Royal College of Obstetricians & Gynaecologists

Green Maternity Report

Taking collective action to deliver low carbon, equitable maternity care

Contents

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The views expressed in the publication are those of the author(s) and not necessarily those of SBRI Healthcare or its stakeholders.

Within this document we use the terms woman and women's health. However, it is important to acknowledge that it is not only women for whom it is necessary to access maternity care. Maternity services and delivery of care must therefore be appropriate, inclusive and sensitive to the needs of those individuals whose gender identity does not align with the sex they were assigned at birth.

Foreword

Professor Ranee Thakar

RCOG President

The climate and ecological crises pose a significant and mounting risk to women's health and reproductive rights. For the first time, in 2024, global temperatures exceeded 1.5°C above pre-industrial levels – a threshold set by the Paris Agreement to reduce the risks and impacts of climate change. Hard won progress on women's health is at risk of reversal. Extreme weather, poverty, food insecurity and displacement caused by climate change directly damage women's health, disrupt access to essential healthcare and hold back progress on gender equality.

Pregnancy further exacerbates climate vulnerability. Pregnant individuals are at increased risk of heat-related illnesses and death. Higher temperatures in pregnancy are associated with preterm birth, reduced birth weight and stillbirth. Our members around the world are already witnessing first-hand the disastrous effects of climate-related extreme weather. In the UK, the health burdens of climate change are falling upon an NHS already struggling to deliver timely and high-quality women's health services. A strong RCOG response has never been more urgent.

A key priority for my term of office as President was to work with our membership to bring about meaningful change in response to the climate crisis. The Green Maternity Challenge has been an inspiring display of how much we can achieve in a short timeframe through collective action. I hope after reading this report we can all feel empowered to make small changes in our own practice with the potential for big impacts. Climate change is happening now and we cannot sit back and let it damage health across our lifetime and the lives of generations to come.

Recognising and limiting our own contributions to the climate crisis, and advocating for change, are integral to our work in supporting women's health and reproductive care in the UK and across the world. We, as a College, will continue to work with other healthcare leaders and decision-makers to ensure that this issue remains at the forefront of the political agenda. Collectively, we can make the difference that women and girls worldwide so desperately need. There is no time to delay- we need to act urgently.

Emma Crookes

Chair of RCOG Sustainability Lived Experience Group
Co-vice chair of RCOG Women's Network

Pregnancy and the birth of a child are some of the most significant and life-changing events for a family. The care provided during this time should not only be of the safest, kindest and highest quality but also reflect a commitment to the planet's well-being, to optimise the health of future generations. When I was asked to Chair the RCOG sustainability lived experience group, my priority was to ensure that any sustainable innovations developed would not be to the detriment of the standard of care that women receive. Importantly, they had to also genuinely support the reduction of maternity healthcare inequalities and inequities for women, birthing people and their babies.

We know how 'postcode lotteries', racism, poverty, poor housing, food insecurity, mental health conditions, lack of support networks, access to transport, domestic abuse, low health literacy, disability and hostile immigration policies intersect to impact on marginalised communities the most. We also know that climate change disproportionately burdens women and birthing people and negatively contributes to systemic gender inequalities. High temperatures, ambient air pollution and climate-related natural disasters affect everyone. For those who need access to healthcare services (e.g. during and after pregnancy) these have a devastating potential to affect equitable healthcare choices for future generations. Moving forward assessing the complex intersectionality of climate change and greener care with inequalities in maternity care must be the starting point.

Over recent years, multiple investigations, reports and surveys about the state of maternity services in the UK have found one thing in common - that women, birthing people and families are not, and do not feel, listened to. Choice and personalisation are central to positive maternity services experiences, good clinical outcomes and greener care. What matters to families must be considered when designing maternity care provision. Removing and/or limiting choices such as Entonox and formula feeding is not acceptable and not the answer.

Through collaboration, integration, creativity, compassion and modernisation, maternity care can be a leader of the green healthcare revolution. In doing so we are fostering a future where the care of women, birthing people and babies is intrinsically tied to the well-being of the world they are entering. It is my hope that this exploration of greener care will inspire more innovation – both in systems and industry – more discussions, and ultimately, a more sustainable and equitable future for women, birthing people and their babies as well as the planet. This is not a problem for the next generation. Let this be the beginning of a deeper commitment to both maternity healthcare and the environment.

