**Health Impact Analysis**

**Lancashire and South Cumbria ICB**

**Green Plan Actions - Towards Meeting Net-Zero**

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Contents

[Executive Summary 4](#_Toc174530717)

[Overarching Recommendation 6](#_Toc174530718)

[Further Recommendations 6](#_Toc174530719)

[Introduction 7](#_Toc174530720)

[Background 7](#_Toc174530721)

[Scope 7](#_Toc174530722)

[Actions, Impacts and Challenges 8](#_Toc174530723)

[1.0 Sustainable Models of Care 8](#_Toc174530724)

[1.1 Plans for the National Elective Recovery Programme 8](#_Toc174530725)

[1.11 National Pathway Improvement Programme (NPIP) 8](#_Toc174530726)

[1.12 ‘Getting it Right First Time’ (GIRFT) 10](#_Toc174530727)

[1.2 Community Diagnostic Centres (CDCs) 11](#_Toc174530728)

[1.3 Access to Care in Areas of Deprivation 14](#_Toc174530729)

[1.4 Decarbonising Pathways and Specialties 16](#_Toc174530730)

[1.5 Decarbonisation of Care Materials 18](#_Toc174530731)

[1.6 Targeted Health Promotion 20](#_Toc174530732)

[2.0 Food and Nutrition 23](#_Toc174530733)

[2.1 Plant-forward Diets 23](#_Toc174530734)

[2.2 Digital Menus 25](#_Toc174530735)

[2.3 Food Insecurity 27](#_Toc174530736)

[2.4 Food Poverty 27](#_Toc174530737)

[2.5 Healthy Eating Partnerships 28](#_Toc174530738)

[2.6 Food Poverty Projects 29](#_Toc174530739)

[3.0 Digital Transformation 31](#_Toc174530740)

[3.1 Digital Transformation Plan 31](#_Toc174530741)

[3.2 Digital Literacy 32](#_Toc174530742)

[3.3 Virtual Outpatient Appointments 34](#_Toc174530743)

[3.4 Online Consultations 34](#_Toc174530744)

[4.0 Travel and Transport 37](#_Toc174530745)

[4.1 Promote Safe and Secure Cycling and Walking 37](#_Toc174530746)

[4.2 Transport Links and Access to Healthcare Sites 38](#_Toc174530747)

[4.3 Non-emergency Patient Transport 40](#_Toc174530748)

[4.4 Cycle Lanes for Accessing Healthcare Sites (see 4.1) 41](#_Toc174530749)

[5.0 Medicines 42](#_Toc174530750)

[5.1 Green Inhalers 42](#_Toc174530751)

[5.2 Reduce Waste from N2O 43](#_Toc174530752)

[6.0 Supply Chain and Procurement 47](#_Toc174530753)

[6.1 Sustainable Procurement Policy 47](#_Toc174530754)

[6.2 Sustainable Procurement Strategy 47](#_Toc174530755)

[7.0 Building Energy 50](#_Toc174530756)

[7.1 Community Renewable Energy 50](#_Toc174530757)

[7.2 Green Gas 52](#_Toc174530758)

[8.0 Capital Projects 54](#_Toc174530759)

[8.1 Procurement Compliance 54](#_Toc174530760)

[9.0 Climate Adaptation 56](#_Toc174530761)

[9.1 Climate Change Adaptation Plan 56](#_Toc174530762)

[9.2 Climate Ready Upgrades to Estates 58](#_Toc174530763)

[10.0 Green Space and Biodiversity 60](#_Toc174530764)

[10.1 Biodiversity and Greenspace Initiatives 60](#_Toc174530765)

[11.0 Waste 62](#_Toc174530766)

[11.1 PPE and PPE Waste 62](#_Toc174530767)

[Conclusions 64](#_Toc174530768)

[Recommendations - To be completed 68](#_Toc174530769)

[Appendix 1 – LSC ICB 10-Point Plan for Practices 69](#_Toc174530770)

[Appendix 2 - Background Annual Average PM2.5 Concentrations, North-West, 2021/22 to 2022/23 70](#_Toc174530771)

[Appendix 3 - Fraction of mortality attributable to particulate air pollution (new method), 2023 71](#_Toc174530772)

[Appendix 4 - Ten GP Surgeries with worst levels of PM2.5 air pollution in England 72](#_Toc174530773)

[Appendix 5 – World Health Organisation Recommended Air Quality Levels and Interim Targets 73](#_Toc174530774)

[Appendix 6 - Number of deaths that occurred before, during and after heat-periods for the leading causes of excess death, June to August 2022 heat-periods, England and Wales 74](#_Toc174530775)

[References 75](#_Toc174530776)

# Executive Summary

**Sustainable Models of Care**

The necessary reduction in the environmental impact of healthcare involves changes in care pathways, specialties, and materials, as well as embracing new technology. However, the key to improved outcomes alongside a lower carbon footprint and cost efficiency, is a shift from treatment to prevention. Community Diagnostic Centres (CDCs) are essential for this shift, but they must be properly staffed and have a focus on preventive care. Targeted health promotion can help reduce disparities and improve the health of vulnerable populations, and building trust and empowering communities are vital components for achieving this. Lowering the risk of disease, not simply increasing medical interventions, calls for a healthcare system that prioritises prevention, equity, and sustainability, while leveraging the potential of CDCs and technology.

**Food and Nutrition**

It is important to understand food poverty and insecurity to effectively promote healthier diets such as plant-based diets. It is also vital to align dietary advice, with nutritional guidelines for chronic conditions like diabetes, and this may involve increased amounts of consultation with registered dietitians. Partnerships between organisations and the use of digital tools, can help to promote healthier eating which aligns with net zero goals. Hospital catering can lead by example in this area.

**Digital Transformation**

Digital transformation in healthcare offers significant potential for improved patient outcomes. Virtual appointments and online consultations enhance access and convenience. However, challenges such as the digital divide, patient preference for face-to-face interaction, and potential for underdiagnosis need to be addressed. While new technologies like wearable sensors show promise for patient monitoring, the online environment can also lead to negative consequences such as cyberchondria, decision fatigue, and delayed treatment. To maximize the benefits of digital healthcare, it's crucial to balance the advantages with the risks and to ensure equitable access for all patients.

**Travel and Transport**

Improved public transport and active travel to promote net-zero goals, can enhance healthcare access and overall well-being. Better public transport links to healthcare facilities (including CDCs) typically improve access for underserved communities, which can lead to more timely treatment and increased engagement with centralised preventative care. Additionally, promoting cycling and walking to reduce car pollution can simultaneously improve public health. However, creating safe cycling and walking routes, which separate cyclists and pedestrians from car traffic, is crucial for the success of these initiatives.

**Medicines**

Green inhalers can reduce greenhouse gas emissions and improve medication adherence, but their suitability depends on individual patient needs. N2O reduction can also benefit patients by reducing side effects, but the use of alternatives to N2O, must be balanced against N2O’s well established safety and effectiveness. Mobile destruction units could help mitigate against N2O emissions. To effectively implement these changes, national guidance, standardisation, and training for healthcare professionals are essential.

Medication use reviews are a valuable tool to reduce waste, optimise prescriptions, and improve patient health, particularly for older adults. Such reviews are already supported by the Lancashire Medicines Management Group (LMMG). This tool is not listed as one of the actions in the ICB Gren Plan, although the plan suggests a move away from polypharmacy, towards self-care and social prescribing to prevent medicines waste.

**Procurement and Supply Chains**

Sustainable procurement in healthcare is a complex but essential process, which offers benefits for patients, staff, and the environment. However, careful consideration must be given to both health and environmental factors. This includes thorough product research, prioritising reputable suppliers, and adhering to certifications and national guidance. The mandate for a 10% weighting of social value in procurement contracts is a positive step, but it is crucial to balance social impact with clinical outcomes; and avoid disadvantaging clinically effective providers who are smaller in size, and less adept at evidencing social value.

**Building Energy and Capital Projects**

Community renewable energy initiatives and switching to green gas sources like biogas, can bring substantial benefits, including job creation, lower energy costs and community funds, as well as improved health through reduced air pollution. Collaboration, education, and financial innovation are key to their success.

**PPE Usage and PPE Waste**

Reducing PPE usage requires a careful balance between reducing waste, ensuring patient and staff safety, and maintaining levels of comfort and confidence. Reusable medical gowns offer a potential solution for environmental and health benefits, as well as patient and staff acceptability.

**Green Space and Biodiversity**

Green space improves air quality, reduces stress, and promotes physical activity. It also helps mitigate against heat-related illnesses and creates a sense of community. Healthcare professionals should be knowledgeable about the benefits of "nature prescribing" and prioritise green space initiatives in low-income areas. Biodiversity can also improve health; it reduces the risk of zoonotic diseases by creating barriers between wildlife and humans. However, careful assessment is necessary to minimise potential risks associated with increased biodiversity.

**Climate Adaptation**

Climate change adaptation is crucial for population health and for maintaining healthcare service continuity. The primary focus should be on preparing for heatwaves due to their significant impact on public health, particularly among vulnerable populations. Improving public education, infrastructure, and building insulation are essential measures; and healthcare facilities such as care homes, must adapt to rising temperatures. Upgrading buildings to withstand heat and improving indoor temperature control can enhance population health and well-being, however, financial and technical challenges need to be addressed.

Preparing for flooding is also vital. This requires ensuring continued access to healthcare services during floods; developing evacuation plans; and improving collaboration between agencies.

As climate change anxiety (CCA) grows, mental health services must be available to help people cope with both CCA and the emotional impact of extreme weather events.

### Overarching Recommendation

During the re-iteration of the ICB Green Plan (required by April-25), consider the health impacts, challenges and examples identified within this report. This should help prioritise areas of focus, such as collaboration with other organisations, including overcoming barriers to such, and ensuring Green Plan actions increase health improvement opportunities for those most in need, thus narrowing existing health inequalities.

### Further Recommendations

1. Given that people with poorer health have higher NHS carbon-footprints (healthcare utilisation, energy-intensive treatments, medication production/transportation and waste), preventative healthcare is the ultimate way to save carbon while positively impacting patients.

Through targeted health promotion and community empowerment, greater prevention can be achieved. Better use of technology and appropriate utilisation of community diagnostic centres can help achieve this.

1. In order to reduce health inequalities, in line with ICB principles, equity of access must be encouraged during the promotion of:
	1. carbon-friendly (and healthier) net-zero diets
	2. digital tools
	3. greener transport options
2. Clinically advised polypharmacy reductions are known to benefit patients and while this is noted in the current Green Plan, it ought to be referenced as a specific action. The risks/benefits of introducing greener equipment, devices, medicines, inhalers, analgesia and even packaging, may be more complex. It is important that national guidance and advice is adhered to, and that evidence-based certifications are checked. Novel approaches which minimise impacts on patients should be prioritised.
3. Public education, infrastructure and building insulation, are essential measures in adapting to rising temperatures. Vulnerable populations such as those living in care homes, must be prioritised when promoting climate adaptation.
4. Health impacts, challenges and examples identified within this report, should be considered during the production of other ICB strategies/action plans, regardless of whether they have a Net-Zero focus or not.

# Introduction

In conducting this Health Impact Analysis (HIA), a combination of procedures, methods, and tools were used to judge the ICB’s Green Plan. Specifically, the 89 actions in the green plan, were investigated as to their potential effects on population health, including the distribution of those effects – inequalities.

# Background

Balancing environmental benefits with potential health risks is crucial for achieving sustainable and health-promoting net-zero actions.

# Scope

Within the scope of the plan, were actions relating to:

* Workforce and System Leadership
* Sustainable Models of Care
* Digital Transformation
* Travel and Transport
* Estates and Facilities
* Building Energy
* Capital Projects
* Water
* Waste
* Green Space and Biodiversity
* Medicines
* Supply Chain and Procurement
* Food and Nutrition
* Climate adaptation

What was NOT in scope, was the indirect impact on health from our contribution to carbon reduction and climate change, and the health impacts of climate change on our population (modelling for the latter is performed at a national level).

# Actions, Impacts and Challenges

# 1.0 Sustainable Models of Care

## 1.1 Plans for the National Elective Recovery Programme

**Action:** Develop an accredited National Pathway Improvement Programme (NPIP) and ‘Getting It Right First Time’ plans for the National Elective Recovery Programme.

### 1.11 National Pathway Improvement Programme (NPIP)

National Pathway Improvement Programmes (NPIPs) are structured initiatives aimed at improving the quality and efficiency of healthcare delivery for specific conditions or groups of patients. They achieve this by developing and implementing standardised care pathways, which are essentially step-by-step guides for managing a particular condition based on best practices and evidence-based guidelines. Pathways which consider net zero implications, may influence health as follows:

**Prioritisation of prevention, early intervention, and chronic disease management** can lead to improved long-term health outcomes and potentially reducing dependence on acute care interventions.

**Efficient use of resources** reduces unnecessary costs, for example reducing acute exacerbations of long-term conditions,leading to less resource utilisation.

**A greater focus on social determinants of health** such as housing, employment, and income, can lead to holistic health improvement and greater equity.

**Empowering individuals** **and groups** through local consultation with patient groups on pathway re-design, promotes prevention and self-management, whereby future health problems may be more proactively prevented.

**Strengthening of community-based interventions** improves access and reduces reliance on centralised healthcare facilities involving travel.

**Challenges:**

Traditional healthcare systems prioritise quick fixes and acute care, shifts towards long-term prevention, proactive self-management and early (perhaps community-based) interventions, are likely to require the ring-fencing of resources, so that they cannot be re-directed towards acute care. As prevention tends to require system-wide collaboration (between different healthcare sectors, community organisations, and policymakers) siloed structures may prove difficult to breakdown and overcome.

Preventative initiativesmay require upfront investments in technology, training, and community resources to create a long-term foundation for success. This may also prove difficult to secure, and local data systems need to be robust enough to support implementation.

**Possible Negative Impacts on Health**

Where national guidance lacks nuance, one-size fits all approaches, may negatively impact certain population groups, with less autonomy limiting clinical choice and personalised care. Also, local innovation may be stifled by a fixation on what’s nationally recommended via the evidence base.

Where there are treatment targets for people on care pathways, these targets can lead to overdiagnosis and overtreatment, for example studies have suggested overprescribing of statins [[1]](#endnote-2), and yet guidelines are evolving to increase the flexibility in prescribing these e.g., where a person is happy to take a statin or there is concern that the person’s risk of a cardiovascular event may have been underestimated.

**Example(s) of Good Practice**

**1. National Cardiac Pathways Improvement Programme (CPIP)**

The Cardiac Pathways Improvement Programme (CPIP) is a national initiative that aims to improve the quality and efficiency of care for people with heart conditions. It was launched in 2020 and is a partnership between the NHS, the British Heart Foundation (BHF), and other stakeholders **[[2]](#endnote-3)**. Early data suggests increased detection of atrial fibrillation (AF), a leading cause of stroke. Preventing strokes positively impacts patient health, but may also simultaneously lower the future carbon footprint, such as fewer future extended hospital stays, reduced intensive care, and less stroke rehabilitation.

**2. RightCare Pathway: COPD**

RightCare Pathways provide a national case for change and a set of resources to support Local Health Economies to concentrate their improvement efforts where there is greatest opportunity to address variation and improve population health. In 2017, it was estimated that £49m could be saved if CCGs achieved the emergency admission rate of their best 5 peers **[[3]](#endnote-4)**.

**Conclusion**

NPIPs have the potential to transform healthcare pathways while supporting the sustainability agenda. This can positively impact people's health through an emphasis on long-term, accessible, and holistic care approaches. However, careful planning, collaboration, and ongoing evaluation is essential to overcome the challenges and ensure NPIPs deliver healthier futures for relevant patients. Stakeholder engagement would be essential before implementing a new care pathway, and care should be taken to ensure that new pathways do not suppress positive local initiatives.

### 1.12 ‘Getting it Right First Time’ (GIRFT)

"Getting it right first time" (GIRFT) is a powerful concept in healthcare that aims to optimise patient care by minimising errors, unnecessary interventions, and delays. From a green perspective, this results in reduced resource consumption and less waste. Potential benefits to people’s health are:

**Reduced diagnostic errors** due to clear protocols and decision-making algorithms minimising misdiagnoses and unnecessary tests

**Minimised treatment delays** whereby pathways promote prompt interventions and prevent unnecessary waiting times, to minimise disease progression.

