



Kent Joint Strategic Needs Assessment (Kent JSNA)

Kent 'Sustainability' JSNA Chapter Summary Update '2013-14'

Contact: Malti.Varshney@kent.gov.uk

Website: www.kpho.org.uk

Sustainability JSNA Chapter Update

Delivering health and social care outcomes through a sustainable approach

The following is a pdf version of the chapter summary found on the Kent JSNA website.

6/1/2014

Kent County Council

Public Health, Planning and Environment Division, Families and Social Care, NHS, the Kent and Medway Air Quality Partnership, the Local Nature Partnership and Kent Environment Strategy Executive Officers Group

Executive Summary

Delivering health and social care outcomes through a sustainable approach

Contributors: Public Health, Planning and Environment Division, Families and Social Care, NHS, the Kent and Medway Air Quality Partnership, the Local Nature Partnership and Kent Environment Strategy Executive Officers Group.

There is a clear interdependency between public health, social care and sustainability and Health and Wellbeing Boards are required to consider wider social, environmental and economic factors that impact on health and wellbeing – such as access to green space, the impact of climate change, air quality, housing, community safety, transport, economic circumstances and employment. This chapter looks at how we can improve delivery of public health outcomes through taking a sustainable approach focussing on these, amongst other priorities for Kent.

A sustainable health and care system requires an integrated approach, improving quality of life and meeting the needs of current and future generations, whilst simultaneously protecting and enhancing the natural environment. Through considering economic, social and environmental impacts in our decision making we can ensure that our approach to delivery of health and social care in Kent is sustainable, with outcomes benefitting our residents now and into the future.

The Marmot Review¹ highlighted that fair distribution of health; well-being and sustainability are important social goals and suggests that tackling social inequalities in health and tackling climate change must go together. An individual's health and wellbeing is influenced by a wide range of factors, including community resilience, built environment, and local economy but also factors such as the wider environment, national and European policies. Universal promotion of healthy lifestyles can have a range of co-benefits for human health and the environment. For example, walking and cycling, often referred to as 'active travel', promote health and reduce the carbon emissions that cause climate change^{2,3,4,5}. Another example is the potential for green gyms in areas of high need which can support communities to be more physically active and promote social interaction contributing to good mental wellbeing^{6, 7, 8, 9,10}.

Areas of focus for this chapter are:

- Planning
- Housing and fuel poverty
- Transport
- Natural and Historic Environment
- Climate resilience
- Air Quality
- Workplace and supply chain

Key issues and gaps

Planning and Sustainability

Planning and health are inextricably linked, however, past interventions and current processes and arrangements for developing shared priorities need to be improved if health and wellbeing priorities for communities are to be delivered effectively. There is a need for local planning authorities to better integrate health issues in Local Development Plans, regeneration and growth strategies (linking to the Local Enterprise Partnership) and transport strategies¹¹. This is particularly important as the planning decisions made now need to consider future pressures such as our ageing population and increased risks from severe weather events and their impacts. Developing and incorporating Health Impacts Assessments into the planning process can ensure that new developments have addressed the potential opportunities and risks to health and wellbeing.

Housing

Being unable to afford to adequately heat a home increases the risk of ill health for families and children¹². It is also believed to be the reason for extra 'winter deaths', particularly for older people or those with disabilities and long term conditions, many of which could be avoided^{13, 14}. Children living in cold homes are twice as likely to suffer from chest problems, asthma and bronchitis¹⁵. As a wider determinant to health, fuel poverty is a contributor to inequalities, conversely excess winter deaths do not necessarily correlate to the areas of high deprivation¹⁶.

The United Kingdom performs poorly in relation to other Western European countries for fuel poverty, homes in a poor state of repair, thermal performance and home insulation^{17,18}. The Kent Warm Homes programme provides housing retrofit for vulnerable or low income households. Measures include cavity wall, solid wall and loft insulation, boiler repairs or replacements.

Partners need to be aware of the Kent Warm Homes programme and identify vulnerable people and energy inefficient homes to ensure maximum health and environmental benefits are achieved.

Transport

Transport provides positive and negative impacts on people's lives, allowing greater access to services, whilst inactive transport (e.g. cars) can lead to air pollution, accidents and increased obesity through lack of exercise.

Transport is responsible for approximately 30% of Kent's greenhouse emissions¹⁹ (DECC figures) and this could be reduced by 60% through a shift towards public and self-propelled transportation, consequently reducing the risk of adverse health effects²⁰.

Kent County Council are working in partnership with Districts, Southeastern Railways, Arriva, Action in Communities, Rural Kent and two hospital trusts to develop sustainable 'Green transport' projects. Sustainable transport should be included in the sustainability planning toolkit, including promotion and publicity to improve uptake of 'Green transport' services.

Climate Resilience

Our climate is changing and evidence is increasing that there will be significant implications for our resident's health and wellbeing, which in turn will lead to an increase in service pressures. The most vulnerable in our county are likely to feel the greatest impacts of these changes, with the elderly particularly at risk²¹. As we know, the older population of Kent (age group 65+ and 85+) is predicted to increase significantly over the next 5 to 10 years²².

Key findings from the UK Climate Projections 2009 (UKCP09)²³ suggest we are likely to experience further changes into the future, and that by 2050 winters are likely to be warmer with increased rainfall, whilst summers are likely to be hotter, including night temperatures, whilst rainfall in the summer is likely to decrease.

In addition to this, we are also likely to experience an increased frequency of severe weather events, posing significant risks, such as 'very hot days', more intense rain leading to increased risk of surface and coastal flooding and changes in storminess and high winds.

In Kent, based on demographics, geography and climate change projections, the areas likely to have the greatest impact on resident's health, both physical and mental are:

- Flooding^{24, 25, 26,27}
- Mortality and morbidity related to temperature^{28, 29,30,31}
- Food and water borne diseases
- Vector borne diseases
- Air Quality^{32, 33, 34,35, 36, 37, 38}
- Vulnerability of infrastructure and built environment^{39, 40}

Challenges for Kent will be to identify those at risk, and ensure that risks are considered in planning, communicated and implemented, particularly in severe conditions and emergency situations.

Air Quality

Air quality in the UK has improved over the last twenty years⁴¹, but despite these improvements there are negative effects to both health and the environment. The most significant pollutants are Particulate Matter (PM), oxides of nitrogen (NO_x), and ozone (O₃)⁴². 2012 calculations estimate approximately 1180 early deaths as a result of just PM_{2.5} air pollution across Kent & Medway in 2010⁴³. Where air pollutant concentrations are found to exceed the objectives set by the government, Air Quality Management Areas (AQMA's) are declared. Districts then develop Air Quality Action Plans with their partners to work towards achieving those objectives.

The Kent and Medway Air Quality Partnership have a dedicated health sub-group. Through collaborative working with multiagency partners a portfolio of projects has been developed to mitigate the effects of air pollution:

- a. Education – "Air We Breathe" & links to smoking cessation
- b. Sustainable Transport – Low carbon vehicles (electric vehicle charging, hybrid

buses, bus retrofit project), active transport & Walk to School.
c. Exposure Reduction – Use of forecasting technologies, KentAir pollution forecast system

It is important that the implications of air quality on health are widely communicated and those most vulnerable are aware and able to manage during periods of reduced air quality^{44,45}.

Workplace health and supply chains

The health sector is a major user of resources and can have a significant carbon footprint. For example, the NHS produces 600,000 tonnes of waste at a cost of £42 million - over one per cent of all domestic waste produced in the UK - and consumes 50 billion litres of water a year⁴⁶. Energy used by the health sector produces about 3.5m tonnes of CO₂ a year⁴⁷. A sustainable workplace is beneficial to staff, the organisation and the community in which they work.

In addition, through encouraging local employment opportunities we can:

Reduce unemployment and its interlinking issues such as depression, anxiety and morbidity, reduce travel miles, encourage greater community cohesion where people can live, work and engage in leisure activities within their communities .

Kent County Council and its partners have a range of initiatives in place to support workplace health and wellbeing and linking these to sustainability. We can draw on these lessons to support our supply chains in building their sustainability credentials.

The Natural and Historic Environment

The natural and historic environment supports health and wellbeing in a variety of ways, from provision of clean air, water and medicines, to food and natural resources^{48, 49}. But nature and heritage also makes a direct contribution to better mental and physical health and improved social engagement, for example, a recent study found that archaeology can improve mental health through linking physical exercise and mental tasks⁵⁰. Increasing access to nature can improve public health and provide opportunities to foster social cohesion. Green spaces can provide social benefits, increased physical and mental wellbeing, although availability and quality are not evenly distributed, with those in deprived urban areas having access to up to five times fewer public parks or green space⁵¹. In addition, incorporating more green space can reduce particulate pollution⁵², leading to improved air quality, for example planting trees along urban roads.

People who live within 500m of accessible green space are 24% more active and fitter⁵³. Reducing the sedentary population by just one per cent would reduce morbidity and mortality rates and save £1.44 billion for the UK⁵⁴.

The inclusion of green spaces and heritage sites should be integrated into the sustainability toolkit, to inform future planning projects.

Recommendations for commissioning

Summary of Recommendations: Although there are often different drivers for sustainability, climate change and public health, there is significant overlap in the actions required to address all three issues. Some key recommendations have become apparent to maximise opportunities from developing sustainable decisions and policies. These recommendations will be developed into an action plan to support delivery and run alongside this chapter.

Theme	Recommendation
Cross-cutting: Communications and embedding into strategy	<ul style="list-style-type: none"> <li data-bbox="555 568 1398 853">▪ Research: Use Local Authority and NHS data systems and the 'Risk Stratification' approach to identify vulnerable people and those who are targeted for a range of interventions (e.g., Energy Company Obligation, Climate resilience, flood risk planning, Kent Air pollution forecasts etc). Use to inform targeted communications. <li data-bbox="555 860 1398 1077">▪ Communications: Develop cross-cutting communications where possible to make every contact count and supply information and training to wider partners such as GPs, Primary Care, Community Care and Ambulance Trusts. <li data-bbox="555 1084 1398 1249">▪ Project: Develop checklist for key strategies and plans to ensure that health and sustainability considerations are adequately reflected and conflicts of interest are addressed
Cross-cutting: Planning	<ul style="list-style-type: none"> <li data-bbox="555 1276 1398 2002">▪ Project: It is recommended that the integration of sustainability and health into the planning system is reviewed with partners and a simple online toolkit produced to inform local planning decisions and ensure risks and opportunities are addressed. The toolkit could cover areas of relevant strategic documents and drivers (e.g., National Planning Policy Framework and Duty to Cooperate) but also key themes such as: <ul style="list-style-type: none"> <li data-bbox="703 1603 900 1637">○ Air Quality <li data-bbox="703 1644 1054 1677">○ Sustainable transport <li data-bbox="703 1684 1075 1718">○ Access to green space <li data-bbox="703 1724 1007 1758">○ Climate resilience <li data-bbox="703 1765 1075 1798">○ Access to healthy food <li data-bbox="703 1805 868 1839">○ Housing <li data-bbox="703 1845 1018 1879">○ Access to services <li data-bbox="703 1886 1305 1928">○ Heritage and opportunities for sense of place <li data-bbox="555 2009 1398 2036">▪ Project: It is recommended that the JSNA is utilised

	<p>as an evidence base for local planning decisions and this should be integrated into the toolkit as above. This will require the tailoring of JSNA evidence to spatial planning and how the JSNA evidence can support local monitoring of health indicators and spatial planning policies.</p>
	<ul style="list-style-type: none"> • Project: It is recommended that local leads be identified representing the Health and Wellbeing Boards to influence and support local planning and training given as appropriate
<p>Housing and fuel poverty</p>	<ul style="list-style-type: none"> ▪ Communications: It is recommended that training and support is given across planners, health practitioners and members to raise awareness and support delivery of multiple outcomes relating to health, wellbeing and sustainability ▪ Project: It is recommended that Health and Wellbeing Boards and partners support delivery of the Warm Homes programme to ensure homes are energy efficient, including those who do not fully fit criteria for ECO but are vulnerable in cold weather (e.g., Warm Homes, Healthy People Fund, Public Health funding), which will require ongoing funding. ▪ Communications: Increase awareness of fuel poverty and the Warm Homes programme with those working with vulnerable groups and engage wider partners, such as GPs, Primary Care, Community Care Services and Ambulance Trusts. ▪ Project / Monitoring: Monitor indoor air quality and summer temperatures in properties and research new insulation and ventilation processes to ensure that insulating properties does not have an adverse effect on residents' health.
<p>Transport</p>	<ul style="list-style-type: none"> ▪ Communications: Widely promote and publicise opportunities for active transport (e.g. cycling, walking) and the use of low carbon and sustainable fuels across organisations and develop projects as appropriate (e.g. electric vehicle charging). ▪ Project: Review the barriers to uptake and ongoing use of travel planning and put measures in place as appropriate. ▪ Project: Provide policy support from the Health and Wellbeing Strategy for sustainable transport schemes to help strengthen bids for funding from the Local Sustainable Transport Fund (LSTF), Local Transport Body (LTB) and the Local Growth Fund (LGF)

<p>Natural Environment and Heritage</p>	<ul style="list-style-type: none"> ▪ Research: Research current number of referrals from health and social care practitioners for green exercise opportunities (e.g., health walks, conservation management, archaeology etc) and use to inform targeted action plan to improve take up. ▪ Research: Undertake a gap analysis to identify current activity in relation to the natural environment and opportunities for delivery of health outcomes. Use this learning to develop a targeted action plan to ensure co-benefits from natural environment and health. ▪ Communications: Review and provide further guidance on opportunities for outdoor exercise and use of green space for practitioners to promote with a view to improve health and wellbeing of Kent residents. ▪ Research: Review how green exercise and opportunities has benefitted patients and if this has led to identifiable improvements in health and wellbeing and reduction in prescriptions. ▪ Communications: Review opportunities for greening the health and social care estate and widely communicate and raise awareness of the benefits of green space to health and wellbeing. ▪ Research and Communication: Review current activity in relation to visiting the historic environment and widely communicate the physical and mental health benefits linked to the six ways to wellbeing. ▪ Project: Identify and develop initiatives which enable the positive health benefits of volunteering/working in the historic environment, e.g., the benefits of archaeological work on mental health as demonstrated through Operation Nightingale
<p>Climate Resilience</p>	<ul style="list-style-type: none"> ▪ Research: Identify groups with pre-existing conditions which could make them more susceptible to severe weather and climate change, linking to the risk stratification approach as appropriate. Use to inform targeted communications. ▪ Communications: It is recommended that climate / extreme weather and air quality preparedness and resilience is promoted within the local health and social care system, targeting those identified above for alerts (e.g., Met Office and KentAir Pollution forecasts air alerts as well as work of the Kent Resilience Forum). ▪ Research: Strengthen understanding of causes and types of flood-related adverse health effects including longer term physical and mental health impacts and develop targeted action plan to address risks.

	<ul style="list-style-type: none"> ▪ Project: Local resilience planning such as Local Multi-Agency Flood Plans should incorporate health impacts and vulnerable communities should be supported in building their resilience to severe weather and climate change. This should include a review of the psychosocial and mental health aspects of emergency preparedness ▪ Research: Map health and social care infrastructure and its interdependencies to identify vulnerability to severe weather, flooding and climate change building on SHAPE and the work of the flood risk team. Use to identify those most at risk and develop actions as appropriate to improve resilience. ▪ Monitoring: Currently, monitoring and surveillance of the impacts of severe weather and climate change on health and wellbeing is not as effective as it could be. For this reason it is recommended that Public Health and partners sign up to the Severe Weather Impacts Monitoring System (SWIMS) to input how services are affected by severe weather and build the evidence base for actions to improve resilience and avoid future and current costs.
Air Quality	<ul style="list-style-type: none"> ▪ Communications: Raise awareness of the impacts of air quality on health across all groups / organisations, including health professionals, decision/policy makers, vulnerable groups (linking with cross cutting activities on communication). ▪ Research: Investigate the public health significance/impact of the air quality management areas in Kent using the Kent & Medway Air Quality Monitoring Network annual report as an evidence base. Use learning to further target and inform communications.
Workplace and Supply Chains	<ul style="list-style-type: none"> ▪ Research: Review the current environmental performance of the health and social care supply chain and identify opportunities for improving and incorporating new sustainable business models (e.g., circular economy, life-cycle assessments). ▪ Communications: Raise awareness of environmental management, climate resilience and workplace health across the health and social care supply chain, e.g., through the STEM scheme. ▪ Project: It is recommended that contracts and procurement include an awareness of the implications of severe weather and climate change and ensure that business continuity plans are in place as appropriate.

Delivering Public Health outcomes through a sustainable approach

There is a clear interdependency between public health, social care and sustainability and Health and Wellbeing Boards are required to consider wider social, environmental and economic factors that impact on health and wellbeing- such as access to green space, the impact of climate change, air quality, housing, community safety, transport, economic circumstances and employment. This chapter looks at how we can improve delivery of public health outcomes through taking a sustainable approach focussing on these, amongst other, priorities for Kent.

A sustainable health and care system requires an integrated approach, improving quality of life and meeting the needs of current and future generations, whilst simultaneously protecting and enhancing the natural environment. Through considering economic, social and environmental impacts in our decision making we can ensure that our approach to delivery of health and social care in Kent is sustainable, with outcomes benefitting our residents now and into the future.

The Sustainable Development Unit (SDU) introduces the concept of system-wide sustainability and clearly states that commissioned and provided services should be within the limits of financial, social and environmental resources.

Central to the delivery of Bold Steps for Kent⁵⁵ over the coming years is Kent's long-term framework for regeneration in the county. Unlocking Kent's Potential⁵⁶ identifies five key priorities for Kent over the next 20-25 years. In addition, it identifies climate change as one of Kent's challenges. The strategy recognises that meeting the challenge of climate change is central to supporting economic growth and regeneration in Kent.