Acknowledgements

Project group

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Green Maternity Challenge teams

We would like to extend a big thank you to all applicants and participants in the Green Maternity Challenge, without whom this project would not have been possible.

Including but not limited to: Menelaos Tzafetas, Emily Barrow, Patrizia Conidi, Shahanaz Rahman, Marisa Taylor-Clarke, Thomas Liney, Hannah Browne, Kerry Munro, Beth Laverick, Laura Allen, Sophie Holland, Lauren Flett, Michelle Mackie, Monique Sterrenburg, Georgina Clark, Kate Croissant, Perrine Dhaisne, Melissa Fox-Blach, Frances Rivers, Jennifer Prescot, Kathin Gray, Posy Bidwell, Meg Wilson, Ilana Pizer-mason, Gillian Delamotte, Caitlin Daly, Zoe Daggatt-Powrie, Angie Willis, Charlie Peters, Rosalind Freestone and Kath Townsend.

Introduction

Background

Healthcare provision in high income countries is a major driver of environmental harm (1, 2). Globally it is estimated that healthcare contributes 4.4% of all carbon emissions (3). In England alone the National Health Service's (NHS) annual emissions total 25 megatons of carbon dioxide equivalent (mtCO2e) roughly equivalent to the annual emissions of the entire country of Croatia (4). As maternity service providers and leaders we all have a vital role to play in bringing our practice within environmental boundaries and securing a safe and just future for women and girls globally.

About the report

The Green Maternity Report brings together lived experience, high-quality case studies, carbon modelling and evidence synthesis to agree eight initial priority areas, and evidence-based recommendations, for carbon reduction in maternity services.

Who should use this guide

This document is designed primarily for healthcare teams, managers and supporting staff. Most recommendations are designed to be feasible for implementation at a local or regional level with good organisational support.

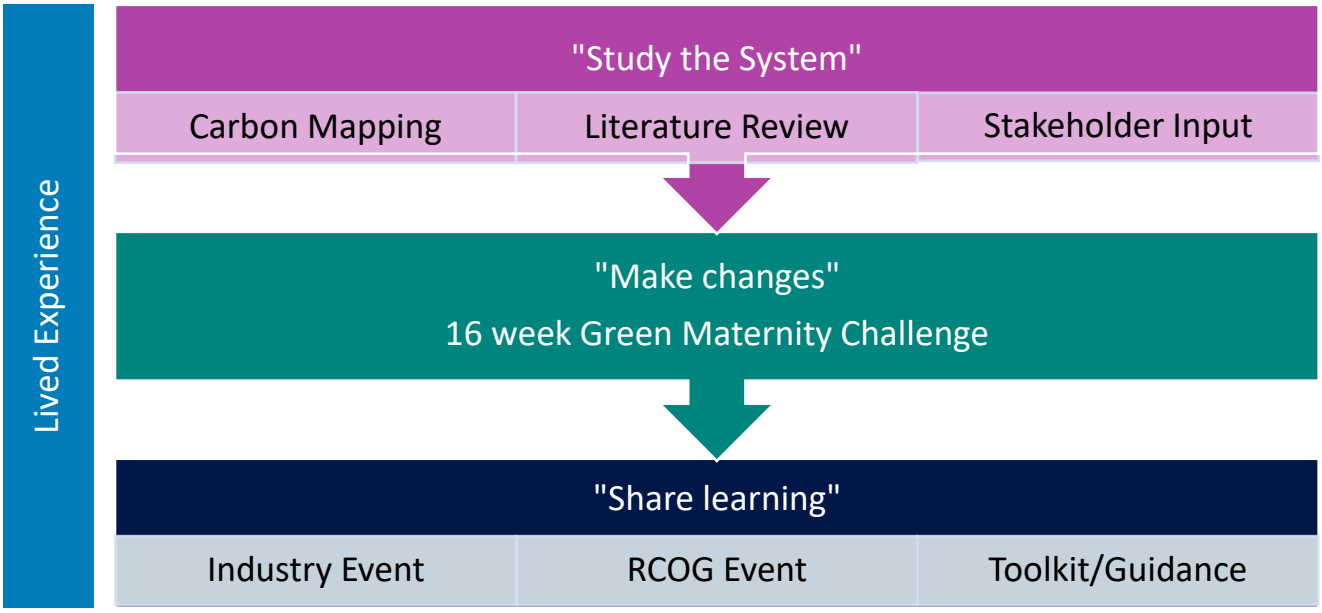
Section 9 is specifically for local, regional and national healthcare leadership teams to develop the support structures necessary for coordinated action.