**Reduced complications** wherebya focus on preventative care and personalised medicine can help manage conditions more effectively

**Increased trust and satisfaction** when active participation in care is encouraged, leading to better adherence to treatment plans, which can ultimately lead to better health outcomes.

**Greater empowerment and self-management** equipping individuals with tools and knowledge to actively manage their health conditions and prevent future issues.

**Reduced stress and anxiety** via more streamlined and efficient pathways improving individual patient flow through the system.

**Challenges**

Real-time access to accurate and comprehensive patient data is crucial for informed decision-making and accurate diagnoses, with effective data management and analysis being essential. GIRFT often requires coordination across different healthcare professionals and specialties, with the breaking down of siloed structures often being challenging.

Continuous learning, upskilling, and adapting pathways to reflect new knowledge and best practices are also crucial for sustained success.

**Possible Negative Impacts on Health**

A singular focus on GIRFT might risk overlooking subtle variances in individual cases; overemphasising objective data and protocols could underplay the role of individual patient histories, symptoms, and concerns; the GIRFT mindset could cause anxiety and stress to clinicians, potentially impacting on decision-making and could stifle innovation and learning (discouraging exploration of new approaches, and the crucial role of learning from mistakes).

**Example(s) of Good Practice**

**1. Acute and General Medicine (AGM):**

AGM represents the single largest group of inpatients in hospitals, with over 2.5m emergency internal medicine admissions every year in England. Also, the number of non-elective internal medicine admissions to hospital has been increasing year-on-year for over a decade (+30%). A GIRFT review, has led to recommendations around areas such as workforce, and some specific recommendations around efficiency. For example, the review found that sepsis may be over-diagnosed by as much as 25% (due to being diagnosed as a precautionary measure). Strategies to ensure that patients presenting with sepsis are identified accurately and treated safely have been published [[4]](#endnote-5).

**2. Interactive pathways to support care for patients with diabetes**

Interactive resources to help NHS staff ensure that people with diabetes receive the best possible hospital care when admitted as an emergency have been developed by the national GIRFT team. Interactive versions of three GIRFT pathways for diabetes are now available to support NHS colleagues. These demonstrate examples of processes and key decisions that need to be worked through to offer best practice to patients in their care [[5]](#endnote-6).

**Conclusion**

Striving for "getting it right first time" holds immense potential to improve people's health by enhancing efficiency, patient experience, and resource optimisation. However, addressing data challenges, promoting collaboration, and embracing continuous improvement are essential for realising this vision and delivering truly transformative healthcare. Care needs to be taken that clinicians are not impeded by the GIRFT mindset.

## 1.2 Community Diagnostic Centres (CDCs)

**Action:** Support the Development of the Community Diagnostic Centres (CDCs) Across the Region

CDC’s can positively impact people’s heath as follows:

**Improved access to diagnostics** are achieved when services are closer to where people live, reducing travel times and costs. This can be particularly beneficial for those with limited mobility, transportation options, or financial resources.

**Faster diagnoses and treatment** may be achieved when extra capacity from CDCs reduces waiting times. This can improve health outcomes for various conditions such as cancers, where early intervention is key.

**Reducing pressure on hospitals** such that a significant proportion of less specialised (diagnostic) activity (performed in CDCs) alleviates overcrowding and waiting times, and allows hospitals to focus on more complex and critical cases.

**A** **more patient-centred environment** compared to large hospitals, may be provided by CDCs in more familiar surroundings, with improved accessibility. This can lead to a more positive experience for patients.

**Improved access to diagnostics in underserved communities** can contribute to reducing health inequalities and ensuring everyone has equal opportunities for timely diagnosis and treatment.

**Employment-related health benefits** where CDCs provide employment opportunities to local residents, especially beneficial to residents close to CDCs sited in the more deprived areas.

**Increased public health capacity** with CDCs playing key roles in public health initiatives such as screening programmes, vaccinations, and other preventive measures.

**Strengthened community well-being** through CDCs serving as hubs for community health and well-being, and connecting people with health services, support groups, and other resources.

**Challenges**

Maintaining high-quality diagnostic services across a large network of centres requires proper staffing, equipment, and training. Concerns have been raised that there may not be enough staff to run both CDCs and existing diagnostic facilities. The Royal College of Radiologists has discovered that 88% of CDCs are staffed with existing Trust employees, and travel between sites is potentially diluting capacity in both settings [[6]](#endnote-7).

Seamless integration of CDCs with existing primary and secondary care services is crucial to avoid fragmentation and confusion for patients, and while a main benefit of CDCs is to bring services closer, it is possible that patients may find navigation of the healthcare system more complicated, in terms of understanding where best to go for which services. Also, transportation barriers and other social determinants of health, may still limit access for some individuals, and Local Authorities may find it difficult to sustain transport links to new centres.

The King’s Fund states that “the real value of CDCs is in realising the vision of doing diagnostics differently, and this is where the focus needs to be. Otherwise, there is a risk that with staffing and financial pressures, coupled with the small volumes of activity being delivered, CDCs are side-lined or scaled back in favour of traditional diagnostic provision” [[7]](#endnote-8).

Furthermore, CDCs sited in areas of deprivation, may also lead to increased traffic and congestion in the area by attracting patients from other areas.

**Possible Negative Impacts on Health**

Easier access to diagnostics could lead to over-referral by healthcare providers, particularly for low-risk conditions or anxiety-driven concerns. This can result in patient anxiety and stress, unnecessary tests/procedures, and exposing patients to potential risks e.g. medication side-effects. Increases in traffic pollution related health determinants, and increasing road traffic accidents are also possible.

**Example(s) of Good Practice**

1. **Whitegate Drive Health Centre CDC in Blackpool**

This CDC serves patients referred by local GPs for various diagnostic needs (x-rays, ultrasounds, MRIs, CT scans, and blood tests). The centre offers shorter wait times compared to hospital-based services, particularly for radiology. It also provides a more community-based and potentially less intimidating environment for patients. Wait times for MRI scans shortened by 85% following CDC inception, allowing for earlier diagnosis and intervention for conditions such as muscle and joint injuries. Also, a GP-led walk-in centre offers convenient access to a range of treatments for patients with minor illnesses and injuries without requiring an appointment. A HealthWatch survey of 104 people, showed that all patients were either very satisfied (75%) or satisfied (25%) [[8]](#endnote-9).

1. **Other CDCs in Lancashire and South Cumbria**

The success of the Whitegates CDC has been instrumental in the decision to site a new CDCs in Fleetwood, further relieving pressure on Blackpool Teaching Hospitals. Other CDCs in LSC have been established in Preston, Kendal, and Rossendale (relieving pressure on LTHTr, UHMBTr and ELHTr respectively). These have significantly improved access, travel distances and waiting times for those in more rural communities such as the Rossendale Valley. This promotes greater equity in healthcare provision [[9]](#endnote-10). Leaders expect that a one-stop shop approach will reduce the number of appointments people need (reducing travel and travel related pollution), helping to diagnose more patients earlier, potentially meaning less advanced disease at diagnosis. Also the diversion of patients away from main hospitals, allows more resources in Trusts being dedicated to treating urgent patients.

**Conclusion**

The development of CDCs was a key recommendation of the Richard’s review on NHS Diagnostic services, proposing the need to revolutionise diagnostic services to cope with the huge increase in demand, improve services and patient outcomes and, more recently, to help tackle backlogs caused by the COVID-19 pandemic. Increasing the number of CDCs presents a promising opportunity to improve access to healthcare, to accelerate diagnoses, and to ultimately enhance population health. Careful planning of locations, the services offered, and thresholds for onward referral and treatment, are crucial to success and mitigating risks such as increased costs. According to the Richards review, CDC configuration should be a local decision to meet local need. However, the implementation of CDCs has seen many being judged against whether they deliver against set minimum numbers of expected diagnostic tests, due to the need to increase the number of tests taking precedence.

## 1.3 Access to Care in Areas of Deprivation

**Action:** Work with Local Authorities, PCNs and the Voluntary Sector to Improve Access to Care in Areas of Deprivation (Transport, Signposting, Community-Based Initiatives)

For people residing in deprived areas, access to healthcare often presents unique and significant challenges. Transport, signposting, and community-based initiatives can play a crucial role in addressing these challenges and improving their healthcare outcomes.

**Public transport and accessibility** can provide a greener option for patients travelling to centres of care. Adequate frequency, appropriate timing schedules and coverage (particularly being able to cover areas of higher deprivation) are essential. Accessible options for people with disabilities, and subsidised fares, can break down geographical barriers and connect people to healthcare facilities. Community transport initiatives, such as shared-taxi schemes, can offer crucial support for reaching healthcare facilities, especially in areas with inadequate public transport.

Greater equity of access among different socio-economic groups, may reduce some of the wide inequalities in outcomes seen between the least and most disadvantaged, simultaneously improving health outcomes overall.

**Broad reaching forms of communication** in multiple languages and being culturally appropriate, can ensure everyone, regardless of language or cultural background, can access healthcare information and navigate the system effectively. Training and employing individuals from the community itself (as navigators) can build trust and provide personalised support in accessing healthcare services, including overcoming complex procedures and paperwork hurdles. User-friendly websites and mobile apps with interactive maps, service directories, appointment booking functions, and health information in plain language, can empower individuals to navigate healthcare independently.

**Community-based initiatives** that bring healthcare directly to underserved communities to reduce transport emissions, can simultaneously increase community engagement with services.

**Mobile clinics** that negate the need for people to travel, can significantly increase access to basic checkups, screening, vaccinations, and medication refills.

**Temporary pop-up clinics** in convenient locations such as community centres, schools, or shelters can offer specific services like Covid-19 immunisation drives, mental health outreach, or addiction support. Furthermore, interventions offered may be better tailored to suit local needs.

**Partnerships with local organisations** such as trusted community groups, faith-based institutions, and non-profit organisations, can foster trust, raise awareness about healthcare services, and provide essential support services like transportation assistance or childcare during appointments.

**Health education and outreach** programmes, workshops, and campaigns within deprived communities, can empower individuals to better understand preventative measures, manage chronic conditions, and seek timely care for health concerns.

**Challenges**

Beyond providing healthcare access, initiatives should also focus on tackling underlying issues like poverty, unemployment, food insecurity, and lack of adequate housing, which contribute significantly to health inequalities. Securing long-term funding, involving volunteers, and partnering with private corporations can ensure the ongoing success and scalability of these initiatives.

Monitoring and evaluating the impact of these interventions, and adapting based on community feedback and data analysis, is crucial for maximising effectiveness and reaching those who need it the most.

**Possible Negative Impacts on Health**

Increased availability of diagnostics and interventions can lead to over-diagnosis of low-risk conditions, and this can especially be the case when individuals are lacking adequate health literacy (which is often the case with people from areas of high deprivation). Improved access can also create a reliance on the medical system, such that minor health concerns are medically managed, with preventative measures, self-management, community support, and healthy lifestyle choices, being displaced in favour of medication or treatment, for example the prescription of antidepressants for low mood or low self-esteem.

**Example(s) of Good Practice**

1. **Lancashire and South Cumbria (LSC) Enhanced Health Checks**

Enhanced health checks (EHCs) complement the standard NHS health check (which helps to prevent cardiovascular related disease). EHCs focus on closing health inequality gaps by targeting the most vulnerable people and those living in the most disadvantaged communities. The EHC incorporates a focus on the wider determinants of health and links closely with social prescribing and third sector organisations to provide people with holistic support and advice to that addresses physical health, mental health, and importantly overall wellbeing [[10]](#endnote-11).

1. **Fylde Coast Medical Service (FCMS) – Health Bus**

The health assessment bus was introduced post-pandemic as a way to clear backlogs of people who were reluctant to make an appointment for a health check-up during Covid-19 restrictions. It was intended as a temporary service for just one month. However, having seen over 1,300 people in a single month, it has remained popular each month since [[11]](#endnote-12). It now provides a mobile unit for free health check screenings and vaccinations. Clinic locations are specifically chosen to maximise patient choice and accessibility, with close links to public transport and on-site parking. Nationally, there is evidence that initiatives such as this increase early detection and intervention for a range of health issues; improve awareness of preventative measures and health resources in underserved communities; and increase trust with a breaking down of barriers to healthcare access in deprived areas [[12]](#endnote-13).

**Conclusion**

Prioritising collaboration between the ICB, Local Authorities, PCNs and the Voluntary Sector, a multi-pronged approach involving transport, signposting, and community-based initiatives can significantly improve healthcare access and outcomes for individuals residing in deprived areas. However, increased access to healthcare should not by synonymous with increased medicalisation of health-related problems. Building trust, breaking down barriers, and empowering communities to take charge of their health are key to achieving equitable healthcare for all.

## 1.4 Decarbonising Pathways and Specialties

**Action:** Work with local clinicians to consider how care pathways/specialties can be decarbonised

A care pathway is “a complex intervention for the mutual decision-making and organisation of care processes for a well-defined group of patients during a well-defined period” [[13]](#endnote-14). Specific de-carbonisation efforts such as ‘travel and transport’ or ‘food and nutrition’, are discussed elsewhere in this report. However, the process of collaboration between agencies and the public, can significantly impact people's health in several positive ways, beyond the individual benefits of the local decarbonisation initiatives themselves.

**Knowledge sharing and collaboration on best practices** allows healthcare providers, researchers, policymakers, and community members to share in decarbonisation efforts. This can result in accelerated development and implementation of effective decarbonisation solutions within care pathways; reduced duplication of effort and resources; and sharing diverse perspectives and expertise to address healthcare's environmental footprint, including within a broader societal context.

**Increased public awareness and engagement** can raise public awareness about the link between healthcare and climate change, encouraging individual and community-level action. This can lead to behaviour and lifestyle changes due to increased awareness around sustainable practices; public support for policy changes and resource allocation towards sustainable healthcare; and active participation in collaborative efforts, empowering both individuals and communities to take ownership of their health and their environment, fostering a sense of agency, and promoting well-being.

**Collaboration on innovation and research** between healthcare institutions, research bodies, and technology companies, can lead to accelerated delivery of sustainable technologies such as telemedicine solutions; a wider testing infrastructure, facilitating larger-scale implementation once effectiveness is proven; and the addressing of complex research challenges and knowledge gaps.

**Framing discussions on net-zero actions around patient well-being** can bring about future actions to reduce the environmental impact of healthcare, which simultaneously promote better patient health and well-being.

**Challenges**

Specific impacts of collaboration will depend on the nature of the partnerships, the level of engagement, and the resources available. At their heart, partnerships must maintain a focus on predicting and monitoring the effects of their net-zero actions on peoples’ health, as well as equity of access to services and equality of outcomes.

**Possible Negative Impacts on Health**

Focusing solely on the negative consequences of climate change without highlighting the potential benefits of decarbonisation could create anxiety and fear, impacting on peoples’ mental well-being. Also, competition for resources or disagreement over specific decarbonisation strategies, could create displacement and social conflict, jeopardising community well-being. Misinformation and lack of transparency, for example regarding cost to the taxpayer of decarbonisation plans, can lead to public resistance and hinder effective implementation.

**Example(s) of Good Practice**

1. **Use of Sustainable Healthcare Coalition (SHC) Guidance and the Care Pathway Carbon Calculator**

SHC guidance on ‘Appraising Sustainability’ has been published due to the growing interest in quantifying and reducing the impact of care pathways. It should be used to incorporate sustainability into decision-making when designing new care pathways, or to understand sustainability considerations when optimising existing care pathways [[14]](#endnote-15). The Carbon calculator makes use of carbon footprint data to help provide a rapid and simple means to produce some indicative numbers on carbon emissions associated with care pathways involving elements such as GP consultations, patient travel, Emergency Department attendances, inpatient stays/bed days, surgical procedures, and condition self-management. A pathway’s sustainability may be improved as follows:-

Streamlining of the pathway may involve decreasing care contacts and travel during any phase.

1. **Lancashire and South Cumbria ICB 10-point plan for Practices**

A 10-point plan has been developed by the Lancashire and South Cumbria ICB alongside primary care colleagues, to help guide practices to reduce their environmental impact. The aim of the plan is to encourage GP practices to align themselves with the NHS’ net zero ambitions. For instance, 48% of general practice’s carbon footprint comes from the prescribing of pharmaceuticals, and one part of the 10-point plan suggests greater consideration of non-pharmaceutical medical interventions such as green social prescribing or increasing physical activity, as alternatives to drug treatments. The plan is outlined in appendix 1. Actions can be delivered in any order, so practices can customise their efforts to best suit their patients and the practice [[15]](#endnote-16).

