve health through promoting enjoyment of the natural environment, more exercise outdoors and a better chance of obtaining fresh, locally grown produce, even in remote areas. However, climate change has a downside as it may also lead to more frequent extreme weather events and more illness from environmentally acquired diseases such as Lyme Disease and food poisoning. In addition, climate change will contribute to changing patterns of work, land use and employment.

While a warmer climate potentially offers more opportunities for making use of the natural environment, it may also lead to greater exposure to injury and environmental hazards. The mountain rescue (MR) teams in the NHS Highland area account for 57% of all MR activity in Scotland, reflecting over 30,000 hours of volunteer time in responding to incidents. Lyme disease is also a growing problem in the Scottish Highlands. It can be prevented by prompt recognition, removal of ticks and early treatment. Unintentional injuries form a high proportion of the emergency workload of NHS Highland, costing around £1.5 million per year. While the majority of these injuries arise from accidents in the home, a significant amount of activity comes from road traffic accidents.

Extreme weather events are a likely consequence of climate change and on several occasions NHS Highland has experienced multiple incidents due to snow, high winds and flooding in recent years. While emergency planning to ensure services can respond as rapidly as possible to restore power, water supplies and access to essential services, communities increasingly need to be able to support themselves during such episodes.

Health impact assessment is essential for all major developments if health benefits are to be maximised and adverse effects minimised.
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Health impact assessment is essential for all major developments if health benefits are to be maximised and adverse effects minimised.

Recommendations

Adapting to climate change and promoting environmental, social and economic sustainability requires coordinated action across the public, private, community and voluntary sectors. Recommendations from this report are therefore directed primarily at Community Planning Partnerships to build on existing joint working between agencies and promote joint action elsewhere.

Community Planning Partnerships (CPP) should

- Monitor and report carbon emissions across agencies and develop joint approaches to reducing carbon hotspots, such as procurement and travel.
- Support communities to develop resilience to extreme weather events through use of sustainable local resources, community empowerment and recognition and development of the role of volunteers.
- Develop joint infrastructure and services across agencies wherever possible, particularly in relation to:
  - Transport for access to essential services, distribution of goods and to promote community connectivity.
  - Catering for schools, care homes, hospitals and other settings at a local level, promoting the production and consumption of local produce where feasible and compatible with healthy diets.
  - Procurement of goods and use of renewable energy sources.
- Consider schemes to reduce fuel poverty by reducing fuel cost as well as improving home energy efficiency. Housing improvements, such as upgrading central heating, should take account of health impacts, householder preference and behaviour and local sustainable fuel availability and cost.
- Raise awareness of the changing natural environment, including the coastal and marine environment, and the goods and services it provides, through school curricula, public engagement, high level inter-agency support and
inclusion of climate change and sustainability issues in integrated impact assessment of all service changes and major developments. Such awareness raising should include changes in food sources such as fish, which may require adjustments to dietary choices and availability.

- **Promote physical activity and mental health and well-being through:**
  - A renewed strategic approach to both physical activity and mental health and well being.
  - Sympathetic development of the built environment.
  - Active travel schemes, with particular consideration of rural settings.
  - Promoting access to and use of the natural environment by all ages and population groups.

- **Help reduce overweight and obesity levels through:**
  - A renewed strategic approach to weight management to include dedicated weight management services, community development and a review of the local obesogenic environment.
  - The availability of affordable healthy food throughout the NHS Highland area, including clear guidance and labelling on healthy choices, taking account of the impact of climate change and sustainability on appropriate dietary choices.

- **Reduce unintentional injuries and hazards through:**
  - Renewed road safety awareness.
  - Using information from Scottish Mountain Rescue to promote safety in the outdoor environment.
  - Raising awareness of Lyme Disease.
  - Raising awareness of the importance of testing and treating private water supplies.
  - Continued focus on preventing falls in older people.
  - Promoting safety in the home, particularly for young children.
Update on recommendations from 2013 annual report

The 2013 report concerned the health and well-being of children. Over the last year, Highland Council has received a good report from the Care Inspectorate and has published its integrated children’s plan *For Highland’s Children 4 (FHC4)*.

**Commissioning and Performance**

The child health profiles have been used by operational units to develop their delivery plans. A more detailed child health needs assessment will be completed in September 2014 and will provide further support for NHS operational units in delivering services that meet children’s and young people’s needs. It will be used to inform the commissioning of child health services from Highland Council and for the development of integrated services in Argyll and Bute. Further work on the needs of children affected by parental substance misuse is due to be completed in November 2014. The performance framework for FHC4 now includes health outcome indicators and measures of inequalities, but will continue to be reviewed and developed.

**Child Development**

Improvement work on the 6-8 week child review has resulted in higher reporting levels but breast-feeding rates at this time remain lower than desirable. All members of the Highland CPP have endorsed breast-feeding initiatives and preventative spend funding from Highland Council has been used to provide more support. Implementation of the 27-30 month review continues, but as yet there is no national consensus on the most appropriate tools to use.

**Health Improvement in Residential Units**

A template for a Health Improvement Plan has been developed for use in Highland CPP residential units. It is planned to extend this template to Argyll and Bute CPP.

**Health needs of looked after children**

A review of the health needs of looked after children in Highland CPP is now in progress.

Both CPPs have now arranged for spot purchase agreements with external specialist providers to ensure access to forensic medical expertise when needed.
Management of children with complex care needs

A decision-making process and budget has been agreed for continuing health care packages in both CPP areas. Individual care packages continue to be monitored, particularly those involving providers outside Highland.

Child and Adolescent Mental Health Services (CAMHS)

The progress in improving waiting times for both specialist CAMHS and the primary mental health workers has been maintained over the last year, but work to reduce the times further, and to improve access to in-patient care (Tier 4) following a detailed needs assessment, is still in progress. Both CPPs have secured Scottish Government funding from the Psychology of Parenting funding stream to build capacity and focus on early years.

Transition to adult services

Transitions to adult services based in Raigmore are being reviewed. A transition audit tool for use with children with exceptional needs, Down’s syndrome and Tier 4 CAMHS has still to be developed.

Input from children and young people

NHS and Highland Council staff attended the 2013 and 2014 Highland Youth Voice (HYV) conferences and the Youth Convener has been involved in commissioning and service meetings. Mental health services remain a concern for HYV representatives. FHC4 reflects the perspective of children and young people, but future developments in both CPPs should include explicit measures to indicate where input from children and young people has resulted in service changes.

Forthcoming areas of work

Progress has been more challenging for other recommendations such as addressing information gaps, implementing the new Child Health Surveillance system and providing a common case management system for all staff working in child health. More information is becoming available from NHS Greater Glasgow and Clyde to inform service delivery in Argyll and Bute, but more regular detail is still needed.

Smoke-Free Homes

The Smoke-Free Homes project was set up in May 2010 by NHS Highland and its partners. Now in its third year, its focus remains on children and infants living in households in disadvantaged areas. Over 1000 pledges have been made over the course of the project:

- The diamond pledge has proved the most popular representing 74% of the total (gold - 16%, silver - 7% and bronze - 3%).

Of the 911 children aged under 18 years living in participating households, 44% were aged under 5.

191 expectant mothers were living in participating households.
Section 1

Human impact on the environment

Human health and well-being are influenced both beneficially and adversely by the environment. The human or anthropogenic impact on the environment resulting in air, water and land pollution is well established, but, in the past, impacts have tended to be at a local level. With increased atmospheric carbon dioxide and other gases, those impacts have become global, leading to climate change and ocean acidification.

Measurable changes in the climate have been occurring over recent decades. In the UK, rainfall patterns have changed, with less rain in summer and more in winter, while temperatures have been rising by about 0.25°C per decade since the 1960s. Climate projections estimate that by 2080 annual mean temperatures in the UK will be approximately 2 to 5°C higher than current levels. The actual level reached will depend on the success or otherwise of emission reductions.

It is now generally agreed that the production of greenhouse gases from human activities is largely responsible, over and above natural climate variation over time. Evidence of the impacts of climate change on systems, whether they be human, biological or physical, is mounting.

- Warmer annual average temperatures and more extreme weather events.
- Impacts on coastal and marine ecosystems.
- Rising sea levels initially secondary to thermal expansion of the oceans and later to shrinking ice sheets.
- Changes to crop yields and the distribution of fishery stocks.

In the North of Scotland in the 2050s, if carbon emissions are low, average temperatures in winter are likely to be 1.6°C higher and 1.9°C higher in summer. While average annual rainfall is not predicted to change much, summer rainfall could reduce by up to 21% and winter rainfall increase by as much as 20%. These temperature changes will result in the northern Scottish climate being more like the southwest of England.

Changes are likely to be greater if carbon emissions remain high.
Scottish Natural Heritage (SNH) support an ecosystem approach to sustainability:

‘The loss of nature affects us all, our economy and our culture. Investing in nature - biodiversity and ecosystems, geodiversity and landscapes - will help secure these benefits for future generations. To look after nature we need to work with nature rather than against it, and work together across all sectors. In nature everything is connected. Following an ecosystems approach means understanding these connections, and including the benefits of nature in the way we manage the land, water and sea.’ (8)

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**Impact of climate change on Scotland’s natural environment and its uses** (7)

- Significant changes to our ecosystems and landscapes within decades.
- Some species of wildlife may move north to Scotland, but species already confined to high mountains in Scotland are likely to be lost as conditions become unsuitable.
- Rising sea temperatures are already contributing to changes in the distribution of plankton and fish around Scotland, and the seabird populations that rely on them.
- It is also likely that the frequency with which inshore fisheries and aquaculture suffer from harmful algal blooms will also increase. Eating shellfish that have ingested harmful algae has serious health consequences.
- A decrease in snowfall will impact on species which need snow to survive.
- Longer growing seasons may allow farmers to grow different crops, but milder winters will bring new pests and diseases to crops, trees, and biodiversity.
- Increases in sea level, especially combined with storm surges, will threaten coastal habitats.
- Impacts of climate change on hydrology will affect flood risk, water quality and availability.
- Challenges for the management of soils.
- Reduced snowfall, leading to fewer winter activities.
- Longer spring, summer and autumn seasons leading to more outdoor activities.
- Changing rainfall patterns leading to management issues such as path maintenance. (9)

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**The health effects of climate change**

The health impacts of climate change can be described as either direct or indirect; as with the other impacts of climate change they are not equally distributed geographically. At a global level there is likely to be an increased risk of: (5)

- Temperature extremes such as heatwaves leading to greater heat-related morbidity and mortality.
- Extreme weather events such as flooding.
- Water and food insecurity.
• Altered patterns of communicable diseases.
• Population displacement resulting from factors such as flooding and food or water insecurity.
• Potential conflict arising from population displacement.

The Scottish Highlands, in keeping with much of the UK, are likely to be less directly affected than other areas of the world, due to geography and the protective effect of affluence. However, some of the predicted global impacts are likely to extend to the UK including an increased risk of morbidity and mortality from extreme weather events and increased cases of food poisoning. Conversely though, there could be positive impacts such as a reduction in cold-related deaths as a result of milder winters and improved use of the natural environment for physical activity.

Climate change will exacerbate global health inequalities; the poorest one billion people are responsible for approximately 3% of the global carbon footprint yet these communities are most affected by the effects of climate change (Fig. 1).

In 2012, the six largest carbon emitting countries or regions were (percentage contribution):
- China (29%),
- US (15%),
- EU (EU27) (11%),
- India (6%),
- Russian Federation (5%)
- Japan (4%)

In China emissions increased by 3.0%, while in the US emissions decreased by 4.0% and by 1.6% in the EU compared to 2011.

‘The rich will find their world to be more expensive, inconvenient, uncomfortable, disrupted and colourless - in general, more unpleasant and unpredictable, perhaps greatly so. The poor will die.’