Section 10 is designed to help researchers and academics to meet current knowledge gaps.

Methodology

Recommendations are based on lived experience, case studies from the Green Maternity Challenge, a 16 week sustainable quality improvement (SusQI) challenge, as well as scoping work combining a literature review, expert opinion and carbon mapping of common maternity care pathways. Full details of the methodology and evidence used can be found in the separate document named 'detailed methodology and evidence for recommendations 'available on the RCOG website. A graphical overview of the project is represented in figure 1.

Figure 1: Graphical representation of the green maternity project plan



Co-design and inclusion

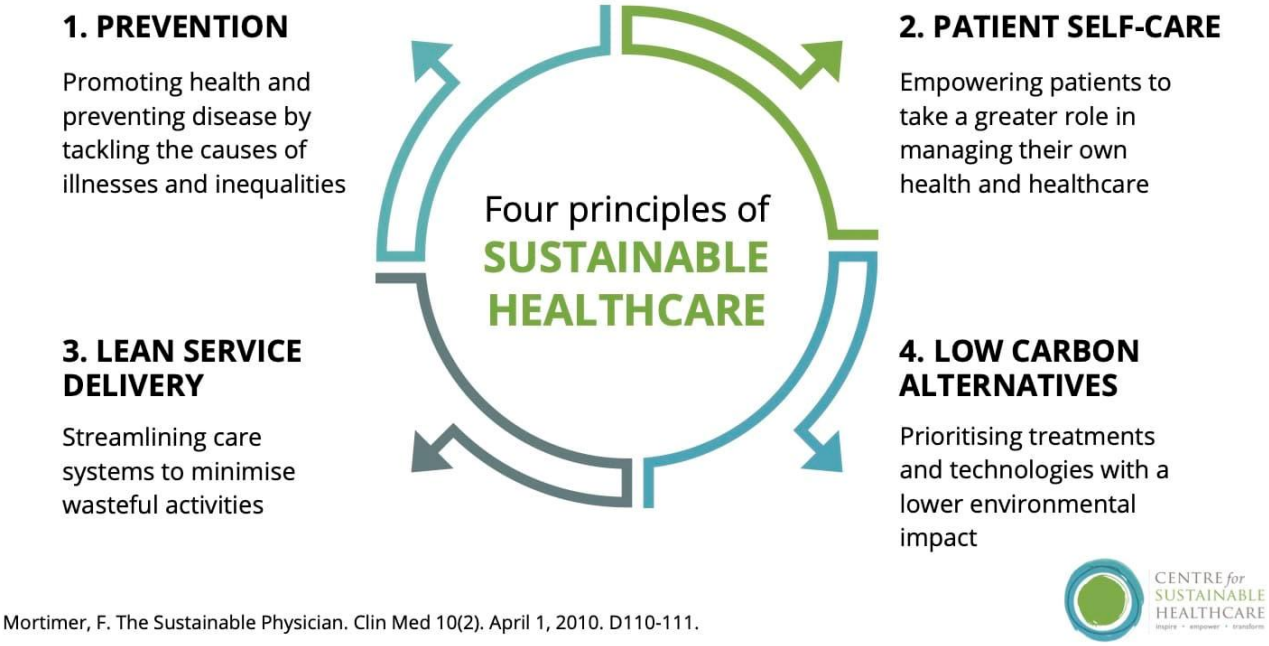
The recommendations, and all preceding project work, have been co-created and reviewed by a purposefully selected and inclusive group of 10 women with lived experience of maternity care. As well as sharing their personal experience, several group members are already active in women's health and/or sustainability charities and advocacy groups, or hold professional roles in relevant industries. With their valuable insights we have carefully reflected on the impacts of any proposed changes on women, birthing people and their families including those who face particular disadvantages and are seldom heard.