**Conclusion:**

Collaboration around the decarbonisation of care pathways offers a powerful tool to improve people's health in multiple ways. By fostering knowledge sharing, engaging with the public, joint innovation, and combined climate resilience, collaborative efforts can maintain a focus on implementing net-zero actions which simultaneously benefit peoples’ health besides indirect climate related health benefits. A clear information strategy is required when any decarbonisation initiative is instigated, in order to mitigate against fears and concerns.

## 1.5 Decarbonisation of Care Materials

**Action:** Develop decarbonisation of care materials and disseminate to place-based partnerships

New technologies and innovations are developing at an incredibly fast pace. The ICB and its partners have a role in identifying and encouraging innovative approaches that will deliver improved patient outcomes with a reduced impact on the climate. Over 1.4% of supply chain emissions are due to single-use devices, some of which could be refurbished and reused, saving both carbon and money [[16]](#endnote-17). Re-usable items are discussed in ‘6.0 Supply Chain and Procurement’ and ‘11.1 PPE and PPE Waste’. Nationally, good progress has already been made in using resources more efficiently, however, the NHS is also working to substitute low-carbon alternatives where these are available.

The following substitutes, can positively impact people’s heath as follows:

**The use of Bio-based polymers** to replace conventional plastics, is expected to save 498 ktCO2e per annum in the future. Due to properties such as biocompatibility, flexibility, stretchability and mechanical strength, these polymers, notably polysaccharides, offer a promising platform for applications such as tissue engineering and regenerative medicine (TERM), drug delivery systems (DDS), coatings for biomedical devices, and wearable sensors [[17]](#endnote-18). As these are derived from natural sources, they do not contain harmful chemicals such as Bisphenol A (BPA) or phthalates. This could reduce the risk of health problems associated with such chemicals, such as hormonal disruption or developmental issues. The integration of biopolymers into medical products is correlated with reductions in carcinogenic impacts, non-carcinogenic impacts and respiratory effects [[18]](#endnote-19).

**Bamboo and hemp** (considered to be sustainable due to fast-growing properties) can be used to replace less carbon-friendly materials used in products such as dressings. As these substances possess natural antimicrobial properties, they could potentially reduce health risks related to bacterial growth on medical supplies.

**Patient feedback** during the implementation of newly designed carbon-free care materials, can subsequently maximise the benefit and functionality of any new carbon-friendly products being developed.

**Challenges**

Currently, sustainable alternatives such as plant-based gowns, might have a higher cost compared to traditional options. However, as production scales up, costs are expected to decrease. Transparency and communication between healthcare providers and patients are crucial throughout any transitions to new care materials to ensure trust and understanding. Collaboration between healthcare providers, manufacturers, and policymakers is essential to ensure smooth development and adoption of safe and effective sustainable care materials. While promising, the use of bio-based polymers, bamboo and hemp in medical materials is still a relatively new area and the regulatory landscape for bio-based polymers is still evolving. Continued research is needed to guarantee efficacy and safety in new applications. Research areas include degradation rates, stimuli-responsiveness, biodegradability, and biocompatibility.

**Possible Negative Impacts on Health**

New, sustainable materials might be more expensive than traditional options, leading to increased healthcare costs. Also, they may have limited availability resulting in inequity in provision. Also, in terms of performance and safety, there may be more uncertainty compared to established options, raising concerns among patients and clinicians. Thorough research, testing and patient feedback mechanisms, are crucial to mitigate against potential risks/otherwise unforeseen problems.

**Example(s) of Good Practice**

For bio-based inhalers see ‘5.0 Medicines’. For sustainable packaging see ‘6.0 Supply Chain and Procurement’

1. **The Born Green Generation Movement**

The Born Green Generation Movement is a partnership of European hospitals aiming to reduce the use of harmful plastics and phase-out toxic chemicals in maternity, neonatal and paediatric wards, that will ultimately reduce both environmental impacts and exposure to harm. Exposure can lead to severe and lasting health issues, from chronic diseases, diabetes and even cancer, as neo-natal defence systems are not yet developed [[19]](#endnote-20).

1. **Lancashire and South Cumbria ICB Formulary for Wound Care Products**

Products made from alginate (a natural polymer that exists widely in many species of brown seaweed) are used as fillers for medium to high exuding wounds. The ICB wound care formulary, recommends Alginate based products as first line hospital and community treatments, due to their ability to regulate water content, and their strength, flexibility [[20]](#endnote-21).

**Conclusion:**

With careful planning, research and collaboration (with patients and clinicians), the necessary transition to more sustainable care materials can be done while mitigating against new risks, and maximising potential new benefits.

## 1.6 Targeted Health Promotion

**Action:** Work with Place-based Partnerships to Produce Targeted Campaigns for Healthy Eating, Smoking Cessation, and Elderly Care, with Accompanying Signposting to Services

The rationale for promoting **healthy eating and smoking cessation** as part of a move to net-zero, is that ultimately healthy eaters and non-smokes will utilise less health and care resources (and have a lower carbon footprint) than their counterparts who will suffer from more smoking and weight-related illness such as cancer, cardiovascular disease, and diabetes.

(For Health Impact Analysis of healthy eating actions section **2.0 on Food and Nutrition**).

In terms of the carbon footprint of services offered, it is entirely feasible that effective services which are less carbon friendly, could save more carbon in the long-run, than carbon-friendly services which are less effective. An example of this might be vaping products for smoking cessation, whereby high clinical effectiveness, as evidenced by a review of clinical trials in 2023 [[21]](#endnote-22), may outweigh other environmental concerns.

However, decarbonised health services can be highly effective, and their existence can promote greater choice in smoking cessation services. For instance, digital promotion and mobileapps may reach people who are not able to access physical locations (**see 3.0 Digital Transformation**)

In terms of **elderly care**, facilities (including domestic homes) consume large amounts of energy for heating, cooling, lighting, and medical equipment, leading to a substantial carbon footprint. With our growing elderly population, demand for care facilities and services is expected to rise, potentially increasing the sector's environmental impact. Place-based partnerships have a clear role to play in terms of promoting elderly care with a net-zero focus. Elderly care is largely implemented by care facilities or families and caregivers. As such, these two audiences can be targeted as follows:

**Care facility administrators and staff:** can be the focus of campaigns to promote energy-efficient upgrades, sustainable practices, and waste reduction. Campaigns could show potential long-term financial gains. This audience could also receive practical training e.g. educational workshops, on implementing sustainable practices. An awards or recognition programme to acknowledge staff or facilities demonstrating leadership in this area, may provide extra incentive to implement change.

**Families and caregivers:** can beeducated about the environmental impact of traditional elderly care and the benefits of net-zero alternatives. They can be signposted to tools and resources such as carbon-reduction calculators and tax break/grants for energy efficient upgrades.

**Challenges**

The inverse care law proposes that people who need healthcare the most are often the least likely to receive it, due to issues such as access and awareness [[22]](#endnote-23). This is particularly the case with preventative services and self-care promoting initiatives, which are often seen as attracting the better educated ‘worried well’, rather than those with most need. As such, it is important that health promotion campaigns are:

* Equity-focused: with high accessibility (ideally higher for those with greater need)
* Culturally appropriate: tailored to the specific cultural needs, beliefs, and languages of diverse communities, ensuring relevance and engagement.
* Built Collaboratively: with the public, community organisations, faith-based groups and other trusted entities, to ensure marginalised populations are engaged and trust is built.
* Monitored and evaluated: for their impact on different groups, so that strategies can be adapted to ensure they are truly serving everyone.

It is also important, that health promotion strategies recognise that it is mostly social, economic, and environmental factors that influence self-care and care provided to others (e.g., the elderly and children). As such, it is important that health promotion activities are aligned with more upstream interventions that address the root causes of health inequalities, such as poverty, employment, housing, and food insecurity.

**Possible Negative Impacts on Health**

Prioritising products with a low carbon footprint may lower clinical effectiveness, compared to effective carbon-unfriendly alternatives e.g., biodegradable nicotine gum versus vaping products 21.

**Example(s) of Good Practice**

1. **Blackburn with Darwen Pharmacy-based Smoking Cessation**

Pharmacies are widely available, often within walking distance for many residents. The positive pharmacy care law implemented in 2013, has seen increased access to pharmacy-led healthcare services, particularly for individuals in underserved areas or facing transportation challenges. These are often the areas seeing relatively higher levels of smoking. Pharmacies can easily offer cessation advice alongside medication dispensing, streamlining the process and potentially increasing uptake. They can also collaborate with local environmental organisations to raise awareness about the link between smoking and climate change, further amplifying the message. Blackburn with Darwen (BwD), offers a pharmacy-led smoking cessation service and 8 out of the 14 pharmacies that offer smoking cessation, are located in BwD’s most deprived areas. Self-reported quit rates at BwD are 57%, compared to the Lancashire average of 53%, while carbon-monoxide verified quit rates are massively above the Lancashire average for this time period (40% versus 7%) [[23]](#endnote-24).

1. **Cumbria County Council new model of care for elderly people**

Cumbria County Council is working with partners to implement a new model of care for elderly people [[24]](#endnote-25). The service model consists of the following basic elements:

* Mobile domiciliary care and support services available in a geographical area;
* Greater use of community alarm and Telecare services backed up by a response service, 24/7
* Mobile technology to be used to alert workers in emergencies, and to provide service user information, etc.
* The use of NHS telemedicine to monitor a person’s vital signs from home

**Conclusion**

Targeted health promotion activities offer strategic approaches to improving population health. By considering specific groups, such as the elderly and those living in areas of deprivation, interventions to address specific needs can be better tailored. This fosters better engagement, tackles health disparities, and promotes preventive healthcare, leading to a healthier and more resilient population.

# 2.0 Food and Nutrition

## 2.1 Plant-forward Diets

**Action:** Promote plant-forward diets across the ICB

Promoting plant-based diets has gained significant traction due to the benefits it offers to the environment, and for simultaneous positive health impacts on individuals:

**Reduced risk of chronic diseases:** Multi-study analysis has linked plant-based diets to a lower risk of obesity, cardiovascular disease, type 2 diabetes, and certain cancers [[25]](#endnote-26).

**Improved weight management:** Plant-based diets are often lower in calories and higher in fibre, which can aid healthy weight maintenance.

**Better gut health:** High fibre content promotes growth of beneficial gut bacteria, potentially improving digestion and overall health, such as skin health [[26]](#endnote-27).

**Reduced risk of allergies and autoimmune diseases:** Some studies suggest plant-based diets might mitigate the risk of developing allergies and autoimmune diseases, although more research is needed in this area.

**Challenges**

Education and support are crucial in promoting mindful and balanced plant-based eating habits to ensure adequate nutrient intake and prevent unintended consequences.

Addressing social and economic barriers to healthy eating through policies and community initiatives, is essential for promoting equitable access to the benefits of plant-based diets.

Re-branding plant forward to make them more appealing, for instance increasing knowledge of improved 'skin health' and ‘gut health’. Regarding the latter, utilising levers such as the 30-plant points challenge may help. This is a dietary approach that encourages consuming a variety of plant-based foods to improve overall health, specifically gut health. The idea is to consume at least 30 different plant foods each week, with people tending to respond to such a measurable evidence-based challenge.

**Possible Negative Impacts on Health**

Poor access to plant-based produce, and poor affordability of such, can negatively impact people financially and mentally. Also, promoting plant-based eating solely for weight loss, can lead to nutrient deficiencies (vitamin B12, Iron, Calcium and Omega-3 fatty acids), as well as unhealthy eating habits.

B12, especially if multiple medications are involved. Depending on the underlying conditions, patients with chronic disease who take multiple medications need close monitoring of low blood sugar levels, low blood pressure, or rapid weight loss. If these occur, the physician may need to adjust medications.

Generally, plant-based diets incorporating fruit and vegetables, fit well with dietary guidelines for people with diabetes, being lower in saturated fat, higher in fibre, and other protective substances like phytochemicals and antioxidants [[27]](#endnote-28). However, the diabetes drug Metformin is a risk factor for decreased vitamin B12 levels, or vitamin B12 deficiency. As strict plant-based diets are also associated with reduced levels of vitamin B12, the Medicines and Healthcare Products Regulatory Authority (MHRA), have produced recommendations around monitoring vitamin B12 levels in at risk patients in receipt of this drug [[28]](#endnote-29).

**Example(s) of Good Practice**

1. **East Lancashire Hospital Trust** introduced an extensive vegan menu for its patients in 2018. It also runs meat-free Mondays every week at the Trust. It has received a ‘Food for Life Served Here’ bronze award, with an element of the award recognising the work the trust has undertaken in reducing the amount of meat served in the hospital. The Trust is also set to use the new NHS England recipe bank of 300 low carbon dishes which has recently gone live. Each recipe can be displayed to patients with ‘FoodPrints’ displaying carbon values. Clearly, this provides a menu nudge to patients, perhaps promoting a sense of patient empowerment.
2. **Plant Based Health Professionals UK**, advocate for integrating plant-based approaches into mainstream healthcare. It is a community Interest company dedicated to providing education and advocacy on whole food plant-based nutrition, for prevention and treatment of chronic disease [[29]](#endnote-30).

**Conclusion**

Clinicians and the public should be well informed about the concept of incorporating plant-based foods such as fruits and vegetables in everyday food consumption, and minimising the consumption of meat, eggs, and dairy products.

Research suggests plant-based diets lower the risks of cardiovascular disease, chronic diseases, meaning that their promotion could lead to substantial health gains. While future NHS dietary recommendations might incorporate plant-based options more explicitly, equipping healthcare professionals with knowledge and resources on plant-based diets, could facilitate informed moves to this healthy diet. For widespread adoption of plant-based alternative foods, it will be important to promote equitable access and affordability. Also, plant-based dietary advice to specific needs and contexts, could maximize potential benefits.

## 2.2 Digital Menus

**Action:** Support the roll out digital menus across our member organisations

The roll-out of digital menus in UK healthcare presents promising opportunities for improving people's health:

**Integration of menus with educational resources:** can promote healthy eating habits beyond hospital settings.

**Detailed nutritional information:** Can be displayed for each dish, enabling individuals to make informed choices based on their health needs and preferences. This can be particularly helpful for those managing chronic conditions like diabetes or allergies.

**Calorie counts and portion size visualisations:** Can promote mindful eating and encourage healthier choices, potentially aiding weight management while simultaneously reducing waste.

**Personalisation:** Menus can be tailored to individual dietary restrictions, allergies, and preferences, ensuring inclusivity, and catering for various needs. Integration with the electronic patient record (EPR) can facilitate this process.

**Transparency and traceability:** Information about food origin, ingredients, and preparation methods, can be shared fostering trust and transparency for patients, while promoting responsible sourcing.

**Two-way communication:** Patients can directly communicate dietary needs and preferences to kitchen staff, reducing errors and ensuring compliance with specific requirements.

**Feedback and review systems:** Feedback loops can allow for continuous improvement of menu offerings and cater to patient preferences effectively.

**Language:** Technology will facilitate easy translation of menus into other languages.

**Menu nudges:** can incorporate other wellbeing messages

**Challenges**

Issues of data privacy and security of personal dietary information must be addressed to maintain patient trust in the ethical use of data.

It will also be important to offer dietary information in a non-judgemental way, and in a way that patients do not feel manipulated or patronised.

Use of digital menus may also expose gaps in current processes, which may need to be dealt with before/during implementation.

**Possible Negative Impacts on Health**

For digital exclusion (see 3.0 Digital Transformation).

Overreliance on digital platforms may lower opportunities for informed sociable advice around diet, with the potential of less personal interaction causing more social isolation. For individuals already struggling with food-related anxiety or disorders, navigating digital menus with detailed calorie counts or restrictive options, might contribute to feelings of isolation and anxiety. Also, overemphasis on calorie counts or portion sizes, might shift the focus from mindful eating and enjoying food, to calorie-counting and disordered eating behaviours.