Kent County Council and its partners have committed to delivery of the Kent Environment Strategy⁵⁷ (KES), which brings together all three strands of sustainability and its delivery is a priority for Kent. The KES follows three themes:

- 1: Living well within our Environmental Limits
- 2: Meeting the Climate Change Challenge
- 3: Valuing our Natural Environment

The priorities in the KES are not repeated here as their delivery is already a commitment for public health and social care. This chapter rather focuses on specific benefits of sustainability and the evidence base for ensuring that gaps identified are addressed in Health and Social Care in Kent.

The Marmot Review⁵⁸ highlighted that fair distribution of health, well-being and sustainability are important social goals and suggests that tackling social inequalities in health and tackling climate change must go together. Universal promotion of healthy lifestyles can have a range of co-benefits for human health and the environment. For example, walking and cycling, often referred to as 'active travel', promote health and reduce the carbon emissions that cause climate change. Another example is the potential for green gyms in areas of high need which can support communities to be more physically active and promote social interaction contributing to good mental wellbeing.

One of the key points of interest of a sustainable approach is that it provides an overarching framework with which to understand and act on the multi-dimensional relationship between human health, health inequalities and the environment in which we live and work. An individual's health and wellbeing is influenced by a wide range of factors, including



Figure 1-1: The concept of sustainable economic development

community resilience, built environment, local economy but also factors such as the wider environment, national and European policies (Figure 1-2)⁵⁹. Collective interaction between these factors results in variable health outcomes experienced by individuals and communities.

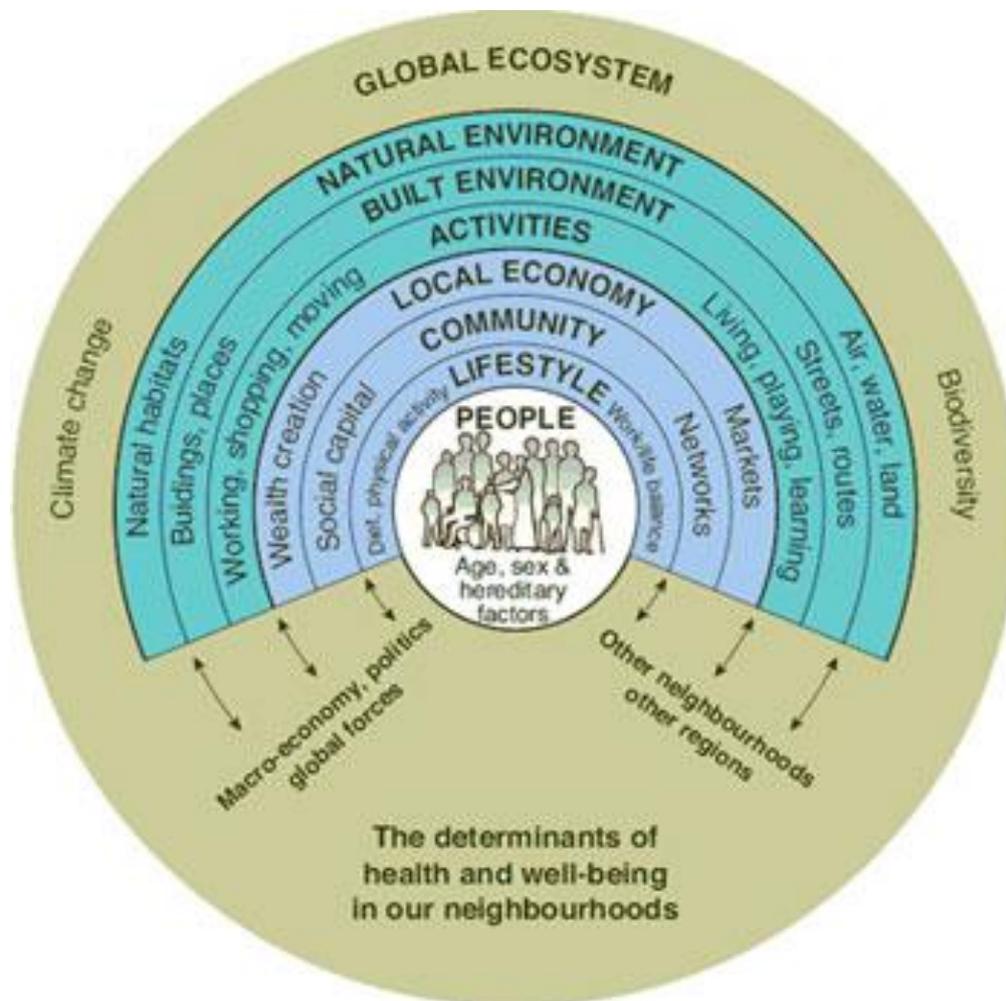


Fig 1-2. Barton & Grant 2006

http://eprints.uwe.ac.uk/7863/2/The_health_map_2006_JRSH_article_-_post_print.pdf

Health inequalities are avoidable variations in health status of groups and individuals. This is a complex issue and persistent health inequalities in Kent pose on-going challenges for commissioners across the health and social care system. These challenges cannot be satisfactorily addressed by any single agency alone and require action across partner organisations. The national review on health inequalities (Fair society, Healthy lives,) ⁶⁰ highlighted that there is a social gradient in health i.e. lower a person's social position, the worse his or her health and therefore action on health inequalities requires action across all the social determinants of health.

The Marmot Review⁶¹ states that reducing health inequalities will require action on six policy objectives:

- Give every child the best start in life
- Enable all children, young people and adults to maximise their capabilities and have control over their lives
- Create fair employment and good work for all

- Ensure a healthy standard of living for all
- Create and develop healthy, sustainable places and communities
- Strengthen the role and impact of ill health prevention

Sustainable decisions and policies can deliver on all of the above and action is required across all the social determinants of health, involving all central and local government departments as well as the third and private sectors.

By looking to incorporate sustainability into health decisions (and vice versa), there are clear benefits relating to the six ways to wellbeing⁶², for example:

1. Connect... With the people around you at home, work, school or in your local community e.g., volunteering on natural or historic environment projects or through spatial planning to improve community cohesion.

2. Be Active... Access to green space and opportunities for outdoor exercise can improve mental and physical wellbeing.

3. Give... Volunteering time and joining community schemes for example, from archaeology and conservation to providing support in emergencies.

4. Keep Learning... Learning new skills and developing others, the natural and historic environment offers multiple opportunities as well as potential to improve understanding of how to build resilience to severe weather events.

5. Take Notice... Kent has a wealth of natural and historic resources, from Areas of Outstanding Natural Beauty (AONB) to heritage sites across the county.

6. Grow your World... By encouraging sustainable transport and retrofitting homes there are multiple positive outcomes such as reducing fuel poverty and associated stress, warmer homes and healthier lifestyles through active transport (e.g., walking and cycling).



Figure 2-3: The Six Ways to Wellbeing

Our climate is changing and evidence is increasing that there will be significant implications for our resident's health and wellbeing, which in turn will lead to an increase in service pressures. The most vulnerable in our county are likely to feel the greatest impacts of these changes, with the elderly particularly at risk⁶³. As we know, the older population of Kent (age group 65+ and 85+) is predicted to increase significantly over the next 5 to 10 years⁶⁴.

The National Adaptation Programme⁶⁵ Action Plan, a requirement of the Climate Change Act (2008), was launched on 1st July 2013. As part of this, a key action identified for Directors of Public Health, Health & Wellbeing boards and Clinical Commissioning Groups is to implement local, evidence-based actions to address health risks from climate change and to prepare, respond and recover to severe weather events associated with climate change, for example through Joint Strategic Needs Assessments, Joint Health and Wellbeing Strategy and Local Health Resilience Partnerships (LHRPs)⁶⁶. This is further supported through The Department of Health's top three priorities for adaptation policies⁶⁷:

- adapting the health and social care infrastructure (hospitals, nursing homes) to be more resilient to the effects of climate change
- to ensure that national and local adaptation plans exist for the expected health impacts from climate change, and that these plans are fully implemented, with regular evaluation to ensure they remain effective
- to increase awareness amongst the public and the medical profession of the health impacts of climate change, and what to do to reduce and adapt to them.

A requirement for NHS organisations to develop a Sustainable Development Management Plan, approved at Board level is included in the Public Health Outcomes Framework⁶⁸, and sustainability is a requirement in the Clinical Commissioning Groups authorisation process. The expectation is that commissioners will require their providers to demonstrate improvement in sustainability performance over time. This chapter, along with the Kent Environment Strategy, goes some way to providing the evidence for delivery of the outcome.

○ **Focus on social care:**

Sustainable social care has to be seen in the context of the critical challenges that Kent and the rest of the UK faces – climate change, demographic change and an ageing population, as well as a national and global financial crisis. Our society is facing social, economic and environmental challenges, and so too are our social care services.

The idea of sustainable social care is a broad and emerging area; as such we should consider how the key tools needed to deliver a sustainable system – strategic commissioning, procurement, design, planning, and joint working can be refocused and adapted.

We should consider sustainable social care from these different perspectives:

- sustainable commissioning and engagement
- resilience, adaptation and climate change
- creating the environment for care: a consideration of the physical environment and its role in sustainable social care
- personalisation

Developing a sustainable social care approach is not a strategy for removing all the pressures on social care, however, it recognises the pressures that social care currently has, and that it will face in the future. Adopting a sustainable approach will equip social care to better rise to the challenges it faces. It is necessary then that we identify what change is achievable. There are a number of challenges for Kent in developing this approach:

1. What are the conditions needed to be in place to make social care sustainable, and how can we design personalised services in Kent that also meet the wider community needs in the longer term?
2. How can we achieve efficiencies that, at the same time, generate environmental, social and economic benefits for the people of Kent and their local communities?
3. What are the impacts of social care services on carbon emissions, and the Kent environment as a whole?
4. How can we deal practically with the effects on vulnerable groups in Kent of extreme weather events such as flooding and drought?

5. The challenge of meeting some of the priorities as set out in the Medium Term Plan, Bold Steps for Kent 2014/15, and the reorganisation of County Council as part of Change to keep succeeding, particularly the options for the future shape of Adult and Children’s social services.

There are two key areas where social care needs to adapt to deliver sustainable social care. Social care organisations need to be configured and act in a way that is supportive to the agenda to complement people who use services and environmental leaders and consider:

- **Long-term vision**

Being sustainable means thinking about the long-term impact of what we do. Too often social care can find itself driven by short-term goals or pressures and find it challenging to take account of the bigger picture, the longer time horizon. However, a focus on outcomes soon makes the case for a sustainable development approach.

- **Leadership and partnership**

All public sector services should now recognise the importance of partnership. For local authorities there is a particular role that they play as the democratic lead in their area. Sustainable social care needs leadership and partnership too, among commissioners, providers and people who use services, i.e. across the whole system.

Our Approach

The needs assessment for sustainability is underpinned by the outcomes for both public health and social care. The public health outcomes framework^{69, 70} consists of two overarching outcomes that set the vision for the whole public health system (figure 1- 4). For social care, there are four over-arching domains (figure 1-5).

This chapter looks at key opportunities to improve health through sustainable programmes and where gaps can, and should, be addressed to maximise the impact of a joined up approach to delivering public health and social care outcomes.

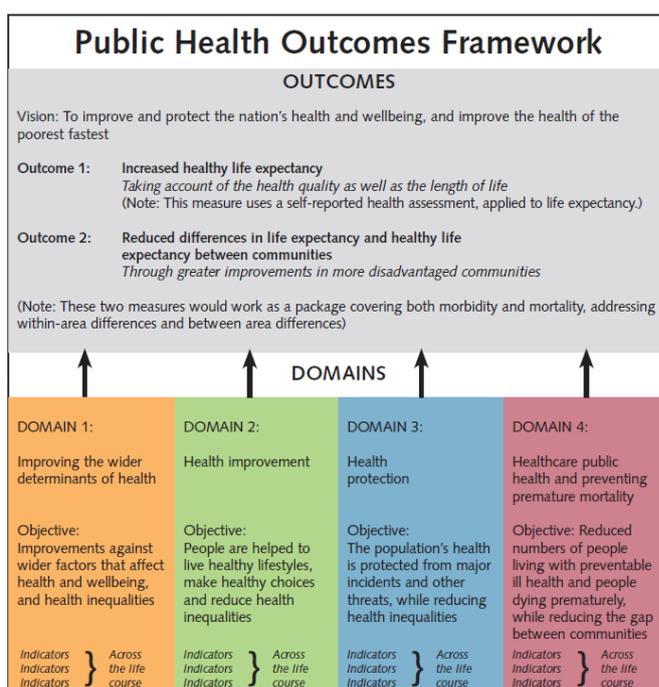


Figure 1-4: Public Health Outcomes Framework⁷¹

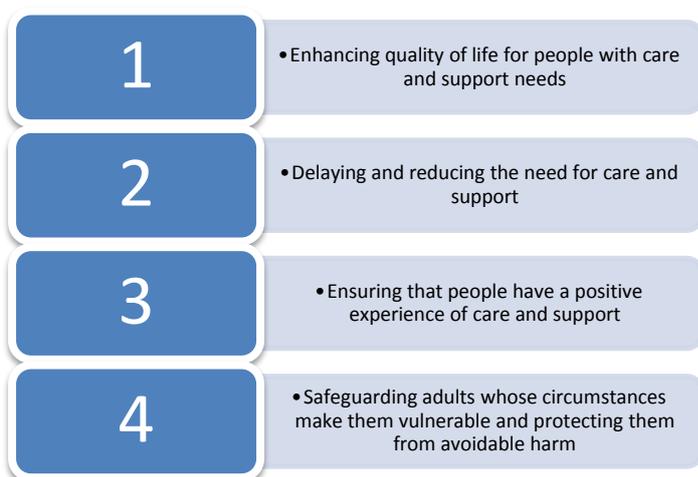


Figure 1-5: Social care domains

The rest of this chapter is separated into the different sustainability priorities, projects and issues which need to be considered. It is the integration of economic, social and environmental issues which is key for sustainable outcomes and so these are then drawn together into a series of recommendations overall. Priorities for Kent and their associated domains and outcomes for public health are summarised in Table 1 and for social care in Table 2.

Areas of focus are:

- Planning
- Housing and fuel poverty
- Transport
- Climate resilience
- Air Quality
- Workplace and supply chain
- Natural Environment

In addition, there are some recommendations that cut across all of the above and so should be coordinated, these are:

Cross-cutting and embedding into strategies	<ul style="list-style-type: none"> ▪ Research: Use Local Authority and NHS data systems and the ‘Risk Stratification’ approach to identify vulnerable people and those who are targeted for a range of interventions (e.g., Energy Company Obligation, Climate resilience, flood risk planning, KentAir pollution forecasts etc). Use to inform targeted communications.
	<ul style="list-style-type: none"> ▪ Communications: Develop cross-cutting communications where possible to make every contact count and supply information and training to wider partners such as GPs, Primary Care, Community Care and Ambulance Trusts.
	<ul style="list-style-type: none"> ▪ Project: Develop checklist for key strategies and plans to ensure that health and sustainability considerations are adequately reflected and conflicts of interest are addressed

NOTE: All the recommendations made will be developed into an action plan which will sit alongside this chapter.