K. Smith, 2008

Emissions which fulfil basic human needs should be differentiated from those which support luxurious lifestyles, described as survival and luxury emissions respectively, with
the Lancet Commission\(^4\) highlighting the need for a strategy of contraction and convergence whereby richer countries rapidly decrease their emissions and poorer countries can increase emissions in order to achieve health and development gain. Reducing carbon emissions in Scotland will only make a small contribution to mitigating impacts elsewhere in the world, but such action can be considered part of our role as responsible global citizens. However, others debate the appropriate balance between the rights of the individual versus the public good.\(^{12}\)

**Mitigating Climate Change**

Mitigation refers to measures aimed at reducing the extent of climate change, either by removing greenhouse gases from the atmosphere through trapping or decreasing their production. Key mitigation measures include a move to renewable energy sources to reduce carbon emissions and an increase in carbon sequestration through actions such as reforestation.\(^{15}\) The Scottish Climate Change Delivery Plan (CCDP)\(^{16}\) describes measures for delivering four transformational outcomes for supporting emissions reduction targets.

Scotland has many natural assets that can support climate change mitigation, such as peatlands. Healthy peatlands provide a sink for greenhouse gases such as CO\(_2\)\(^{17}\) while degraded peatlands act as a CO\(_2\) source through peat decomposition.\(^{18}\) Over a fifth of Scotland’s land area is covered in blanket bogs; Caithness and Sutherland feature some of the largest and most intact in the world.\(^{18}\) Scottish Natural Heritage (SNH) supports peatland restoration through the ‘Peatland Action’ project, which helps climate change mitigation by increasing carbon sequestration. Some of the work in the Highlands includes:

- **Drumrunie Estate peatland restoration**: 334 hectares of peatland restoration in Assynt carried out by the Assynt Foundation in 2013/14.

Scottland’s commitments on climate change are set out in ‘Low Carbon Scotland: Meeting the Emissions Reduction Targets 2010-2022’. Furthermore, Scotland’s Climate Change
Adaptation Framework places specific climate change duties on public bodies so that in exercising their functions they act in ways which reduce emissions, support adaptation and are sustainable.

**Adapting to Climate Change**

The legacy of past and current greenhouse gas emissions means that climate change is unavoidable regardless of the success of any global mitigation measures. Even under their low-emission mitigation scenario the IPCC predicts increasing global temperatures over the next 20-50 years. Adaptation, a process of adjusting to climate change to limit harm and exploit possible benefits, is therefore as essential as mitigation. The potential conflict between mitigation and adaptation should be acknowledged and any adaptation should, where possible, avoid detrimental impacts on both society and the environment.

From a public health perspective, initiatives aimed at addressing climate change are, in general, good for health. Such co-benefits include:

- A shift to more active forms of travel would increase physical activity levels and the attendant health benefits. Reduced reliance on motorised transport would subsequently improve air quality and reduce levels of respiratory disease.
- Improving home energy efficiency could benefit population health through improvements in the control of winter indoor temperatures and indoor air quality. However, without proper implementation, such measures may result in adverse health outcomes as a result of poor air exchange.
- Decreasing consumption of livestock products could reduce emissions and improve health through healthier diets.

Climate change adaptation requires fundamental redesign of services and service provision to reduce carbon emissions, build community resilience and minimise health impacts. Developing such environmentally sustainable practice not only contributes to climate change mitigation and adaptation but also produces health gain through provision of sustainable and effective services. It requires long-term commitment across all sectors, agencies and organisations to support coordinated action.

NHS Scotland, with its large estate and considerable workforce, has a prominent role to play. Incorporating environmental

‘Adaptation is an ongoing process. It involves the on-going integration of options, costs and risks by private and public decision makers in different locations and over different timescales...
This approach should be one of sustainability that builds the resilience of our communities and the long-term prosperity of our environment and our economy.’

Scottish Climate Change Adaptation Programme

A carbon footprint is a measure of the environmental impact of human activity expressed as a weight of CO₂ emissions.

In 2004 the estimated carbon footprint of NHS Scotland represented 23% of public sector emissions and 3.6% of Scotland’s total carbon footprint.

The largest single sector contributor to carbon emissions was that of procurement (52%) followed by travel (24%) and buildings (23%).
sustainability into NHS practice is driven by CEL 2: A Policy on Sustainable Development for NHS Scotland (2012), which details the mandatory production of Sustainable Development Action Plans (SDAPs), and supported through the NHS Scotland Sustainable Development Strategy.

Addressing carbon management is a particular challenge for NHS Highland; it is the largest of the 14 territorial health boards covering 41% of Scotland’s land mass and includes an estate in excess of 175 properties.\(^{(22)}\) NHS Highland revised its Carbon Management Plan in 2012; principal drivers for change have included legislation, national targets and returns as well as the view that more sustainable practice is the ‘right thing to do’. Improving health was one of the reasons cited for why it is both morally and operationally sensible to embed sustainability and carbon management into NHS Highland practices.\(^{(22)}\)

The financial challenges facing the NHS have been a further driver as reducing costs in areas such as transport, energy and water provision can make financial savings as well as reduce carbon emissions. Carbon reduction measures contribute significantly to the financial position of NHS boards through the use of carbon taxation schemes such as the Carbon Reduction Commitment Energy Efficiency Scheme. However, the investment required for such schemes can be a constraining factor. While some measures can, with minimal investment, achieve good savings in terms of the 3 Cs of Costs, Consumption and Carbon emissions, others require considerable initial investment which can limit abilities to align health service delivery with environmental sustainability.

NHS Highland is committed to reducing \(\text{CO}_2\) emissions by 33% by 2016 from a 2010/11 baseline. Some of the recent measures taken by NHS Highland include:

- Transfer of energy supplies to national contracts and use of electronic billing.
- Implementation of five biomass schemes and two Solar Photovoltaic installations leading to the achievement of some of the highest levels of success against the efficiency and emissions targets set for NHS Scotland.
- Achievement of an A-Rated Building energy certificate for the new Migdale Hospital.
- Reduction in water consumption by approximately 35% over recent years.
Forthcoming developments include generating more electricity from renewable sources, introducing efficiency measures to reduce waste levels, more emphasis on transport and including procurement within the annual sustainability report. However, environmental sustainability still needs to be incorporated into decision-making processes at every level in the organisation.

**Future provision of health and social care**

The Sustainable Development Unit (SDU) has outlined transformational shifts required for a more sustainable health and care system: (23)

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>health and social care at institution led services based on needs</td>
<td>community focused health and social care based on needs and assets</td>
</tr>
<tr>
<td>a predominantly medicalised approach</td>
<td>a more holistic approach that empowers individuals and communities</td>
</tr>
<tr>
<td>a focus on sickness</td>
<td>a focus on being well</td>
</tr>
<tr>
<td>professional centred</td>
<td>person centred</td>
</tr>
<tr>
<td>isolated and segregated</td>
<td>integrated and in partnership</td>
</tr>
<tr>
<td>buildings</td>
<td>healing environments</td>
</tr>
<tr>
<td>decision making based on today’s finances alone</td>
<td>decision making that also accounts for current and future impacts on society and nature</td>
</tr>
<tr>
<td>single indicator and historical measurements</td>
<td>multiple balanced scorecard information in real time</td>
</tr>
<tr>
<td>sustainability as an add on</td>
<td>integration in culture, practice and training</td>
</tr>
<tr>
<td>waste and overuse of all resources</td>
<td>a balanced use of resources where waste becomes a resource</td>
</tr>
<tr>
<td>nobody’s business</td>
<td>everyone’s business</td>
</tr>
</tbody>
</table>

Figure 2: Transformational shifts in health and social care (23)

Changing demography, increasing complexity of illness in an increasingly elderly population and financial constraints are among the drivers for change in health service provision in NHS Highland and across the developed world. NHS Highland has set out the way it can change the delivery of health and social care services to make them more sustainable and resilient: (25)

‘Increasingly over the next 10 years, health care delivery will become less dependent on hospitals and institutional care and will rely more on co-production and partnership with individuals and communities, supporting health and social care delivered in the home and local community settings. There will be continuing emphasis on prevention and early intervention to maintain and improve people’s health and independence. Care will become as patient-centred as possible...The use of technology and provision of timely and relevant health intelligence to support remote consultation, information requirements and management will be maximised, reducing the
need to travel for both patients and professionals. Such changes will support sustaining service provision in remote and rural areas; however, radical redesign of primary and out of hours care will also be essential to maximise efficient use of resources and attract and retain high quality staff. Increasingly, services and care settings will be provided jointly across agencies through integration and partnership working. With increasing service provision in the community, there will be a reduction in hospital bed numbers and hospital-based staff across Highland. Technically complex care, particularly for relatively rare conditions, will increasingly be provided on a regional and national basis, with local service providers working with centres of excellence according to agreed quality standards.’

**Single Outcome Agreement (SOA)**

Scottish Government has set out its requirements for Community Planning Partnerships (CPPs) to improve outcomes for local people through enhanced partnership working between public bodies, the private and voluntary sectors and communities. The SOA covers six themes: the early years; older people; health inequalities; employability; economic growth; and development and community safety.

In recognition of the importance of the natural environment, the SOA between Highland CPP and the Scottish Government includes the environment as an additional seventh theme. Although the environment is not a separate priority area within the Argyll and Bute SOA, other work supports this agenda including green networks and action to reduce fuel poverty.

Action to improve environmental outcomes will also support other SOA and NHS priorities: promoting physical activity; decreasing health inequalities; and supporting economic recovery and growth and employability.

The Highland Environment Forum is the main inter-sectoral group formulating local environmental priorities for CPP action. Supporting communities to adapt to extreme weather events and promoting understanding and awareness of the environment have been identified as key topics.
Carbon CLEVER is a Highland Council led initiative which has the target of a carbon neutral Inverness in a low carbon Highlands by 2025. Carbon neutrality has been defined as zero net carbon emissions after balancing a measured amount of carbon released with an equivalent amount sequestered or offset.\textsuperscript{26} The vision is that: \textsuperscript{27}

‘By 2025, the Highlands will be a region where its residents and visitors can move around easily by low carbon and sustainable forms of transport. The region is well connected both in terms of transport links and through digital connectivity. Buildings across the region will have been energy renovated, and new buildings are energy efficient. The growing majority of buildings in rural areas will be heated by renewable sources. Electricity will be generated from a range of renewable sources, and excess energy can be transmitted to surrounding regions through smart grids, or stored efficiently. Land and resources across the Highlands are utilised for optimal economic, social, and environmental gains. Communities across the region are engaged, are highly active, more healthy and empowered.’

Carbon CLEVER will focus action on five key strategic themes (economy, energy, land use and resources, transport and engagement). More information on the Carbon CLEVER initiative can be found at www.highland.gov.uk/carbonclever.

**Individual action**

It is not just organisations that have a role to play in the sustainability agenda. Many communities across NHS Highland are taking action to reduce their carbon footprint and live in a more sustainable way.

Since the passing of the Land Reform (Scotland) Act 2003 community groups have had the opportunity to own and manage land and buildings in the area they live and work. Such ownership and land and asset management is fundamental to the development of resilient and sustainable communities in Scotland through income generation, local service development and environmental improvements. Highlands and Islands Enterprise aims to increase community ownership and asset management and, in partnership with the Big Lottery Fund, are delivering the Scottish Land Fund. £9 million has been provided

The Scottish (Managed) Sustainable Health Network works collaboratively to improve sustainability in a way which maximises health and equity.\textsuperscript{28}

Forthcoming areas of work include the sustainability of food sources and also indirect emissions produced by organisations through their activities but which occur from sources not owned or controlled by themselves.
by the Scottish Government for investment from 2012-2016.\(^{(29)}\)

Over 420,000 acres of land across the Highlands and Islands are now in community ownership. Assets include lighthouses, industrial units and large estates such as Knoydart and Assynt.\(^{(29)}\) The recent passage of the Community Empowerment (Scotland) Bill further supports the enablement of resilient rural communities.