> "This work is deeply important to me and to all women because maternity care impacts not only the health and wellbeing of mothers and babies but also the future of our planet. As women, we often carry the burden of navigating healthcare systems not always designed with our needs or the environment in mind. Ensuring maternity care is both sustainable and equitable is about more than reducing carbon footprints, it's about creating a system where every woman, regardless of race, background or socio-economic status, feels supported, respected and empowered during one of the most vulnerable times in her life. By addressing environmental waste, systemic inefficiencies and health disparities, we can lay the groundwork for healthier families, stronger communities and a better future for generations to come."
>
> **Tahnee Brathwaite, lived experience group member**

Clinical care pathways approach

For the NHS to reach net zero it needs to not only decarbonise its estates and supply chain but also move towards low-carbon models of care. These necessary changes to clinical pathways are within the direct influence of frontline maternity staff and leadership teams and so will be the focus of this guide. Additionally, by focussing on improvements to clinical care rather than products or buildings we have the unique opportunity to improve services for women, birthing people and their families while safeguarding the future health of women and girls globally. The Centre for Sustainable Healthcare set out four principles of sustainable clinical care as detailed in figure 2 (5):

Figure 2: Four principles of sustainable healthcare



Mortimer, F. The Sustainable Physician. Clin Med 10(2). April 1, 2010. D110-111.

Sustainable quality improvement

Sustainable quality improvement is a holistic approach to improving healthcare systems and can be incorporated into existing QI models. Using SusQI principles we aim to deliver the best possible health outcomes, experience and social value while minimising financial and environmental costs. The CSH has a useful step-by-step guide to SusQI to find out more and begin planning your own service improvement.

$$\text{Sustainable Value} = \frac{\text{Outcomes and experience for women and families}}{\text{Environmental + financial + social costs}}$$

Initial priorities for green maternity care

Read through all eight or jump straight to case studies below if you already have an idea of where you want to make changes.

Priority 1: Improve information sharing	
p. 11	Imperial College Healthcare NHS Trust: Enhancing sustainable value of the first obstetric antenatal appointment
Priority 2: Right care, right away	
p. 13	Kingston Hospital NHS Foundation: The Olive Clinic - Reducing health inequalities for Albanian-speaking women
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p. 15	South Warwickshire University NHS Foundation Trust: Improving outcomes with perineal massage
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p. 11	Imperial College Healthcare NHS Trust: Enhancing sustainable value of the first obstetric antenatal appointment
p. 18	West Suffolk NHS Foundation Trust: Streamlining the multiple pregnancy pathway
p. 19	Whittington NHS Hospital Trust: Implementation of Joint Antenatal Care Appointments
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Priority 5: Better care for hyperemesis gravidarum	
p. 22	Norfolk and Norwich University NHS Hospital Trust: Reducing the impact of nausea and vomiting in pregnancy - an ambulatory approach
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p.24	Imperial College Healthcare NHS Trust: Postnatal hypertension made simple and sustainable
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Priority 7: Green labour and birth	
p. 27	Hull University teaching hospital: Entonox Reduction*
p. 29	Hampshire Hospitals NHS Foundation Trust: Streamlining birth and suture packs in maternity care*
p. 29	University Hospitals Dorset: Reduction in use of local anaesthetic spray*
Priority 8: Improved infant feeding support	
p. 31	Great Western Hospital NHS Trust: Improving breastfeeding support

** Case studies identified in scoping work and not from the Green Maternity Challenge*

Limitations: A rapidly evolving response to the climate crisis

Where possible, case studies are reported with projected cost and carbon savings over the first year of implementation. These are best estimates produced with advice from carbon footprinting experts from the CSH, but are limited by the short period of data collection to date.

Sustainability in healthcare is an evolving field and while the recommendations in this report are a summary of the currently available evidence, we hope these will be added to and amended as more information becomes available.

Case study guidance and templates are available here.

Get involved

Join the CSH Women's Health Sustainability Network and share case studies and other resources via their discussion forum.