Table 1-1: Sustainability priorities and associated Public Health outcomes and JSNA chapters

Sustainability priority	Supports PH Domains:	Supports PH Outcomes:	Links to other JSNA chapters
Planning	<ol style="list-style-type: none"> 1. Improving wider determinants of health 2. Health Improvement 3. Health Protection 4. Healthcare, public health and preventing premature mortality 	<p>Most outcomes are supported through sustainable development.</p>	<ul style="list-style-type: none"> • Health inequalities • Physical activity, diet and Obesity • Mental health • Environment / housing / transport and homelessness • Health, wellbeing and sustainability
Housing and Fuel Poverty	<ol style="list-style-type: none"> 1. Improving wider determinants of health 2. Health Improvement 4. Healthcare, public health and preventing premature mortality 	<p>PH1.1: Children in poverty</p> <p>PH1.9: Sickness absence rate</p> <p>PH1.17: Fuel poverty</p> <p>PH2.23: Self-reported wellbeing</p> <p>PH2.24: Injuries due to falls in people aged 65 and over</p> <p>PH4.4i: Age-standardised rate of mortality from all cardiovascular diseases (including heart disease and stroke) in persons less than 75 years of age per 100,000 population</p>	<ul style="list-style-type: none"> • Environment / housing / transport and homelessness • Excess winter deaths • Health, wellbeing and sustainability

		<p>PH4.4ii: Age-standardised rate of mortality that is considered preventable from all cardiovascular diseases (including heart disease and stroke) in persons less than 75 years of age per 100,000 population</p> <p>PH4.7i: Age-standardised rate of mortality from respiratory diseases in persons less than 75 years of age per 100,000 population</p> <p>PH4.7ii: Age-standardised rate of mortality that is considered preventable from respiratory diseases in persons less than 75 years of age per 100,000 population</p> <p>PH4.14: Hip fractures in people aged 65 and over</p> <p>PH4.15: Excess winter deaths</p>	
Transport	<ol style="list-style-type: none"> 1. Improving wider determinants of health 2. Health Improvement 3. Health Protection 	<p>PH1.10: Killed and seriously injured casualties on England's roads</p> <p>PH1.18: Social isolation (Placeholder)</p> <p>PH2.12: Excess weight in adults</p> <p>PH2.13: Proportion of physically active and</p>	<ul style="list-style-type: none"> • Physical activity, diet and Obesity • Chronic obstructive pulmonary disease (COPD) • Coronary heart disease (CHD)

		inactive adults PH3.1: Fraction of mortality attributable to particulate air pollution	<ul style="list-style-type: none"> • Stroke and transient ischemic attack (TIA) • Diabetes
Climate Resilience	3. Health Protection	<p>PH3.1: fraction of mortality attributable to particulate air pollution</p> <p>PH3.6: Public sector organisations with a board approved sustainable development management plan (to include the consideration of climate resilience)</p> <p>PH3.7: Comprehensive, agreed inter-agency plans for responding to public health incidents and emergencies (Placeholder)</p> <p>PH4.3: mortality rate from causes considered preventable</p> <p>PH4.4i: Age-standardised rate of mortality from all cardiovascular diseases (including heart disease and stroke) in persons less than 75 years of age per 100,000 population</p> <p>PH4.4ii: Age-standardised rate of mortality that is considered preventable from all cardiovascular diseases (including heart</p>	<ul style="list-style-type: none"> • Health inequalities • Long term conditions (LTC) • Mental health • Urgent care • Environment / housing / transport and homelessness • Health, wellbeing and sustainability

		<p>disease and stroke) in persons less than 75 years of age per 100,000 population</p> <p>PH4.7i: Age-standardised rate of mortality from respiratory diseases in persons less than 75 years of age per 100,000 population</p> <p>PH4.7ii: Age-standardised rate of mortality that is considered preventable from respiratory diseases in persons less than 75 years of age per 100,000 population</p> <p>PH4.8: mortality rate from infectious and parasitic diseases</p>	
Air Quality	<p>3. Health Protection</p> <p>4. Healthcare public health and preventing premature mortality</p>	<p>3.1 Air Pollution, using a PM 2.5 indicator</p> <p>4.3 mortality rate from causes considered preventable</p> <p>4.4i: Age-standardised rate of mortality from all cardiovascular diseases (including heart disease and stroke) in persons less than 75 years of age per 100,000 population</p> <p>4.4ii: Age-standardised rate of mortality that is considered preventable from all cardiovascular diseases (including heart</p>	<ul style="list-style-type: none"> • Chronic obstructive pulmonary disease (COPD) • Coronary heart disease (CHD) • Stroke and transient ischemic attack (TIA)

		<p>disease and stroke) in persons less than 75 years of age per 100,000 population</p> <p>4.7i: Age-standardised rate of mortality from respiratory diseases in persons less than 75 years of age per 100,000 population</p> <p>4.7ii: Age-standardised rate of mortality that is considered preventable from respiratory diseases in persons less than 75 years of age per 100,000 population</p>	
Workplace and supply chain	<ol style="list-style-type: none"> 1. Improving wider determinants of health 2. Health Improvement 3. Health Protection 	<p>1.9: Sickness absence rate</p> <p>2.23: Self-reported wellbeing</p> <p>3.7: Comprehensive, agreed inter-agency plans for responding to public health incidents and emergencies (Placeholder)</p>	<ul style="list-style-type: none"> • Health inequalities
Natural Environment	<ol style="list-style-type: none"> 1. Improving wider determinants of health 2. Health Improvement 3. Health Protection 	<p>1.16: Utilisation of outdoor space for exercise / health reasons</p> <p>2.6: Excess weight in 4-5 and 10-11 year olds</p> <p>2.12: Excess weight in adults</p> <p>2.13: Proportion of physically active and inactive adults</p>	<ul style="list-style-type: none"> • Health inequalities • Physical activity, diet and Obesity • Mental health • Physical health

	2.23: Self-reported wellbeing 3.1: fraction of mortality attributable to particulate air pollution	
--	---	--

Table 1-2: Sustainability priorities and associated Social Care outcomes

Sustainability Priority	Supports Social Care Domains:	Supports Social Care Outcomes:
Planning	<p>Enhancing quality of life for people with care and support needs</p> <p>Delaying and reducing the need for care and support</p> <p>Safeguarding adults whose circumstances make them vulnerable and protecting from avoidable harm</p>	<ul style="list-style-type: none"> • People are able to find employment when they want, maintain a family and social life and contribute to community life, and avoid loneliness or isolation. • When people develop care needs, the support they receive takes place in the most appropriate setting, and enables them to regain their independence. • Everyone enjoys physical safety and feels secure • People are protected as far as possible from avoidable harm, disease and injuries. • People are supported to plan ahead and have the freedom to manage risks the way that they wish.
House and fuel poverty	<p>Enhancing quality of life for people with care and support needs</p> <p>Delaying and reducing the need for care and support</p> <p>Safeguarding adults whose circumstances make them vulnerable and protecting from avoidable harm</p>	<ul style="list-style-type: none"> • People manage their own support as much as they wish, so that they are in control of what, how and when support is delivered to match their needs. • Carers can balance their caring roles and maintain their desired quality of life. • When people develop care needs, the support they receive takes place in the most appropriate setting, and enables them to regain their independence. • Everyone enjoys physical safety and feels secure • People are protected as far as possible from avoidable harm, disease and injuries. <p>People are supported to plan ahead and have the freedom to manage risks the way that they wish.</p>

<p>Transport</p>	<p>Enhancing quality of life for people with care and support needs</p> <p>Delaying and reducing the need for care and support</p>	<ul style="list-style-type: none"> • People manage their own support as much as they wish, so that they are in control of what, how and when support is delivered to match their needs. • Carers can balance their caring roles and maintain their desired quality of life. • People are able to find employment when they want, maintain a family and social life and contribute to community life, and avoid loneliness or isolation. • Everyone has the opportunity to have the best health and wellbeing throughout their life, and can access support and information to help them manage their care needs.
<p>Climate Resilience</p>	<p>Ensuring that people have a positive experience of care and support</p> <p>Safeguarding adults whose circumstances make them vulnerable and protecting from avoidable harm</p>	<ul style="list-style-type: none"> • People who use social care, and their carers are satisfied with their experience of care and support services • Carers feel that they are respected as equal partners throughout the care process • Everyone enjoys physical safety and feels secure • People are protected as far as possible from avoidable harm, disease and injuries • People are supported to plan ahead and have the freedom to manage risks the way that they wish.
<p>Air Quality</p>	<p>Delaying and reducing the need for care and support</p> <p>Safeguarding adults whose</p>	<ul style="list-style-type: none"> • Everyone has the opportunity to have the best health and wellbeing throughout their life, and can access support and information to help them manage their care needs. • Early diagnosis, intervention and reablement mean that people and their carers are less dependent on intensive

	<p>circumstances make them vulnerable and protecting from avoidable harm</p>	<p>services.</p> <ul style="list-style-type: none"> • Everyone enjoys physical safety and feels secure • People are protected as far as possible from avoidable harm, disease and injuries • People are supported to plan ahead and have the freedom to manage risks the way that they wish.
Workplace and supply chain	<p>Enhancing quality of life for people with care and support needs</p> <p>Delaying and reducing the need for care and support</p> <p>Ensuring that people have a positive experience of care and support</p> <p>Safeguarding adults whose circumstances make them vulnerable and protecting from avoidable harm</p>	<ul style="list-style-type: none"> • People manage their own support as much as they wish, so that they are in control of what, how and when support is delivered to match their needs. • Carers can balance their caring roles and maintain their desired quality of life. • When people develop care needs, the support they receive takes place in the most appropriate setting, and enables them to regain their independence. • Carers feel that they are respected as equal partners throughout the care process • People are protected as far as possible from avoidable harm, disease and injuries • People are supported to plan ahead and have the freedom to manage risks the way that they wish.
Natural Environment	<p>Enhancing quality of life for people with care and support needs</p>	<ul style="list-style-type: none"> • People are able to find employment when they want, maintain a family and social life and contribute to community life, and avoid loneliness or isolation.

Delaying and reducing the need for care and support

- Everyone has the opportunity to have the best health and wellbeing throughout their life, and can access support and information to help them manage their care needs.

1. Planning

The link between effective planning and developing strong, healthy and sustainable communities is widely recognised. If sustainable development is to be meaningful it is essential that a community has easy access to appropriate services, healthy food, employment, recreational opportunities and green spaces. Such foundations are the basis for viable and vibrant communities.

Planning and health are, and will continue to be, inextricably linked, however, past interventions and current processes and arrangements for developing shared priorities need to be improved if health and wellbeing priorities for communities are to be delivered effectively. There is a need for local planning authorities to better integrate health issues in Local Development Plans, regeneration and growth strategies (linking to the Local Enterprise Partnership) and transport strategies. This is particularly important as the planning decisions made now need to consider future pressures such as our ageing population and increased risks from severe weather events and their impacts.

The housing and care home sectors have a major part to play both in reducing carbon emissions and adapting to the effects of climate change. Future health: sustainable places for health and wellbeing⁷² (CABE, 2009) shows how good planning can have a positive impact on health, how health trusts can cut carbon and costs by co-locating services, and how designers can influence people's wellbeing.

This chapter links to planning throughout but the key health and well-being determinants with a link to sustainable development include:

- **Housing, through ensuring that:**
 - There is provision of adequate spaces for living and playing
 - There is a high quality of existing and new homes including construction, internal environments, design quality, energy and water efficiency
 - Consideration of the indoor environment and increased temperatures
- **Transport -providing sustainable transport options through:**
 - Opportunities for recreation, leisure, exercise including walking and cycling
 - Employment and education
 - Shops, social networks, services and green spaces
 - Service provision
 - Improving air quality
- **Employment and skills through**
 - Encouraging local employment opportunities and reducing unemployment, consequently improving psychological wellbeing and reducing morbidity and premature mortality
- **Open space and public realm through:**
 - Ensuring there are open spaces of a minimum size
 - Easy access by all users, including wheel chair access
 - Providing access to recreational opportunities linked to green spaces and the countryside

- Access to fresh, local produce
- Building resilience to severe weather and climate change through use of sustainable drainage systems (SUDS) and natural shading.
- Addressing the *Six Ways to Wellbeing* through improving access to the natural and historic environment⁷³

Severe weather and climate change can also impact infrastructure in a number of ways, both directly and indirectly through interdependencies with other infrastructure such as utilities and transport networks.

Increasingly incorporating Health Impacts Assessments into the planning process can ensure that new developments have addressed the potential opportunities and risks to health and wellbeing. For example, through maintaining and increasing green infrastructure in urban areas, in particular trees which can grow to a large size can help provide significant areas of shade and cooling during warm, sunny weather. Natural flood defences such as land management in areas upstream of the flood risk could prevent problems downstream. However risk assessments should be undertaken to ensure strategies are not detrimental to health. For example contamination of flood water and increased health risks from bacteria growth in reed beds or increased risks from vector borne diseases.

The above just begin to review the opportunities that better integration with the planning system can include. Recommendations are as follows:

<p>Cross-cutting:</p> <p>Planning</p>	<ul style="list-style-type: none"> ▪ Project: It is recommended that the integration of sustainability and health into the planning system is reviewed with partners and a simple online toolkit produced to inform local planning decisions and ensure risks and opportunities are addressed. The toolkit could cover areas of relevant strategic documents and drivers (e.g., Duty to Cooperate) but also key themes such as: <ul style="list-style-type: none"> ○ Air Quality ○ Sustainable transport ○ Access to green space ○ Climate resilience ○ Access to healthy food ○ Housing ○ Access to services ○ Heritage and opportunities for sense of place ▪ Project: It is recommended that the JSNA is utilised as an evidence base for local planning decisions and this should be integrated into the toolkit as above. This will require the tailoring of JSNA evidence to spatial planning and how the JSNA evidence can support local monitoring of health indicators and spatial planning policies. • Project: It is recommended that local leads be identified representing the Health and Wellbeing Boards to influence and support local planning and training given as appropriate
---	--

- | | |
|--|---|
| | <ul style="list-style-type: none">• Communications: It is recommended that training and support is given across planners, health practitioners and members to raise awareness and support delivery of multiple outcomes relating to health, wellbeing and sustainability |
|--|---|

2. Housing and Fuel Poverty

Being unable to afford to adequately heat a home increases the risk of ill health for families and children. It is also believed to be the reason for extra 'winter deaths', particularly for older people or those with disabilities and long term conditions, many of which could be avoided.

○ **Measuring fuel poverty**

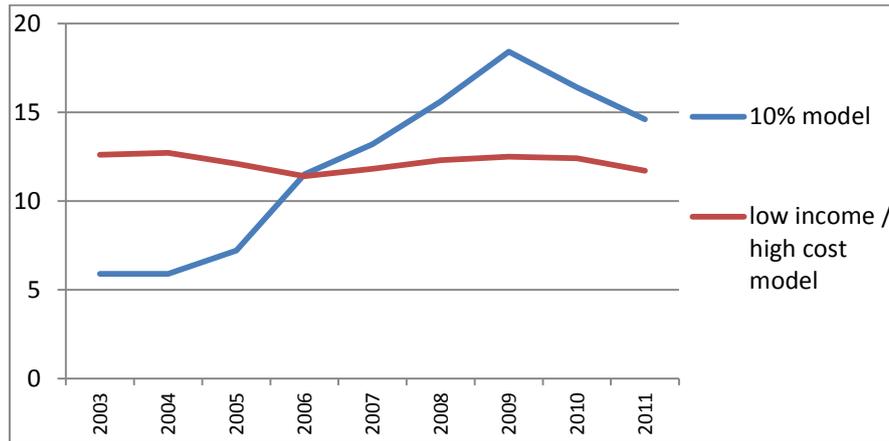
The most recently used definition of fuel poverty, commonly known as the 'ten per cent' measure^{74, 75} calculates fuel poverty as any household spending more than ten per cent of income on fuel (including utility costs, such as lighting) to maintain an adequate level of warmth. An adequate level of warmth is usually defined as 21° in the main living area and 18° for all other occupied areas. A recent review⁷⁶ now recommends a 'low income/high cost' measurement which represents the gap between the modelled fuel bill for each household and the reasonable cost threshold for the property. The low income/high cost measurement considers a household to be fuel poor where:

- they have required fuel costs that are above average (the national median level) and;
- were they to spend that amount they would be left with a residual income below the poverty line

The UK is ranked bottom for energy (or fuel) poverty out of 13 western European countries⁷⁷ and near the bottom of the other league tables on affordability of space heating (14 out of 15), share of household expenditure spent on energy (11 out of 13), homes in poor state of repair (11 out of 15), thermal performance (6 out of 8), and the gap between current thermal performance and what the optimal level of insulation should be in each country (7 out of 8). Overall, no other country of the 16 assessed performs as poorly as the UK across the range of indicators⁷⁸.

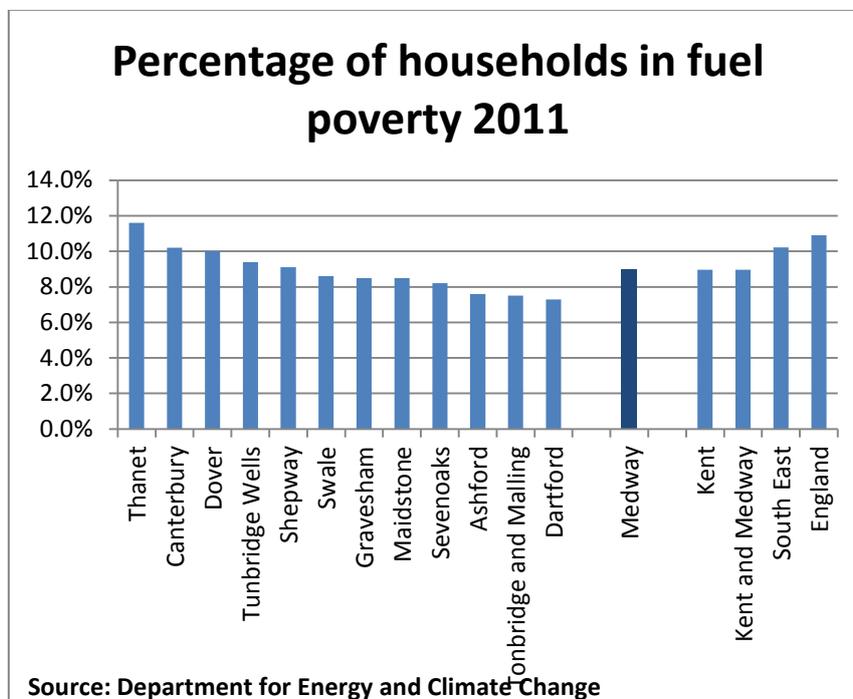
Nationally, fuel poverty in 2011 was at 14.6%, the figure below show trends in fuel poverty nationally from 2003 to 2011 when calculated using the 10% definition and the Hills definition⁷⁹. Figure 3-1 illustrates that by using the Hills calculation, there will be less people classified as in fuel poverty, compared to the current ten percent rule.

Figure 3-1: Trends in fuel poverty in England (2003-2011)⁸⁰



Fuel poverty in Kent was at 11.4% in 2011

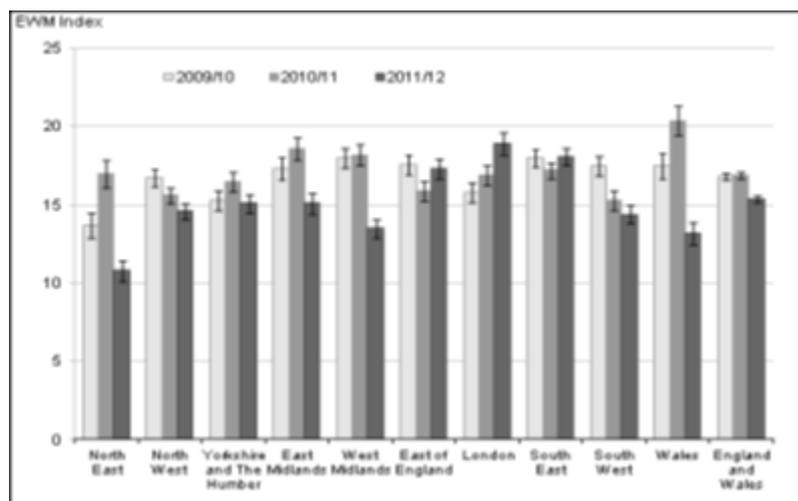
Figure 3-2: Fuel poverty in Kent districts, compared to South East and England (2011)



○ **Fuel poverty and health**

Excess winter deaths are defined by the Office for National Statistics (ONS) as the difference between the number of deaths during the four winter months (December-March) and the average number of deaths during the preceding four months (August-November) and the following four months (April-July). A European study showed that England had higher rates of excess winter deaths than some countries with much more severe winters, such as Finland and the Netherlands⁸¹. Findings indicated that this was due to colder living rooms, unheated bedrooms and a lack of outside warm clothing.