The community of Eigg were pioneers of community buy-out after successfully taking ownership of the island in 1997. As part of the process, the Isle of Eigg Heritage Trust was established as a partnership between the residents of Eigg, the Scottish Wildlife Trust and Highland Council to buy and manage the island in order to create opportunities for environmentally sustainable economic, housing and infrastructural development.

Issues facing the islanders under the landlord system included unemployment, poor housing conditions and a lack of infrastructure which prompted the buy-out campaign. These issues were addressed through the development of a strategic plan and the launch of a fundraising campaign.

Successful developments since the buy-out have included the renovation of properties, the development of a multi-purpose centre and island website and the installation of a broadband network. More recently the island embarked upon a renewable energy project involving the development of an electricity network powered by wind, solar and hydro-electric energy thus enabling 24 hour electricity for residents and businesses.\(^{(30)}\)

The carbon footprint for individuals living in the UK equates to approximately 10 tonnes, with personal travel and household energy needs accounting for over half this amount.\(^{(20)}\) This figure needs to be reduced by 80% to achieve sustainability.\(^{(31)}\)

Many of the measures that an individual can take to save energy also save money and are beneficial to health. In a rural area such as that covered by NHS Highland, reducing costs and carbon use associated with travel are a particular challenge.
Energy
- Use energy-efficient light bulbs and appliances and turn off when not in use.
- Use a cooler temperature for washing clothes and try to avoid tumble-drying.
- Good insulation and draught-proofing measures.
- Use of renewable sources of energy.

Travel
- Walk or cycle where possible.
- Alter working patterns to include greater use of video- and tele-conferencing.
- Investigate possibilities for car-sharing.
- Increase use of public transport or low-carbon vehicles.

Food
- Reduce consumption of animal products such as meat and dairy.
- Where possible buy fresh, locally produced products when in season.
- Avoid drinking bottled water.

Reduce
- Reduce waste by trying to buy items with less packaging.
- Consider second-hand goods where appropriate.
- Avoid printing where possible.
- Plan meals and buy only what you need to reduce food waste.

Reuse
- Find new uses for items or swap with friends.
- Mend rather than replace.

Recycle
- Recycle garden waste or compost at home.
- Increase recycling at home and work. (20,32)
Section 2

Environmental effects on human health

Our health and well-being is influenced by our surroundings at home, at work, while travelling and during our leisure time. Climate change will alter these surroundings and the home, work and leisure activities we engage in.

This section considers major influences on health in the home, health in the working environment and the contribution that the built and natural environments can make to promoting health and well-being, as well as considering the implications of climate change for each of these settings.

2.1 Home environment

Housing provides the fundamental human needs of shelter and security and its quality can affect both physical and mental health. Aspects that can contribute to ill-health or injury include dampness, heating levels, noise, insulation, air quality and poor design.\(^{(33)}\)

Scottish housing quality standards are enforced by local authorities and monitored through the Scottish House Condition Survey.\(^{(34)}\) In general, the condition of the housing stock in Scotland is fairly good but in older, particularly rural, houses poor energy efficiency and the high costs of heating often mean that occupants cannot afford to keep warm. This has been recognised by UK Government who pay pensioners a fixed annual winter fuel payment as well as a cold weather payment when the local temperature is either recorded at, or forecast to be, an average of zero degrees Celsius or below over seven consecutive days.

The Scottish Housing Quality Standard (SHQS) was met by 46% of homes surveyed across Scotland in 2012. Failure to meet the SHQS was most commonly due to poor energy efficiency.\(^{(34)}\) The majority of homes (69%) met the National Home Energy Rating (NHER) for ‘good’ with respect to energy efficiency, but older houses and dwellings in rural areas were more likely to be rated as NHER ‘poor’. Furthermore, 27% of households were identified as fuel poor. Households living in older dwellings, those in rural areas and those with lower energy efficiency were more likely to be classified as fuel poor.
Fuel poverty was also associated with household characteristics such as low income and older age.\(^{34}\)

The Scottish Government housing strategy, *Homes Fit for the 21st Century*, aims to develop more sustainable housing through the creation of sustainable communities and the achievement of climate change objectives.

**Excess Winter Deaths**

Deaths during winter are higher than deaths in the rest of the year, due in part to lower ambient temperatures in the winter months. The underlying causes of death contributing to this Excess Winter Mortality (EWM) are mostly circulatory and respiratory diseases rather than conditions directly related to cold such as hypothermia.\(^{35}\) There is a common formula, used internationally, to calculate EWM.\(^{36}\) Deaths in the four winter months (Dec-Mar) are compared with the average deaths in the four months preceding and following this winter period. The Excess Winter Mortality Index\(^{35}\) then enables comparisons to be made across geographical areas or between genders and age-groups.

Seasonal variation in mortality, including excess winter deaths, has been decreasing for over 50 years\(^{36}\) (Fig. 3). Improved housing quality leading to warmer homes probably accounts for some of this improvement.

**Figure 3: Excess winter deaths in Scotland, 1951-2013, all ages.** Source: National Records of Scotland\(^{36}\) adapted by NHS Highland Public Health Intelligence & Epidemiology.

There have been, on average, 130 excess winter deaths per year over the last 10 years in NHS Highland. Of these, 75% were over 75 years of age which is similar to the rest of Scotland. NHS Highland and its constituent local authorities
The concept of ‘affordable warmth’ has been defined on the basis of the proportion of household income which must be spent to achieve a specified level of heating. Fuel poverty is when a household would need to spend more than 10% of its income on fuel use to achieve the standard heating regime.³⁷,p.20

Cold Comfort Study

Fuel poverty has consistently had a lower EWM index than Scotland as a whole suggesting that the risk of excess winter death in Highland is slightly lower (Figs. 4 and 5), although the EWM index is not reducing.

EWM has been shown to vary widely across Europe³⁸ with countries which experience low winter temperatures such as Finland having low rates of EWM compared to countries with much milder winters such as Spain. Lack of individual preparedness and poor thermal efficiency of homes have been described as contributing factors to these trends.³⁶ Cold external temperatures will have little impact upon a person who rarely leaves a warm home. Many studies³⁹,⁴⁰ have explored external temperature and have found that it is difficult to measure an individual’s exposure to cold weather, and that exposure affects different social groups in different ways. Other research,³⁷,³⁸ notably the Cold Comfort study,(37)

Cold Comfort Study

[^37]: Cold Comfort Study

[^38]: EWM has been shown to vary widely across Europe with countries which experience low winter temperatures such as Finland having low rates of EWM compared to countries with much milder winters such as Spain. Lack of individual preparedness and poor thermal efficiency of homes have been described as contributing factors to these trends. Cold external temperatures will have little impact upon a person who rarely leaves a warm home. Many studies have explored external temperature and have found that it is difficult to measure an individual’s exposure to cold weather, and that exposure affects different social groups in different ways. Other research, notably the Cold Comfort study, has challenged this view by highlighting the unclear link between poor health and fuel poverty in Scotland. One in three homes defined as fuel poor compared to 27% across Scotland as a whole. The Scottish Government is committed to improving access to affordable warmth. The national Home Energy Efficiency Programme provides assistance to those most vulnerable to fuel poverty.

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ways. Other research, \cite{41,42} notably the Cold Comfort study,\cite{37} has focussed upon the impact of indoor temperatures. The study showed that, across all properties, mortality at the coldest time of year (Dec- Jan) increased by 50% in the coldest homes compared to 30% in the warmest.

Fuel poverty

Fuel poverty is a long-standing concern within Scotland and was discussed in the 2011 Public Health Annual Report as a determinant of health inequalities. Historically, fuel poverty arose from the connection between low indoor temperatures and poor health and was seen as a social problem arising from people living in poor housing and unable to heat their homes adequately. A recent review \cite{43} has challenged this view by highlighting the unclear link between poor health and fuel poverty in Scotland. One in three homes defined as fuel poor were not income poor and over half of the fuel poor households were not in receipt of means-tested benefits, disability living allowance or tax credits. It appears that existing criteria for defining households eligible for assistance may need reconsideration if those in most need are to be targeted effectively.

Using the current definition, NHS Highland has one of the highest proportions of households in fuel poverty in Scotland with 39% of households in both Highland and Argyll and Bute described as fuel poor compared to 27% across Scotland as a whole.\cite{44}

There are three main drivers of fuel poverty: fuel costs, income and energy efficiency with levels of fuel poverty most susceptible to fuel prices and least susceptible to home energy efficiency measures.\cite{43} Remote and rural areas are particularly vulnerable as households tend to rely on more expensive fuels such as solid fuel, liquid petroleum gas (LPG) and oil, the prices of which have risen substantially in recent years.\cite{43} Home energy efficiency measures alone are now considered insufficient for eliminating fuel poverty although they can provide longer-lasting protection compared to the variability over time of income or fuel pricing.

The Scottish Government is committed to improving access to affordable warmth. The national Home Energy Efficiency Programme provides assistance to those most vulnerable to fuel poverty.

**Healthy Homes for Highland (HHH)** is a multi-agency referral scheme for vulnerable households at risk of fuel poverty in Highland Council area. Frontline staff in any agency can refer people for advice by using the simple referral card or helping the householder to call: 0808 808 2282. Each card and call referral is co-ordinated by Home Energy Scotland.

Anyone referred to HHH can get free advice and assistance with:

- Making their home warmer and identifying ways to reduce fuel bills which may lead to the installation of grant funded insulation, heating and other energy efficiency measures.
- Home fire safety checks.
- Getting more income from tax credits and benefits and access to other entitlements.
- Debt counselling.

395 referrals were made to HHH between January 2012 and March 2014 resulting in 300 successful staff contacts.
Poor energy efficiency and the associated fuel poverty in private sector housing stock is a major challenge.

Argyll and Bute Council in partnership with Alienergy are delivering the £2.4m Home Energy Efficiency Programme targeting just over 1,000 homes in the private sector in 2013/14. The programme provides grants for householders and private tenants to obtain solid wall, loft and cavity insulation. There is also a project to upgrade heating systems.

The Welfare Reform Working Group has broad multi-agency representation to help direct resources to tackle digital exclusion and vital housing support, welfare rights and budgeting advice for the most vulnerable.

However, Highland Council’s Affordable Warmth Partners Group has concerns over the implications of the new scheme for remote and rural areas given the specific challenges facing these areas such as being off the mains gas grid and having poorer housing stock. According to the Scottish House Conditions Survey more than half of all households in rural areas are not on the gas grid which has implications for heating costs as gas is currently the cheapest of the major commercial fuels. The provision of funding should reflect the higher costs of installing heating systems in older rural houses and the potential additional costs of replacing or relocating oil tanks. Both these costs are currently excluded from the scheme and their absence has prevented some applicants from upgrading their homes.

Fuel poverty is predicted to increase as a result of an ageing population, the impact of climate change legislation on fuel bills, changes to the benefit systems and an increasing number of single person households. Strategies suggested to reduce fuel poverty include targeting households with residents over retirement age without access to the gas grid and using social landlords to identify fuel poor social tenants. Ideas for future programmes include widening the focus from heating to other energy-saving improvements and from individual households to communities. Reducing fuel costs, through social tariffs for example, would be more effective than increasing income.

Indoor Air Pollution

While much of the focus on environment and health is on outdoor exposures most of our time is spent indoors. Indoor air pollution can result from many sources such as the materials used in building construction, heating and cooking appliances, mould and dust mites, cleaning products and radon gas.

Human behaviours such as smoking also play a significant role. Tobacco smoke is a major cause of indoor air pollution. WHO recommends levels of indoor airborne fine-particulate matter (PM$_{2.5}$) should be below 25 micrograms per cubic metre of air (25µg/m$^3$) averaged over 24-hours, whereas the average PM$_{2.5}$ level in a typical home where people smoke is four times higher than this.
Following the ban on smoking in enclosed public places in 2006 the following health benefits were seen:

- A reduction in exposure to environmental tobacco smoke (86% fall in PM$_{2.5}$ concentrations in Scottish pubs two months after ban implementation).\(^{[48]}\)
- Improved self-reported respiratory and sensory symptoms of bar workers.\(^{[49]}\)
- Improved cardiovascular health with a 17% reduction in hospital admissions for acute coronary syndromes.\(^{[50]}\)
- No evidence of a shift in smoking in public places to smoking within the home environment.