Useful reading

If you would like to learn more about sustainable healthcare the following resources are a useful starting point:

Learn about the link between climate change and women's health
RCOG Learning: Climate and Health | RCOG
Policy position: Climate change and women's health | RCOG

Plan your own project with ideas, guides and tools for sustainable service improvement
SusQI Step-by-step guide | CSH
The Centre for Sustainable Healthcare Resource library |CSH
Greener Healthcare and Sustainability Project: Quality improvement library and forum | GHASP
The Green Surgery Report | UKHACC
Intercollegiate Green Theatre Checklist | RCSEd
Care Pathway Carbon Calculator | SHC

Understand broader health service Net Zero strategy across the UK and call for systemic action
UK Health Alliance on Climate Change | UKHACC
Delivering a 'Net Zero' National Health Service | Greener NHS
Green plan guidance | NHS England
Decarbonisation strategic delivery plan | NHS Wales
Climate emergency and sustainability strategy | NHS Scotland

Priority 1: Improve information sharing

Current systems are outdated. Duplication and errors are common, leading to poor outcomes, resource wastage and frustration for women and birthing people. Clear referral pathways between providers, a cohesive digital maternity system and smooth discharge processes are needed.

"A major concern raised by the team is the lack of a cohesive digital system for maternity care. Inefficient information-sharing processes leads to duplication, errors and resource wastage. Developing a unified system would improve care delivery, enhance communication and reduce the environmental footprint of healthcare administration."

Tahnee Brathwaite, lived experience group member

Case study: Imperial College Healthcare NHS Trust

Full report: Enhancing sustainable value of the first obstetric antenatal appointment

Problem: Inefficient referral pathway to antenatal care

- 48% of appointments under 20 weeks did not require physical examination and in-person attendance could have been avoided.
- 13% of referrals did not meet local referral criteria.
- Only 17/55 women were able to accurately describe the reason for their consultant antenatal clinic appointment, leading to misinterpretation and anxiety.

Solution: An overhaul of the existing triaging system and the introduction of a new telephone clinic for first trimester appointments resulted in streamlined resource use across the whole department.

Benefits:

24,262 kgCO2e saving annually

£1,872 saving annually

Wait times for in-person clinics were reduced from 6 weeks to 3 days.
Virtual appointments were highly valued. 45/54 women preferred a virtual service.

Recommendations

1.1 Improve booking, referral and triaging processes to ensure women and pregnant people are seen by the correct professional as soon as possible, maximising opportunities for counselling and illness prevention.

- Make booking processes straightforward and accessible.
- Design systems to provide detailed and accurate referral information, allowing triaging to appropriate pathways.
- Ensure women know the reason for any referral (e.g. to consultant-led care) and provide condition-specific information in advance of appointments.
- Utilise booking pages to link patient information resources relevant to early pregnancy (e.g. smoking cessation, aspirin for preeclampsia risk).

1.2 Ensure discharge information is high-quality, concise and reaches the right target.

- Improve discharge and information transfer processes.
- Work with GPs and community midwifery teams to understand any problems at the interface between services and how best to design smooth pathways.

1.3 Use digital systems to modernise information sharing.

- Call for a cohesive digital system for maternity care. This should be uniform nationally and easily accessible by both community and hospital teams.
- Utilise digital systems to improve appointment scheduling, access to patient information, automated triggers and reminders.
- Avoid reliance on post for communication with women and other health professionals as delays can result in errors and duplication.

Priority 2: Right care, right away

Time and resource constraints lead to suboptimal initial care and increased resource use later. Ensuring women and pregnant people are seen at the right time and place and receive the necessary resources the first time will improve clinical, financial and environmental outcomes long-term. The way women and birthing people interact with care is heavily shaped by past experiences (both positive and negative). By improving these initial encounters we can begin to build the trusting relationships vital to promote long-term health and wellbeing.

Case study: Kingston Hospital NHS Foundation

Full report: The Olive Clinic - Reducing health inequalities for Albanian-speaking women

Problem: The local Albanian community were identified as experiencing barriers to accessing quality care:

- More than 40% of women booked their pregnancy later than nationally recommended, with 1 in 5 bookings made after 12 weeks of gestation, missing out on routine screening.
- 57% of women saw more than two midwives during their pregnancy. Some met a different midwife at every appointment.
- Only 19% of women with limited English proficiency had an interpreter for all routine antenatal appointments.

Solution: The Olive clinic – a specialist clinic serving the Albanian population staffed by a continuity of care team of midwife and in-person interpreter.

Benefits: Any long-term potential benefits from early engagement were beyond the scope of measurement and so are not captured.