Figure 3-3: Excess winter mortality in England and Wales by region (2009-2012)



From ONS statistical bulletin 2012

As a wider social determinant of health, fuel poverty is a contributor to inequalities. Unemployed people experience the highest fuel poverty rate and in 2008, due primarily to rising fuel costs', over half of single pensioners and two thirds of workless households were classified as being in fuel poverty⁸².

There is some difficulty in directly measuring the cost of fuel poverty to health, but estimates indicate that fuel poverty could contribute to approximately 10% of excess winter deaths, this equates to 2,700 people per year^{83, 84}.

Children living in cold homes are twice as likely to suffer from chest problems, asthma and bronchitis⁸⁵.

- **Kent Excess Winter Deaths**

Excess winter deaths are not necessarily related to areas of deprivation as illustrated in the diagram below, but instead this possibly relates to households that are asset rich, but income poor and are often not eligible for free adaptations and repairs offered through national fuel efficiency programmes. Overall, the highest ratio of excess winter deaths occurring between 2002 and 2011 were recorded in Canterbury, followed by Tunbridge Wells and Sevenoaks. The lowest ratio during the same period was Dover, followed by Dartford and Tonbridge and Malling.

Figure 3-4: Ratio of excess winter deaths in Kent by Local Authority (2002-2011)⁸⁶

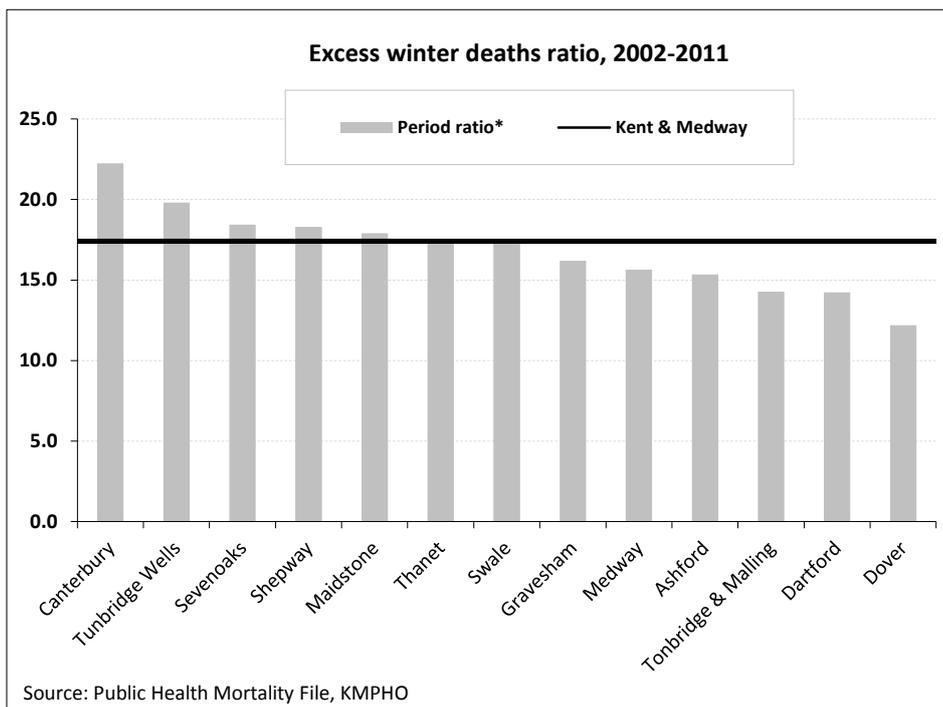


Figure 3-5: Correlation of deprivation and excess winter deaths (2002-2011)

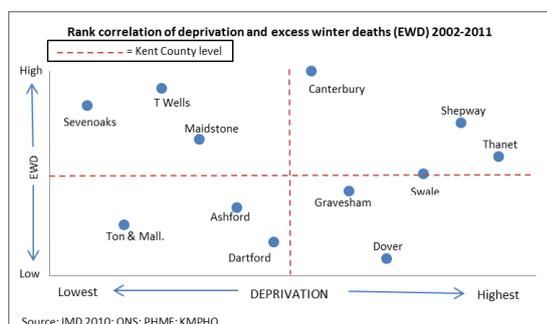
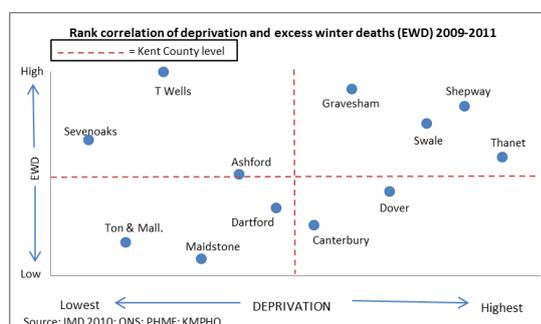


Figure 3-6: Correlation of deprivation and excess winter deaths (2009-2011)



○ **Winter Warmth Programmes**

Kent local authorities and partner agencies have worked together over the last two years to reduce the negative impact of cold weather on health, in particular unscheduled admissions and re-admissions to hospitals. Kent Public Health Department was successful in receiving funding from the Department of Health from the Warm Homes Healthy People fund. The bid was completed in partnership with the Home Improvement Agencies and Age UK organisations across the county. The resulting interventions included a media intervention to raise awareness and a Kent-wide programme, aiming to reduce the levels of mortality and morbidity in vulnerable people aged over 75 with an underlying cardiac or respiratory condition and who have the potential to be affected by cold temperatures due to living in cold housing. Winter Intervention Support Kent (WISK) used existing data and a targeted approach aimed at those at high risk in the twelve districts. Almost nine hundred homes across Kent received a home assessment by Home Improvement Agencies and were subsequently provided with advice, signposting, energy tariff checks, loft clearance and

insulation, draft reduction, warm clothes, electric blankets and energy efficient radiators. In addition salt was provided during severe weather to avoid trips and falls due to ice and snow.

- **Domestic Housing retrofit**

The links between fuel poverty and health have been outlined above and one of the key factors in fuel poverty is poor quality, and in particular poorly insulated, housing. The Green Deal is a finance mechanism that enables measures to be installed at no upfront cost with the cost of the measures being repaid through the energy bill. The golden rule being that cost of installation should be less than or equal to the savings on the energy bill achieved by having the measures installed. Alongside the Green Deal sits the Energy Company Obligation (ECO) which supports the installation of measures when achieved savings won't meet the golden rule, such as vulnerable or low income households or properties with solid walls.

In March 2012, following a directive from Kent Leaders the Kent and Medway Sustainable Energy Partnership (KMSEP) was formed to support Kent residents and businesses to take advantage of both Green Deal and the Energy Company Obligation. The aims of the partnership are:

- To ensure residents and businesses get a clear and consistent message about what funding and finance options are available to support retrofitting of energy efficiency measures and what the best options are for them.
- To tackle fuel poverty by drawing in as much ECO and other funding to Kent as possible
- To support our local network of SMEs to be 'Green Deal Ready' and take advantage of economic growth and opportunities in the sector
- To reduce carbon emissions in Kent & Medway

In 2013 the Kent and Medway Sustainable Energy Partnership engaged Enterprise Utility Services through a framework agreement to deliver ECO funded retrofit projects under the Warm Homes brand in 7 pilot areas across Kent. Due to national changes to Green Deal and ECO announced by Government in December 2013, work with Enterprise on the Warm Homes programme was placed on hold until clarity on funding was obtained. Work continued to be delivered until April 2014 by Enterprise and Aran Services, an additional contractor, and to date the scheme has achieved:

- 1067 measures installed on 1042 properties around Kent, of which:
 - 602 properties were social housing
 - 420 properties were privately owned

The KMSEP is now working on a new framework contract to deliver ECO funded home improvements, and hopes to appoint contractors to begin work in October 2014.

Although ensuring people can adequately heat their homes is a clear priority, there is also a need to consider the indoor air quality of insulated homes to ensure that this does not have an adverse effect on residents health. Insulating properties will reduce heat loss (and also reduce heat gain through the structure of the building in summer) but increases the air tightness of a building. Reduced ventilation may lead to the build-up of chemical and biological contaminants leading to high indoor air pollution and mould growth that could negatively affect health. Increased temperatures in summer will lead to greater solar gains in a dwelling, depending on location, orientation and transparency of windows. In an

insulated building this heat will take longer to dissipate and without adequate ventilation could lead to a risk of overheating.

Although it is likely that the majority of the impact of increased air pollutants can be resolved by ensuring alternative forms of ventilation are installed alongside energy efficiency measures, natural ventilation may no longer be sufficient to avoid the risk of overheating during the summer in the future. Consideration needs to be given to monitoring these issues and researching the potential solutions.

It should also be noted that if increased summer temperatures have the potential to lead to increased summer mortality, the method for calculating excess winter deaths may need to be amended to ensure these figures are not lost or cancelled out by summer mortality rises.

The Kent Housing and Affordable Warmth Strategy, approved by The Joint Policy and Planning Board (Housing) contains overarching aims to work in partnership across the county to:

- ensure that older people (65+) with underlying circulatory or respiratory disease are offered support to reduce their risk of morbidity and mortality due to excess cold temperatures in the home
- Increase awareness of the risks in older people (65+) with underlying circulatory or respiratory disease of the effects that excess cold temperatures can have on their health
- maximize take-up of benefits and utility company interventions
- maximize take up of services relating to affordable warmth/energy efficiency/fuel poverty

The following recommendations are made:

Housing and Fuel Poverty	<ul style="list-style-type: none"> ▪ Project: It is recommended that Health and Wellbeing Boards and partners support delivery of the Warm Homes programme to ensure homes are energy efficient, including those who do not fully fit criteria for ECO but are vulnerable in cold weather (e.g., Warm Homes, Health People Fund, Public Health funding), which will require ongoing funding.
	<ul style="list-style-type: none"> • Communications: Increase awareness of fuel poverty and the Warm Homes programme with those working with vulnerable groups and engage wider partners, such as GPs, Primary Care, Community Care Services and Ambulance Trusts.
	<ul style="list-style-type: none"> ▪ Project / Monitoring: Monitor indoor air quality and summer temperatures in properties and research new insulation and ventilation processes to ensure that insulating properties does not have an adverse effect on residents' health.

3. Transport

Transport can have both positive and negative impacts on peoples' health. It is a great enabler, allowing greater and more rapid access to care services with improving transport links whilst inactive transport (e.g., car use) can lead to air pollution, accidents and increased obesity through lack of exercise.

Facilitating a shift towards public and self-propelled transportation can improve air quality, personal activity levels and improve traffic congestion. Road transport is responsible for ~30% of Kent's greenhouse emissions, this has the potential to be reduced by 60% with achievable sustainable transport⁸⁷, which, in turn, represents an opportunity to minimise adverse health effects⁸⁸.

The savings made from investing in sustainable transport far outweigh that of road schemes, for example, in the context of cycling, benefit ratios reach as high as 5 or 6:1⁸⁹. The financial savings are complimented by evidence for improved health with a shift from motor to active transport⁹⁰. A 2010 Study by Hartog et al.,⁹¹ demonstrated a 3-14 month 'life extension' with greater uptake of cycling, far out weighing potential loss of <49 days when accounting for road traffic incidents and greater exposure to air pollution. On a larger scale, a significant reduction in mortality has been demonstrated with 100,000 commuter cyclists reducing mortality by 12.28 per annum⁹².

Reduced mortality is a very blunt indicator, and is far from the only tangible health benefit of more sustainable transport, not least being more physically active. A linear inverse relationship between risk or morbidity and physical activity has been demonstrated for strokes, Coronary Heart Disease and Cardiovascular disease⁹³. The World Health Organisation estimates that the prevalence of physical inactivity accounts for 22% of cardiovascular disease prevalence globally⁹⁴. Men who cycled (39.8%) and/or used public transport (44.6%) to get to work were significantly less likely to be overweight and obese compared with those driving to work (60.8%)⁹⁵. Further to this, within 20 years, reductions in the prevalence of type 2 diabetes, dementia, ischaemic heart disease, cerebrovascular disease, and cancer because of increased physical activity would lead to savings in the UK of roughly £17 billion (in 2010 prices)⁹⁶.

○ **Current Service Provision**

Currently Kent houses 550 miles of cycle paths alongside four commercially run cycle specific facilities. Kent County Council encourages the provision of cycling facilities in Kent in strategy and policy. Growth without Gridlock, Kent's Transport Delivery Strategy supports tailored infrastructure improvements throughout Kent⁹⁷.

KCC has been given £2.3 million in funding from the Sustainable Transport Fund to develop green transport projects that support economic growth and reduce carbon emissions. KCC are working in partnership with Southeastern Railways, Action in Communities, Rural Kent and two Hospital trusts to deliver:

- £1.5 million to improve sustainable access to key High Speed stations in the east of the county, as well as to promote and facilitate walking, cycling and public transport for onward journeys
- £100,000 for improved facilities at Kent hospitals for walking and cycling
- £85,000 to support the work of Kent's Community Rail Partnerships
- Support for on-going work to develop smartcard ticketing and improved integration between types of transport

Under Kent County Councils Local Transport Plan, 2011-2016⁹⁸, Kent's District Councils are producing area specific cycling strategies that include plans as to how the Kent cycle network will be developed and connected. To date, Ashford, Canterbury, Dover, Sevenoaks, Shepway Thanet and Tonbridge & Malling councils have strategies in place with Swale, Dartford and Tunbridge Wells producing drafts to be updated every five years.

The Association of Train Companies (ATOC) have been granted £250,000 of government funding to implement PlusBike Infrastructure enabling nationwide cycle hire and train ticketing throughout the 2,250 stations. The same funding stream granted £1 million to South Eastern for four Kent stations to install 20 Brompton Bikes per station⁹⁹.

The Kent Freedom Pass is available to students in years 7-11 at a cost of £100 annually. In the financial year 2012/13 27,885 were issued, at considerable cost to KCC. KCC also offer a 16+ Travel card, offering those in education to have subsidised anytime travel at a cost of £520 per year. Reduced rates are available on a means tested basis.

KCC has recently been awarded £273k to install Electric Vehicle Charging Points on Public Sector estate across the county, working with Medway and 9 of the District Councils. This will see 49 'fast' charge points (top up from empty to full in 3-4 hours) installed over the next 18 months, the majority of which will be located in off street car parks and therefore accessible to the public. Sussex Air Quality Partnership (in a bid backed by KCC, Hampshire, East and West Sussex and Brighton and Hove) were also awarded £1.8M for the installation of 35 'Rapid' charge points (top up from empty to full in 30 minutes) to be installed at points on the strategic road network across the South East, around 10 of which will be in Kent and Medway. These will be at locations such as service stations and close to motorways junctions and will be delivered before March 2015.

As part of the launch of a Statutory Quality Partnership Scheme with Arriva and Tonbridge and Malling Borough Council, KCC have invested £230,000 to part fund Arriva's fleet of 11 hybrid buses. These brand new diesel- electric buses significantly reduce emissions and noise pollution. They also use up to 1/3 less fuel, making them a more sustainable mode of transport. The buses are running along the no. 71 route from Maidstone to Larkfield and Snodland. These hybrids represent the first of their kind in Kent and will help contribute to improving air quality in the local Air Quality Management Areas (AQMAs). The Green Bus route has been further enhanced with the addition of £150K Defra air quality grant funding (awarded to Tonbridge and Malling Borough Council, Maidstone Borough Council, Kent County Council and Arriva Southern Counties Bus Company) to fit emission reducing equipment (retrofit) on up to ten Arriva buses.

A similar retrofit project in London has shown that hybrid buses can reduce CO₂ emission by 30% and NOx emissions by 21%. Retrofitted buses show a 47% reduction in CO₂ and 78%

reduction in NOx. The upgraded buses will run on route 72 and compliment the new hybrid buses (route 71) making this one of the greenest routes in the South East.

Under the New Ways 2 work campaign, the KCC run Kent Journey Share (<https://kentcarshare.liftshare.com/default.asp>) is a free web-based service which links drivers, passengers, walkers, cyclists and taxi users who make similar journeys and encourages them to share their trip. It is aimed at reducing single occupancy commutes, currently around 91% of journeys, with emphasis on large scale employers with high commuter numbers. In July 2010, there were 3, 400 members equating to an approximate saving of 360 tonnes of CO₂ per annum¹⁰⁰.

Other transport schemes operating in Kent include:

- Kickstart Bus Service Enhancements: Improvements to service frequency and infrastructure; and promotional offers to deliver improved access to key healthcare, education, employment and essential food shopping services.
- New Ways to School: Delivery and support for active travel to schools targets within the 600 School Travel Plans across Kent. KCC Highways and Transportation (H&T) have recently allocated 'seedcorn' funding to capital schemes (such as pedestrian access improvements and cycle and scooter parking) submitted for funding by schools.
- New Ways to Work: Delivery and support for active travel to businesses through Business Travel Plan measures including personalised travel planning, green guardian support networks, bike to work schemes, 'seedcorn' grants for infrastructure etc, under the New Ways to Work brand.
- Wheels to Work: Provision of scooters to long term unemployed (especially those with young families) in rural areas where access to employment opportunities and education is limited.
- Upgrade of supported bus fleet engine emission standards to Euro 3 minimum: Funding of the upgrades of bus engines to Euro 3 standard across the supported bus fleet in Air Quality Management Areas where there is a demonstrable link with public health.
- "Licence to Kill" Theatre Production: An innovative theatre education project which explores the circumstances and consequences of a road traffic crash.
- Improving accessibility in Romney Marsh: Delivery of improved accessibility and a more effective public transport system in Romney Marsh, acting to improve air quality and encourage physical activity.