NHS Highland will introduce a smoke-free workplace policy to include all premises and grounds by March 2015. Local Authorities are considering similar policies and proposals have been made to prohibit smoking in private vehicles when a child is present.

**Radon gas**

Radon is a natural radioactive gas which is emitted to varying degrees from soils and rocks. In outdoor environments radon is rapidly diluted in open air but enclosed spaces such as mines and buildings can cause radon to accumulate to higher levels. Exposure to radon increases the risk of developing lung cancer especially when combined with exposure to environmental tobacco smoke. Radon is very common and is generally found at low levels indoors and outdoors without being a cause for concern. However in some areas the radon levels are higher which can increase the risk to health.\(^{[45]}\) Public Health England has produced radon maps which identify areas of Scotland which have the highest levels of radon. The maps can be used to assist Councils, businesses, landlords and homeowners with decisions regarding whether any further action is necessary.

The Highland Council have programmes of radon monitoring underway in council housing and other properties to check actual radon levels. If levels are found above action levels appropriate remedial actions are taken to reduce radon to acceptable levels. The council has identified a number of houses, offices and schools where levels were high and appropriate action has been taken to reduce radon levels. Actions include improving ventilation and fitting radon sumps. The Highland Council are encouraging other public bodies,
Implications for the future
Climate projections\(^{(3)}\) estimate that by 2080 annual mean temperatures in the UK will be approximately 2 to 5°C higher than current levels. At present the health burden of low temperatures exceeds that of high temperatures although this pattern is expected to alter in the future. Heat-related mortality is predicted to rise steeply across the UK as a whole but in Highland the impact of climate change is less likely to result in large increases in summer temperatures.\(^{(6)}\) It is difficult to predict what impact warmer winters may have on EWM. Temperature only explains some of the variance in EWM with other factors such as individual preparedness and influenza also being influential.\(^{(35)}\) The health burden is likely to be experienced by the most vulnerable within the population and therefore likely to be amplified by the ageing population. Fuel poverty may reduce, but costs may transfer to maintaining summer cooling systems rather than winter heating.\(^{(43)}\)

Additionally, improving home energy efficiency may increase exposure to indoor air pollution by reducing the air exchange between the internal and external environments. Warmer temperatures and wetter conditions may also lead to increased levels of indoor air pollutants such as moulds and dust mites which exacerbate respiratory conditions such as asthma. Ensuring that energy efficiency schemes provide adequate ventilation and information on maintaining adequate air exchange is essential if improving housing and reducing fuel costs is to improve health.
2.2 Work and health

Work, in general, is good for us, physically, mentally and financially. It increases our confidence and independence and makes us feel part of society, as long as the work undertaken is seen as meaningful and adequately rewarded.\(^{(51)}\) However, it can also adversely affect health. In 2011/12, 1.7 million working days were lost due to accidents and work-related ill health in Scotland.\(^{(52)}\)

Healthy Working Lives (HWL)

The Scottish Centre for Healthy Working Lives provides free and confidential support and advice to employers to help create a healthier workforce. Having healthier and more motivated employees can result in reduced sickness absence and increased productivity. Local Healthy Working Lives Advisers provide advice and services for employers in implementing health, safety and well-being policies and practices.

Under the Healthy Working Lives Award Programme, HWL Advisers support businesses to develop plans and outcomes relevant to their organisation’s needs. Benefits include reduced absence rates, a healthier, more motivated and productive workforce and improved health and safety. Both the reputation of the organisation and the health of the wider community can benefit.

A pilot training session has been delivered to small and medium enterprises (SMEs) to address commonly held erroneous health beliefs. The training specifically targeted common musculoskeletal and mental health conditions which frequently result in staff taking time off work. The session also highlighted the benefits of a supportive and adaptive workplace to encourage staff to remain in work or quickly return to work where possible. The benefits to the health of staff of being physically active were also emphasised.

Working Health Services

This service is targeted at SMEs that have no access to Occupational Health (OH) or Employment Assistance Programmes. It aims to improve health and support individuals to remain in work or return to work. Although not a full OH service for SMEs the service provides individuals in eligible organisations with an initial assessment to identify any

In NHS Highland, there are currently 90 organisations actively working to achieve different levels of the HWL Award which includes over 44,500 employees. There are a further 150+ organisations that the Advisers provide services for policy development, training, and health and safety advice.

SMEs are organisations that are registered companies which employ between 1-250 employees. There were 340,840 SMEs, employing an estimated 1.1 million people, across Scotland in March 2013.\(^{(53)}\) SMEs tend to account for a greater proportion of private sector employment in rural areas compared to urban areas.
Health and Work Service

An independent Health and Work Service is being established to make occupational assessments and advice more readily available to employees, employers and GPs to enable them to better manage sickness absence. It will provide OH advice and support to enable individuals with a health condition to stay in or return to work. There are two elements to the service which is due to start in late 2014:

Assessment: Once the employee has reached, or is expected to reach, four weeks of sickness absence they will normally be referred by their GP for an assessment by an OH professional.

Advice: Employers, employees and GPs will be able to access advice via a phone line and website. Following an assessment, employees will receive a return to work plan with recommendations to help them to return to work more quickly and information on how to access appropriate interventions. The new service aims to fill the gaps in current support and will therefore complement, rather than replace, existing OH provision.

Health Promoting Health Service (HPHS)

Scottish Government requires hospitals to contribute to reducing health inequalities through the promotion of health and well-being in patients, their families and staff. Implementation is over a three year period from 2012 to 2015. Hospital staff should be trained in generic health improvement competencies. The concept that ‘every healthcare contact is a health improvement opportunity’ is central to the Quality Ambitions of person-centredness and effectiveness. It supports the existing health improvement work in hospital settings such as the Tobacco Policy, HWL and Brief Intervention Training. The year two annual report on HPHS received positive feedback from Scottish Government.

Accidents and work-related ill health

The law on health and safety at work is regulated by the Health and Safety Executive and local authorities (LAs). In general LAs are the main enforcing authority for retail,
wholesale distribution and warehousing, hotel and catering premises, offices and the consumer/leisure industries. The role of LAs is to determine that businesses are effectively and proportionately managing their health and safety risks. To do this, LAs use a range of interventions to influence, encourage and advise business and, where necessary, hold to account those who fail to meet their responsibilities. A clear focus is on tackling the key causes of injury and ill-health at work.

Implications for the future

Nearly half of the employment in the NHS Highland area is provided by the public sector, with the other major employers in the region being the tourist and leisure industries and the renewable energy sector. The area also has a very high proportion of SMEs.

The impacts of climate change on employment will vary between sectors and will be both direct and indirect. Changing ecosystems have implications for many sectors, particularly agriculture, fishing and energy production. Risks arise both from climate change itself and from changes in how land, water and energy are managed. Impacts on infrastructure will compound these effects.\(^{(54)}\) The possibility of reduced winter activities as a result of less predictable snow cover could be detrimental to tourism.

Although many of the global impacts are likely to be negative, in areas such as Highland there are also likely to be new opportunities for employment arising from mitigation and adaptation policies such as the growth of the renewable energy sector and installing flood defences. More direct impacts arising from climate change itself, such as altered crop growing capabilities, could also generate jobs within the agricultural sector. Although predicting exact impacts with confidence is difficult there is a need to develop resilient workforces that can respond and adapt to change. Providing a healthy working environment has therefore never been more important.

Recent health and safety projects have looked at:

- Hazards of fatalities and injuries resulting from being struck by vehicles – by reviewing workplace transport/vehicle movements and advising on requirements.
- Hazards from Legionella infection – reviewing premises with cooling towers/evaporative condensers and advising on requirements.
- Hazards from explosion caused by leaking LPG – reviewing premises with buried metal LPG pipework and advising on requirements.
2.3 The built environment

The built environment describes the places in which people live, work, play and socialise and the connections between them.\(^{(55)}\) Any attempts to improve health and well-being are constrained by the limitations of this environment.\(^{(56)}\)

![Figure 6: Barton and Grant's health map\(^{(57)}\)]

The built environment can impact on health both directly and indirectly. Direct impacts include air and water quality, noise and traffic related injuries while environmental influences on the behaviours or feelings of those who live there are indirect impacts.\(^{(58)}\) The impact of neighbourhoods on health includes:\(^{(59)}\)

- Links between the built environment, health and well-being, and physical activity levels.
- Perceptions of neighbourhood are strongly associated with health and well-being; if neighbourhoods are seen as unsafe, dirty or poorly maintained, residents are more likely to experience depression, anxiety and poor health. Parental perceptions of neighbourhood safety can also influence levels of physical activity in children.
- ‘Walkable’ neighbourhoods are associated with higher levels of physical activity and lower levels of obesity. They feature high population density and connectivity, varied land use, good accessibility and good pedestrian and cycling facilities. Such features may be difficult to achieve in remote and rural areas.

“Today’s issues (around place) are less about toxic or infectious threats but rather the capacity of ugly, scarred, threatening environments to foster hopelessness and stress and to discourage active healthy lives and behaviours.”\(^{(56, p.2)}\)

Sir Harry Burns,
Former Chief Medical Officer for Scotland

Scottish Natural Heritage (SNH)\(^{(60)}\) highlight the economic, environmental and social benefits of green infrastructure as:

- Improved general health, health-related complaints and mental health.\(^{(61)}\)
- Reduced self-reported stress when there is more greenspace in the local area.\(^{(62)}\)
- Providing a focal point for communities.\(^{(63)}\)

Overweight and obesity cannot be tackled by just relying on individuals to change their behaviour as the factors that contribute to gaining weight have been interwoven into the very fabric of our lifestyles to such an extent that weight gain is almost inevitable in today’s society. The evidence also suggests that the provision of health information, although important, is not sufficient and that to make the changes necessary we have to reshape our living environment from one that promotes weight gain to one that supports health choices.

Obesity Route Map\(^{(64)}\)

Source: Catriona Coull
- Children with access to greenspace are more likely to be physically active and less likely to be overweight than those living in neighbourhoods without such access.

- Self-efficacy and social support also explain variance in levels of physical activity.

Developing neighbourhoods that reflect this evidence base is key to improving health and well-being in communities and individuals.

**The obesogenic environment**

An environment in which high fat, high sugar foods are cheap and widely available, where opportunities for walking and cycling are limited and car driving is prioritised, is described as obesogenic i.e. one that promotes the development of obesity.

Overweight and obesity is a significant issue across Scotland, in common with other developed countries. Scottish Health Survey figures show that in 2012 64.3% of adults aged 16+ were overweight or obese and 27.1% were obese. The prevalence of overweight and obesity increased considerably between 1995 and 2008 although subsequently numbers have stabilised. One in six (16.8%) children aged 2 to 15 is at risk of obesity and a further 13.8% are at risk of overweight.\(^{(65)}\)

\[\text{Figure 7: Prevalence (\%) of obesity in Scotland, by gender 1995-2012}^{(65)}\]

Community planning can act in many ways to reduce the obesogenic nature of the built environment such as promoting walkable neighbourhoods and good design, restricting the number of fast food outlets within certain areas, supporting community markets and providing allotments and community growing schemes.

‘Overweight and obesity cannot be tackled by just relying on individuals to change their behaviour as the factors that contribute to gaining weight have been interwoven into the very fabric of our lifestyles to such an extent that weight gain is almost inevitable in today’s society. The evidence also suggests that the provision of health information, although important, is not sufficient and that to make the changes necessary we have to reshape our living environment from one that promotes weight gain to one that supports healthy choices.’