**Example(s) of Good Practice**

1. University Hospitals of Morecambe Bay NHS Foundation Trusts (UHMBFT) digitalised its patient meal ordering service in 2017. This led to a halving of food waste, an estimated saving of £26,000, and also reduced printing costs by £190,000 annually [[30]](#endnote-31). The previously admin-heavy task is now streamlined freeing up nursing time, and is performed by Healthcare Assistants armed with a digital tablet (thus maintaining social interaction), but much closer mealtimes (promoting patient satisfaction). The digital process allows real-time updates on patients and hugely improves communication between wards, kitchens, patients, and clinicians, who can update dietary requirements, portion sizes and allergies as necessary.
2. Barts Health NHS Trust report that digital ordering improves the service they give to their patients, for example paediatric dieticians use the technology to create bespoke controlled diets for children with special needs and to balance the low energy/high protein requirements of children with reduced mobility [[31]](#endnote-32).

**Conclusion**

Leveraging the potential of digital menus responsibly, can contribute to improved patient satisfaction within healthcare settings, can empower individuals to make more informed choices, and can promote healthy behaviours that have the potential to be maintained beyond the healthcare setting.

## 2.3 Food Insecurity

**Action:** Interact with Place Based Partnerships and VCFSEs to understand the causes and extent of food insecurity across the region.

**And**

## 2.4 Food Poverty

**Action:** Contribute to a review of food bank use and investigate patterns of food poverty.

By reviewing food bank usage, investigating food poverty, and understanding the extent of food insecurity and the specific causes such as low income, poor accessibility, and limited knowledge about healthy eating, resources and programs can be better tailored to address those specific needs.

This avoids a "one-size-fits-all" approach and offers more effective solutions. Appropriate strategies to address systemic issues like poverty, housing instability, and access to healthy food options, can create lasting improvements beyond individual interventions.

**Challenges**

Reaching and engaging with the those suffering from food insecurity and food poverty, such as marginalised groups, racial minorities, people with disabilities, and those facing social stigma, can be difficult due to trust barriers, language limitations, and inaccessibility. Time, funding, and personnel constraints can limit the ability to conduct in-depth and inclusive research or engagement activities.

**Possible Negative Impacts on Health**

Power dynamics can create challenge to ensuring all voices are heard, meaning important issues are missed. Poor understanding of issues can lead to sub-optimal directing of resources.

**Example(s) of Good Practice**

1. The Health Determinants Research Collaboration (HDRC) is a five-year project running to 2025 and is grant funded by the National Institute for Health and Care Research (NIHR). It aims to explore what Blackpool Council and its partners can do to improve the overall health of the community. There is a strong focus on health inequalities, and social determinants of health such as food insecurity.
2. West Lancashire Borough Council (WLBC) commissioned research on food insecurity to inform the potential development of preventative, sustainable and cost-effective policy solutions in 2021.

**Conclusion**

Place-based partnerships and VCFSEs are well placed to capture local understanding of food insecurity in order to better inform policy. Capability can be enhanced by collaborating with organisations such as the NIHR.

## 2.5 Healthy Eating Partnerships

**Action:** Establish Healthy Eating Partnerships with partner organisations and councils

Partnerships bring together diverse expertise and resources, promoting: increased knowledge and access to healthy eating; shared goals and shared challenges, fostering a sense of mutual support; improved affordability of healthy foods when collaboration reduces costs; different perspectives and strengths to create solutions (for diverse needs and cultural preferences); and community empowerment whereby collaboration nurtures a sense of ownership leading to a higher propensity of groups adopting and sustaining healthy habits over time. Partnerships could include the British Nutrition Foundation, the ‘Collaboration for Kids’ charity, and contract caterers in the education sector.

**Challenges**

Challenges to overcome (to name a few) are communication and trust, expertise, and funding, maintaining engagement and enthusiasm among partners (potentially hindered by staff turnover and burnout), logistical hurdles, cultural differences in populations, and competing priorities. Tracking the impact of partnerships and demonstrating their effectiveness can also be difficult.

**Possible Negative Impacts on Health**

In partnering with the private sector, proven healthy eating practices, could be overshadowed by the marketing of produce and practices with a weaker evidence-base.

If healthy eating partnerships are not culturally sensitive, or do not address underlying social inequalities, they may stigmatise certain groups, or exclude them from benefits.

Also, partnerships focused solely on weight loss could create unhealthy fixations on calorie counting or body image, potentially triggering disordered eating behaviours in some individuals.

**Example(s) of Good Practice**

1. **Lancashire County Council** is taking bolder steps towards making healthy food the norm for thousands of children in Lancashire. Its ‘Food for Life’ programme is giving children better access to healthy food, an understanding of where food comes from, and is engaging the most deprived schools and early years settings, to embed a positive food culture that will ultimately help children to access and eat a more balanced diet [[32]](#endnote-33).
2. **FoodFutures: North Lancashire's Sustainable Food Partnership** comprises of representatives from the local farming community, local food businesses, the public sector, Lancaster City and County council, Lancaster District Food Poverty Alliance, NGOs, community food groups, and local academic institutions. The partnership works together to cultivate "a thriving local food system that is healthy, resilient and fair" [[33]](#endnote-34).

**Conclusion**

Leveraging strengths of partners and focusing on common sensible goals are crucial for establishing and sustaining effective healthy eating partnerships that can truly make a positive impact on peoples’ health.

## 2.6 Food Poverty Projects

**Action:** Explore whether food poverty projects alongside the council could be implemented

Projects such as these, could influence health through:

**Increasing Access to Nutritious Food** such as affordable fruits, vegetables, and whole foods, reducing reliance on processed foods high in sugar, salt, and unhealthy fats, which contribute to chronic diseases like obesity, diabetes, and heart disease.

**Reducing Malnutrition** especially among vulnerable populations caused by food poverty. Malnutrition can lead to weakened immune systems, and increased risk of infections.

**Improving Prenatal and Early Childhood Nutrition:** via projects such as ‘Healthy Start’ whereby support is offered to qualifying pregnant mothers or parents with young children to ensure proper nutrition during critical development stages. This can lead to better birth outcomes, improved cognitive development, and a stronger foundation for lifelong health.

**Lowering the Risk of Chronic Disease** whereby healthy food promotes preventative healthcare by reducing risk factors for chronic diseases like heart disease, stroke, type 2 diabetes, and some cancers.

**Improving Mental and Emotional Wellbeing** through lowering stress and anxiety caused by food insecurity.

**Promoting Healthier Eating Habits** through incorporating educational components and empowering individuals to make informed choices about their diet, promoting a sense of control and improving self-esteem.

**Increasing Self-Efficacy** with well-nourished people being better equipped to manage existing health conditions and being more likely to adhere to self-manage and adhere to treatment plans.

**Challenges**

The success of these projects hinges on good collaboration between Local Authorities, healthcare providers, and community organisations. This allows for Identification of vulnerable populations, targeted outreach efforts and a holistic approach, whereby food projects are integrated with other health initiatives to address the multifaceted issue of food poverty and its impact on health. Proper storage and hygiene standards can be a challenge for some food poverty projects, especially those with limited resources.

**Possible Negative Impacts on Health**

Processed foods with high sugar, salt, and unhealthy fats might be more readily available for donation compared to fresh produce or whole grains. Food poverty projects do not necessarily address underlying problems such as the accessibility and affordability of nutritious food and individuals may experience feelings of disempowerment or loss of control over their food choices.

**Example(s) of Good Practice**

1. **Blackburn with Darwen Local Authority**, since April 2023, has offered significant grants to all its schools to help provide food to their most vulnerable pupils and families. The grants were to support around 8,000 of the most vulnerable pupils who would not normally be eligible for free school meals [[34]](#endnote-35).
2. **Lancashire & Cumbria FareShare** operates a large food distribution centre that collects surplus food from supermarkets, manufacturers, and other businesses, and then distributes it to a network of charities and community groups across the region. These groups then provide the food to people in need through food banks, school breakfast clubs, homeless shelters, and other programs [[35]](#endnote-36).

**Conclusion**

Overall, food poverty projects with local authorities offer a powerful strategy for improving health outcomes, promoting preventative healthcare, and fostering a healthier community.

# 3.0 Digital Transformation

## 3.1 Digital Transformation Plan

**Action:** Develop an ICB ‘Digital Transformation Plan’ that incorporates the ‘What Good Looks Like’ framework, and is shared with place-based partnerships

A well-designed digital transformation plan for healthcare has the potential to significantly improve patient health in several ways:

**Telemedicine/virtual appointments/online consultations** see 3.3 and 3.4

**Patient Portals** allow patients to access their medical records, view test results, communicate with doctors, and manage prescriptions, promoting patient engagement and ownership of their health.

**Electronic Health Records (EHRs)** provide centralised platforms for storing and sharing patient data across different healthcare providers. This improves care coordination, reduces the risk of medical errors, and ensures doctors have a complete picture of a patient's medical history.

**Remote Patient Monitoring** involves wearable devices and sensors that can collect vital health data (heart rate, blood pressure, glucose levels) remotely, allowing for early detection of potential health problems and facilitating timely interventions.

**Clinical Decision Support Systems (CDSS)** are artificial intelligence powered tools that can provide real-time guidance to healthcare professionals at the point of care, suggesting evidence-based treatment options and improving decision-making, for example risk prediction algorithms.

**Digital Health Information Platforms** can offer patients access to educational resources and support specific health condition patient groups, promoting self-care and informed decision-making.

**Personalised Medicine** can analyse vast amounts of patient data to identify genetic predispositions and tailor preventive measures or treatment plans to individual needs.

**Streamlined Administrative Processes** can automatically perform administrative tasks such as appointment scheduling, which frees up healthcare staff to focus on patient care.

**Reduction in Medical Errors** arises when EHRs and digital prescribing systems minimise errors in medication dosage or administration, improving patient safety.

**Improved Resource Allocation** occurs when data analysis helps identify areas of high demand and allocate resources more effectively.

**Challenges**

Robust cybersecurity measures are crucial to protect sensitive patient data, and while digital tools offer many benefits, the importance of direct interaction between patients and healthcare providers should not be forgotten, whereby an appropriate level of face-to-face care, is important for clinical capability, and issues such as trust.

**Possible Negative Impacts on Health**

Not everyone has access to reliable internet or digital literacy skills. Efforts should be made to bridge this gap and ensure equitable access to these technologies. These technologies should not widen existing inequalities in healthcare access.

**Example(s) of Good Practice**

1. **LSC ICB Digital Inclusion Team** is working with a number of voluntary, community, faith, and social enterprise (VCFSE) organisations to enable their digital sustainability, increase numbers of digital health champions, and increase the number of people in our communities that are digitally enabled in order to reduce health inequalities [[36]](#endnote-37)
2. **E-health** is a field that utilises information and communication technology to support the health status of its users. The emergence of this digital health approach has provided a new way of smoking cessation support for smokers seeking help. Meta-analysis has found that personalised e-health interventions can effectively help smokers quit smoking, and the diverse remote intervention methods of e-health can provide more convenient options for further customisation [[37]](#endnote-38).

**Conclusion**

Overall, a well-executed digital transformation plan for healthcare can be a powerful tool for improving patient health outcomes, promoting preventative care and empowering patients to take an active role in managing their health.

## 3.2 Digital Literacy

**Action:** Collaborate with our partners to improve digital literacy across the region in order to reduce levels of digital exclusion

The ‘Digital Divide’ refers to the gap between individuals, households, and communities that have access to essential digital technologies and those who do not. This gap can be due to several factors, such as income, location, education/skills/confidence, and disabilities. Digital literacy training programsare one way to help bridge the digital divide and promote more equitable access to digital health. Improving digital literacy empowers individuals to:

**Navigate medical websites** and research conditions, leading to a better understand of treatment options, and informed decision-making with clinicians

**Distinguish credible medical information** from misinformation or marketing tactics.

**Fully utilise online patient portals** for tasks like viewing lab results, managing prescriptions, and scheduling appointments. This promotes proactive engagement in their healthcare journey.

**Confidently participate in digital initiatives** such as telehealth consultations and using wearable health trackers, including the interpretation of data for early detection of potential health issues.

**Articulate health concerns, symptoms, and medical history** more effectively during consultations with doctors; assisting clinician understanding and improving diagnostic accuracy.

**Ask informed questions about treatment plans**, medications, and potential side effects. This fosters a more collaborative doctor-patient relationship.

**Tracking fitness goals, monitoring chronic conditions, or managing stress**, thus promoting proactive self-care practices.

**Evaluate health information** to make informed decisions about diet, exercise programs, and complementary therapies, potentially leading to healthier lifestyle choices.

**Challenges**

Digital literacy initiatives should be culturally sensitive and cater to the diverse needs of different populations. Also, even for well-informed clinicians, it may be difficult to distinguish credible sources from unreliable ones.

**Possible Negative Impacts on Health**

Easy access to vast amounts of medical information can lead to cyberchondria (the fear of having every illness one reads about online), which can cause anxiety and unnecessary worry. Also, the constant barrage of health information online can be overwhelming, leading to decision fatigue and difficulty making informed choices.

Social media and online health trends can create unrealistic expectations about health and appearance, which can lead to feelings of inadequacy, body dissatisfaction, and unhealthy comparisons to others.

Digital access to medical information might lead some to attempt self-treatment or delay seeking professional medical advice, potentially worsening health outcomes. Also, platforms and apps may be vulnerable to data breaches, and sensitive medical informationmay be exposed through data breaches or oversharing.

**Example(s) of Good Practice**

1. **Get Online @ Your Library (Lancashire Library Service)** provides free basic computer skills training and internet access for residents. This empowers individuals to navigate online resources and build confidence using digital tools, which can be a steppingstone to exploring health information online.
2. **Healthier Lancashire Digital Toolkit** provides a range of resources aimed at improving digital literacy for health and wellbeing. These include tutorials on using patient portals, downloading trusted health apps, or critically evaluating online health information.

**Conclusion**

On the whole, improved digital literacy is a powerful tool for health, and efforts must focus on bridging the digital divide. However, it is important to be aware of the potential downsides of digital literacy, and to promote the responsible use of technology to maximise the positive impact on health outcomes.

## 3.3 Virtual Outpatient Appointments

**Action:** Support Trusts to deliver more virtual outpatient appointments: reach the 25% target

**And**

## 3.4 Online Consultations

**Action:** Support the PCNs to significantly increase the use on online consultations, as part of embedding total triage

Virtual outpatient appointments and online consultations can have the following positive impacts on people's health:

**Increased access to care** can be achieved, especially for those in rural areas, with limited mobility, or work schedules that conflict with traditional office hours.

**Increased productivity** can be achieved with online consultations leading to higher volumes of people seen, potentially increasing diagnosis rates, but also risk assessments and early interventions. For example, there is a digital stream version of the NHS Diabetes Prevention programme [[38]](#endnote-39)

**Improved convenience** can be achieved with patients saving time and money by eliminating travel and periods spent in waiting rooms. For instance, virtual consultations have been shown to be effective for monitoring of chronic conditions such as chronic pain.

Mental Health care can be delivered by virtual therapy, which can be particularly helpful for those who might feel anxious or uncomfortable in a traditional setting.

**Challenges**

Besides the digital divide and privacy and security concerns, covered in 3.1, there are challenges around patient preference, with some patients preferring the in-person interaction and trust built during a face-to-face appointment. Also, online consultations may pose communication barriers, in terms of internet connectivity and building rapport, with effective communication being limited by a reduction in non-verbal clues.

**Possible Negative Impacts on Health**

Virtual consultations restrict clinical ability to perform thorough physical examinations, which can be critical for diagnosing certain conditions. Online consultations, while suited to follow-up appointments, medication refills, or discussing non-urgent health concerns, may not be suitable for many ‘first’ and diagnostic appointments. According to a study published in BMJ Quality and Safety, GP appointments over the phone or online can miss serious illnesses and put patients at risk. Researchers said mistakes via remote consultation are rare, but there is a risk of patients being under-diagnosed, with GPs being swayed by what has been said previously, and less qualified staff not acting on signs of illness [[39]](#endnote-40).

**Example(s) of Good Practice**

1. **L&SC ICB** were one of the 8 national pilot locations to offer the national Diabetes Prevention digital stream suite of interventions. The digital stream offers the usual support, assistance and guidance to people at risk of diabetes, but through the use of digital interventions such as:
	1. wearable technologies that monitor levels of exercise
	2. apps which allow users to access health coaches
	3. online peer support groups
	4. the ability to set and monitor goals electronically

This online method of recording activity may have better potential than face-to-face monitoring for tracking progress – helping bring down high blood sugar levels and in turn prevent or delay onset of the disease.