Recommendations for sustainable transport are:

Travel	<ul style="list-style-type: none"> ▪ Communications: Widely promote and publicise opportunities for active transport (e.g., cycling, walking) and the use of low carbon and sustainable fuels across organisations and develop projects as appropriate (e.g., electric vehicle charging)
	<ul style="list-style-type: none"> ▪ Project: Review the barriers to uptake and ongoing use

	of travel planning and put measures in place as appropriate
	<ul style="list-style-type: none">▪ Project: Provide policy support from the Health and Wellbeing Strategy for sustainable transport schemes to help strengthen bids for funding from the Local Sustainable Transport Fund (LSTF), Local Transport Body (LTB) and the Local Growth Fund (LGF)

4. Natural and Historic Environment

Nature supports health and wellbeing in a variety of ways, from provision of clean air, water and medicines, to food and natural resources. For example, through planting trees along urban roads, particulate pollution can be reduced (Woodland Trust). But nature also makes a direct contribution to better mental and physical health and improved social engagement. Increasing access to nature can improve public health and provide opportunities to foster social cohesion.

○ **Health Inequalities: Access to nature for everyone**

In England the most deprived communities are ten times less likely to live in the greenest areas¹⁰¹ and the most affluent 20% of wards in England have five times the amount of green space than the most deprived 10% of wards¹⁰². This is reflected in the poorer health and wellbeing of these communities.

Provision of places to access nature is important for giving everyone the opportunity to take advantage of the health benefits that nature provides. Nature is a free commodity that should be available to be enjoyed by all. But access to natural environments is not equal. Many areas do not have accessible natural green space to recommended standards. Natural England's Accessible Natural Green Space Standard (ANGSt) provides a set of benchmarks for ensuring access to places near to where people live¹⁰³. The Forestry Commission carried out an ANGSt assessment for Kent in 2007 showing that only 3% of households meet all the ANGSt requirements¹⁰⁴.

○ **Mental health**

Contact with nature can help to prevent, alleviate and assist recovery from mental health problems. In particular, natural environments help to lower levels of stress, enhance mood, increase concentration and boost self-esteem. Many researchers conclude that people have an innate need to experience nature; lack of interaction with nature and the outdoors is a growing problem amongst children¹⁰⁵.

Around 163,000 to 190,000 people in Kent are living with common mental health problems (such as anxiety and depression) and a further 60,000 people are living with severe mental illnesses (such as severe depression or post-traumatic stress disorder)

Having a view of green space from one's house increased emotional wellbeing by 5% and general health by 2%¹⁰⁶.

Contact with nature has been shown to reduce the severity of ADHD in children¹⁰⁷.

90% of people reported an increase in self-esteem after an outdoor walk versus 17% indoors¹⁰⁸.

Operation Nightingale, a project to support the rehabilitation of injured soldiers) has suggested that archaeological work is particularly helpful for people with mental health problems as it combines physical activity with mental tasks¹⁰⁹.

- **Physical health**

Access to nature can encourage participation in physical activity. Evidence suggests that being outdoors in nature is an important factor that helps to maintain people's motivation to keep fit. For example, many join schemes such as the Green Gym for their health, but they stay because of the environment¹¹⁰. Many participants in health walks cite the changing seasons and variety of wildlife as a major encouragement to continue attending. These examples of 'Green exercise' – physical activity undertaken in the outdoors – connect people to nature in their local area.

Individuals with easy access to nature are three times more likely to participate in physical activity than those with poorer access and therefore are 40% less likely to become overweight or obese¹¹¹.

- **Social engagement and cohesion**

Green spaces in the community can provide significant social benefit. This enhanced 'social capital' includes community networks, civic engagement, sense of belonging and equality, co-operation with others and trust in the community¹¹².

Availability and quality of local green spaces is not evenly distributed; people in deprived urban areas can have five times fewer public parks and good-quality green space than people in more affluent areas and this is reflected in the poorer health and wellbeing of those communities¹¹³.

Evidence suggests that levels of social interaction can be directly influenced by the availability of green space, particularly in urban areas. There is great opportunity to increase social interaction through schemes that encourage people to take part in improving their natural environment¹¹⁴.

People who live within 500m of accessible green space are 24% more active and fitter. Reducing the sedentary population by just one per cent would reduce morbidity and mortality rates and save £1.44 billion for the UK¹¹⁵.

Studies have shown the presence of vegetation is associated with a 50% reduction in violence and property crimes in otherwise identical public housing blocks¹¹⁶.

In addition, English Heritage have found through a study of 500 people that Adults who live in areas of higher levels of historic environment are likely to have a stronger sense of place¹¹⁷.

- **Public Sector estate**

Patients and service users benefit from access to nature at healthcare settings such as hospitals and community care centres. Benefits are gained from views of trees, shrubs and flowers through windows; walking or sitting in gardens and courtyards; Research has shown that even five minutes spent in a hospital garden can decrease stress and anxiety. The NHS, local authorities and private healthcare providers can help to improve the health of both patients and staff through greening their estate¹¹⁸.

<p>Many people are not meeting recommended levels of physical activity and are therefore at greater risk of developing common chronic diseases. Promoting physical activity through primary care at general practice surgeries and community health centres is an important element in encouraging active lifestyles. About three-quarters of the population visit their GP each year, and around one in four people say that they would be more active if advised to do so by a GP or nurse¹¹⁹. Natural and Historic Environment</p>	<ul style="list-style-type: none"> • Research: Research current number of referrals from health and social care practitioners for green exercise opportunities (e.g., health walks, conservation management, archaeology etc)
	<ul style="list-style-type: none"> • Research: Undertake a gap analysis to identify current activity in relation to the natural environment and opportunities for delivery of health outcomes. Use this learning to develop a targeted action plan to ensure co-benefits from natural environment and health.
	<ul style="list-style-type: none"> • Communications: Review and provide further guidance on opportunities for outdoor exercise and use of green space for practitioners to promote with a view to improve health and wellbeing of Kent residents.
	<ul style="list-style-type: none"> • Research: Review how green exercise and opportunities has benefitted patients and if this has led to identifiable improvements in health and wellbeing and reduction in prescriptions
	<ul style="list-style-type: none"> • Communications: Review opportunities for greening the health and social care estate and widely communication and raise awareness of the benefits of green space to health and wellbeing.
	<ul style="list-style-type: none"> • Research and Communication: Review current activity in relation to visiting the historic environment and widely communicate the physical and mental health benefits linked to the six ways to wellbeing.
	<ul style="list-style-type: none"> • Project: Identify and develop initiatives which enable the positive health benefits of volunteering/working in the historic environment, e.g., the benefits of archaeological work on mental health as demonstrated through Operation Nightingale

5. Building Climate resilience

Key findings from the UK Climate Projections 2009 (UKCP09)¹²⁰ suggest we are likely to experience further changes into the future, and that by 2050:

- Winters are likely to be warmer by around 2.2°C;
- Summers are likely to be hotter by around 2.8°C;
- The hottest summer days could increase by up to 3.7°C;
- Summer night time temperatures are likely to increase by 3°C;
- Winter rainfall is likely to increase by 14%;
- Summer rainfall is likely to decrease by 24%.

In addition to this, we are also likely to experience an increased frequency of severe weather events, posing significant risks, with:

- More 'very hot' days (what we consider extreme currently will likely prove to be average in 20 years);
- More intense downpours of rain leading to increased flood risk, particularly surface water flooding;
- Increased risk of coastal flooding;
- Changes in storminess and high winds;
- Increased water scarcity

UKCP09 data have been used by Public Health England (formerly the Health Protection Agency) to identify the key threats and opportunities for health in the UK as well as for the development of recommendations for action. In addition, in 2012 the national Climate Change Risk Assessment was produced, again highlighting the key issues for Health and Wellbeing in the UK.

Kent is no stranger to extreme weather events. A recent Kent partnership research project to assess the impact of severe weather on Kent estimated that costs to the county council were £2.5 million per year and the cost to the wider Kent community was £44 million per year¹²¹. The analysis looked at only a third of the most severe weather events, so the costs are likely to be much higher.

As with all public services, social care is affected by the current major social, economic and environmental challenges. That is, in Kent, we have an ageing and dynamically diverse population, we see the real effects of climate change, financial challenges and increases in health inequalities. By 2026 the older population of Kent is expected to have increased by 30.7% on 2006 levels¹²², whilst the ratio of traditional working age population compared to those of current state pension age will have fallen from 3:1 to 2:1. This demographic shift represents a significant challenge to public services¹²³.

In many cases, those most vulnerable are the most affected by the impacts of severe weather incidents, climate change and health inequalities. The premise of a sustainable social care model is that successful solutions to these challenges will recognise and address social, economic and environmental factors at the same time, and that we take the longer term view.

Health is currently severely impacted by severe weather, e.g., daily mortality in South East England increases at temperatures above about 27°C and the HPA state that in 2012, there is a 1 in 40 chance that South-East England will experience a severe heat-wave causing 3,000 immediate heat-related deaths^{124, 125}. The 2008 study, "Growing Old in a Changing Climate"¹²⁶ highlights that by 2031 over 50s are expected to represent approximately 41 per cent of the UK population (27 million) and we know that people in old age may be physically,

financially and emotionally less resilient to dealing with the effects of a changing climate than the rest of the population.

Local authorities are at the front line in dealing with the impacts of climate change; not only with the impacts on our own services but also the people living and working in Kent. We therefore have a vital role in three areas:

- Community leadership – persuading others to reduce emissions and prepare for climate change.
- Service provision – increasing the resilience of local services and reducing their environmental impact.
- Estate management – minimising emissions from our own estate and ensuring operations are well adapted to climate change.

In Kent, based on demographics, geography and climate change projections, the areas likely to have the greatest impact on resident's health are:

- Flooding
- Mortality and morbidity related to temperature
- Food and water borne diseases
- Vector borne diseases
- Air Quality (covered in later sections)
- Vulnerability of infrastructure and built environment (covered in previous planning section)

- **Flooding**

Kent has the highest risk of local flood of all authorities in England and surface water flooding is estimated to affect 76,000 properties in Kent, of which approximately 60,000 are residential properties¹²⁷. Kent is also currently estimated to have approximately 64,000 properties at risk of river and coastal flooding, of which approximately 46,000 are residential properties (as some of these properties will also be at risk of surface water flooding, this number should not be added to the surface water figure to give a total)¹²⁸.

Previous flooding impacts in Kent and Medway include:

- Approximately 503 houses flooded in July 2007, costing the Medway community £14.3 million
- 200 residents in the Canterbury district were impacted by floods, with over 40 flooded internally, during April 2000.
- Shepway District Council received 200 calls in two hours of an event in August 1996. Over 400 properties were flooded, 192 internally, 44 declared uninhabitable and 30 structurally damaged.
- Insurance claims and property damage cost £5.9 million in November 2000;
- 82 schools closed during November 2000
- 18,000 Kent residents passed through our rest centres in October 2000;
- Kent Highway Services paid £7 million repairing flooded roads in October 2001

All of these impacts are likely to have had health repercussions for our communities, for example through stress from displacement or inability to access to services needed.

The health impacts of flooding can take two forms:

Direct: Immediate impacts such as drowning or physical trauma

Indirect: Consequences such as damage to infrastructure, displacement and disruption, increased insurance costs, the effects of these can impact on people's lives for months or even years¹²⁹.

Groups particularly vulnerable to flooding are children, pregnant women, people with physical impairments, people with sensory impairments, people with cognitive impairments, elderly people, people with chronic illnesses, tourists, the homeless and people with cultural and language based vulnerabilities¹³⁰.

Coastal areas are likely to be more vulnerable to climate change due to rising sea levels, coastal wave activity, and accelerated erosion. The vulnerability is increased due to social deprivation, geographical isolation and low adaptive capacity¹³¹.

A study of the implications of a 1968 flooding event in Bristol on morbidity and mortality¹³² highlighted that in the year after the flooding surgery attendance of those who had been flooded increased by 53% and mortality in this group increased by 50%, predominantly the over 65's and in particular women over 75. This is the only study to look into the longer term impacts of flooding. Damage to homes, e.g., damp and mould is likely to contribute to this increase.

A study of the aftermath of the 2007 floods found that the prevalence of all mental health symptoms (psychological distress, probably anxiety, probable depression and probable post-traumatic stress disorder (PTSD)) were two to five times higher among individuals who were flooded¹³³. The provision of emergency and longer term mental health care in planning, response and recovery is therefore an important component of flood management¹³⁴.

Heavy precipitation and flooding may also adversely affect healthcare infrastructure¹³⁵.

Table 6-1: Projections of the additional impacts of flooding and storms on mortality, injuries and mental health in the UK under plausible future climates¹³⁶

Outcome	Time period					
	2020s		2050s		2080s	
	Baseline population ³	Changing population ⁴	Baseline population ³	Changing population ⁴	Baseline population ³	Changing population ⁴
Deaths	4-17	5-21	6-34	8-49	13-69	14-98
Injuries	80-340	100-420	120-680	160-980	270-1,380	290-1,960
Mental health 'events' ⁵	3,000-4,000	4,000-6,000	4,000-7,000	8,000-13,000	5,000-8,000	13,000-20,000

¹ Projections assume no adaptation or deterioration of current flood defences.

² Climate scenarios are based on UKCP09 scenarios: for the 2020s (2010-2039) a medium emissions scenario is used; for the 2050s (2040-2069) and 2080s (2070-2099) low, medium and high emissions scenarios were used. Note that low, medium and high emissions correspond to IPCC B1, A1B, and A1FI scenarios. Within each emission scenario, lower, central and upper estimates were considered based on different probability levels.

³ 'Baseline population' assumes there is no change in population between now and the future.

⁴ 'Changing population' is based on the set of results assuming low, medium, and high population growth, EXCEPT for mental health where results are for high population growth only.

⁵ Figures are for England and Wales only. It is estimated that inclusion of Scotland and Northern Ireland would increase estimates by around 10-15%.

Mortality and morbidity relating to temperature

The 2012 study by the Health Protection Agency (now Public Health England) highlighted the following issues in relation to the temperature effects of climate change on human health¹³⁷.

In the UK heat related deaths begin to occur when the mean daily temperature rises above the minimum mortality band of 15.6-18.6°C¹³⁸. Attributable burdens from cold weather are currently substantially larger than from heat exposure due to the UK experiencing more cold days than hot days. In the UK excess winter death has been estimated to represent 20,000-50,000 more deaths per year.

Under current climate conditions, an estimated 800 'heat-related' deaths occur per year in the UK, mainly from cardiovascular, cerebrovascular and respiratory disease¹³⁹ and it is estimated that this is accompanied by approximately 80,000 days additional NHS hospitalisation.

Heat-related mortality is projected to increase steeply in the UK in the 21st century. We estimate this increase to be approximately 70% in the 2020s, 260% in the 2050s, and 540% in the 2080s¹⁴⁰, compared with the 2000s heat-related mortality baseline of around 2,000 premature deaths. This is in the absence of any physiological or behavioural adaptation of the population to higher temperatures.

The South East, along with London, East and West Midlands, the East of England and the South West appears to be most vulnerable to current and future effects of hot weather. The elderly, particularly those over 85 years of age, are much more vulnerable to extreme heat and cold compared with younger age groups. This is supported by a study carried out by Kent County Council and partners which highlighted that the heat wave in 2003 resulted in around 130 excess deaths in the county, mainly in this older age group¹⁴¹.

Those at greatest risk from heat related mortality and morbidity are those with pre-existing respiratory and cardiovascular problems¹⁴².

In general illnesses that compromise thermoregulation, mobility, awareness and behaviour (including dementia and Parkinson's disease) increase the risk of heat related death¹⁴³.

The national Climate Change Risk Assessment identified the health risks from increased summer temperatures and overheating in buildings as the most significant, along with the health impacts from flooding¹⁴⁴.

Table 6-2: Risk factors for heat stress (from Donaldson et al.)¹⁴⁵

Risk Factor	Comments
Extreme old age	>80 years
Dependency	Bedridden>semi-dependent>mobile
Drugs	Especially phenothiazines, antidepressants, alcohol, diuretics
Cardiovascular	Congestive heart failure, ischaemic heart disease

Risk Factor	Comments
Neurological	Cerebrovascular disease, autonomic impairment, head injury, cerebral tumour or abscess
Mental condition	Dementia, confused states
Endocrine	Diabetes mellitus, hyperthyroidism, hyperpituitarism
Skin disorders that impair sweating	
Infections	Respiratory, gastrointestinal and septicaemia

Food and Water Borne Diseases

The 2012 study by the Health Protection Agency (now Public Health England) highlighted the following issues in relation to food and water borne diseases¹⁴⁶.

Climate can affect human behaviour, such as food consumption and preparation practices, which can increase the risk of food-borne diseases¹⁴⁷. In addition, warmer weather and milder winters will allow pathogens such as Salmonella to grow more readily in food and will favour flies and other pests that affect food safety.

The most important mechanisms to prevent and control food and water-borne diseases are early detection, surveillance and monitoring, horizon scanning, risk assessment, management, communication and preparedness for potential outbreaks.

The safety of food and water is tightly controlled at the National and EU level. This provides the UK with resilience to changes associated with climate and the potential to adapt to the challenges of climate change. There is a need to ensure that existing measures are maintained and strengthened.