Obesity Route Map\(^{(64)}\)

Source: Catriona Coull
Individual actions to support health are more likely to occur and be effective in an environment that supports health, well-being and healthy choices:

**Planning**: The Highland Council’s Open Space Guidance requires that all new residential developments have features that enhance the environment such as greenspace and play and recreation facilities. If space limitations are restrictive then a specified investment is required to improve capacity and quality of the nearest existing local facility.

**Development of NHS sites**: Seeing greenspace from a hospital bed can facilitate recovery time and reduce the length of hospital admission\(^{(66)}\) so designing spaces to encourage contact with greenspace can provide therapeutic benefit. Health care settings around NHS Highland have taken the opportunity to improve their greenspace in order to provide both therapeutic and recreational benefits.

Lawson Memorial Hospital in Golspie has developed a network of walking paths for therapeutic and recreational use. These networks include distance markers and a range of biodiversity-enhancing planting and construction. The project was developed through partnership with Forestry Commission Scotland (FCS), SNH, The Sutherland Partnership, Golspie Community Council, League of Friends for Lawson and the Cambusavie Unit.

New Craigs Hospital in Inverness is nearing the final planning stage of a range of environmental improvements that can potentially benefit patients, visitors, staff and the local community. This partnership includes The Green Exercise Partnership (FCS and SNH), Highland Council, Highland User Group, Voluntary Sector (The Conservation Volunteers, Abriachan Forest Trust) and Robertsons.

**Building design**: Great Glen House, headquarters of SNH and housing several other organisations, has been commended for its physical design and also for how the design of internal facilities supports staff activity. In addition to creating an active and healthy staff culture that supports all levels of fitness the building design also creates numerous social and informal support opportunities.
Promoting healthy food: The Healthy Living Award is a national award for food services in Scotland. Cafes and restaurants that have this award make it easier for customers to make healthy choices. All NHS Highland cafes and restaurants hold it. There are also 289 establishments in Highland, ranging from libraries, cafes, leisure centres and hotels, which welcome and support breast-feeding mothers and babies through the Baby Friendly Welcome Sticker scheme. Both the Highland Council and Argyll and Bute Council meals service in primary schools have achieved the Food for Life award, recognising their provision of meals which are freshly prepared and the procurement of food which is local, organic, sustainable and traceable.

Three new Community Food and Health practitioners will contribute to improving the health and well-being of communities in Highland. They will work to identify and support local initiatives on the food and health agenda which could include improving food access and availability, growing projects or supporting food skills. An important aspect of the work will be delivered through healthy weight interventions with outcomes which seek to build on self confidence, resilience and community connectedness.

Allotments and community growing: Participation in allotment gardening can support health and well-being in a number of ways. Regular physical activity benefits physical health and mental wellbeing. The benefits of purposeful activity are enhanced by being in a natural environment and from social interaction. The fresh fruit and vegetable produce also supports a more affordable healthy and balanced diet.

Highland Council is also updating its policy to include support for community growing. Because community growing projects have social inclusion at their core, the well-being benefits are particularly prominent. Growing food in community gardens is more than just providing fresh food for the table. Community gardens are like community centres but instead of buildings, rows of vegetables grow among communal open space. They can play a key role in improving individual, community and societal health by increasing activity, building social networks and providing a hub for social activities which can enhance resilience. Developing and maintaining a community garden can also improve the local environment and contribute to environmental sustainability.

Since 2010 the number of allotment sites in Highland has increased from 5 to 16 and the number of individual allotments from 94 to 362 with further sites planned.
Highland Council is adopting an assets-based approach to establishing and running allotment sites. Community groups are supported to establish allotment associations, find land and set up allotment sites, often on land leased from the council. Sites are then run by the allotment associations. In supporting communities to use existing assets a more sustainable model for running allotments is possible alongside the benefits of community empowerment.

‘Local Produce’ in Argyll and Bute aims to increase the availability of affordable local produce and increase interest and knowledge of the social, environmental, health and economic benefits of sourcing food locally. Projects include Islay House Community Garden, Campbeltown Community Organic Garden and Tarbert Healing Garden. Bute Produce, a market garden in Rothesay, not only aims to provide local, affordable produce for the island but also hopes to help reduce local carbon emissions. Local Origins Rural Network (LORN) is a local producers and skills network and market showcasing the best in locally grown and created food. The project has involved the transformation of an abandoned commercial unit into an emergent community growing resource.

Transport

In Highland, transport is fundamental to individuals and communities for access to essential services and for work, social and leisure activities. Design and community planning can be used to support connectivity and travel choices.

Argyll and Bute Council Local Transport Strategy\(^{(67)}\) specifies several objectives under active travel:

- Considering the needs of pedestrians and cyclists when planning developments to maximise opportunities for cycling and walking.
- Implementing travel plans, both for the council and private companies.
- Continuing the school travel plan programme.
- Promoting the car sharing website.
- Reducing business and commuter travel.

The Highland Council draft Green Transport Strategy\(^{(68)}\) states that, ‘The Highland Council is committed to active travel and the health benefits this can bring. Creating a network of suitable paths and cycle routes will allow our residents a choice in their everyday travel. Education and training will raise safety awareness, not just for those choosing to walk and cycle, but for motorists who share the same road space. Through a combination of infrastructure, services, and education, we can encourage residents and visitors to choose more sustainable forms of travel.’
Policy aimed at increasing active travel is usually aimed at urban environments rather than rural communities. The creation of active rural communities faces challenges such as the distances between destinations, a comparative lack of supporting public transport and infrastructure which supports cycling or walking and a prevalent car culture which may dominate both individual choices and infrastructural decisions. This is not to say that active travel is not possible in rural areas but that policy should be adapted to local need and support integrated transport systems.

The successful incorporation of health issues into transport policies relies on cooperation among sectors and high-level political commitment. NHS Highland is pursuing transport related actions through its Health and Transport Action plan, part of its Carbon and Sustainability Management Programme. Community Planning Partners, including the Highlands and Islands Transport Partnership (HITRANS), are working to ensure local transport plans and infrastructure take account of health related issues. Community planning partners are some of the largest employers in the area; developing integrated transport and transport for staff should be a key service delivery consideration.

Highland Council, Scottish Ambulance Service, HITRANS and NHS Highland have set up the Highland Integrated Transport Provision Project, piloting an integrated transport service through promotion of a coordinated hub, the Lochaber Transport Advice & Bookings Service. It was set up following the Audit Scotland Report on Transport for Health and Social Care (2011) which identified that transport services for health and social care are fragmented and there is a lack of leadership, ownership and monitoring of the services provided. Voluntary Action Lochaber (VAL) is managing and operating the new services and managing community engagement in the development and delivery of the project, which will report by July 2015.

Argyll and Bute Council

In 2013/14 the Strategic Transportation Unit secured £944,000 external capital for a variety of infrastructure projects across Argyll and Bute. The key sustainable walking and cycling projects which were delivered were improved access to Connel Station and refurbishment to Jubilee Bridge in Appin.

In Helensburgh bus stops are now suitable for low floor buses to improve access.
2.4 Air and water quality

Promoting and maintaining the quality of the environment requires input from many partner agencies at a national and local level. At a local level there is considerable partnership working between Environmental Health and Public Health Departments as illustrated through the production of the Joint Health Protection Plan.

Air Quality

Legislation over the last century has dramatically reduced air pollution across the UK from industrial and domestic sources. However, poor air quality can still occur due to other sources such as road traffic. New technologies, such as biomass schemes, may also have an impact.

Recent reports have found that poor air quality in the UK shortens life expectancy by an average of seven to eight months.\(^{70}\) In 2012 the Chief Medical Officer in England placed urban air pollution within the top ten causes of mortality in the UK.\(^{71}\)

Under the Local Air Quality Management (LAQM) regime Local Authorities are required to undertake air quality reviews of their areas to ensure that the national air quality objectives will be achieved for various pollutants. If the objective for a pollutant is exceeded the local authority must declare the affected area an Air Quality Management Area (AQMA). The authority must then draw up and implement an action plan to reduce pollution levels in the specified area.

Following the LAQM model, the first review of air quality in the Highlands by Environmental Health was published in 1998. From that initial review to the most recent, the reports have concluded that air quality in the Highland Council area is generally good. However, certain streets in Inverness have been shown to have high levels of nitrogen dioxide. It is likely an AQMA will need to be declared to protect the long term health of residents of properties in the city centre.

Water quality

In Scotland we benefit from having excellent drinking water nearly all of the time. Most of us have access to the Public Water Supply (mains water) provided by Scottish Water (SW) who have invested heavily over the past ten years in
improving water supplies in the Highlands and Islands. These supplies are all disinfected and regularly tested for bacteriological and chemical quality and assessed against international standards.

In 2012, the last year for which data is available, a total of 153,433 samples were taken from customers’ taps across Scotland and just over 200 of these failed to comply with the statutory standards. SW and the health protection team in NHS Highland have clear protocols for the prompt investigation and management of the few treatment failures that occur.

Within rural areas however, there are a significant number of people who do not have access to ‘mains’ water and instead have a Private Water Supply (PWS). Such supplies are not the responsibility of SW but of the owners and users. In 2012 there were 19,916 registered PWS in Scotland which cover around 3% of the Scottish population. Local Authorities enforce the PWS regulations and conduct annual risk assessments on the larger Type A supplies which supply either more than 50 people, or a commercial or public activity. Type B supplies are more common and these are smaller, domestic supplies.

In 2012, some 57,358 tests were carried out in Scotland on PWS; 91% complied with standards compared with well over 99% of mains water samples. The risk to health is therefore significantly greater from PWS than it is with mains water.

In the NHS Highland area, there are several cases of illness each year as a result of consuming contaminated water from a PWS, and probably even more are unreported. These are most commonly cases of *E. coli* O157 infection but may also include other gastrointestinal infections such as cryptosporidiosis and campylobacteriosis. Local residents can be affected but commonly tourists are more prone to infection. Typically in these cases visitors come to stay for a short holiday in a remote location and rent a property which has a private water supply. Within days of arrival some, or all, of the visitors develop diarrhoea and vomiting and sometimes require admission to hospital.

*E. coli* O157 infection can be particularly severe. In recent years there has been at least one outbreak of *E. coli* O157 infection associated with a PWS every summer. These

\[
\text{Over a fifth (21%) of the total number of registered PWS in Scotland occur in the NHS Highland area.}
\]

There are 2,338 registered PWS (719 Type A and 1,619 Type B supplies) in the Highland Council area.

In Argyll and Bute Council area there are 1,848 registered PWS (437 Type A and 1,411 Type B supplies).
outbreaks usually affect several people, often children, and some of them have required lengthy hospital care as around 10% of cases develop renal failure and need kidney dialysis.

There is a perception that fresh drinking water, running off the local hills and fields is better for you and healthier than the mains water which is supposedly ‘tainted’ by chemical disinfectants. In reality, rural water courses are often contaminated. Outwardly healthy farm animals and wild animals, such as cows, sheep and deer intermittently excrete harmful micro-organisms such as *E. coli* O157 and *Cryptosporidium* in their faeces which are then washed by the rain into streams and lochs. If surface water passes untreated to a PWS, the infective organisms pass straight on to a human consumer. Similarly, run-off from agricultural fertilisers can pose a risk of chemical contamination. The quality of PWS, especially the microbiological quality, therefore continues to be a concern.

**Implications for the future**

Warmer temperatures may lead to increased demand for, and more opportunities to use, urban greenspace. Changes in rainfall present an increased flood risk with long term consequences to health and the economy.

Our built environments will need to adapt to the impacts of climate change in order to develop more sustainable and resilient communities. Reducing the obesogenic nature of the built environment can also help with adapting to climate change by:

- Promoting physical activity, active travel and developing ‘walkable’ neighbourhoods.
- Promoting the production and consumption of local healthy food and reducing food miles.