1. **Lancashire Teaching Hospitals NHS Foundation Trust** has, since Covid-19, launched Attend Anywhere’ where suitable outpatient appointments are performed as a video consultation. Basically, the usual face to face appointment, is conducted over a PC or mobile device instead of at the hospital or community clinic.

**Conclusion**

Overall, virtual outpatient appointments and online consultations offer a valuable tool for improving healthcare access and convenience. However, it's important to acknowledge the limitations and ensure equitable access to this technology for optimal impact on people's health.

# 4.0 Travel and Transport

## 4.1 Promote Safe and Secure Cycling and Walking

**Action:** Support Trusts and ICB partners to improve and maintain secure storage facilities and safe travel routes for cyclists / walkers

**And**

4.4 Cycle Lanes for Accessing Healthcare Sites

**Action:** Work with local authorities to improve/create cycle lanes in relation to accessing healthcare sites.

Supporting NHS Trusts and Integrated Care Board partners to encourage safe travel routes for cyclists and walkers can:

**Increase Physical Activity** by people to leaving their cars behind for short trips, thereby increasing physical activity levels, which is a major contributor to overall health and well-being.

**Encourage Active Travel** whereby staff as well as patients walk or cycle to healthcare facilities. Daily doses of exercise, reducing the risk of chronic diseases like heart disease, type 2 diabetes, and some cancers.

**Reduce stress** in terms of cycling and walking being known to be stress-relieving activities, but also secure storage and safe routes reducing stress-levels of current walkers/cyclers. Exposure to nature during commutes can further enhance mental well-being.

**Social Interaction** can be fostered when walking and cycling infrastructure incorporates dedicated paths and shared spaces, which can encourage social interaction and combat feelings of isolation.

**Reduced Air Pollution** via less car traffic, leads to cleaner air. This is particularly beneficial for respiratory health, especially in urban areas with high pollution levels.

**Challenges**

The success of these initiatives hinges on creating truly safe routes that separate cyclists and pedestrians from car traffic. Proper signage, lighting, and infrastructure design are crucial. Walking and cycling infrastructure should be accessible for people of all ages and abilities, and this might involve dedicated areas for wheelchairs, benches for rest, and well-maintained surfaces.

**Possible Negative Impacts on Health**

Increased cycling and walking traffic could lead to more accidents, especially if infrastructure isn't designed well. Also, despite cycling and walking being something that reduces pollution, exposure to air pollution while engaging in these activities can be a factor. Proper separation of cyclists and pedestrians from car traffic is crucial, and strategic route planning that prioritises routes through low-traffic areas can help mitigate this.

Most e-bikes use lithium-ion batteries which can overheat and ignite under certain circumstances. Fires involving lithium batteries are the fastest growing fire risk in London, with a fire brigade call-out for such fires once every two days during 2023. Many of these fires are caused by incompatible chargers, modifications to e-bikes, or faulty and/or counterfeit products which are purchased online. Following London fire brigade ‘ChargeSafe: e-bike and e-scooter safety advice’ can help mitigate against this [[40]](#endnote-41).

**Example(s) of Good Practice**

1. **Lancashire County Council** has ‘Local Cycling and Walking Infrastructure Plans (LCWIPs)’. These are a new, strategic approach to identifying cycling and walking improvements, and the plans will enable a long-term approach to developing local cycling and walking networks to realise the vision of safer, greener and healthier travel opportunities [[41]](#endnote-42)
2. **Vivup** is a UK-based employee benefits provider that works with NHS providers. A salary sacrifice scheme allows NHS staff to spread the cost of a new bike and safety equipment over monthly salary repayments, typically at a tax-efficient rate.

**Conclusion**

In conclusion, supporting travel routes for cyclists and walkers is a win-win situation. It promotes healthy lifestyles for the general population, reduces the burden on healthcare systems, and fosters a healthier environment for everyone. However, safety concerns must be addressed to ensure that people’s health is not damaged through engaging in what should be healthy activities.

## 4.2 Transport Links and Access to Healthcare Sites

**Action:** Work with local authorities and transport providers to improve public transport links and access to healthcare sites

Improving transport links and access to healthcare sites can have a significant positive impact on people's health in several ways by:

**Increasing Access to Care** via better public transport, dedicated shuttles, or improved road infrastructure. Such improvements are especially important for those living in rural areas or with limited mobility, and is crucial for increasing access to preventive care, screenings, and treatment of chronic conditions.

**Reducing Missed Appointments** via ensuring transport is reliable, frequent, and timely.

**Reduced Stress** of travel, via less crowded transport, which is more comfortable and frequent, with conveniently placed pick-up points and drop-offs

**Increased Social Support** whereby it is easier for friends and family members to visit patients, and it is easier for support groups to come together in places served by public transport, fostering social interaction and reducing feelings of isolation.

**Increased Empowerment** fostered by enhanced mobility, and a sense of control over health facility attendance, potentially improving overall well-being, and proactive self-care and prevention.

**Improved Emergency Outcomes** can be driven by more timely treatment responses, preventing deteriorations and complications arising during treatment delays. Analysis of the London Ambulance Service in the 2020 Covid-19 lockdown period (when traffic levels were hugely reduced) found that 999 response times to the most serious medical emergencies fell by 47 seconds, with a much larger drop of 2minutes 39 seconds for serious emergencies where patients were conveyed to hospital [[42]](#endnote-43).

**Challenges**

At present, existing key health facilities need ample, affordable transport links, and accessibility must consider rural areas, underserved communities, and people with disabilities. New hospitals, plus any new community diagnostic centres, ought to be strategically located such that accessibility is increased, particularly for those in disadvantaged groups.

However, if the new hospitals programme is to increase accessibility, then in the period between now and when design of the new hospitals begins, our system needs an overhaul whereby prevention, self-care and a community-focused approaches are prioritised, with better use of health and care partners. Change is essential such that the challenge faced by the new hospitals programme is affordable.

**Possible Negative Impacts on Health**

Improving the transport links of disadvantaged areas, may lead to gentrification. This is where the area becomes more desirable, leading to rising rents and property values, potentially displacing current residents with people form higher socio-economic groups. This may impact on the health of the displaced people. Also, funding allocations need to be balanced across different areas to avoid creating disparities in access.

**Example(s) of Good Practice**

1. **Lancashire Teaching Hospital Trust (LTHTr)** supports people to use **The Healthcare Travel Costs Scheme**, which applies to people with low-incomes or people in receipt of benefits. The scheme states “you should use the cheapest, most appropriate means of transport, which in most cases will be public transport”. It only covers patients, not those who are visiting people in hospital. At LTHTr, people can be reimbursed at LTHTr’s General Office, or by submitting a form to the NHS Choices website.
2. **Blackburn with Darwen** **Local Authority** has a deal with the Department of Transport around extra funding in 2023/24 and 2024/25. This has seen the development of a new orbital service with links from sheltered accommodation locations and parts of Darwen, to the wider transport network and the hospital. The previous provision (‘dial-a-ride’) did not permit bus pass use, but the new regular service does, and the necessity to change buses at the bus station to get to the hospital, is no longer necessary.

**Conclusion**

By improving public transport links and access to healthcare sites, we can create a system that promotes preventative care, timely treatment, and overall well-being for everyone, especially those currently seeing inequity of access. Healthcare facilities should be accessible for people with disabilities, and public transport should be affordable, also rural and underserved communities should be prioritised.

## 4.3 Non-emergency Patient Transport

**Action:** Create an ICB ‘Travel Plan’, conjoining Trust, Local Authority, and other partner ‘Travel Plans’ with ICB responsibilities for non-emergency patient transport improvement

For health benefits of transport improvement see 4.2, additional impacts on health via improved patient transport services could be:

**Higher Tech Vehicles** maycontain features which improve patient safety

**More Vehicles Catering for Immobility** means higher numbers of wheelchair-accessible vehicles, and greater levels of assistance in boarding people with limited mobility.

**Greater Sensitivity Levels** from more staff being well trained in disability needs, and being better equipped to relieve potential anxieties, leading to better patient mental well-being.

**Better Comfort and Dignity** via clean, well-maintained vehicles with features like temperature control and comfortable seating.

**Improved Social Connection** being fostered by good transport support, facilitating participation in support groups or condition-related social interactions.

**Challenges**

Door-to-door pick-up and drop-off services can be particularly beneficial for those with limited mobility or those living in remote areas, however, clearly this can be costly, and electric vehicles and charging infrastructure typically have a higher upfront cost compared to traditional options. Readily available charging infrastructure is crucial for reliable services. Government funding and industry partnerships can play a vital role in overcoming these hurdles. Appointment reminder services to ensure that patients don’t miss pick-ups, can decrease inefficiencies driven by patient forgetfulness. Extreme weather conditions (heat or cold) can impact the performance and range of electric vehicles, contingency plans might be needed to ensure reliable service in all weather conditions.

**Possible Negative Impacts on Health**

Health access could become inequitable by:

* new electric vehicle coverage not extending to all regions, particularly rural areas
* higher operating costs compared to traditional vehicles, leading to increased transport fees

Electric vehicles currently have a shorter range compared to traditional vehicles. This could potentially increase travel times for long-distance transfers requiring additional charging stops.

**Example(s) of Good Practice**

1. **Homerton University Hospital** will become the first NHS Hospital Trust to have all ambulances being fully electric by the end of 2024. Each ambulance, in the new fully electric fleet, is estimated to save 4,000 kilograms of CO2 emissions every year. Lightweight, more accessible features are described as advantageous for the crews, and the vehicles can convey patients with a powered trolley bed system and a powered carry chair, increasing convenience for patients. Also, an integrated scanning system can be used to scan for stock levels of items, potentially improving patient safety via the stock-taking of essential items [[43]](#endnote-44).
2. Serving the **University Hospitals of Leicester**, a new fully electric Hospital Hopper bus service has been on the roads since June 2022. This provides a more sustainable travel option for and runs half-hourly which promotes patient engagement with services.

**Conclusion**

With careful planning to address challenges, and the prioritisation of accessibility and equity, there can be a positive impact on health, from non-emergency transport moving towards net-zero.

## 4.4 Cycle Lanes for Accessing Healthcare Sites (see 4.1)

# 5.0 Medicines

## 5.1 Green Inhalers

**Action:** Establish Green Inhaler guidance and training across the region for primary and secondary care.

Traditional inhalers (widely prescribed for those with asthma or chronic obstructive pulmonary disease - COPD). The environmental impact of inhalers prescribed in a given month in Lancashire, is likely to be greater than that caused by the emissions of over 50,000 cars. This is because inhalers usually rely on propellants that contribute to greenhouse gas emissions. Green inhalers, such as dry powder inhalers (DPIs), don't use these propellants and have a much smaller carbon footprint. Green inhalers may positively impact on people’s health through:

**Improved Inhaler Dosage** whereby DPIs often have dose counters, which can help ensure patients take the correct amount of medication.

**Easier Use** is cited by users of DPIs, when they are asked to compare DPIs to traditional inhalers. This could lead to better adherence to treatment regimens. They also reduce the need for a spacer, and usually have a counter to inform users of the number of doses left, which reduces waste.

**Shared Decision-Making** whereby patients are offered a choice based on explanations of the environmental benefits of greener options, empowers patients and fosters a sense of shared decision-making with their doctor.

**Improved Self-Esteem** occurs when patient understand how they have lowered their environmental Impact, through use of greener alternatives. Peoples’ understanding of their contribution towards a healthier planet, can help their sense of self-worth, and be especially important to environmentally conscious individuals.

**Challenges**

The most important factor in choosing an inhaler, is that it delivers the medication effectively for the individual's needs. In some cases, a traditional inhaler might be the best option for a patient, and it should be made clear to patients that the traditional option is perfectly acceptable. Patient and clinician discussions should jointly determine the right type of inhaler for individual patients, with selections considering particular circumstances. Greater variation in types of inhalers, will likely add to complexity of discussions.

**Possible Negative Impacts on Health**

DPIs rely on proper inhalation technique to deliver medication effectively. If a patient doesn't use a DPI correctly, they might not receive the full dose of medication, potentially leading to uncontrolled asthma symptoms. Also, using a DPI might be more challenging for young children or people with coordination issues. These individuals might require a different type of inhaler or additional training to ensure proper use.

There is a small chance of developing thrush (fungal infection) of the mouth or throat with DPIs. This is because they don't contain alcohol, which has antifungal properties. DPI users can mitigate any risk by rinsing their mouth with water after DPI use.

**Example(s) of Good Practice**

1. The **Greener Practice High Quality and Low Carbon Asthma Care Toolkit** is a national toolkit providing guidance and resources for general practices to improve asthma outcomes while reducing their environmental impact. It includes downloadable resources, educational materials, and step-by-step guides for implementing quality improvement projects focusing on asthma diagnosis, medication, and inhaler use. [[44]](#endnote-45)
2. **L&SC Medicines Management Group** **(LSCMMG)** has desk-top guidance that complements the Greener Practice toolkit. It includes information specific recommendations for prescribing in Lancashire and South Cumbria and can be accessed through the LSCMMG website [[45]](#endnote-46).

**Conclusion**

For most people, the advantages of green inhalers outweigh any minor health risks. These advantages are:

* improved self-esteem from the knowledge of having a reduced environmental impact; and
* improved medication adherence

However, the best inhaler type depends on the individual patient's needs and preferences, and factors such as age, medical history, and the ability to use different inhaler techniques, must be considered.

## 5.2 Reduce Waste from N2O

**Action:** Support Trusts to develop plans to optimise and reduce waste from N2O

N2O, also known as laughing gas, is used in hospitals for procedural sedation and analgesia (PSA). It is 300 times more potent than carbon dioxide as a greenhouse gas. The NHS estimates that 5% of the total carbon footprint of an acute NHS organisation is attributable to anaesthetic gases, particularly N2O [[46]](#endnote-47). Administration, with or without an analgesic agent, induces a state that allows patients to tolerate painful and/or noxious procedures, and its effects on respiration and haemodynamics are minimal. Besides undiluted usage in hospitals and in dentistry, it is also commonly administered in a 50:50 mixture with oxygen to give analgesia during labour. More efficient and effective use of N2Ocan be achievedas a result of staff training and education, the development of clinical guidelines and protocols, and via monitoring N2O use and obtaining feedback.

Reducing use of N2O, can positively impact patients as follows:

**Reduced Nausea and Vomiting** after surgery or birth can be the result of minimising N2O use, especially if dosage would have otherwise been high. This in turn, can lead to fewer post-operative complications and a more comfortable recovery experience for patients.

**Improved Cognitive Function** may result from not using high concentrations of N2O, which can temporarily impair cognitive function. This can potentially lead to faster recovery and better decision-making capabilities for patients post-surgery.

**Greater Flexibility and Choice** from provision of alternative anaesthesia techniques such as intravenous pain medications, patient-controlled analgesia (PCA) pumps, and non-medication techniques such as relaxation and distraction.

Reducing use of N2O, can also positively impact staff via:

**Lower long-term exposure risks** protecting staff from exposure associated memory loss, vitamin B12 depletion (potentially causing brain and nerve damage) and ringing or buzzing in the ears.

It should be noted that just one bottle of another commonly used anaesthetic gas, namely desflurane, has the same global warming effect as burning 440 kg of coal [[47]](#endnote-48). Switching to greener alternatives like xenon or sevoflurane, can significantly reduce the environmental impact of both N2O and desflurane. N2O is also the traditional gas used in dental practices. However, there are challenges to using alternative gases (see below).

In terms of the **benefits of alternative gases**, there is limited evidence to suggest significant differences in patient health outcomes based on the type of anaesthetic gas used. The choice of anaesthetic is primarily based on factors such as:

* Patient health and medical history
* Type of procedure being performed
* Doctor's experience and preference

While some green alternatives might have different side effect profiles compared to traditional options, minor differences would not be a reason for choosing one gas over another. Suitability would be the key determining factor. As the set of Guidelines for the Provision of Anaesthetic Services (GPAS) continues to be updated, it will continue to include an environmental impact assessment, and suggest good practice that minimises environmental impact whilst maintaining or enhancing safety and quality of care. However, specific recommendations can only be made once there is evidence available to support them.