Vector Borne Diseases

Vector-borne diseases are influenced by climatic and land use changes as well as human activities. There is uncertainty regarding the distribution of tick and mosquito (arthropod) species and the pathogens they potentially transmit to humans but it is likely that the range, activity and vector potential of many ticks and mosquitoes will increase across the UK up to the 2080s¹⁴⁸.

Climate change adaptation strategies, including the creation and expansion of inland wetlands and coastal marshes (to mitigate flooding and sea level rise) and habitat defragmentation initiatives intended to assist wildlife adaptation may have a greater influence on arthropod distribution than the direct effects of climate change¹⁴⁹.

The incidence of existing infectious agents, such as Lyme disease transmitted by ticks, is likely to increase. An increase in the number of mosquito species and the abundance of mosquitoes generally, with implications for transmission of arboviruses, such as West Nile virus is possible¹⁵⁰.

In 2003 and 2006 during periods of hotter temperatures, Kent and Medway NHS received a 22% increase in calls regarding mosquito bites.

Air Quality

Predicting the future impact of climate change on air pollution is difficult. According to the UK Department of Health, future ambient concentrations of air pollutants which are hazardous to health will depend on trends in emissions of primary and precursor pollutants, and on trends in meteorological conditions which affect dispersal of pollutants and secondary atmospheric processes¹⁵¹. In the UK it is predicted that the weather conditions associated with winter air pollution episodes will become less common, while the conditions associated with summer episodes will increase in frequency, and intensity. Elsewhere there are concerns about an increase in forest fires releasing pollutants and an increase in dust storms leading to mortality from cardiovascular and respiratory disease¹⁵².

Changes in the climate are likely to impact on air quality; increases in temperature may affect the formation of ozone, increasing the frequency and severity of summer smogs. During the UK heat-wave of August 2003, between 420 and 770 (depending on the method of calculation) deaths brought forward were attributable to air pollution in a 15-day period¹⁵³.

Though separate policy frameworks have evolved for managing air pollution and climate change, it will be important to develop strong linkages between these into the future.

Delivery of air quality and climate change goals requires public engagement to encourage more sustainable behaviour in relation to, for example, transport choices. The local public health benefits resulting from many climate change and air quality mitigating actions should inform future communications activities at national and local level.

The county already has a number of plans, training and resources in place to respond to severe weather events. The Kent Resilience Forum (KRF) has developed, and is developing, a number of plans with Kent Partners including:

- Pan-Kent Multi Agency Flood Plan (covering Kent & Medway)
- Local Multi Agency Flood Plans
- Heat wave Plan for England (updated annually)
- Low Temperatures Plan
- Kent Resilience Forum Drought Plan
- Kent Resilience Forum Heat Wave Plan
- Local Flood Risk Strategy
- Single and Multi-Agency Flood Response Plan (Kent Resilience Forum)
- Shoreline Management Plans
- Strategic Flood Risk Assessments
- Local Health Resilience Partnerships

Severe Weather Impacts Monitoring System (SWIMS)

SWIMS is an online data capture facility enabling teams/business units across Kent Partners (including Kent County Council, Kent Police, district and borough councils and the Environment Agency) to record how their service is affected during severe weather events, as and when they occur across the county. For more information visit www.kent.gov.uk/SWIMS

SWIMS is currently being rolled out nationally as part of the Climate Ready programme.

Climate Resilience	<ul style="list-style-type: none"> • Research: Identify groups with pre-existing conditions which could make them more susceptible to severe weather and climate change, linking to the risk stratification approach as appropriate
	<ul style="list-style-type: none"> • Communications: It is recommended that climate / extreme weather and air quality preparedness and resilience is promoted within the local health and social care system, targeting those identified above for alerts (e.g., Met Office and KentAir Pollution forecasts air alerts as well as work of the Kent Resilience Forum).
	<ul style="list-style-type: none"> • Research: Strengthen understanding of causes and types of flood-related adverse health effects including longer term physical and mental health impacts
	<ul style="list-style-type: none"> • Project: Local resilience planning such as Local Multi-Agency Flood Plans should incorporate health impacts and vulnerable communities should be supported in building their resilience to severe weather and climate change. This should include a review of the psychosocial and mental health aspects of emergency preparedness
	<ul style="list-style-type: none"> • Research: Map health and social care infrastructure and its interdependencies to identify vulnerability to severe weather, flooding and climate change building on SHAPE and the work of the flood risk team.
	<ul style="list-style-type: none"> • Monitoring: Currently, monitoring and surveillance of the impacts of severe weather and climate change on health and wellbeing is not as effective as it could be. For this reason it is recommended that Public Health and partners sign up to the Severe Weather Impacts Monitoring System (SWIMS) to input how services are affected by severe weather and build the evidence base for actions to improve resilience and avoid future and current costs.

6. Air Quality

Despite modern challenges, such as the conflicts between economic growth and sustainability, air quality in the UK has improved over the last twenty years. Some pollutants such as sulphur dioxide (SO₂), lead and carbon monoxide (CO) are no longer a major concern for much of the UK. This is largely due to national policies targeted at cleaner technologies and fuels, combined with local initiatives (such as ports switching to low sulphur fuel). There have also been improvements in ambient concentrations, although for some key pollutants, this trend has slowed.

Despite these improvements, we are still seeing the evidence of the negative health effects, and environmental damage, caused by air pollutant emissions. The air pollutants of greatest concern in the UK now are particulate matter (PM), oxides of nitrogen (NO_x), and ozone (O₃). Meanwhile, climate change has emerged as a major global challenge with achievement of legally binding targets by 2050 a key priority for the UK Government.

Table 7-1: The health and environmental effects of PM, NO_x and ozone, and the observed trends.

Pollutant	Health Effects	Environmental effects	Trend
Particulate matter (PM_{2.5} and PM₁₀ secondary PM)	Short and long term exposure can worsen respiratory and cardiovascular illness and increase mortality.	Secondary PM includes sulphate, nitrate and ammonium, formed from SO ₂ , NO _x and NH ₃ which are the main drivers for acidification and eutrophication. Black carbon, a potent short lived climate forcing agent, is a key part of the particulate matter mix, resulting from combustion.	Concentrations in urban areas have largely levelled off since around 2000.
Nitrogen oxides (NO_x – made up of NO and NO₂)	Can cause inflammation of the airways, affect lung function and respiratory symptoms. Involved in the	Contribute to acidification and eutrophication of terrestrial and aquatic ecosystems, damaging habitats and leading to	Initial reduction in concentrations in line with emission controls, but concentrations have levelled off since the early 2000s and remain

Pollutant	Health Effects	Environmental effects	Trend
	formation of PM and ozone. The effects of long term exposure are less certain than the effects of short term exposure.	biodiversity loss.	largely flat. There are indications that emission controls on diesel vehicles have not delivered the expected reductions in NO ₂ concentrations.
Ozone (O₃)	Can damage airways and reduce lung function. Increases incidence of respiratory symptoms and additional COPD hospital admissions	Can cause damage to plants, leading to yield loss and impact on biodiversity. Ozone is also a greenhouse gas.	Severity of peak episodes (summer smog) greatly reduced, but background urban levels are rising

The health effects of PM are more significant than those of other air pollutants. PM is made up of a complex mixture of solid and liquid particles, including carbon, complex organic chemicals, sulphate, nitrates, ammonium, sodium chloride, mineral dust, water and a series of metals, which is suspended in the air. PM10 refers to particles with a diameter smaller than 10µm and PM2.5 to particles with a diameter smaller than 2.5µm. They may be produced directly from a source such as a combustion engine – or formed from reactions between other pollutants (e.g. NO₂, SO₂, and NH₃) in the atmosphere (secondary PM). Chronic exposure contributes to the risk of developing cardiovascular diseases and lung cancer¹⁵⁴. Particulate matter can have an either cooling or a warming effect on climate, depending on its properties.

There has been a shift in the dominant sources of air pollutants. Twenty to thirty years ago these were mainly industry and domestic heating. Today they are dominated by large combustion plant (power generation) and transport. These activities contribute to both local air pollution and climate change, so it is important to recognise the links between these policy areas.

Local authorities in the UK have a duty under Local Air Quality Management (LAQM) legislation to review and assess air quality. Where levels exceed national objectives, measures should be put in place to reduce emissions, and be reported in a local Air Quality Action Plan. Most such action plans are designed to address difficulties in complying with national objectives for nitrogen dioxide (NO₂) and/or PM10. Typical measures to reduce emissions from local sources include traffic management, encouraging the uptake of cleaner vehicles, and increased use of public transport, along with more sustainable travel options such as walking and cycling. Such measures will also reduce PM2.5 emissions.

Air Quality and Public Health

Poor air quality is a significant public health concern. The burden of particulate air pollution alone in the UK in 2008 was estimated to be equivalent to nearly 29,000 deaths at typical ages and an associated loss of 340,000 years of population life¹⁵⁵.

In recognition of this all upper tier Local Authorities in England are required to demonstrate a reduction in attributable deaths and associated years of life lost due to particulate air pollution (PM_{2.5}) in line with indicator 3.1 of the Public Health Outcomes Framework (PHOF) for 2013-2016¹⁵⁶.

It has been estimated that removing all fine particulate air pollution would have a bigger impact on life expectancy in England and Wales than eliminating passive smoking or road traffic accidents. The economic cost from the impacts of air pollution in the UK is estimated at £9-£19 billion every year. This is comparable to the economic cost of obesity (over £10 billion)¹⁵⁷.

There are also additional costs to the NHS from respiratory hospital admissions triggered by air pollution. For example, in 2007/08, there were over 74,000 emergency admissions to hospital because of asthma and the NHS's non-elective spell tariff was £612 million for 2007/08. There are clear links between asthma and air quality; Asthma UK estimate the annual cost of asthma to society at £2.3 billion..." (EAC, March 2010)¹⁵⁸.

The Air Quality Management Resource Centre note that the health impacts of air quality in the UK are almost twice those of physical inactivity, estimated to be £10.7 billion per annum and are comparable to the cost of alcohol misuse to society, estimated to be £12-£18 billion per annum. However, the effects of poor air quality on our health fails to receive the same level of attention as the latter within medical circles (EAC, March 2010).

Elimination of man-made particulates has been estimated to show a gain in life expectancy of 7-8 months compared to only 1-3 months for the elimination of road traffic accidents or 2-3 months for passive smoking (Table 4: EPUK, 2011¹⁵⁹).

Table 7-2: Comparison of the benefits of reducing PM_{2.5} by 10µg/m³ (equivalent to eliminating man-made PM_{2.5} in 2005), the elimination of motor vehicle traffic accidents and the elimination of exposure to passive smoking.

	Reduction in PM_{2.5}	Elimination of road traffic accidents	Elimination of passive smoking
Expected gain in life expectancy	7-8 months	1-3 months	2-3 months
Estimated equivalent gain in life years in England and Wales from 2005-2110 for the whole population (including people born during that time)	39,058,000	8,126,000	13,194,000

Studies (Defra, 2006¹⁶⁰, and Shaleen Sutaria 2010¹⁶¹) show that in the UK the deprived communities are generally located in inner urban areas, where the air quality is generally poorer, further exacerbating inequality.

Kent's position between London and the continent brings health challenges associated with its unique pollution profile. As a gateway to the continent Kent & Medway's extensive transport network carries a disproportionate number of HGVs, with their associated carcinogenic diesel emissions. This cross channel traffic is continuing to increase¹⁶². Around the Kent coast and ports shipping brings additional impacts from the use of marine diesel.

Even away from local urban and traffic sources, pollution impacts on the population. Easterly winds can bring pollution from continental sources, which affect the whole of Kent, raising levels of particulate and/or ozone. Winds from the opposite direction can bring London's urban pollution plume drifting across western Kent.

On top of the urban pollution problems seen everywhere this unique combination of additional factors in Kent exacerbates pollution, and hence health and inequalities. The research¹⁶³ suggests that COPD is likely to be the third largest cause of death worldwide. Additional research (Susanna Lagoria et al, 2006¹⁶⁴, Antonella Zanobetti et al, 2008¹⁶⁵) has also established air pollution as one of the potential causes and exacerbating factor for COPD.

Shaleen Sutaria (2010)¹⁶⁶ estimated that there were 963 excess deaths per year due to long term exposure, and 91 excess deaths per year due to short term exposure to air pollution in Kent; this estimate again ignores the larger effects on morbidity due to air pollution and shows that interventions to reduce air pollution have co-benefits on health, climate change and the economy.

In 2012 a new estimate of 1180 early deaths as a result of just PM2.5 air pollution across Kent & Medway in 2010 was calculated by the Kent & Medway Air Quality Partnership (K&MAQP) Health Sub Group. The calculation used methods recommended in the August 2012 statement 'Estimating the mortality burden of particulate air pollution at the local level' from the Committee on the Medical Effects of Air Pollutants (COMEAP), the Government's official advisory panel¹⁶⁷.

The Kent and Medway Air Quality Partnership have a dedicated health sub-group. Through collaborative working with multiagency partners a portfolio of projects has been developed to mitigate the effects of air pollution:

- a. Education – “Air We Breathe” & links to smoking cessation
- b. Sustainable Transport – Low carbon vehicles (electric vehicle charging, hybrid buses, bus retrofit project), active transport & Walk to School.
- c. Exposure Reduction – Use of forecasting technologies, Kent Air alerts system

Cross cutting benefits are expected with other PHOF indicators, including those linked to physical activity, childhood obesity, smoking and mortality due to cardiovascular disease.

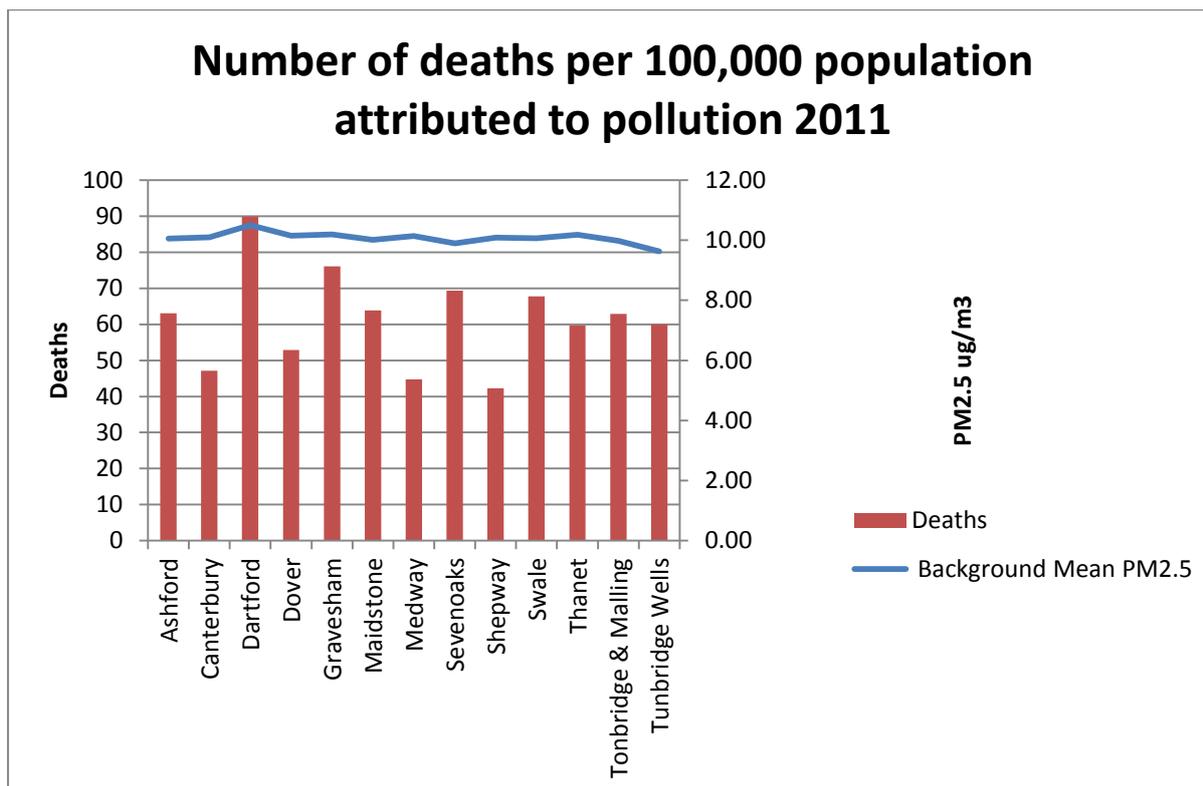


Figure 7-1: Early deaths from PM2.5 in 2010⁴⁸

Despite the focus for most Local Authority work resting with oxides of nitrogen (under the direction of LAQM and prospective financial burden), the PHOF is the first government directed document indicating that partnership working must look at the broader remit of air quality and public health, redirecting our focus to particulates.

In June 2012 the World Health Organisation, stated that diesel particulates are carcinogenic¹⁶⁸. All of our most valued sources of public health information are giving us the most direct statements produced to date that action on (and education about) particulate emissions is required now. We must work in co-operation with our partners to ensure that lifestyle adjustments required by changing pollutant levels are promoted with equal importance to public health messages on taking more exercise, eating “5 a day” and reducing smoking.

There are opportunities for taking advantage of the cross over between the health and wellbeing agenda, climate change and carbon reduction initiatives and air quality programmes. For example, walking and cycling have the potential to improve fitness, diminish obesity, and reduce noise, air pollution, and greenhouse gases associated with travel. Just half an hour a day of walking or cycling can halve the risk of developing heart disease¹⁶⁹. Over half of the daily trips that people make are short and provide an opportunity for physical activity that is free and accessible¹⁷⁰.