Climate change may also affect air and water quality. Climate change predictions of drier summers, interspersed with heavy rain, are likely to increase risk of raw water contamination. Data relating to the past six years have shown that annual cases of cryptosporidiosis have ranged from 20 to 45 and annual cases of *E. coli* O157 from 6 to 26. Although common gastrointestinal illnesses have been relatively stable in recent years, such water-borne infections may increase in the future.

**Anyone with a PWS should install an appropriate treatment system and make sure it is regularly maintained and inspected.**

Regular maintenance is just as important as installing a treatment system in the first place.

Suitable treatment might be as simple as installing a UV system at the point the water supply enters the building.

Environmental Health Officers from the Local Authorities are able to provide help and advice on minimising the risk. Grants may also be available to improve a PWS.
2.5 The natural environment

In the Highlands we depend on a healthy natural environment. We take products such as food, water and timber from the natural world, but it also provides other, less obvious goods and services. Healthy ecosystems regulate our climate, degrade our waste and limit the spread of disease; their beauty and tranquillity inspires and relaxes us. The natural environment is complex but may easily be deranged and this can lead to lasting consequences for local economies and their social stability.\(^{(73)}\)

Given the complexity of the natural world and the broad diversity of human exploitation many nations have adopted the ecosystem approach to its management. The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. It recognizes that humans, with their cultural diversity, are an integral component of ecosystems. As we manage the land and sea we must be fully aware of the consequences for the people who use natural resources or live with the consequences of their exploitation.\(^{(74)}\) A healthy natural environment is therefore vital to environmental, social and economic sustainability. Greater investment in our natural capital to protect existing ecosystems is needed to maintain and improve the health of the natural environment.

The coastline of the Highlands is considerable and the productive seas are among the cleanest in the UK. The Highlands are known for their marine wildlife and every year thousands of people come to the area to dive, watch sea birds and marine mammals, sail, canoe or just enjoy the environment. However, people also live there all year round, using the coast for their own work, healthy exercise and recreation. Traditionally the fishing industry has sustained many coastal communities but, as it has declined, aquaculture has become of increasing importance as has the offshore renewables industry. The Highland Coastal Development Strategy was developed to ensure all interests in coastal use are taken into account. Promoting knowledge and understanding of the natural environment amongst local communities is vital for sustainable development.
Physical activity

Although other areas may debate the point, Fort William is advertised as the outdoor capital of the UK. Hill walking, rock and ice climbing, mountain biking, skiing and canoeing are possible in the Cairngorms whilst Glenmore Lodge is Scotland’s National Outdoor Training Centre. The Cairngorms, Aonach Mor and Glencoe also have significant ski installations. These activities bring many visitors to the Highlands and, as a result, play a significant role in the local economy. A range of partner organisations continue to be committed to improving access and enjoyment of these environments including SNH, FCS, Paths for All, Community Woodlands Association and the Cairngorms National Park Authority.

However, the mountains and coastline are not just for visitors as many local people like to get away from the built environment and take exercise outdoors. Indeed, given free choice, people seem to prefer outdoor to indoor exercise and benefit more from it. (75)

Engaging in any regular physical activity, either outdoor or indoor, can reduce the risk of many chronic conditions such as heart disease and Type II Diabetes as well as improving weight management. (76) Exercise can also reduce the risk of developing breast and colon cancers. These findings are independent of the effect of physical activity in reducing body weight. (77) Exercise also improves mental health and well-being (78) by reducing the risk of depression in adults and limiting cognitive decline in older people. Continued activity across the life-course maintains mobility and reduces the risk of falls. Reducing sedentary behaviour is also important. (79)

Revised physical activity recommendations (80) reflect a tailored approach across the life course and all age groups are advised to minimise sedentary behaviour. Despite promotion of the benefits of regular exercise only 62% of adults and 70% of children met recommended physical activity levels in 2012. Men and boys were more likely than women and girls to exercise at recommended levels. Physical activity also reduces with increasing age.

While the Highlands offer many opportunities for outdoor physical activity, not all of NHS Highland’s population regard the ‘great outdoors’ in this way or find it accessible.

Maximising the health benefits of the outdoor environment
needs to focus on those environments within easy reach of individuals, families and communities and also the routes that connect less obviously attractive environments with recognised places of natural beauty. Initiatives such as the Core Paths plan, local Conservation projects and ‘Woods In and Around Towns’ (FCS) provide opportunities to improve immediate access to health enhancing greenspace.

The Physical Activity and Sport Strategy for Highland Council is taking a Community Planning approach to the provision and promotion of physical activity, emphasising the need to include all ages and population groups, reduce inequalities and improve access to facilities.

**Development of the Argyll and Bute Physical Activity Position Statement**

NHS Highland has developed a Physical Activity Position Statement, following a scoping exercise with key partners, which aims to improve physical activity levels in the local population. Various areas for improvement were identified:

- Widening access through addressing the perceived exclusivity of physical activity.
- Improving transport provision although it is recognised this is a major challenge in more remote and rural areas.
- Greater partnership working to improve coordination, integration and knowledge sharing particularly with the third sector.

The following priority areas have been identified:

- Maintain provision of physical activity opportunities within and beyond the school gate.
- Support greater workplace levels of physical activity.
- Maintain physical activity opportunities in recreational or leisure settings that are inclusive and accessible to all.
- Support physical activities for older adults and those with long-term conditions.
- Enhance the promotion of physical activity within healthcare settings.
- Promote and maintain environments which support rather than hinder physical activity.
- To facilitate greater partnership working and delivery of effective communication.
Argyll and the Isles Coast and Countryside Trust (AICCT) is an independent body, supported by Argyll and Bute Council, SNH, FCS and NHS Highland, which works with communities to pool resources, experience and information to help maintain and enhance our shared assets. The Trust aims to:

- Encourage, facilitate and promote responsible access to our coast and countryside.
- Maximise external funding opportunities for the benefit of the natural, historic and social environment.
- Encourage participation, partnership working and sharing of best practice with local communities and partners.
- Create social benefits such as employment, training and volunteering opportunities.

In addition to supporting health and well-being the natural environment can play a role in supporting the education and development of children.

Dornoch Allsorts

Dornoch Allsorts, in association with High Life Highland, runs regular out-of-school and holiday programmes for children in Dornoch and Tain. The organisation prides itself on creating and using environments that allow freedom, imagination, play and adventure to truly blossom. Their main space is a donated piece of semi-woodland, shaped over time by ideas generated by the children themselves, to become a wild playground with endless possibilities for fun and adventure. This model is being rolled out to other areas of Highland.

Woodland classroom

Making use of local community woodland, Farr Primary School enjoys frequent use of a woodland classroom which provides additional natural stimuli to learning and imaginative development as well as environmental awareness and appreciation.
Mental health and well-being

Supporting mental health and well-being is one of Scotland’s key public health challenges\(^ {(81)} \) with estimates suggesting that more than a third of the population are affected by mental health disorders every year. There is a growing amount of work linking the natural environment and mental well-being:

- Being outdoors leads to improved cognition, concentration and attention, alleviating aggression and facilitating restoration by improving mood and supporting recovery and personal development.\(^ {(82)} \)

- Supporting recovery from stress. Stress reduction is a key benefit of interacting with the natural environment.\(^ {(83)} \)

The Mental Health Strategy in Scotland recognises the need for psychological and social prescribing approaches that make use of the natural environment, supporting easy access to greenspace and outdoor activities. Wider benefits include the opportunity for socialisation, building self-confidence and increasing employability through skills development.

Blarbuie Woodland Enterprise (BWE)

Blarbuie Woodland Enterprise, a partnership initiated between Reforesting Scotland, NHS, Argyll Green Woodworkers Association, Scottish Association for Mental Health and Lochgilphead Community Council, has successfully restored woodlands at the Argyll and Bute Hospital in Lochgilphead. Various user groups have benefitted from the restoration including patients, staff, local groups and the public. BWE offer a range of activities including guided walks and horticulture.

Highland Branching Out Project

Abriachan Forest is a community woodland that has been delivering supportive outdoor activities for a variety of adult groups over the last ten years. *Branching Out* is co-ordinated by FCS and is a partnership programme between the NHS, FCS and community organisations providing woodland activities on referral for mental health services. Key evaluation results have shown low attrition rates in hard to reach populations, significant increases in levels of activity and self-reported improvements in confidence, self-esteem and loneliness.

The local Branching Out project is coordinated by NHS Highland in partnership with Abriachan Forest Trust, Community Woodland Association and community mental health and OH teams. Activities are varied according to the interests and skills of the group, the site and weather conditions but commonly include a walk and a craft or conservation activity combined with lunch.
Tick prevention knowledge is vital for Highland communities, especially those who work outdoors or provide recreational activities such as forest rangers, guides and schools. Reliable information should also be provided on tourist notice boards. Tick removal devices should be readily available for use (i.e. in first-aid boxes in B&Bs) and to buy locally. Work is also in progress to improve data coding to map prevalence.”

Dr James Douglas
GP, Fort William

With climate change, ticks that carry LD have become increasingly widespread and may increase further in the future. Climate change predictions suggest more summer-type outdoor activities will be possible for longer periods, leading to increased exposure to hazards such as ticks.

2.6 Environmental hazards

Our natural environment provides many benefits to health and well-being but can also expose those who use it to certain illnesses or hazards.

Lyme Disease

Lyme Disease (LD) or Lyme Borreliosis is an illness that may result from a tick bite infected with the bacteria *Borrelia burgdorferi*. Cases of LD are often acquired through recreational activities including gardening, camping, walking, and hiking. Certain occupational groups are also at greater risk such as those who work in forestry, deer stalking and fencing.

Ticks, tiny spider-like creatures, can survive in many places, but prefer moist areas with dense vegetation or long grass. They are most active in spring, summer and autumn. Ticks wait until an animal like a sheep, deer, or human, brushes past, bite to attach themselves to the skin and start to feed on the blood. Ticks can carry many diseases but LD is the most common disease transmitted by ticks in Scotland. Not all ticks carry disease and not all areas of Scotland have infected ticks but the Highlands have the highest incidence of LD in the country. Transmission is more likely the longer the tick is attached to the skin but can occur from infected ticks in less than a day. Prompt removal within a few hours will prevent infection.

Often the only symptom of LD is a rash, which gradually spreads from the site of the tick bite. Some people may also experience ‘flu-like’ symptoms such as fatigue and muscle and joint pain. In the majority of cases, LD can be treated successfully with antibiotics. Early treatment usually clears the rash within several days and helps to prevent complications. More serious conditions such as viral-like meningitis, nerve or heart damage and arthritis can develop without treatment.

There is no effective vaccine against LD so tick awareness, avoidance of tick infested areas if possible, keeping to paths, the use of appropriate clothing and early removal of attached ticks remain the most important prevention measures. An insect repellent containing DEET may also be used. Routine checking of clothes, body and pets for ticks when you get home after outdoor activity is recommended.
**Mountain rescue**

No matter how safe we try to make it, activity on mountains and on similarly difficult terrain will inevitably lead to accidents. When these activities are remote from immediate help the seriousness of any injury will be compounded.

Treating and evacuating people who have been injured in remote locations requires a complex set of skills, coordination and dedication and is largely undertaken by volunteer Mountain Rescue Teams (MRTs). There are 23 MRTs in Scotland as well as Scottish Cave Rescue, the Search and Rescue Dog Association Scotland and the RAF. 13 MRTs are based in the NHS Highland area. Most team members are unpaid volunteers, although Police Officers make an important contribution to some teams. In 2012, over 30,000 hours of incident response time were contributed by volunteers in the NHS Highland area, excluding time spent in training, organising and fund raising. These volunteers make a major contribution to the safety of people taking part in outdoor activities in Scotland, and can put themselves at personal risk in order to benefit others.

In 2012, MRTs in Scotland responded to 636 incidents, of which 363 (57%) were in the NHS Highland area. Five of the ten teams responding to the most incidents were operating in the NHS Highland area. The Lochaber, Glencoe and Cairngorm MRTs responded to 204 incidents, 32% of all MRT incidents in Scotland.