**Challenges**

**Alternative Green Anaesthetic Gas Options** are currently being explored for their safety and efficacy profiles compared to traditional gases. Xenon and sevoflurane are currently regarded as viable alternatives. However, Xenon is a rare gas, making it less readily available than traditional options. Also, due to its rarity, Xenon is considerably more expensive than N2O. Sevoflurane is more readily available compared to Xenon, making it a more realistic option in terms of the increased cost versus the significant environmental benefits. Other challenges around greener alternatives, include additional staff training, the need for equipment adjustments, and potential lack of patient suitability.

**Green N2O Machines** aren't currently commercially available from the point of view of eliminating N2O emissions altogether. However, hospitals can implement various strategies to reduce nitrous oxide waste such as:

* using low-flow delivery systems, which deliver N2O more slowly while maintaining effectiveness
* using demand valve systems, which only deliver N2O when the patient inhales, minimising unnecessary gas release
* regularly maintenance of equipment to ensure efficient delivery and minimise potential leaks
* use mobile destruction units (MDUs) to collect residual N2O and destroy it

**Possible Negative Impacts on Health**

Using alternatives to traditional options, might not be as effective for certain types of pain or sedation. This could lead to inadequate care for some patients, potentially delaying recovery or increasing discomfort. Different pain medications may have varying side effects such as drowsiness or dizziness, and some may have a greater effect on respiration, haemodynamics and cognitive function.

**Example(s) of Good Practice**

1. **The Newcastle Upon Tyne Hospitals NHS Foundation Trust** became the first Trust to use an MDU in September 2021. The MDU purifies 99.6% of the nitrous oxide entering the unit, ‘cracking’ the potent greenhouse gas into nitrogen and oxygen which are harmless [[48]](#endnote-49).
2. **East Lancashire Hospitals Trust** ’The Great Escape: The Nitrous Oxide Mitigation Project’has thoroughly reviewed the Trust’s nitrous oxide usage. At the Blackburn site it found an environmental burden >2,500 tonnes of CO₂e per year, contributed to by a major pipe leak in the main theatre complex. Also, one room in the Central Birth Suite was identified as having higher than recommended levels of N2O. These issues were subsequently fixed, via the isolation and closure of the leaking pipeline, and via the unblockage of ventilation flow in the Central Birth Suite [[49]](#endnote-50).

**Conclusion**

Overall, reducing N2O (and other traditional gases) in hospitals can benefit patients by potentially reducing side effects, and improving cognitive function. However, N2O and desflurane, are well established as safe and effective. N2O with Oxygen (gas and air) works quickly and wears off quickly, can be self-administered (giving a sense of control during childbirth), and is considered safe (for both mother and baby when used in birthing). As such, it may be appropriate for Trusts to consider similar mobile destruction units (MDUs) as used in Newcastle 45, which could initially be rolled out throughout Women’s Services with central destruction unit installations capturing and cracking the nitrous oxide that has come from the piped network.

As anaesthetists are encouraged to consider their individual carbon footprints, through measures such as: (1) avoiding desflurane and N2O, (2) practising low-flow anaesthesia, and (3) embracing techniques to minimise the requirement for inhalation agents, such as regional and total intravenous anaesthesia (TIVA) [[50]](#endnote-51), there needs to be careful consideration that alternative measures are clinically appropriate. Standardisation and training in using alternative gases and alternative techniques is required across healthcare settings nationally, based on good evidence round the efficacy and effectiveness of newer alternatives to traditional options.

# 6.0 Supply Chain and Procurement

## 6.1 Sustainable Procurement Policy

**Action:** Encourage ICB / Trusts / partner members to have a Sustainable Procurement Policy.

**And**

## 6.2 Sustainable Procurement Strategy

**Action:** Support the development of an ICB-wide ISO20400 Sustainable Procurement Strategy that all Trusts can use (possibly other ICP partners too)

**Indirect Benefits**

**Sourcing goods from cleaner producers** may lead to a reduction in carbon related water pollution and air pollution. Air pollution from burning fossil fuels can cause multiple health issues, including asthma, cancer, heart disease, and premature death. Combusting the additives (benzene, toluene, ethylbenzene, xylene) found in fuels used by factories, produces cancer-causing ultra-fine particles and aromatic hydrocarbons [[51]](#endnote-52). Globally, fossil fuel pollution is responsible for one in five deaths.

**Judicious use of Antibiotics** is encouraged in sustainable procurement policies and can prioritise alternatives when appropriate. This helps combat the growing problem of antibiotic resistance, which can lead to increases in more difficult-to-treat infections for patients.

However, sustainable procurement in healthcare goes beyond benefits indirectly affecting everyone’s health (at an environmental or societal level). By making conscious choices about the products and services hospitals and other healthcare partners acquire, there may be direct positive impacts on patient health within healthcare facilities.

**Challenges**

Guidelines and policies that prioritise sustainable product selection and responsible waste management, may require development, and once developed lead to upheaval of existing arrangements, including the forging of new partnerships. A shift towards a longer-term view may be required, whereby environmental and health impacts of products need to be considered throughout their lifecycle, from acquisition to disposal. Also, staff training on sustainable procurement practices may be required to empower them to make informed choices.

**Example(s) of Good Practice**

Some medical suppliers have created internal codes of conduct and/or come together as industry groups to set overall principles of procurement, such as:

1. **The Pharmaceutical Supply Chain Initiative** is a group of pharmaceutical and healthcare companies who share a vision of excellence in safety, environmental, and social outcomes in the communities where they buy [[52]](#endnote-53).
2. **The Sustainable Healthcare Coalition** is a healthcare sector led group that looks for the greatest opportunities to inspire sustainable practices in healthcare through the collaboration of its members [[53]](#endnote-54).

**Direct Benefits**

**Sustainable Cleaning Products** which are free from harsh chemicals and volatile organic compounds show promise for improving indoor air quality and potentially reducing respiratory issues. However, more large-scale clinical studies are needed to definitively establish their effectiveness against conventional cleaners across a wider range of health outcomes.

**Sustainable Healthcare Materials** such as citrate-based biodegradable polymers, are likely to have a lower risk of contributing to Healthcare Associated Infections (HCAIs), due to inherent antimicrobial properties [[54]](#endnote-55).

**Re-usable Medical Equipment** which are durable and well-maintained can minimise the spread of germs compared to disposable alternatives. This may be because improper disposal of disposable equipment can create opportunities for contamination if not done correctly. The environmental benefits of reusable surgical gowns and drapes are known to be an important contributor to health care sustainability programs [[55]](#endnote-56), and this is discussed in section 11.1 (PPE and PPE Waste).

**Sustainable Packaging** made fromnatural materials rather than plastics, could reduce the risks associated with harmful chemicals used in plastic production. For instance, evidence shows that the outcomes of Bisphenol A (BPA) exposure are cancers, endocrine disruptions, immunosuppression and reproductive defects and BPA-free alternatives should be promoted to avoid these adverse consequences [[56]](#endnote-57).

**Sourcing Fresh, Local Food** (see 2.0 Food and Nutrition)

**Building Materials** (see 8.1 Capital Projects Procurement Compliance)

**Energy-efficient Buildings** (see 9.2 Climate Ready Upgrades to Estates)

**Challenges**

Sustainable materials might not always offer the same level of sterility as traditional packaging, which is paramount in healthcare settings. Ensuring product safety and efficacy should remain as the top priority.

**Possible Negative Impacts on Health**

Some sustainable materials may lack the barrier properties of traditional plastics, which are crucial for protecting sensitive medical products from moisture, oxygen, or contamination, potentially lowering their effectiveness. Some recycled materials might contain residual contaminants that could leach into products and pose health risks, for instance, recycled food contact plastics are vectors for toxins [[57]](#endnote-58). Certain natural fibres used in clothing or building materials might trigger allergies in some people. Some sustainable options such as natural cleaning products, might be less effective against harmful bacteria compared to conventional options.

**Example(s) of Good Practice**

1. **University Hospital of Morecambe Bay Trust (UHMBT)** has (in its Green Plan) committed to develop a Sustainable Procurement Strategy, which will involve (among other things) the provision of sustainable procurement training to all procurement staff. [[58]](#endnote-59)
2. **The Lancashire Procurement Policy** **(LPC)** lays out fundamental procurement principles and intended direction for collective contracting between the NHS Trusts of Blackpool Teaching Hospitals, East Lancashire Hospitals, and Lancashire Teaching Hospitals. The policy recognises the importance of working with suppliers to lower the carbon impact of all aspects of procurement; making decisions based on whole life cycle costs and minimisation of waste; and encouraging local suppliers to bid for the supply of goods and services, promoting the use of local businesses whenever possible. [[59]](#endnote-60)

**Conclusion**

Integrating sustainable procurement into healthcare provision can contribute to a healthier environment for patients, staff, and the community at large. However, it can be a complex issue, and the key is to be a mindful of health considerations as well as environmental factors when making choices. This can be achieved by checking for certifications; researching materials used in sustainable produce and their associated health concerns; choosing products with good disclosure about materials used in the processing (and any potential health risks); and prioritising reputable vendors.

# 7.0 Building Energy

The vast network of hospitals, clinics, and other buildings used by the NHS, mostly rely on fossil fuels for heating, hot water, and electricity generation. These contribute to greenhouse gas emissions and local air pollution. The NHS is estimated to emit 25 mega tonnes of CO2 equivalent per year [[60]](#endnote-61), which is roughly equal to around 5% of the country’s emissions, and 40% of public sector emissions [[61]](#endnote-62). The operation of NHS facilities currently makes up 15% of the NHS Carbon Footprint Plus (‘Plus’ meaning inclusive of emissions that can be influenced), of which 10% is building energy (operational carbon) [[62]](#endnote-63)

In terms of air quality, fine particulate matter concentrations (PM2.5) in Lancashire are below the national average (see appendix 1). However, there is huge disparity in distribution of air pollution. For instance, Barrow-in-Furness sees average PM2.5 concentrations of 6.3 micrograms per m3, below the national average (7.4) and the regional average (7.1), and yet data published by the British Lung Foundation in 2018, revealed that air quality around 4 GP practice locations in Barrow-in-Furness, was above 16 micrograms per m3, all 4 featuring in the worst 10 GP surgeries nationally for PM2.5 concentrations (see appendix 3) [[63]](#endnote-64).

Key health conditions associated with air pollution primarily include asthma, respiratory disease, coronary heart disease, stroke, and lung cancer. According to the World Health Organisation, air pollution is carcinogenic, and recommended annual exposure limits should be 5 μg/m3 for PM2.5, and 10 μg/m3 for nitrogen dioxide (see appendix 4). Appendix 1 shows that only 4 North-West districts (all Cumbria area) were on average below the WHO recommended limit during 2022.

## 7.1 Community Renewable Energy

**Action:** Work with partners to develop Community Renewable Energy initiatives.

Community renewable energy initiatives are projects where local residents, businesses, and organisations such as the NHS, work together to generate clean power from renewable sources. These initiatives offer environmental, social, and potentially economic benefits, directly impacting the community where they're implemented. Types of initiatives include community-dedicated (or even community-owned) solar farms; solar panels on the rooftops of homes and businesses to generate their own electricity; community wind turbines, generating cheap electricity for the local area; and biogas digesters converting organic waste to renewable gas, for electricity or heating. Benefits of Community Renewables include:

**Reduced Air Pollution** such as smog, particulate matter, and nitrogen oxides. These pollutants contribute to respiratory problems, heart disease, and cancer. Cleaner air, especially in urban areas, leads to fewer hospital admissions and overall better respiratory health for the community**.**

**Lower Energy Costs** can result from reduced reliance on the grid and provide participants with lower electricity costs.

**Increased Energy Security** as communities become less dependent on traditional energy sources and price fluctuations.

**Job Creation** in terms of local jobs in installation, maintenance, and education.

**Empowerment** as community involvement fosters a sense of ownership and promotes a sense of energy security from lower cost, sustainable alternatives.

**Challenges**

High upfront costs, complex funding options, and long-term maintenance needs can put a strain on resources. Also, feasibility studies and complex regulations can delay projects, with identifying sites, addressing community concerns, and ensuring grid integration adding to the complexity.

**Possible Negative Impacts on Health**

Low-income residents might struggle to afford upfront costs of participation, missing out on long-term benefits, and demand for properties in receipt of cheaper energy could increase, potentially impacting low-income renters with increased rents or displacement. Also, unequal power dynamics can exclude low-income residents from decision-making, potentially prioritising wealthier voices.

Land use for projects could also displace low-income communities, or limit future land uses e.g., reduce planned construction of affordable housing.

Other negative impacts focus on construction and operation (mostly dust and noise pollution). These are specific to particular projects, for instance rotating wind turbines which may disrupt sleep and cause other annoyance to nearby residents and large hydroelectric projects, can disrupt fishing.

**Example(s) of Good Practice**

1. **University Hospitals of North Midlands** has installed 1089 solar panels on hospital roofs funded by ethical investors. The community energy company maintaining the panels receive revenue from surplus energy sold back to the grid; the hospital receives cheap renewable energy (and improved energy resilience); investors get a return (over 20 years); and surplus monies accumulate into a ‘community fund’ to support local people. [[64]](#endnote-65)
2. **Repowering London** is a non-profit energy cooperative which works in partnership with local authorities and community groups in some of London’s poorest areas. The organisation aims to cut carbon dioxide emissions, fight fuel poverty, and generate training and employment opportunities for communities. Its model enables local communities to invest in ethical solar projects, often on social housing where individual households might not otherwise be able to afford the capital outlay. Profit from the sale of electricity to the grid is used to benefit the whole community and to give investors an annual return. Its projects are run democratically using Community Benefit Societies – a type of co-operative – to ensure that every voice is heard [[65]](#endnote-66).

**Conclusion**

Despite the challenges, community renewable energy initiatives, can pave the way for more sustainable energy, leading to improved health impacts through benefits such as new local jobs and community funds. Collaboration, public education, innovative financing, and learning from established projects can all help initiatives be successful.

## 7.2 Green Gas

**Action:** Explore the procurement of Green Gas across the ICB

Fossil fuels such as natural gas release pollutants during combustion, for example nitrogen oxides and particulate matter. These pollutants can significantly contribute to poor air quality. Switching to green gas sources like biogas eliminates these emissions, thus improving air quality. Based on the existing evidence and the known negative impact of fossil fuel emissions on air quality, there is a suggestion that buildings using green energy, may have better indoor air quality, but further research is needed to definitively establish this connection, which is complicated by the fact that greener buildings are likely to have better ventilation systems which is a more important determinant of indoor air quality.

However, what is certain, is that reduced air pollution from healthcare, can contribute to improved outdoor air quality. Blackpool in particular, is shown to have poor outdoor air quality, with PM2.5 levels of almost 8 (see appendix 1). This translates into an annual all cause adult mortality (attributable to particulate air pollution) of 6.5%, which is well above the England average of 5.8%.

It is important to note, that district wide averages for air pollution, may mask the fact that some more defined locations, such as lower super output areas, may have higher-risk levels. Appendix 3 shows high pollution levels in parts of Barrow-in-Furness.

**Challenges**

Existing healthcare sites might require upgrades to their infrastructure to accommodate green gas sources, and these sources might require adjustments to existing energy systems to ensure optimal efficiency and prevent potential energy waste, this can involve additional costs and potential disruptions.

Also, green gas sources might be less readily available and more costly, and staff might require additional training to operate and maintain equipment related to using green gas sources.

**Possible Negative Impacts on Health**

Biogases still produce some pollutants during combustion, and these pollutants and their effects are perhaps less well researched and understood. Improperly managed biogas facilities in particular, might release harmful emissions during the production process. However, well-regulated biogas plants minimise this risk. Hospitals transitioning to green gas might require infrastructure upgrades, whereby construction dust or disruptions during this process could temporarily impact indoor air quality. Proper planning and mitigation strategies can minimise these issues.