Public health professionals can work with their local authorities to promote the health benefits of using public transport, walking and cycling. As an additional measure, providing early warnings of elevated pollution levels allows individuals that might be vulnerable to the short-term effects of air pollution (e.g. asthmatics, or those with pre-existing lung or heart conditions) to be alerted so they can reduce strenuous activity outdoors. Such alerts can also help to anticipate increased demand for medical services. Public information services and pollution forecasts are provided nationally by Defra in the UK¹⁷¹ and in Kent by the Kent

& Medway Air Quality Monitoring Network¹⁷² (<http://www.kentair.org.uk>). Other local forecast systems operate around the UK, most notably Airtext (covering Greater London) and airAlert (covering Sevenoaks, East Surrey, Southampton and Sussex).

Air Quality in Kent

Kent has twelve district councils, while Medway is a Unitary Authority, and all are required to review and assess air quality in their areas on an on-going basis. Where air pollutants concentrations are found to exceed the objectives set by the government, Air Quality Management Areas (AQMA's) are declared. Districts then develop Air Quality Action Plans with their partners to work towards achieving those objectives.

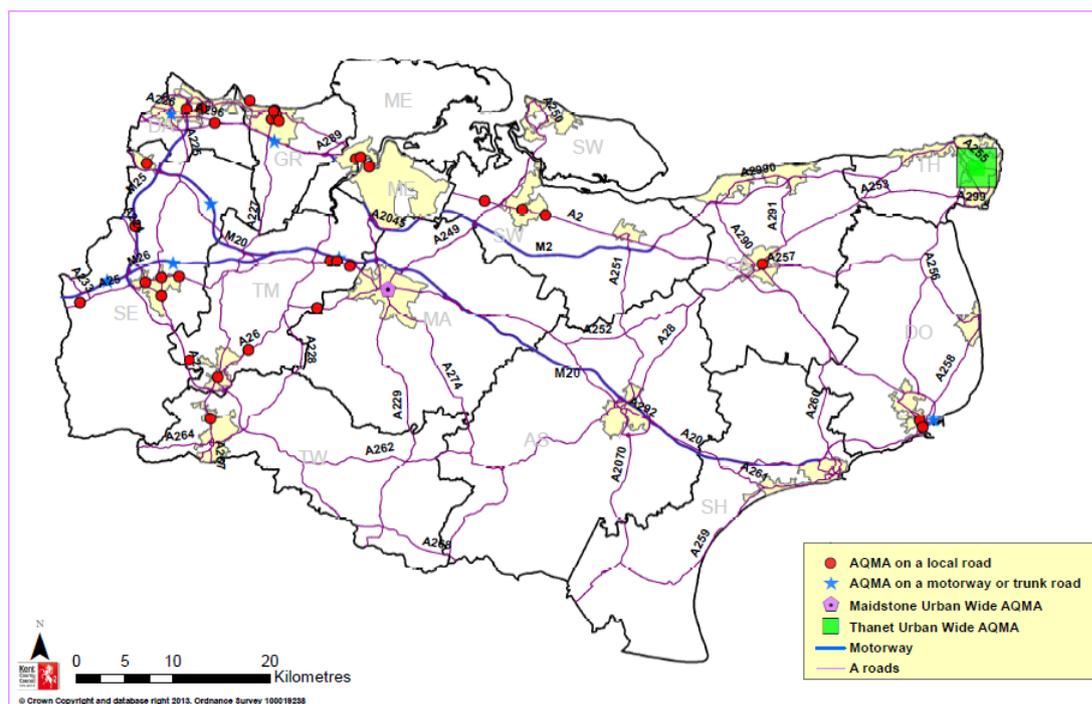


Figure 7-2: Air quality management areas in Kent and Medway

The Kent & Medway Air Quality Partnership provides strategic direction and support across the county. The Kent and Medway Air Quality Monitoring Network (K&MAQMN) was formed in 1992 to assist the partnership, and ensure a coordinated approach to air quality monitoring and reporting across the county. It also enables a cost effective approach for monitoring and data ratification to be employed.

AQMA's have been declared along a number of major roads and in congested town centres in the county, but these do not usually monitor for local levels of PM_{2.5}. Local levels of PM_{2.5} upon which the PHOF indicator 3.1 is based are modelled estimates linked to population density. This makes it difficult for Directors of Public Health to demonstrate progress against the indicator. To be able to do this, Directors of Public Health need to be equipped with:

- an understanding of the technical limitations of PM_{2.5} monitoring and the health effects of exposure
- a suite of actions to limit both the long-term effects of exposure, and exposure in the event of a pollution episode

The K&MAQMN currently consists of a number of district automatic monitoring sites, which collect high quality high resolution data sets. These monitoring sites are predominantly located within existing AQMA's.

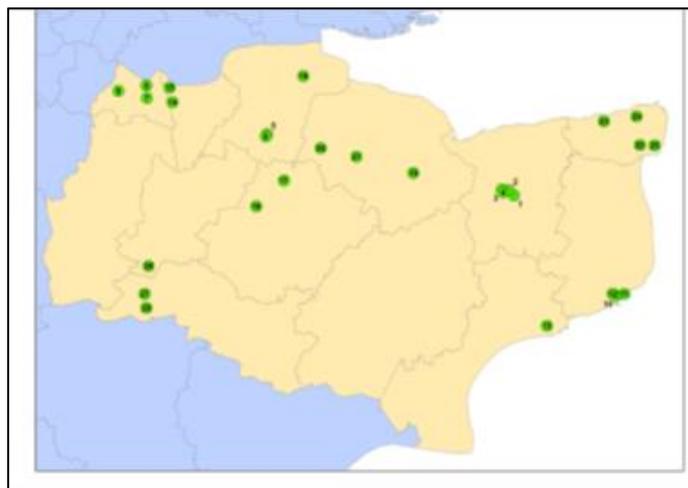


Figure 7-3: Map of automatic monitoring sites in the K&MAQMN

The K&MAQMN is supported by a publicly accessible website, KentAir (www.kentair.org.uk), which includes access to real-time and historic monitoring data, government health advice, educational information, a sustainable travel page, and the ability for anyone to subscribe to a free regional air pollution forecast, which is received by email.

A forecast is triggered whenever there is likely to be a pollution episode of moderate and above for certain air pollutants, and conforms to the Government's Daily Air Quality Index (DAQI). As well as giving information on the nature of the pollution, a link is provided for subscribers to obtain government health advice on what actions may be needed to reduce exposure and the impact on their health. The DAQI system is used within the UK to provide near-real-time information about air quality levels and to allow sensitive individuals to take action if required. The descriptions associated with each band are provided in Table 5

Table 7-3: DAQI Air quality bandings and their descriptions

Band	Index	Accompanying health messages for at-risk individuals	Accompanying health messages for the general population
Low	1-3	Enjoy your usual outdoor activities.	Enjoy your usual outdoor activities.
Moderate	4-6	Adults and children with lung problems, and adults with heart problems, who experience symptoms, should consider reducing strenuous physical activity, particularly outdoors.	Enjoy your usual outdoor activities.
High	7-9	Adults and children with lung problems, and adults with heart problems, should reduce strenuous physical exertion, particularly outdoors, and	Anyone experiencing discomfort such as sore eyes, cough or sore throat should consider reducing

Band	Index	Accompanying health messages for at-risk individuals	Accompanying health messages for the general population
		particularly if they experience symptoms. People with asthma may find they need to use their reliever inhaler more often. Older people should also reduce physical exertion.	activity, particularly outdoors.
Very High	10	Adults and children with lung problems, adults with heart problems, and older people, should avoid strenuous physical activity. People with asthma may find they need to use their reliever inhaler more often.	Reduce physical exertion, particularly outdoors, especially if you experience symptoms such as cough

Recommendations for improving air quality and associated health impacts (also see cross-cutting activities and those related to planning, transport and climate resilience as all support delivery of air quality outcomes):

Air Quality	<ul style="list-style-type: none"> • Communications: Raise awareness of the impacts of air quality on health across all groups / organisations, including health professionals, decision/policy makers, vulnerable groups (linking with cross cutting activities on communication)
	<ul style="list-style-type: none"> • Research: Investigate the public health significance/impact of the air quality management areas in Kent using the Kent & Medway Air Quality Monitoring Network annual report as an evidence base.

7. Workplace health and supply chains

The health sector is a major user of resources and can have a significant carbon footprint. For example, the NHS produces 600,000 tonnes of waste at a cost of £42 million - over one per cent of all domestic waste produced in the UK - and consumes 50 billion litres of water a year¹⁷³. Energy used by the health sector produces about 3.5m tonnes of CO₂ a year¹⁷⁴. This all contributes to climate change.

There are many reasons why a sustainable workplace is beneficial to staff, the organisation and the community in which they work:

- Higher recruitment rate of staff to organisations who are seen to be sustainable and have good CSR¹⁷⁵
- Higher retention rate of staff in organisations who practice CSR (included environmental, Community Investment, HR issues, Marketplace)
- Less absenteeism if employees like where they work
- Healthier employees where sustainable travel is actively promoted
- Resource efficiency at work translates to resource efficiency at home – better environment in the long-term

In addition, the need through encouraging local employment opportunities we can:

- Reduce unemployment and its interlinking issues such as depression, anxiety and morbidity
- Reduce travel miles
- Encourage greater community cohesion where people can live, work and engage in leisure activities within their communities

Kent County Council and its partners have a range of initiatives in place to support workplace health and wellbeing and linking these to sustainability. We can draw on these lessons to support our supply chains in building their sustainability credentials.

Steps to Environmental Management (STEM):

With European funding, KCC developed the STEM scheme which launched in 2011. As the name suggests a step-by-step guide to putting an environmental management system in place within a business or organisation. The scheme has three levels; Blue, Silver and Gold. The criteria in each of these levels correspond to requirements in the internationally recognised BS8555 and ISO 14001. Since its launch, the scheme has been well received with over 450 businesses being certified. The most effective delivery of STEM has been the workshops and these have been extensively delivered across Kent. Many local authorities have taken the opportunity to run STEM workshops with their suppliers, helping to become part of the green supply chain and share the benefits of improved environmental management.

Businesses that operate an environmental management system to the STEM standard on average save £2,065 annually, reducing annual carbon emissions by 3.9 tonnes.

Recommendations for workplace and supply chain are:

Workplace and Supply Chain	<ul style="list-style-type: none"><li data-bbox="426 241 1276 421">• Research: Review the current environmental performance of the health and social care supply chain and identify opportunities for improving and incorporating new sustainable business models (e.g., circular economy, life-cycle assessments)<li data-bbox="426 430 1276 577">• Communications: Raise awareness of environmental management, climate resilience and workplace health across the health and social care supply chain, e.g., through the STEM scheme<li data-bbox="426 586 1276 721">• Project: It is recommended that contracts and procurement include an awareness of the implications of severe weather and climate change and ensure that business continuity plans are in place as appropriate.
-----------------------------------	---

8. References

- ¹ Health Inequalities in Kent – Two Years on from Fair Society Healthy Lives, The Marmot Review – February 2012
- ² Analysis and synthesis of evidence on the effects of investment in six Cycling Demonstration Towns Report for Department for Transport and Cycling England, Sloman L. et al., 2009
- ³ Do the health benefits of cycling outweigh the risks? Environmental Health Perspective, 118(8) 1109-1116, Hartog et al, 2010
- ⁴ The health risks and benefits of cycling in urban environments compared with car use: Health impact assessment study, BMJ, 343, Rojas-Rueda, D et al., 2011
- ⁵ Inverse association between cycling to work, public transport, and overweight and obesity: findings from a population study based in Australia Preventative Medicine, 46(1) 29-32, Wen & Rissel (2008)
- ⁶ Is physical activity or physical fitness more important in defining health benefits? Journal of the American College of Sports Medicine, 379-400, Blair et al., 2001
- ⁷ Increasing Physical Activity Reduces Risk of Heart Disease and Diabetes, WHO (World Health Organization) 2007a
- ⁸ Effect of increasing active travel in urban England and Wales on costs to national health service, Jarrett et al., 2012 The Lancet, 379(9832) 2198-2205
- ⁹ Community green: using local spaces to tackle inequality and improve health, CABE 2010
<http://webarchive.nationalarchives.gov.uk/20110118095356/http://www.cabe.org.uk/publications/community-green>
- ¹⁰ Green exercise: complementary roles of nature, exercise and diet in physical and emotional wellbeing and implications for public health policy, Whitehouse et al 2001 cited in: Pretty, J et al 2003 CES Occasional Paper 2003-1, University of Essex <http://www.outdoorfoundation.org/pdf/GreenExercise.pdf>
- ¹¹ Guidance on Transport Assessment and Travel plans, October 2008: Page 7, 2.3.1, Kent County Council Highway Services
- ¹² Children Living in Cold Homes, What happens to children in persistently bad housing?
- ¹³ Fuel Poverty – Excess Winter Deaths, www.decc.gov.uk/hillsfuelpovertyreview
- ¹⁴ Cold exposure and winter mortality from ischaemic heart disease, cerebrovascular disease, respiratory disease and all causes in warm and cold regions of Europe, Eurowinter Group (1997) (Lancet 349:1341-6)
- ¹⁵ Children Living in Cold Homes, What happens to children in persistently bad housing?
- ¹⁶ Public Health Mortality File, KMPHO
- ¹⁷ Cold exposure and winter mortality from ischaemic heart disease, cerebrovascular disease, respiratory disease and all causes in warm and cold regions of Europe, Eurowinter Group (1997) (Lancet 349:1341-6)
- ¹⁸ Fact File: The Cold Man of Europe, Association for the Conservation of Energy 2013
- ¹⁹ Kent Environment Strategy www.kent.gov.uk/kentenvironmentstrategy
- ²⁰ Local Transport Plan for Kent 2011-16. Chapter 11 – The Implementation Plan for Tackling a Changing Climate 119-125, Kent County Council 2011
- ²¹ Temperature Effects of Climate Change on Human Health, Hajat et al., 2012 Health Protection Agency
- ²² Bold Steps for Kent – The Medium Term Plan 2014/15
- ²³ UK Climate Projections 2009; <http://ukclimateprojections.metoffice.gov.uk/>
- ²⁴ Impacts of Flooding, WHO 2002 Flooding: Health effects and preventative measures
- ²⁵ Flood Affected Properties in Kent, Local Flooding Strategy
- ²⁶ Properties at risk of Surface Water in Kent, Environment Agency Flood Map
- ²⁷ Groups Particularly Vulnerable to flooding, Stanke et al., 2012
- ²⁸ Temperature Effects of Climate Change on Human Health, Hajat et al., 2012 Health Protection Agency
- ²⁹ Heat Related Deaths, Donaldson et al., 2001
- ³⁰ Heat Related Mortality and Morbidity, Vandentorren et al., 2006
- ³¹ Illnesses that Increase the Risk of Heat Related Death, Kovats and Hajat 2008
- ³² Links Between Asthma and Air Quality, Asthma UK EAC, March 2010

-
- ³³ Urban Pollution Problems in Kent, European Respiratory Society 2003
- ³⁴ Air Pollution as one of the Potential Causes and Exacerbating Factor for COPD, Susanna Lagoria et al., 2006
- ³⁵ Air Pollution as one of the Potential Causes and Exacerbating Factor for COPD, Zanobetti et al., 2008
- ³⁶ Estimating the Mortality Burden of Particulate Air Pollution at the Local Level, Committee on the Medical Effects of Air Pollutants (COMEAP)
- ³⁷ The mortality Effects of Long-Term Exposure to Particulate Air Pollution in the UK, The Committee on the Medical Effects of Air Pollutants (COMEAP) 2010
- ³⁸ Diesel Particles are Carcinogenic, WHO August 2012 <http://www.who.int/bulletin/volumes/90/7/12-010712/en/>
- ³⁹ UK Deprived Communities Located in Inner Urban Areas, Defra 2006
- ⁴⁰ UK Deprived Communities Located in Inner Urban Areas, Shaleen Sutaria 2010
- ⁴¹ Air Quality Strategy for England, Scotland, Wales and Northern Ireland. Defra 2011
<https://www.gov.uk/government/publications/the-air-quality-strategy-for-england-scotland-wales-and-northern-ireland-volume-2>
- ⁴² Air Quality Strategy for England, Scotland, Wales and Northern Ireland. Defra 2011
<https://www.gov.uk/government/publications/the-air-quality-strategy-for-england-scotland-wales-and-northern-ireland-volume-2>
- ⁴³ Urban Pollution Problems in Kent, European Respiratory Society 2003
- ⁴⁴ Estimating the Mortality Burden of Particulate Air Pollution at the Local Level, Committee on the Medical Effects of Air Pollutants (COMEAP)
- ⁴⁵ The mortality Effects of Long-Term Exposure to Particulate Air Pollution in the UK, The Committee on the Medical Effects of Air Pollutants (COMEAP) 2010
- ⁴⁶ NHS Sustainable Development Unit <http://www.sduhealth.org.uk/>
- ⁴⁷ NHS Sustainable Development Unit <http://www.sduhealth.org.uk/>
- ⁴⁸ Natural Capital: supporting evidence and analysis to the Natural Environment White Paper – The Natural Choice: securing the value of nature, p.13., Defra 2011
<http://www.archive.defra.gov.uk/environment/natural/documents/newp-evidence-nat-capital-110607.pdf>
- ⁴⁹ UK National Ecosystem Assessment 2011- The UK National Ecosystem Assessment: Synthesis of Key Findings., <http://uknea.unep-wcmc.org/>
- ⁵⁰ Green exercise: complementary roles of nature, exercise and diet in physical and emotional wellbeing and implications for public health policy, Whitehouse et al 2001 cited in: Pretty, J et al 2003 CES Occasional Paper 2003-1, University of Essex <http://www.outdoorfoundation.org/pdf/GreenExercise.pdf>
- ⁵¹ Effect of increasing active travel in urban England and Wales on costs to national health service, Jarrett et al., 2012 The Lancet, 379(9832) 2198-2205
- ⁵² Trees can Improve your health. The Wood Trust,
<http://www.woodlandtrust.org.uk/mediafile/100097680/trees-can-help-improve-health.pdf>
- ⁵³ Natural England's Accessible Natural Green space Standard (ANGSt),
http://www.naturalengland.org.uk/regions/east_of_england/ourwork/gi/accessiblenaturalgreenspacestandardangst.aspx
- ⁵⁴ UK Climate Projections 2009; <http://ukclimateprojections.metoffice.gov.uk/>
- ⁵⁵ <https://shareweb.kent.gov.uk/Documents/priorities-policies-plans/Bold%20Steps%20for%20Kent/Bold-Steps-for-Kent.pdf>
- ⁵⁶ <https://shareweb.kent.gov.uk/Documents/community-and-living/Regeneration/Regeneration%20framework%20November%202009.pdf>
- ⁵⁷ Kent Environment Strategy www.kent.gov.uk/kentenvironmentstrategy
- ⁵⁸ Health Inequalities in Kent – Two Years on from Fair Society Healthy Lives, The Marmot Review – February 2012