Most casualties are evacuated initially to NHS Highland facilities. MRTs are also called out to non-mountaineering incidents including searches and rescues related to water sports, horse riding, running, snow sports and mountain biking. In Scotland, the largest number of incidents relate to summer hillwalking, followed by winter hillwalking. Among the casualties treated, lower limb injuries are the commonest. RAF and Royal Navy helicopters were involved in the response to 225 incidents, with Lossiemouth contributing to the highest proportion (40.9%).

Long term trends suggest an increase in rescues (Fig. 8), particularly in relation to summer hill walking. However, reporting of incidents may also have improved over this time and it is difficult to assess trends in use of the outdoors. The number of MRTs in Scotland has also increased and some of
the newer teams contribute their skills to other rescue activities.

![Figure 8: Mountain Rescue Teams in Scotland, Total Incidents, 1964-2012 Source: Mountain Rescue Committee of Scotland](image)

**Water-based activities**

As well as the mountains, the coast, rivers and lochs have all experienced increased recreational activity from sailing, canoeing and diving. Incidents involving water can result in death or serious injury due to cold (hypothermia), submersion (drowning) or contact with hard objects when falling or jumping into water. Incidents occur to those undertaking recreational and work-related activities.

From 2001-13, there were 91 emergency admissions for injury due to submersion or drowning (excluding those with self-determined intent). Approximately one third of these admissions were visitors to the area.

<table>
<thead>
<tr>
<th>Health Board of residence</th>
<th>Hospital location</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highland</td>
<td>NHS Highland</td>
<td>51</td>
<td>56%</td>
</tr>
<tr>
<td>Highland</td>
<td>Other than NHS Highland</td>
<td>9</td>
<td>10%</td>
</tr>
<tr>
<td>Non Highland</td>
<td>NHS Highland</td>
<td>31</td>
<td>34%</td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>91</td>
<td>100%</td>
</tr>
</tbody>
</table>

*Figure 9: Emergency hospital admissions occurring during the period from 2000/01 to 2012/13 with injury due to submersion or drowning*¹

¹With codes for external causes in any diagnostic position from W65-W749; X71-X719; X92-X929; Y21-Y219. Data source: SMR01 data analysed by Health Intelligence & Knowledge Team, NHS Highland
During the same 13 year period there were nearly the same number of accidental deaths (n = 90) in Highland residents from water-related incidents (Fig. 10).

<table>
<thead>
<tr>
<th>Deaths</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary cause of death¹</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diving/jumping into water</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>In bath tub</td>
<td>2</td>
<td>2%</td>
</tr>
<tr>
<td>Epilepsy</td>
<td>2</td>
<td>2%</td>
</tr>
<tr>
<td>Car drivers/passengers</td>
<td>7</td>
<td>8%</td>
</tr>
<tr>
<td>Fall into natural water</td>
<td>7</td>
<td>8%</td>
</tr>
<tr>
<td>Others mainly unspecified</td>
<td>20</td>
<td>22%</td>
</tr>
<tr>
<td>Vessel on water (canoe/fishing etc.)</td>
<td>25</td>
<td>28%</td>
</tr>
<tr>
<td>Drowning/submersion whilst in natural water</td>
<td>26</td>
<td>29%</td>
</tr>
<tr>
<td>All</td>
<td>90</td>
<td>100%</td>
</tr>
</tbody>
</table>

Figure 10: Deaths of Highland residents due to an accidental water-related cause in 00/01 to 12/13. Data source: ACaDMe GROS deaths: ICD9/10 codes for accidental drowning. Extracted and analysed as at 26/03/14.

Most occurred either in relation to those in a vessel on the water or when in natural water. Six were associated with alcohol intoxication which exacerbates the effects of cold. Hypothermia is therefore likely to occur more quickly, as well as making people more likely to have an accident.

Over the last year the Royal Society for the Prevention of Accidents (RoSPA) has worked with Local Authorities and as a result Scotland's Water Safety Reference Group has been established to focus on reducing the number of water related injuries and deaths in Scotland. Action taken by the group includes:¹⁸⁵

- Maintaining records of drowning and water-related incidents by passing on data to the Water Incident Database.
- Encouraging all LAs to adopt a localised Water Safety Policy using a national framework.
- Documenting, sharing and utilising campaigns on key safety issues in case studies.
- Discussing national water safety campaigns and strategies.
- Working in partnership with local authorities, the rescue services, the Scottish Government and relevant third sector organisations.
Road traffic accidents

Road safety is a priority at a local and national level and addressed locally by Safer Highland, part of the Community Planning Partnership. Provisional findings from Transport Scotland\(^{(86)}\) have shown that there were 445 accidents across Highland and 208 across Argyll and Bute in 2013 which represent 7% of accidents nationally. There were 618 casualties across Highland, with 21 fatalities, and 304 casualties in Argyll and Bute, with 11 fatalities.

Road accidents in which someone was killed or injured and recorded by police have been declining since records began in 1970. Despite this trend, the risk of being involved in a fatal or serious collision is higher in Scotland per head of population than any other area of the UK.\(^{(88)}\) Furthermore, between 2007 and 2011 the death rate in Highland was 12.9 per 100,000 population: the highest rate in Scotland which had a national rate of 4.4 per 100,000.\(^{(87)}\)

Rural areas such as the Highlands tend to have specific transport associated risks in comparison with more urban areas such as road type, hazards involving deer and livestock and the impacts of extreme weather. Rural areas are also popular with motorcyclists who are involved in a high proportion of fatal road collisions. Although not unique to rural areas, young drivers also account for a high proportion of the victims of road collisions. Contributory factors include speeding, alcohol and inexperience. The disproportionate high level of young lives lost on Highland roads is a key concern for communities and road policing. However, addressing this issue is complex given that road safety messages can be dismissed as irrelevant by this group of drivers.

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**According to data for 2010-2012,\(^{(87)}\)** there has been a decrease in the number of road collisions in all areas except Lochaber and Skye. The majority of accidents in the Highland area occurred in and around Inverness which is indicative of the high volume of traffic in this area.
2.7 Unintentional injuries

‘Accidents’ are increasingly referred to as ‘unintentional injuries’ (UIs) due to the fact that they, and the injuries incurred from them, are in the main both predictable and avoidable and not just occurrences by chance. Most are dealt with by immediate first aid or by a primary care clinician and go unrecorded, but some require admission to hospital and some result in death. Where UIs occur depends on the age of person injured. In under five year olds, most UIs occur in the home, while leisure activities and incidents on the road account for most injuries in young adults. In older adults most UIs result from falls or trips.

UIs are estimated to cost UK society £150 billion each year. The National Institute for Health and Care Excellence (NICE) estimated that an 11% reduction in UIs would offset the cost of implementing the UI prevention guidelines in the home, on the road and through outdoor and leisure activities.

<table>
<thead>
<tr>
<th>Rate per 100,000 population per year</th>
<th>Estimated number in NHS Highland population</th>
<th>Cost per year (£)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A &amp; E</td>
<td>3,300</td>
<td>10,560</td>
</tr>
<tr>
<td>Hospital admission</td>
<td>200</td>
<td>640</td>
</tr>
</tbody>
</table>

**Figure 11:** Estimated numbers and costs of hospital admissions and A & E visits due to unintentional injuries among the under-15’s in NHS Highland

<table>
<thead>
<tr>
<th>Rate per 100,000 population per year</th>
<th>Estimated number in NHS Highland population</th>
<th>Cost per year (£)</th>
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</tr>
<tr>
<td>Hospital admission</td>
<td>200</td>
<td>640</td>
</tr>
</tbody>
</table>

**Total cost** 1,545,200

Potential benefits to NHS Highland by avoiding admissions and A&E visits for UIs could be around £1.5 million.

**Attendance at Accident and Emergency Departments**

There were 100,291 attendances at A&E facilities in NHS Highland during 2012/13. This total includes both illness and injuries. Raigmore is by far the busiest site, seeing 31% of those attending A&E departments, and providing nearly 60% of A&E activity. In 2013, at least 6% of the population attended the Raigmore department due to an UI. The most numerous attendees for any reason were aged 20 to 24 years (Fig. 12). The under 15 age group accounted for nearly 16% of all injuries presenting to A&E, but injuries in older people more commonly resulted in hospital admission (Fig. 13).
Figure 12: Attendances to Raigmore A&E department during 2013: numbers due to unintentional injury* or other reasons(*1) (mainly illness with some deliberate injury) by age band

Fig. 12 & 13 data source: EDIS extract analysed by NHS H Service Planning.

Figure 13: Attendances to Raigmore A&E Department during 2013 due to unintentional injury: proportion by flow group (Group 1 = Minor injury: see & treat, Group 2 = Requiring acute assessment before management plan, Group 3 = Medical admission, Group 4 = Surgical admission & Group 5 = Out-of-hospital care)
Hospital admissions

Falls were the most common cause for admission accounting for approximately 47% of all UIs to children (Fig. 14). ‘Other injuries’ include those involving being struck by or against, crushing, scalds, piercings and accidental exposures. Over half of UIs in children aged under 5 years occurred in the home, compared to 10% of the 10-14 year olds. Most (90%) UIs from poisoning occurred in the home.

![Hospital admissions for unintentional injuries in children aged under 15 years in NHS Highland, by type, 2008/09 to 2012/13. Source: ISD Unintentional Injuries Report (Feb 2014)(90)]

There are many more UIs in adults than in children. Falls accounted for 63% of all UIs resulting in hospital admission, similar to the national average (Fig. 15).

![Hospital admissions for unintentional injuries to adults (15+) in NHS Highland by type, 2008/09 to 2012/13.](90)
The proportion of all injuries sustained in the home remained relatively steady, averaging 35%, compared to 29% nationally. This difference may reflect the older population in Highland as the home becomes the major place of injury in the older age groups.

Deaths

NHS Highland has had significantly higher numbers of deaths from UIs in adults aged over 15 years, producing the highest standardised mortality ratio (131.9, 95%CI 121.4-142.4) in mainland Scotland for 2008-12.

### Years of Life Lost (YLL)

YLL are a measure of premature mortality and are used to describe the estimated length of time an individual would have lived had they not died prematurely.

While death from injury is relatively rare, it contributes disproportionately to YLL because of the age of the people affected.

<table>
<thead>
<tr>
<th>Year of death</th>
<th>2008</th>
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<td>32%</td>
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Figure 16: Deaths as a result of UIs in NHS Highland, all ages by type and place, 2008/09 to 2012/13. Source: ISD Unintentional Injuries Report (Feb 2014) * Note – change in national coding has led to an increase since 2011 (alcohol and drug intoxication now classified as UIs rather than mental disorders) **Note – totals suppressed due to small numbers

Routine data systems for admissions and deaths do not record the place of injury or death in the same way, making analysis difficult. Not all death certificates will record the place of death/injury so the ‘in the home’ figures in Fig. 16 should be considered a minimum figure. The data relate to deaths in NHS Highland for all ages owing to extremely low numbers of deaths in children (13 deaths in 5 years).

The proportion of deaths from an injury occurring in the home averaged 13% prior to 2011 and 31% from 2011 onwards (Fig. 16), reflecting the inclusion of deaths from drug and alcohol misuse since 2011. The proportion of deaths caused by a fall was 45% compared to 48% nationally (Fig. 17). Other causes of deaths from UIs include water, machinery and fire related but being struck by or against does not account for many in contrast to the hospital admission data.
The proportion of all injuries sustained in the home remained relatively steady, averaging 35%, compared to 29% nationally. This difference may reflect the older population in Highland as the home becomes the major place of injury in the older age groups.

Deaths
NHS Highland has had significantly higher numbers of deaths from UIs in adults aged over 15 years, producing the highest standardised mortality ratio (131.9, 95%CI 121.4-142.4) in mainland Scotland for 2008-12.