**Example(s) of Good Practice**

1. **Blackburn with Darwen Council** have approved proposals for an anaerobic digestion facility (ADF) in Darwen Lancashire. The ADF would treat waste onsite to generate renewable energy, predominantly biomethane 'green gas', but also electricity and biofertiliser. The gas (enough to power 7,000 homes daily) would be exported to the local distribution network, and the electricity generated would be used to power the plant. International research is ongoing regarding on-site ADFs for hospitals, particularly regarding optimising waste streams, managing potential risks associated with medical waste, and ensuring cost-effectiveness. Pilot projects have demonstrated potential, and East Suffolk and North Essex NHS FT already processes its food waste into a compost-like residue which an off-site ADF turns into green energy [[66]](#endnote-67).
2. **University College London Hospital NHS Foundation Trust (UCLH)** has implemented a combined heat and power (CHP) system that uses natural gas to generate electricity more efficiently than traditional methods. The waste heat from this process is then captured and used to provide hot water for the hospital. While natural gas is not a perfectly green solution, CHP systems are significantly more efficient than traditional methods and can be a stepping stone towards even greener solutions such as biogas [[67]](#endnote-68).

**Conclusion**

The potential benefits of using green gas for energy, are improved outdoor air quality in the area of use, and possibly even improved indoor air quality on-site. Reduced exposure of the population to toxins, likely outweigh any minor (often temporary) drawbacks, especially when considering long-term environmental and public health benefits.

# 8.0 Capital Projects

## 8.1 Procurement Compliance

**Action:** Work with our Procurement team to ensure PPN06/20 (minimum 10% weighing for social value in procurement) and PPN06/21 (carbon reduction plan in place for contracts above £5 million) are compliant

The NHS Procurement Policy Notice (PPN) 06/21 focuses on integrating environmental considerations into NHS contracts. A minimum of 10% weighting for social value, means that when the NHS evaluates bids from different suppliers for goods, services, or works, at least 10% of the total score will be based on the social value each bid offers. Suppliers will need to demonstrate the positive social impact their bid can generate alongside price and quality considerations. This might involve outlining specific initiatives or programs they plan to implement. This ensures that the NHS procurement process contributes to positive social outcomes within the communities it serves, potentially promoting a more sustainable and equitable healthcare system. Some potential positive impacts on peoples’ health are:

**A Focus on Prevention** whereby tenders might encourage suppliers to prioritise initiatives that promote healthy lifestyles and preventative healthcare within communities, such as health educational programs, investment in community centres or sports facilities, or support services such as substance abuse.

**Reduced Health Inequalities** whereby suppliers are encouraged to focus on underserved communities facing greater health challenges. Initiatives could be mobile health clinics in disadvantaged areas, language interpretation services to improve access to healthcare, training programs for healthcare professionals to better understand cultural sensitivities.

**Improved Working Conditions for Staff** whereby suppliers prioritise fair wages, training opportunities, and well-being programs for their employees, with the added benefit of happier staff translating into improved care.

**Employment Opportunities** whereby suppliers are encouraged to work with local businesses, and/or commit to hire from disadvantaged groups. The economic impact having a ripple effect on overall health and well-being in the community.

**Challenges**

"Social Value" Is difficult to define and quantify. Metrics used to evaluate social value might not perfectly capture the true benefits to public health. Social value initiatives often have long-term public health benefits like improved community health or reduced health inequalities, but procurement scoring may prioritise short-term factors that are easier to measure.

Ensuring that suppliers genuinely deliver on their social value promises might be hampered by resource limitations of both the NHS and the supplier, with smaller suppliers perhaps struggling to compete when significant resource investment is required (e.g., data capture and analysis) to demonstrate impact.

**Possible Negative Impacts on Health**

Focusing on social value can potentially decrease clinical and cost effectiveness, especially if it leads to choosing suppliers with less clinical expertise or slightly higher prices but stronger social value propositions. Finding the right balance between cost, quality, and social value is crucial.

Implementing social value scoring effectively can add complexity and time to the procurement process, meaning people potentially waiting longer for service implementation. Balancing thorough evaluation with timely procurement is also important.

**Example(s) of Good Practice**

1. **Lancashire County Council** has stated in its ‘Social value policy and framework 2024-28’ that to realise added-value benefits, “we and our suppliers will collaborate to plan how contracts and projects can be delivered in ways that generate outcomes that contribute to the eight 2050 Lancashire priorities”. These are economic prosperity, transport and infrastructure, environment and climate, housing, early years and education, and employment and skills. The policy sets out how the council will work with staff, partners and suppliers to deliver social value for Lancashire [[68]](#endnote-69).
2. **Lancashire Teaching Hospitals NHS Foundation Trust** holds the Social Value Quality Mark, and in its commitment to social value, it states “Lancashire Teaching Hospitals will carry out value-based actions and activities to help tackle health and socio-economic inequalities, making lives fairer with improved quality and inclusivity for our communities, businesses, patients, and workforce” [[69]](#endnote-70).

**Conclusion**

While the impact on individual health outcomes might be indirect, prioritising social value in procurement, creates a healthier environment by focusing on prevention, equity, and community well-being. However, there needs to be a balance between any social value added, compared to any loss in clinical output/outcomes.

# 9.0 Climate Adaptation

## 9.1 Climate Change Adaptation Plan

**Action:** Develop an ICB-wide Climate Change Adaptation Plan

A climate adaptation plan aims to reduce risks to human health, the environment, and our way of life, through the impact of climate change. The plan involves assessing vulnerabilities, identifying actions to address them, and implementing those actions. By proactively adapting, we can lessen the negative consequences of climate change and build a more resilient future.

**Heatwave Preparedness**

During summer 2022, there were an estimated 3,000 all-cause excess deaths associated with 5 heat episodes, the highest number in any given year [[70]](#endnote-71). Heat-related mortality is associated with deprivation and poor housing. Despite rises in mean summer temperatures of at least 1°C in the more prosperous southeast England, since 1971 heat-related mortality has not risen. In the USA, in states such as North Carolina, heat-related mortality has virtually disappeared, with the likely explanation being a large increase in air-conditioning presence in homes [[71]](#endnote-72). Parts of the UK population are vulnerable to heat, due to a lack of knowledge regarding the dangers, poor heat insulation of buildings and homes, and poor pre-existing health (heat-related excess deaths, tend to be represented by increases in typical death reasons, such as cardiovascular disease, respiratory disease and neurological conditions (see appendix 6). The following measures could potentially lead to lower mortality and morbidity:

**Public Education** on staying cool, hydration, and the symptoms of heatstroke, through campaigns and targeted outreach to vulnerable groups.

**Support Insulation of Housing** through signposting to grants and through education and awareness. This can also help reduce deaths related to cold weather

**Implement Heat Alert Systems** to warn residents about upcoming heatwaves.

**Mitigate Urban Heat** by planting trees, using reflective surfaces, and promoting modern energy-efficient buildings where heat, ventilation and cooling is well-controlled. Care homes and Nursing homes would be important partners in this aspect.

**Establish and Maintain Cooling Centres** in public buildings such as hospitals and ensure that public pools and beaches are accessible.

**Collaborate with Healthcare Providers** to ensure they are prepared for a rise in heat-related illnesses, with stockpiles of essential medications for heatstroke and heat-related complications, well trained staff on stand-by with flexible working arrangements, and clear care protocols being in place.

**Partner with Community Organisations and Social Care** to reach vulnerable populations and provide support during heatwaves, for instance meal delivery to vulnerable individuals.

**Offer Energy Assistance Programs** for low-income residents to afford cooling solutions.

**Flooding Preparedness**

**Upgrading Flood Defences and Protecting Infrastructure** near hospitals and clinics can ensure continued access to healthcare during floods. The plan could also involve waterproofing measures to protect essential equipment and supplies, and backup power systems for continued energy needs.

**Flood Risk Assessments** involve assessing the flood risk of hospitals and other facilities, prioritising critical care areas and ensuring essential services remain operational during floods.

**Emergency Protocols** for evacuating patients, relocating equipment, and maintaining communication, would minimise disruption to healthcare services during flooding, and protect the most vulnerable.

**Stockpiling** essential medications, medical supplies, and hygiene products to ensure continued care during and after floods.

**Raised Awareness** about flood risks and self-preparedness measures among healthcare staff and the public, can reduce injuries and fatalities during floods.

**Collaboration with Emergency Services and Local Authorities** is crucial for a coordinated response to floods and ensuring timely access to healthcare services in affected areas.

**Challenges**

Local Authorities and the NHS already face financial strain, making it difficult to secure funding for adaptation. Also, there is uncertainty in terms of predicting adaptation requirements and their health impacts. Robust data is required on local climate projections, vulnerable population projections (potentially affected by unpredictable migration numbers), and the potential health risks.

Successful planning relies on collaboration between the NHS, local authorities, and other agencies. Overcoming bureaucratic hurdles and ensuring clear communication can be challenging. Maintaining public, staff, political and financial support for plans over time, may prove to be difficult.

New challenges such as potentially rising water-borne diseases and vector-borne diseases, may require close collaboration with public health departments, on the prevention of such diseases.

More extreme weather eventsmay require planning for disruption to transport systems and power supplies, to enable continued access to healthcare.

**Possible Negative Impacts on Health**

The NHS and local Authorities have many demands on their resources. Balancing climate adaptation with immediate health and care needs, requires careful prioritisation, such that current care is not compromised.

**Mental Health Impacts of Climate Change** such as anxiety and depression, can be exacerbated by alarming awareness campaigns. Sufficient access to common mental health services such as psychological therapies, can mitigate against this, as can knowledge of environmental actions. The phenomenon of climate change anxiety (CCA) requires further research [[72]](#endnote-73).

**Displacement due to flooding** could cause post traumatic stress disorder (PTSD), where evacuation plans are insufficient. Again, this could be mitigated against by access to mental health services.

**Example(s) of Good Practice**

1. **Blackpool Teaching Hospitals NHS Foundation Trust** has a severe weather plan co-owned by the Trust, Blackpool Council and the ICB. The plan is directly linked to the Heatwave and Cold Weather Plans for England and details specific actions for various alert levels according to national guidance, the Local Resilience Forum and organisation risk registers. Climate change adaptation is covered in the Trust’s risk registers, and a multidisciplinary team has been established to develop a coordinated and integrated adaptation plan [[73]](#endnote-74).
2. **East Lancashire Hospitals Trust** states in its Green Plan, that it engages with public authorities and partners in tackling extreme weather events, such as heat waves and flooding. It worked with Blackburn with Darwen Borough Council on the ‘Connecting East Lancashire’ programme, where climate change adaptation was a prominent theme. Building on its existing ‘Heat Wave and Extreme Weather’ plans, the Trust is analysing climate change risks and developing action plans across its estate and service areas [[74]](#endnote-75).

**Conclusion**

Good heatwave planning can significantly improve health outcomes during hot weather by reducing the risk of heat-related illnesses. Public education and infrastructure will help people stay cool and hydrated, which will lowering the risk of heatstroke, heat exhaustion, and other heat-related illnesses. Mitigating heat stress by good planning, can prevent a surge in heat-related emergencies and fatalities, placing strain on the health system. Children, older adults, and those with chronic health conditions are more susceptible to heat, and plans must ensure that they have access to support and resources to stay safe during heatwaves.

## 9.2 Climate Ready Upgrades to Estates

**Action:** Ensure Trust Estates Strategies incorporate Climate Change readiness and are actively assessing the built environment to make climate-ready upgrades

NHS Trust estates strategies, focused on adapting the built environment to climate change can significantly impact people's health by:

**Upgrading Building** insulation, installing cool roofs and walls, and optimising ventilation systems to maintain cooler temperatures within hospitals and clinics.

**Utilising Natural Ventilation and Shading** with strategically placed trees and landscaping.

**Creating Green Spaces Around Facilities** to reduce the heat island effect and improve air quality. Heat islands are urbanised areas that experience higher temperatures than outlying areas, with built structures absorbing and re-emitting the sun's heat more than natural **landscapes** such as trees and water bodies.

**Providing Better Temperature Control** with more advanced temperature regulation, managed digitally by individual patients, will improve comfort and provide a sense of empowerment.

**Installing Waterproof Barriers and Improved Drainage** to minimise disruptions to patient care during floods. This ensures continued access to essential medical services.

**Challenges**

Upgrading Trust buildings to face climate change presents several hurdles, such as the financial strain of upfront retrofitting costs, technical hurdles to adapting older (sometimes historic) buildings and integrating new technologies that might require staff training. Also, securing long-term political and financial commitment for ongoing maintenance and updates may be difficult.

**Possible Negative Impacts on Health**

Construction can generate dust, which can be problematic for patients with respiratory issues or weakened immune systems; it can cause disruption such as noise, which can be stressful for patients and staff, potentially impacting recovery and work efficiency, and building processes might involve chemicals that could irritate patients or staff.

**Example(s) of Good Practice**

1. **Lancashire and South Cumbria New Hospitals Programme** is aiming to address significant problems with our ageing hospitals in Preston, Lancaster, and Barrow-in-Furness. The New Hospitals Programme offers a once-in-a-generation transformation opportunity to provide cutting-edge hospital facilities. The poor condition of current estates means they lack sufficient environmental controls and are expensive to run, with probable negative Impacts on health [[75]](#endnote-76).
2. **Lancashire and South Cumbria ICB** have ensured that all new builds and retrofits over £15 million, meet the NHS England Net Zero Building Standard (published 23/02/23) [[76]](#endnote-77).

**Conclusion**

Most of the measures relate to better regulation of temperature, which can result in faster recovery times for patients due to a more comfortable and controlled environment. Improved working conditions can also reduce stress and fatigue among staff, leading to better quality care for patients. Measures relating to flood, ensure continued access to essential healthcare services when extreme rainfall leads to the flooding of healthcare premises.

# 10.0 Green Space and Biodiversity

## 10.1 Biodiversity and Greenspace Initiatives

**Action:** Working with partners such as NHS Forest and Lancashire Wildlife Trust to develop further biodiversity and greenspace initiatives across the ICB

Further developing green space and biodiversity across the ICB, can significantly impact people's health in many positive ways:

**Reduced Stress Hormones**, lower blood pressure, and improved mood, are known associations with access to green spaces. This can help combat levels of anxiety and depression, which are relatively high in parts of LSC ICB, and have risen since Covid-19.

**A Sense of Community and Belonging** can be fosteredby opportunities for relaxation and social interaction, afforded by green space access

**Increased Physical Activity** is encouraged when green space such as parks and trails encourage people to engage in physical activities like walking, cycling, or gardening. This regular exercise can improve cardiovascular health, reduce the risk of obesity and diabetes, and strengthen bones and muscles. Motivation to be more active is provided by spaces being pleasant and safe.

**Improved Air Quality** is a product of trees and plants acting as natural filters, absorbing pollutants and releasing oxygen, leading to cleaner air, especially in urban areas. This can improve respiratory health and reduce the risk of asthma, COPD, and other respiratory problems.

**A Shift Towards Active Travel** options like cycling or walking, will reduce air pollution caused by car traffic, and promote physical activity related health improvement

**Reduced Risk of Heat-Related Illnesses** can be a result of trees and green spaces helping to provide shade and regulate urban temperatures, mitigating the effects of heatwaves. This can reduce the risk of heatstroke, dehydration, and other heat-related illnesses, especially for vulnerable populations like the elderly or those with chronic conditions (see also 9.0 Climate Adaptation).

**Enhanced Cognitive Function** is associated with time spent in green spaces, which can be beneficial for people of all ages, including children whose cognitive skills are developing.

**A lower risk of zoonotic and vector-borne diseases** is likely where an ecosystem provides additional habitats for species, and reduces the potential contact between wildlife, livestock and humans. Research has shown that high biodiversity frequently reduces rates of pathogen transmission, although each case requires an assessment of whether risk reduction efforts are needed [[77]](#endnote-78), with host and vector management being an important consideration.

**Challenges**

Green spaces are often concentrated in wealthier areas, leaving low-income communities without their health benefits. Funding for development and maintenance can be difficult to prioritise against acute medical needs, and finding suitable land, especially in urban areas, can be challenging.

Public awareness about the link between green space, biodiversity, and health might be low, and healthcare professionals might not be familiar with "nature prescribing" and the potential benefits. Also, biodiversity efforts may require assessment of whether risk reduction strategies are needed.

**Possible Negative Impacts on Health**

Climate change and vandalism can threaten the future use and health benefits of green spaces. Safety concerns and antisocial behaviour in some green spaces further discourage use, particularly in disadvantaged areas.