59 Barton, H and Grant, M (2006) A health map for the local human habitat. The journal for the Royal Society for the Promotion of Health, 126 vol 6. Pp252-253. ISSN 1466-4240. URL:

<http://dx.doi.org/10.1177/1466424006070466>

⁶⁰ Health Inequalities in Kent – Two Years on from Fair Society Healthy Lives, The Marmot Review – February 2012

⁶¹ Health Inequalities in Kent – Two Years on from Fair Society Healthy Lives, The Marmot Review – February 2012

⁶² www.liveitwell.org.uk/ways-to-wellbeing/six-ways-to-wellbeing

⁶³ Temperature Effects of Climate Change on Human Health, Hajat et al., 2012 Health Protection Agency

⁶⁴ Bold Steps for Kent – The Medium Term Plan 2014/15

⁶⁵ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/209866/pb13942-nap-20130701.pdf

⁶⁶ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/209866/pb13942-nap-20130701.pdf

⁶⁷ Adaptation to Climate Change for Health and Social Care Organisations

http://www.sduhealth.org.uk/documents/publications/adaptation_guidance_final.pdf

⁶⁸ Improving outcomes and supporting transparency -

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/263658/2901502_PHOF_Improving_Outcomes_PT1A_v1_1.pdf

⁶⁹ Public Health Outcomes framework data Tool November 2012, Public Health England 2012

<http://www.phoutcomes.info/>

⁷⁰ Public Health Outcomes Framework, Mortality Rankings, Public Health England 2011

<http://longerlives.phe.org.uk/#are/E06000041/par/E92000001>

⁷¹ Public Health Outcomes framework data Tool November 2012, Public Health England 2012

<http://www.phoutcomes.info/>

⁷² Future health: sustainable places for health and wellbeing; CABE 2009

⁷³ www.liveitwell.org.uk/ways-to-wellbeing/six-ways-to-wellbeing

⁷⁴ Getting the Measure of Fuel Poverty, Hills 2012

⁷⁵ Annual report on fuel poverty statistics, Department of Energy and Climate Change 2013

⁷⁶ Getting the Measure of Fuel Poverty: Hills 2012

⁷⁷ Fact File: The Cold Man of Europe, Association for the Conservation of Energy 2013

⁷⁸ Fact File: The Cold Man of Europe, Association for the Conservation of Energy 2013

⁷⁹ Getting the Measure of Fuel Poverty: Hills 2012

⁸⁰ Getting the Measure of Fuel Poverty: Hills 2012

⁸¹ Healy, J.D, 2003. Excess winter mortality in Europe: A cross country analysis identifying key risk factors.

Journal of Epidemiology & Community Health, 57, pp784-789. DOI <http://jech.bmj.com/content/57/10/>

⁸² Cold exposure and winter mortality from ischaemic heart disease, cerebrovascular disease, respiratory disease and all causes in warm and cold regions of Europe: Eurowinter Group (1997) (Lancet 349:1341-6)

⁸³ Annual report on fuel poverty statistics: Department of Energy and Climate Change 2013

⁸⁴ Fuel Poverty – Excess Winter Deaths, www.decc.gov.uk/hillsfuelpovertyreview

⁸⁵ Annual report on fuel poverty statistics: Department of Energy and Climate Change 2013

⁸⁶ Public Health Mortality File, KMPHO

⁸⁷ Growth Without Gridlock. A transport delivery plan for Kent, December 2010, Kent County Council December 2010

⁸⁸ Growth Without Gridlock. A transport delivery plan for Kent, December 2010, Kent County Council December 2010

⁸⁹ Analysis and synthesis of evidence on the effects of investment in six Cycling Demonstration Towns Report for Department for Transport and Cycling England, Sloman L. et al., 2009

-
- ⁹⁰ Do the health benefits of cycling outweigh the risks? Environmental health Perspective, 118(8) 1109-1116, Hartog et al, 2010
- ⁹¹ Do the health benefits of cycling outweigh the risks? Environmental health Perspective, 118(8) 1109-1116, Hartog et al, 2010
- ⁹² The health risks and benefits of cycling in urban environments compared with car use: Health impact assessment study, BMJ, 343, Rojas-Rueda, D et al., 2011
- ⁹³ Is physical activity or physical fitness more important in defining health benefits? Journal of the American College of Sports Medicine, 379-400, Blair et al., 2001
- ⁹⁴ Increasing Physical Activity Reduces Risk of Heart Disease and Diabetes, WHO (World Health Organization) 2007a
- ⁹⁵ Inverse association between cycling to work, public transport, and overweight and obesity: findings from a population study based in Australia Preventative Medicine, 46(1) 29-32, Wen & Rissel (2008)
- ⁹⁶ Effect of increasing active travel in urban England and Wales on costs to national health service, Jarrett et al., 2012 The Lancet, 379(9832) 2198-2205
- ⁹⁷ Growth Without Gridlock. A transport delivery plan for Kent, December 2010, Kent County Council December 2010
- ⁹⁸ Local Transport Plan for Kent 2011-16. Chapter 11 – The Implementation Plan for Tackling a Changing Climate 119-125, Kent County Council 2011
- ⁹⁹ Brompton Bikes, <http://road.cc/content/news/54089-68-cycle-rail-and-sustrans-projects-england-share-%C2%A315-million-dft-funding-full>
- ¹⁰⁰ KentJourney Share (2013), <https://kentcarshare.liftshare.com/default.asp>
- ¹⁰¹ Half an hour a Day of Walking or cycling can Halve the Risk of Developing Heart Disease, Dora C 1999
- ¹⁰² Effect of exposure to natural environment on health inequalities: an observational population study, R. Mitchell, F. Popham 2008 [Effect of exposure to natural environment on health inequalities: an observational population study](http://www.naturalengland.org.uk/regions/east_of_england/ourwork/gi/accessiblenaturalgreenspacestandar dangst.aspx)
- ¹⁰³ Natural England's Accessible Natural Green space Standard (ANGSt), http://www.naturalengland.org.uk/regions/east_of_england/ourwork/gi/accessiblenaturalgreenspacestandar dangst.aspx
- ¹⁰⁴ Natural England's Accessible Natural Green space Standard (ANGSt), http://www.naturalengland.org.uk/regions/east_of_england/ourwork/gi/accessiblenaturalgreenspacestandar dangst.aspx
- ¹⁰⁵ Effect of exposure to natural environment on health inequalities: an observational population study, (Mitchell R, Popham F, 2008The Lancet 372 (9650): pp 1655-1660
- ¹⁰⁶ Community green: using local spaces to tackle inequality and improve health, CABE 2010 <http://webarchive.nationalarchives.gov.uk/20110118095356/http://www.cabe.org.uk/publications/community-green>
- ¹⁰⁷ Natural England's Accessible Natural Green space Standard (ANGSt), http://www.naturalengland.org.uk/regions/east_of_england/ourwork/gi/accessiblenaturalgreenspacestandar dangst.aspx
- ¹⁰⁸ Mind (2007) Ecotherapy: The green agenda for mental health. Mind week report. Mind: London.
- ¹⁰⁹ <http://www.dmasuk.org/>
- ¹¹⁰ Forestry Commission ANGST Assessment, [http://www.forestry.gov.uk/pdf/accnatgreenrep-report.pdf/\\$file/accnatgreenrep-report.pdf](http://www.forestry.gov.uk/pdf/accnatgreenrep-report.pdf/$file/accnatgreenrep-report.pdf)
- ¹¹¹ State of understanding report: personal well-being and interactions with nature. Economic and Social Research Council (ESRC), Reid, L and Hunter, C 2011 <http://www.esrc.ac.uk/my-esrc/grants/RES-355-25-0020/outputs/Read/37df7aac-3f04-4e7d-b68c-663cee662fb0>
- ¹¹² Forestry Commission ANGST Assessment, [http://www.forestry.gov.uk/pdf/accnatgreenrep-report.pdf/\\$file/accnatgreenrep-report.pdf](http://www.forestry.gov.uk/pdf/accnatgreenrep-report.pdf/$file/accnatgreenrep-report.pdf)

-
- ¹¹³ Natural Capital: supporting evidence and analysis to the Natural Environment White Paper – The Natural Choice: securing the value of nature, p.13., Defra 2011
<http://www.archive.defra.gov.uk/environment/natural/documents/newp-evidence-nat-capital-110607.pdf>
- ¹¹⁴ UK National Ecosystem Assessment 2011- The UK National Ecosystem Assessment: Synthesis of Key Findings., <http://uknea.unep-wcmc.org/>
- ¹¹⁵ Health and the Natural Environment. Natural England, NE50, Natural England 2007
- ¹¹⁶ The UK National Ecosystem Assessment: chapter 23: Health Values from Ecosystems, p. 1163, UK National Ecosystem Assessment 2011 <http://uknea.unep-wcmc.org/>
- ¹¹⁷ Historical Environment and Sense of Place: Heritage Counts 2009. <http://hc.english-heritage.org.uk/Previous-Reports/HC-Sense-of-Place/>
- ¹¹⁸ The UK National Ecosystem Assessment: chapter 23: Health Values from Ecosystems, p. 1163, UK National Ecosystem Assessment 2011 <http://uknea.unep-wcmc.org/>
- ¹¹⁹ Community green: using local spaces to tackle inequality and improve health, CABE 2010
- ¹²⁰ UK Climate Projections 2009; <http://ukclimateprojections.metoffice.gov.uk/>
- ¹²¹ Climate change: A guide for Kent’s decision makers, June 2010
- ¹²² Bold Steps for Kent – The Medium Term Plan 2014/15
- ¹²³ Bold Steps for Kent – The Medium Term Plan 2014/15
- ¹²⁴ KCC Climate Change Adaptation Policy
- ¹²⁵ Temperature Effects of Climate Change on Human Health, Hajat et al., 2012 Health Protection Agency
- ¹²⁶ http://sei-international.org/mediamanager/documents/Publications/Future/climate_change_growing_old.pdf
- ¹²⁷ Properties at risk of Surface Water in Kent, Environment Agency Flood Map
- ¹²⁸ Properties at risk of Surface Water in Kent, Environment Agency Flood Map
- ¹²⁹ Impacts of Flooding, WHO 2002 Flooding: Health effects and preventative measures
- ¹³⁰ Properties at risk of Surface Water in Kent, Environment Agency Flood Map
- ¹³¹ Vulnerability in Coastal Areas, Zsomboky et al., 2011
- ¹³² Bennet, G. 1970. Bristol Floods 1968. Controlled Survey of Effects on Health of Local Community Disaster. British Medical Journal Volume 3 (5720) pp 454-458. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1701441/>
- ¹³³ Prevalence of Mental Health Symptoms, Tapsell and Tunstall 2008
- ¹³⁴ Flood Management, Murray et al., 2011
- ¹³⁵ UK Climate Change Risk Assessment; Hames and Vardoulakis 2012.
<https://www.gov.uk/government/publications/uk-climate-change-risk-assessment-government-report>
- ¹³⁶ UK Climate Change Risk Assessment; Hames and Vardoulakis 2012.
<https://www.gov.uk/government/publications/uk-climate-change-risk-assessment-government-report>
- ¹³⁷ Temperature Effects of Climate Change on Human Health, Hajat et al., 2012 Health Protection Agency
- ¹³⁸ Temperature Effects of Climate Change on Human Health, Hajat et al., 2012 Health Protection Agency
- ¹³⁹ Heat Related Deaths, Donaldson et al.,
- ¹⁴⁰ Temperature Effects of Climate Change on Human Health, Hajat et al., 2012 Health Protection Agency
- ¹⁴¹ Temperature Effects of Climate Change on Human Health, Hajat et al., 2012 Health Protection Agency
- ¹⁴² Heat Related Mortality and Morbidity, Vandentorren et al., 2006
- ¹⁴³ Illnesses that Increase the Risk of Heat Related Death, Kovats and Hajat 2008
- ¹⁴⁴ National climate Change Risk Assessment, <https://www.gov.uk/government/policies/adapting-to-climate-change>
- ¹⁴⁵ Heat Related Deaths, Donaldson et al.,
- ¹⁴⁶ Health Effects of Climate Change in the UK 2012, Sotiris Vardoulakis and Clare Heaviside, 2012
<http://www.hpa.org.uk/hecc2012>
- ¹⁴⁷ Health Effects of Climate Change in the UK 2012, Sotiris Vardoulakis and Clare Heaviside, 2012
<http://www.hpa.org.uk/hecc2012>

-
- ¹⁴⁸ Health Effects of Climate Change in the UK 2012, Sotiris Vardoulakis and Clare Heaviside, 2012
<http://www.hpa.org.uk/hecc2012>
- ¹⁴⁹ Health Effects of Climate Change in the UK 2012, Sotiris Vardoulakis and Clare Heaviside, 2012
<http://www.hpa.org.uk/hecc2012>
- ¹⁵⁰ Health Effects of Climate Change in the UK 2012, Sotiris Vardoulakis and Clare Heaviside, 2012
<http://www.hpa.org.uk/hecc2012>
- ¹⁵¹ UK Climate Change Risk Assessment; Hames and Vardoulakis 2012.
<https://www.gov.uk/government/publications/uk-climate-change-risk-assessment-government-report>
- ¹⁵² UK Climate Change Risk Assessment; Hames and Vardoulakis 2012.
<https://www.gov.uk/government/publications/uk-climate-change-risk-assessment-government-report>
- ¹⁵³ UK Climate Change Risk Assessment; Hames and Vardoulakis 2012.
<https://www.gov.uk/government/publications/uk-climate-change-risk-assessment-government-report>
- ¹⁵⁴ Diesel Particles are Carcinogenic, WHO August 2012 <http://www.who.int/bulletin/volumes/90/7/12-010712/en/>
- ¹⁵⁵ Air Quality: Public Health Impacts and Local Actions.
[http://laqm.defra.gov.uk/documents/air_quality_note_v7a-\(3\).pdf](http://laqm.defra.gov.uk/documents/air_quality_note_v7a-(3).pdf)
- ¹⁵⁶ Public Health Outcomes framework data Tool November 2012, Public Health England 2012
<http://www.phoutcomes.info/>
- ¹⁵⁷ Air Quality: Public Health Impacts and Local Actions.
[http://laqm.defra.gov.uk/documents/air_quality_note_v7a-\(3\).pdf](http://laqm.defra.gov.uk/documents/air_quality_note_v7a-(3).pdf)
- ¹⁵⁸ Links Between Asthma and Air Quality, Asthma UK EAC, March 2010
- ¹⁵⁹ Air Quality: Public Health Impacts and Local Actions.
[http://laqm.defra.gov.uk/documents/air_quality_note_v7a-\(3\).pdf](http://laqm.defra.gov.uk/documents/air_quality_note_v7a-(3).pdf)
- ¹⁶⁰ UK Deprived Communities Located in Inner Urban Areas, Defra 2006
- ¹⁶¹ UK Deprived Communities Located in Inner Urban Areas, Shaleen Sutaria 2010
- ¹⁶² Impact from the use of Marine Diesel, Kent County Council 2011
- ¹⁶³ Urban Pollution Problems in Kent, European Respiratory Society 2003
- ¹⁶⁴ Air Pollution as one of the Potential Causes and Exacerbating Factor for COPD, Susanna Lagoria et al., 2006
- ¹⁶⁵ Air Pollution as one of the Potential Causes and Exacerbating Factor for COPD, Zanobetti et al., 2008
- ¹⁶⁶ UK Deprived Communities Located in Inner Urban Areas, Shaleen Sutaria 2010
- ¹⁶⁷ Estimating the Mortality Burden of Particulate Air Pollution at the Local Level, Committee on the Medical Effects of Air Pollutants (COMEAP)
- ¹⁶⁸ WHO World Health Organisation, Air Quality Guidelines, WHO (World Health Organization) Global Update 2005
- ¹⁶⁹ Half an hour a Day of Walking or cycling can Halve the Risk of Developing Heart Disease, Dora C 1999
- ¹⁷⁰ Half an hour a Day of Walking or cycling can Halve the Risk of Developing Heart Disease, Dora C 1999
- ¹⁷¹ The mortality Effects of Long-Term Exposure to Particulate Air Pollution in the UK, The Committee on the Medical Effects of Air Pollutants (COMEAP) 2010
- ¹⁷² Pollution Forecasts for Kent and Medway, <http://www.kentair.org.uk>
- ¹⁷³ NHS Sustainable Development Unit <http://www.sduhealth.org.uk/>
- ¹⁷⁴ NHS Sustainable Development Unit <http://www.sduhealth.org.uk/>
- ¹⁷⁵ Benefits of a Sustainable Workplace Institute of Public Health, Ireland (2011) Health Inequalities,
<http://www.publichealth.ie/healthinequalities/healthinequalities>