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Source: ISD Unintentional Injuries Report (Feb 2014) * Note – change in national coding has led to an increase since 2011 (alcohol and drug intoxication now classified as UIs rather than mental disorders) ** Note – totals suppressed due to small numbers

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<tr>
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Primary and other emergency care

While data on hospital admissions and length of hospital stay is readily available, the impact of UIs on the workload of primary care is less easy to establish. In relation to the working age population, a survey found more than 10% of sick notes issued by GPs were for injury and poisoning. How many children seek treatment only from their GP for UIs is largely unknown. One study in Holland reported that nearly 10% of all new health problems in those aged under 18 years presenting to GPs during a year were due to an UI, equivalent to an incidence rate of 115 per 1000 aged under 18 years old. Skin lacerations and cuts accounted for 30% of all injuries with the incidence being highest in the under 5 year olds. Male gender, living in rural areas and for the under 5 year olds, having three or more siblings and having a more deprived socio-economic background were all associated with higher rates of UIs.

The Scottish Ambulance Service (SAS) was involved in 42,869 accident and emergency incidents and 1,210 air ambulance missions in the NHS Highland area during 2012/2013. For Scotland overall, the second most common reason for involvement (after transfers) was due to falls and the seventh was due to overdosing and poisoning. Of the 42,869 incidents, nearly two thirds (27,918) were emergency call-outs and almost a fifth of these were for those with UIs, although some data were difficult to interpret.
In addition to the land-based incidents, 1,210 air ambulance missions were recorded in the NHS Highland area during 2012/13, accounting for nearly 40% of the Scottish total (3,235). Over 70% of the missions involved transfer from the islands to hospitals in NHS Highland or transfer between NHS Highland hospitals and hospitals elsewhere in Scotland.

**Injury prevention**

Many regard their home as a safe place to be, free from external causes of injury and hazards. However, a significant proportion of UIs are sustained in the home. ‘Home’ is defined as any non-institutional place of residence, and is not necessarily the individual’s own home. Over the five year period 2008-12, nearly 19,000 UIs led to a hospital admission in NHS Highland. Of these 6,632 (35%) happened in the home with the majority (n=4132) experienced by those aged 65 years and over. Of the 600 plus deaths as a result of UI, 124 (20%) occurred in the home with the highest proportion occurring in the 15-64 years age group.

NHS Highland is already actively working on falls prevention programmes for older people, which have been reported on previously. Policies designed to improve housing quality are more likely to reduce falls and UIs in the home, as well as reducing health inequalities for other reasons.

**Accident prevention requires:**

- Environmental improvements to make homes and leisure areas safer.
- Education in order to increase awareness of risks and their mitigating measures.
- Enforcement of legislation.
- General safety advice:
  - Do not place baby bouncers on raised surfaces.
  - Do not put anything under the window which could be climbed on.
  - Put hot drinks out of reach and away from the edges of tables and worktops.
  - Use rear hotplates and keep pan handles out of reach.
  - Keep medicines and chemicals out of sight and reach of children, preferably in a locked cupboard.
  - Keep nappy sacks out of reach of babies and toddlers.
  - Children can drown in less than 3cm of water - never leave children or babies in the bath unsupervised, even for a moment.

[AgeUK and AgeScotland](#) provide practical advice on keeping healthy and preventing falls, specifically for the elderly.

[RoSPA](#)
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Unintentional injuries are a significant cause of morbidity across the life course. Preventing injuries, particularly those in the home and those in the youngest and oldest age groups, would significantly lessen the burden on health and its related services in NHS Highland. The most significant barrier to accident prevention is lack of knowledge and a key area for action includes raising awareness and understanding of accident prevention.

Injuries sustained whilst outdoors are a particular issue for Highland. Good preparation is vital for reducing accidents in this setting. The Mountaineering Council of Scotland has detailed guidance on its website for enjoying Scotland’s outdoors safely (www.mcofs.org.uk).

**iCycle**

The Road Safety Unit, in partnership with North Ayrshire Council, have developed a new cycle training toolkit. The iCycle website provides cycle training resources including printed materials and a training video for cycle trainers. It was developed following wide consultation as it was recognised that the resource had to be accessible, relevant and engaging. Film footage has been included which provides trainers with a valuable visual reminder of what is involved in each training session.

All schools in Argyll and Bute and North Ayrshire now have access to the website. Evaluation by Transport Scotland showed that participants felt more confident and parents reported more young people cycling to school from just over a quarter prior to training (28%) to just over a half after training (51%). iCycle was shortlisted in the category of Most Innovative Transport Project of the Year for the Scottish Transport Awards 2014.

Argyll and Bute Council currently deliver cycle training on-road to 95% of primary schools compared to the national average of 37.6%.

[www.iCycle.org.uk](http://www.iCycle.org.uk)

Prevention of accidents and injuries in the outdoors includes:

- Education and supervision of children.
- Training and use of safety equipment such as lifebelts.
- Awareness of weather conditions.
- Good preparation and planning.
- Informing others of plans.
2.8 The impact of extreme weather

Over recent years a number of extreme events have occurred across the UK including strong winds, heavy rain, heatwaves and prolonged cold weather. Although relatively mild, the winter of 2013/14 was noted for a variety of extreme weather events including prolonged periods of rainfall resulting in severe flooding across many areas of the South of England. Widespread flooding was not a significant problem locally, but the Highlands were particularly affected by a number of severe wind events.

Severe winds, December 2013

On 4th December 2013 an Amber ‘be prepared’ weather warning was issued for high winds across the Highlands and Islands in response to predicted widespread gusts of 60-70mph and up to 90mph in more exposed areas. Concerns were also held over the possibility of tidal storm surges and coastal flooding as a result of the combined severe winds and spring tides. In response a Tactical Oversight Group was convened in Inverness and a number of multi-agency groups were established across the area.

As predicted, severe winds were experienced across the region resulting in widespread disruption particularly to transport networks. Effective transport systems are vital in any area but especially for more remote and rural areas such as the Highlands and Islands which relies on a combination of ferry, road, rail and air networks. The damage to power cables resulted in extensive power outages and there was also localised flooding.

The most vulnerable community members were identified and appropriate arrangements made to ensure their needs were met.

Impacts of extreme events are wide-reaching. In addition to the short- and long-term physical health effects, extreme events can have detrimental psychosocial and economic impacts. Disadvantaged and vulnerable populations are disproportionately affected.

Although the response to extreme weather events is largely undertaken by local fire and rescue services, police and emergency planning teams, building community resilience is
increasingly emphasised. With the frequency of events likely to increase, causing multiple disruptions to transport, power and services, many remote areas are likely to experience prolonged isolation before normal services can be restored. Local community resilience to cope in such situations is increasingly important.

Argyll and Bute Community Planning Partners set up a Community Resilience project following the severe weather in the winters of 2011/12 and 2012/13. The subsequent power outages for protracted periods in some areas of Argyll highlighted the need to improve the resilience of communities and the need to create a mechanism whereby communities, the council, health and the emergency services could work better together. Argyll and Bute Council, NHS Highland, Police Scotland, Scottish Fire and Rescue, the Coastguard, Argyll Voluntary Action, Red Cross, Royal Voluntary Service, Scottish and Southern Energy, Scottish Power and the Scottish Government worked in partnership to prepare guidance which was issued to all 54 community councils in Argyll and Bute.

The project has improved joined-up working between partners and communities both in the planning for, and during an actual response to, an emergency situation.
Adaptation to and mitigation of the impacts of climate change include increasing the use of renewable sources of energy, such as wind, wave and tide.

Scotland has these energy sources in abundance, and many developments are in progress, but the impacts on local communities must be balanced against benefits to the wider population.

Impact assessment, mandatory for the environment, must include the impact on human health and the views and expectations of local communities.

2.9 Impact assessment

As described within this report human activities have had, and continue to have, significant impacts on our environment. Conversely, the environment in which we live and work contributes to our health and well-being. Consequently, it is vital that we identify beneficial and detrimental processes and impacts, whether they affect the environment itself or human health and well-being and take action accordingly.

Impact assessments are now required as part of many policy making and planning processes such as Strategic Environmental Assessment (SEA), Environmental Impact Assessment (EIA) and Equality Impact Assessment (EQIA).

Health Impact Assessment (HIA) is a method for assessing the likely impact of policies and plans on health with a view to incorporating the results into planning and decision making. Although not mandatory, it should complement the other assessment processes mentioned above. The aim is to maximise positive health impacts and mitigate negative impacts. HIA can also be used as a means of facilitating community engagement in planning. There are a number of tools available to support both rapid approaches and more detailed work.\(^{(99)}\)

The potential physical health effects of environmental hazards are, for the most part, well-established within medical and scientific communities. More recently however, work within the fields of sociology and environmental psychology has demonstrated the importance of the psychosocial impacts of such hazards\(^{(100)}\) in addition to the need for greater awareness and understanding of them.\(^{(101)}\) Responses to environmental health concerns are mediated by variables such as the nature of the stressor, the social and cultural context of the stressor and individual and community characteristics.\(^{(102)}\)

Developments, and their accompanying planning processes, can have significant impacts on individuals and communities. Pre-development consultations for developments such as waste plants, quarrying and wind farms frequently highlight perceived impacts on local health and well-being. In addition, it is increasingly recognised that the decision making process itself may impact on communities through the generation of anxiety and concern whether a development goes ahead or...
not. This process may take considerable time to come to a conclusion and in view of the potential for differing views may lead to divisions in what may previously have been a close-knit community.

**Argyll Array wind farm proposal**

In 2011, an offshore wind farm development was proposed off the coast of Tiree, in the Inner Hebrides. The proposal was subsequently suspended secondary to concerns about its viability following geological surveys. The perceived impacts of the proposed wind farm and the community response to the suspension of the project have recently been investigated.

Semi-structured interviews were conducted with members of the Tiree community. There was overwhelming consensus over what Tiree meant as a place to live and work, but opinions were divided on the perceived impacts of the Argyll Array. It was not possible to group these views according to islander classification. Community cohesiveness was reported as being severely affected with some islanders describing irreversible divisions.

Once analysis is complete, the project findings should inform decision-making in future planning scenarios.

The Scottish Health Inequalities Impact Network (SHIIAN) has undertaken a project to look at the health impacts of developments in rural areas in particular identifying and exploring the key health and well-being issues common to different rural development scenarios. The research seeks to identify whether there are particular health or wellbeing impacts that can be linked specifically to rurality or remoteness. A number of themes or issues are being investigated, including:

- **Population** – ageing and youth migration.
- **Economy** – lack of major employers and reliable work; lack of diversity; lower than average proportion of SMEs.
- **Employment** – ‘portfolio’ careers (seasonal working and seasonal/transient workforce); lower wages; lack of jobs and opportunities for young people; recruitment and retention of highly skilled and essential workers.
- **Access to services** – need to travel long distances to access services and amenities.
• Physical environment – different patterns of water and land use, difficult physical terrain.
• Infrastructure – vulnerability of supply and distribution chains; higher costs.
• Cost of living – fuel and food costs.
• Rights and responsibilities of people living in rural areas.
• Resilience of people in rural communities.
• Magnitude of comparatively small changes in rural and remote areas.

As the climate continues to change there will be impacts on the natural environment, land use, leisure activities and employment in addition to changes arising from mitigation and adaptation policies. It has therefore never been more essential to consider the impacts of climate change and the environment on human health and well-being.
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References

5 Working Group II contribution to the fifth assessment report of the intergovernmental panel on climate change. Climate Change 2014, Impacts, Adaptation and vulnerability summary for policymakers. Intergovernmental Panel on Climate Change: 5,2014
23 Route Map for Sustainable Health. Sustainable Development Unit (SDU), 2013.
75 Mitchell R. Is physical activity in natural environments better for mental health than physical activity in other environments? Social Science and Medicine (2013); 91: 130-134.