**Example(s) of Good Practice**

1. **South Ribble Borough Council** has adopted a Biodiversity Strategy, pledging to restore, conserve and enhance the biodiversity in the Borough. Its strategic vision is for a Borough where biodiversity is bigger, better and more joined up. With networks of accessible, natural greenspace, linking areas of habitat that are positively managed for wildlife, biodiversity gains, as well as resident enjoyment and wellbeing [[78]](#endnote-79).
2. **Royal Cornwall Hospital Trust** has appointed biodiversity champions who ensure that all the projects deliver a “Biodiversity Net Gain” of at least 10%, which is required by law (from January 2024). Cornwall Council also make this a requirement of all planning applications. Examples include planting trees and creating new habitats gardens and wild areas to deliver biodiversity net gain [[79]](#endnote-80).

**Conclusion**

By partnering with other organisations, raising awareness, prioritising underserved communities, and implementing sustainable management practices, the ICB can unlock the potential of green space and biodiversity for a healthier and more equitable future.

# 11.0 Waste

## 11.1 PPE and PPE Waste

**Action:** Reduce the use of PPE, while exploring whether reusable alternatives to single-use PPE items (aprons, wipes, face masks) are clinically more appropriate across the ICB.

Reducing PPE use and PPE waste can positively impact people's health in numerous ways, although it is important to prioritise safety when making these changes. Potential benefits are as follows:

**Reduced Risk of Skin Irritation** may occur where overuse of PPE, for example gloves, would otherwise have led to skin irritation and dermatitis for healthcare workers. Reducing unnecessary use can minimize this risk.

**Better Patient Experience** can be achieved when excessive PPE creates communication barriers and makes it more difficult for patients to connect with healthcare workers. Reducing unnecessary PPE can improve patient satisfaction and well-being.

**Reduced Risk of Hospital-Acquired Infections (HAIs)** occurs when overuse of PPE creates a false sense of security and potentially leads to lapses in other infection control practices like hand hygiene. Optimising PPE use can ensure proper focus on core infection control measures.

**Re-usable alternatives (aprons, wipes, face masks) may be clinically more appropriate** to single-use PPE items. For instance, comparative study supports the view that reusable medical gowns offer superior protection and performance over disposable alternatives [[80]](#endnote-81).

**Challenges**

Healthcare workers might be hesitant to reduce PPE use, especially during outbreaks or with highly infectious patients or immune-compromised patients, due to fear of contracting infections themselves or transmitting them to patients respectively.

Reducing reliance on single-use PPE might require investing in reusable options or alternative materials and establishing PPE reprocessing Infrastructure.

Changing practice may require standardising protocols, staff training and education, and behavioural and cultural shifts.

**Possible Negative Impacts on Health**

Striking the right balance between reducing PPE and ensuring adequate protection for healthcare workers and patients is crucial. Overly aggressive reductions could increase the risk of exposure to infectious diseases. For instance, research led by the University of Plymouth, found that C difficile infected gowns treated with 1,000 parts per million of chlorine for ten minutes (the time recommended by the Department of Health and Social Care) still contained all strains of C difficile spores, which did not reduce [[81]](#endnote-82). Also, patients might misinterpret reduced PPE as a sign of less stringent procedures being followed, potentially causing anxiety.

**Example(s) of Good Practice**

1. **North Tees and Hartlepool NHS Foundation Trust** launched its Reusable Gown Service in 2020, to manage supply issues during the pandemic and to support its sustainability agenda. They offered a fully managed sterilisation and laundry service for reusable gowns and were provided with a 12-month sterility guarantee from its supplier. Each gown was covered for up to 100 uses when used in accordance with manufacturer’s instructions. Modelling savings based on using 7000 gowns every week, it is estimated that hospitals involved saved 223 tonnes of CO2e, 51 tonnes of clinical waste and saved £382K [[82]](#endnote-83). Furthermore, in semi-structured face to face interviews sites that had used both types of gowns, agreed that reusable gowns offered better protection, and were more durable and comfortable than single-use gowns.
2. **LSC Integrated Care Board** in its 10-Point Green Plan for Practice, emphasises the 3 R’s (Reduce, Reuse and Recycle). Specifically, it advocates use of sustainable/reusable Revolution-ZERO IIR masks, which have been successfully trialled and adopted across the country 15.

**Conclusion**

Reducing PPE use and waste has the potential to improve environmental sustainability, enhance healthcare worker well-being, and improve patient care. However, it's crucial to maintain a safety-first approach and implement these changes in a thoughtful and responsible manner.

# Conclusions

**Sustainable Models of Care**

The ultimate way to improve healthcare sustainability, is through prevention. Targeted health promotion fosters better engagement with key groups, tackles health disparities, and promotes preventive healthcare, leading to a healthier and more resilient population. Community Diagnostic Centres (CDCs) clearly play an important role in this, bringing services closer. As the real value in CDCs is in doing things differently, such as offering preventative services, CDCs need to be well staffed (not diluting staff from elsewhere), be carefully planned, and provide extra capacity. The urge to scale back CDCs in favour of traditional diagnostic provision due to financial pressures, needs to be resisted.

Increased access to healthcare should not by synonymous with increased medicalisation of health-related problems. Building trust, breaking down barriers, and empowering communities to take charge of their health are key to achieving equitable healthcare for all.

Besides a shift towards promoting prevention and self-care, care pathways, specialties and care materials, all need to become more carbon friendly. New technology and innovation will inevitably play an important role. Careful planning, following evidence-based research and collaboration (between patients and clinicians), will foster trust in order to maximise potential new benefits.

**Food and Nutrition**

Understanding food poverty, food insecurity, food bank usage, and employing appropriate strategies which are tailored to specific areas/groups is essential to promote consumption of more sustainable and healthier foods, such as plant-based foods. Clinicians and the public should be well informed about the concept of incorporating more plant-based foods such as fruits and vegetables in everyday food consumption. Generally, plant-based diets incorporating fruit and vegetables, fit well with dietary guidelines for people with long term conditions such as diabetes, being lower in saturated fat, higher in fibre, and other protective substances.

Ideally, a registered dietitian should be part of the health care team that designs a plant-based diet for patients with chronic disease, and physicians should apply MHRA guidelines around monitoring (e.g., monitoring vitamin B12 levels) with certain diets and at-risk patients.

Leveraging strengths of partners and focusing on common sensible goals are crucial for establishing and sustaining effective healthy eating partnerships, and delivering food poverty projects that can truly make a positive impact on peoples’ health.

Again, technology has an important role to play, for instance leveraging the potential of digital menus in hospitals can empower individuals to make more informed choices and can promote healthy behaviours that could be maintained beyond the healthcare setting.

**Digital Transformation**

A well-executed digital transformation plan for healthcare can be a powerful tool for improving patient health outcomes, promoting self-care, preventative care and empowering patients to take an active role in managing their health.

Virtual appointments and online consultations improve access and convenience; however, the limitations need to be considered:

* Potential inequity of access, driven by income, location, education/skills/confidence, age, disabilities (the ‘digital divide’)
* Face-to-face appointment often being preferred by some patients, and in-person interaction helping build trust and rapport

Mistakes via remote consultation are rare, but there is a risk of patients being under-diagnosed, and clearly online consultations are best suited to follow-ups and non-urgent health concerns as opposed to ‘first’ and diagnostic appointments. New technologies to monitor patients real-time, e.g., wearable sensors, may have better potential for recording activity and tracking progress than face-to-face monitoring.

Video-consultations are preferable to telephone appointments, but there are challenges in terms of improving peoples’ digital literacy to facilitate the embracing of new methods. The on-line world can be a scary (leading to cyberchondria) and overwhelming (leading to decision fatigue). Vast amounts of information available can lead to delays seeking treatment (due to self-diagnosing) and can create unrealistic expectations (e.g., about body/appearance).

**Travel and Transport**

Improving public transport links and access to healthcare sites, can (while taking cars off the road) create a system that promotes more engagement with preventative care, more timely treatment, and increased well-being for everyone, especially those currently seeing inequity of access. Healthcare facilities needs to be accessible for everyone, with rural and underserved communities being prioritised, and public transport being affordable.

Supporting travel routes for cyclists and walkers, is in many ways an even better use of resources. It simultaneously improves access while promoting healthier lifestyles and a healthier environment. However, safety concerns must be addressed to ensure that people’s health is not damaged through engaging in what should be a healthy activity. Creating truly safe routes that separate cyclists and pedestrians from car traffic, with proper infrastructure design are crucial. Routes should be accessible for people of all ages and abilities, and this might involve dedicated areas for wheelchairs, benches for rest, and well-maintained surfaces.

**Medicines**

The two actions deemed as requiring health impact analysis, were around ‘establishing green inhaler guidance and training’ and ‘supporting trusts to reduce N2O’. However, patient medication use reviews can also be a powerful tool for the NHS to achieve its net-zero goals (tackling medication waste and optimising prescriptions). The latter is known to have health benefits, e.g., polypharmacy reduction, especially for older adults, can reduce fall risk via removing interactions and side effects from taking multiple medications. Also, providing patients with greener medication options, may improve their self-esteem in terms of knowing they have made a responsible choice.

In respect of green inhalers (dry powder inhalers - DPIs) which don't use greenhouse gas propellants, these are known to lead to improved medication adherence. However, the best inhaler type depends on the individual patient's needs and preferences. Factors such as age, medical history, and the ability to use different inhaler techniques, must be considered.

In respect of reducing N2O, less use can benefit patients by reducing side effects such as nausea and improving cognitive function. However, N2O is well established as safe and effective. N2O with Oxygen (gas and air) works quickly, wears off quickly, and can be self-administered (giving a sense of control) e.g., during childbirth. As such, it may be appropriate for Trusts to consider mobile destruction units (MDUs). If anaesthetists are to be encouraged to consider their own individual carbon footprints, there needs to be national guidance, standardisation, and training, such that anaesthetists are competent and confident with new methods.

**Procurement, Supply Chains, Energy and Waste**

Integrating sustainable procurement into healthcare provision can contribute to a healthier environment for patients, staff, and the community at large. However, it can be a complex issue, and the key is to be a mindful of health considerations as well as environmental factors when making choices. This can be achieved by checking for certifications; researching materials used in sustainable produce (and their associated health concerns); choosing products with good disclosure about materials used in the processing (and any potential health risks); and prioritising reputable vendors. In terms of contract awards, a minimum 10% weighing for social value in procurement, is mandated. However, there needs to be a balance between any social value added, compared to any loss in clinical output/outcomes, and effective smaller providers should not be disadvantaged by being less able to prove added social value.

Despite the challenges, community renewable energy initiatives, can pave the way for more sustainable energy, leading to improved health impacts through benefits such as new local jobs and community funds. Collaboration, public education, innovative financing, and learning from established projects can all help initiatives be successful.

In terms of PPE and PPE waste, striking the right balance between reducing PPE and ensuring adequate protection for healthcare workers and patients is crucial. Overly aggressive reductions could increase the risk of exposure to infectious diseases, and could also undermine patient confidence, leading to anxiety. Studies have supported the view, that reusable medical gowns offer superior protection and performance over disposable alternatives, whilst offering large CO2e savings and cost savings.

**Green Space, Biodiversity and Adaptation**

Green spaces can improve air quality, increase physical activity, reduce stress hormones, and create a sense of community and belonging. They can also reduce the risk of heat related illnesses where tress and shade regulate urban temperatures.

Healthcare professionals need to be familiar with "nature prescribing" and the potential health benefits, and it is important that new green space initiatives prioritise low-income communities who can realise the highest health gains. It is also important that the use of green spaces are not threatened by concerns around anti-social behaviour and public safety.

Increasing biodiversity can provide a lower risk of zoonotic and vector-borne diseases, where an ecosystem provides additional habitats for species, and reduces the potential contact between wildlife, livestock and humans. Additionally, host and vector management is a viable option. While research has shown that high biodiversity frequently reduces rates of pathogen transmission, potential biodiversity increases do require assessments of how to minimise risk.

The main focus of climate change adaptation needs to be around heatwave preparedness. Heat-related mortality is associated with deprivation and poor housing, and much of the UK population is vulnerable to heat, due to a lack of knowledge regarding the dangers, poor heat insulation of buildings and homes, and poor pre-existing health.

Public education and infrastructure will help people stay cool and hydrated, which will lower the risk of heatstroke, heat exhaustion, and other heat-related illnesses. Mitigating heat stress by good planning, can prevent a surge in heat-related emergencies and fatalities, which would place a strain on the health system. Children, older adults, and those with chronic health conditions are more susceptible to heat, and plans must ensure that they have access to support and resources.

Upgrading Trust buildings to face climate change, presents several hurdles, such as the financial strain of upfront retrofitting costs and technical hurdles. However, better regulation of temperature at heath care sites, can result in faster recovery times for patients due to a more comfortable and controlled environment. Also, the improved working conditions can reduce stress and fatigue among staff, leading to better quality care for patients.

Clearly adaptation measures relating to flooding, must ensure continued access to essential healthcare services, when extreme rainfall leads to the flooding of healthcare premises, or the disruption of transport systems or power supplies. It must also consider evacuation procedures for populations affected. Successful planning relies on collaboration between the NHS, local authorities, and other agencies such as public health teams (regarding infectious diseases).

There is a clear role for NHS Mental Health teams to play, as ‘Climate Change Anxiety’ (CCA) becomes more prominent, and as more and more people are affected by extreme weather events, potentially causing trauma.

# Recommendations - To be completed

# Appendix 1 – LSC ICB 10-Point Plan for Practices

**1. Declare a practice climate and nature crisis**

**2. Optimise inhalers**

**3. Calculate the practice's carbon footprint**

**4. Monitor and reduce your practice's energy usage**

**5. Consider switching your business banking provider to a green bank**

**6. Environmental prescribing and treatment**

**7. Engage, educate and empower patients to take individual action on the climate crisis for the benefit of their health**

**8. Promote active transport for both staff and patients**

**9. Embed the '3 Rs' into practice culture - Reduce, Reuse, Recycle**

**10. Use the green impact for health toolkit**

[**https://www.lancashireandsouthcumbria.icb.nhs.uk/GreenerNHS/primary-care/net-zero-resources/10-point-green-plan-practices#:~:text=This%2010%2Dpoint%20plan%20has,the%20NHS'%20net%20zero%20ambitions**](https://www.lancashireandsouthcumbria.icb.nhs.uk/GreenerNHS/primary-care/net-zero-resources/10-point-green-plan-practices#:~:text=This%2010%2Dpoint%20plan%20has,the%20NHS'%20net%20zero%20ambitions)

# Appendix 2 - Background Annual Average PM2.5 Concentrations, North-West, 2021/22 to 2022/23

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**Source:** [**https://fingertips.phe.org.uk/search/air#page/3/gid/1938133043/pat/6/par/E12000002/ati/501/are/E08000001/iid/93867/age/-1/sex/-1/cat/-1/ctp/-1/yrr/1/cid/4/tbm/1/page-options/car-do-0**](https://fingertips.phe.org.uk/search/air#page/3/gid/1938133043/pat/6/par/E12000002/ati/501/are/E08000001/iid/93867/age/-1/sex/-1/cat/-1/ctp/-1/yrr/1/cid/4/tbm/1/page-options/car-do-0)

# Appendix 3 - Fraction of mortality attributable to particulate air pollution (new method), 2023

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**Source:** [**https://fingertips.phe.org.uk/search/air#page/3/gid/1000043/pat/6/par/E12000002/ati/501/are/E08000001/iid/93861/age/230/sex/4/cat/-1/ctp/-1/yrr/1/cid/4/tbm/1/page-options/car-do-0**](https://fingertips.phe.org.uk/search/air#page/3/gid/1000043/pat/6/par/E12000002/ati/501/are/E08000001/iid/93861/age/230/sex/4/cat/-1/ctp/-1/yrr/1/cid/4/tbm/1/page-options/car-do-0)

# Appendix 4 - Ten GP Surgeries with worst levels of PM2.5 air pollution in England

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Available at: <https://cdn.shopify.com/s/files/1/0221/4446/files/PM_Report_FINAL_web_40b0715b-8775-4ee1-a092-2199f9c48a46.pdf?14854756238904833688&_ga=2.227804504.47432139.1543321398-1627606212.1540458037>

# Appendix 5 – World Health Organisation Recommended Air Quality Levels and Interim Targets



Available at: [https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health](https://www.who.int/news-room/fact-sheets/detail/ambient-%28outdoor%29-air-quality-and-health)

# Appendix 6 - Number of deaths that occurred before, during and after heat-periods for the leading causes of excess death, June to August 2022 heat-periods, England and Wales



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