100% of women received continuity of care with a named midwife and interpreter. Staff resources are optimised by reducing the time and effort required for referrals and avoiding duplicate appointments.

Costs: Current projections suggest a modest increase in carbon and financial costs, but this must be balanced against experience and outcomes. Relocating the clinic closer to the served community is being considered to reduce environmental impacts and further improve access.

3.27 kgCO2e additional annually

£6,049 additional annually

Recommendations

2.1 Remove barriers faced by some communities to accessing timely and appropriate care

- Design bespoke solutions with community members to fully understand access barriers.
- Consider implementing specialist clinics for groups facing access difficulties to build trust and understanding between the community and health professionals.
- Nurture closer links between maternity healthcare providers and grassroots organisations already known and trusted by the target community.

2.2 Establish care models to allow continuity of care wherever possible.

- Aim for continuity of care with a named midwife (and consultant if required) for all women and pregnant people, but particularly those with complex needs. This requires appropriate staffing levels to be implemented safely.
- Establish consistent multidisciplinary teams (e.g. midwife, consultant and interpreter) for improved teamwork and information sharing.

2.3 Improve access to culturally appropriate care and professional interpreting services.

- Ensure that, at a minimum, professional interpreting services are offered at every appointment. Where possible, offer an in-person service and a woman's preferred sex of interpreter.
- If a dominant language is commonly used in your local service, consider grouping patients into clinics by language and employing an in-person interpreter for the full session.

2.4 Allow flexibility for longer appointments where necessary (e.g. where interpreting services are required) to avoid unnecessary repeat journeys and late-running clinics.

- Consider whether a longer appointment or additional resources are required to support an equitable experience of maternity care as recommended by NICE guideline CG110: Pregnancy and complex social factors (6).

Get involved

Ongoing work is necessary to establish greener care models for communities facing disadvantage and barriers to access. However, a strong directive to improve access to culturally appropriate care and professional interpreting services was provided by lived experience advisors.

Do you have a solution to this problem?

We are looking for more case studies and examples. Join the CSH Women's Health Sustainability Network and share case studies and other resources via their discussion forum.

Priority 3: Prevention

Remaining healthy during pregnancy can alter the lifetime health and associated resource use of women, birthing people and their babies and so is a priority target for sustainable healthcare. It is important to note that although there are many steps that can be taken to support the prevention of ill-health, this must be combined with government-level action to tackle wider social inequalities and strongly linked health factors (e.g. access to a good quality diet or smoking status).

"Education emerged as a critical gap in care. Early awareness of pelvic floor health, ideally starting in schools, was highlighted as essential for preventing long-term health issues. However, women's health education continues to be deprioritised. Postnatally, better access to contraception was identified as a key strategy to promote longer intervals between pregnancies, reducing the demand on antenatal services."

Tahnee Brathwaite, lived experience group member

Case study: South Warwickshire University NHS Foundation Trust

Full report: Improving outcomes with perineal massage

Problem: low uptake of antenatal perineal massage.

- Only 18% of respondents undertook perineal massage in their most recent pregnancy. Apprehension, the intimacy of the massage, social stigma, difficulty reaching and lack of knowledge were barriers.
- 44% of women were given information on the importance of perineal massage and massage technique. Midwifery staff confidence and competing time pressures were major barriers.

Solution: A comprehensive staff training package. New patient information and troubleshooting resources normalising perineal massage and increasing confidence and uptake.

Benefits:

1.887 kgCO2e saving annually

£64,795 saving annually

Increased confidence and reduced stigma for women.
Increased knowledge and confidence for staff.

Recommendations

3.1 Prioritise counselling, empowerment and preventative medicine in maternity appointments. High-quality counselling is imperative to prevent ill-health, but time and resource barriers make this difficult to achieve.

- Consult with women and birthing people to understand what they consider high-value preventative healthcare.
- Prioritise time for counselling in appointments. If there is consistently inadequate time in the appointment schedule, assess whether needs could be met in a different way e.g. by antenatal classes grouped by a particular condition.
- When a topic is discussed regularly (e.g. vaginal birth after caesarean) consider whether patient information materials could be sent in advance of the appointment to allow more personalised discussion during the consultation.

3.2 Antenatal perineal massage has been shown to reduce rates of perineal trauma, is low cost and requires minimal resources (7)**.** The environmental impact of pelvic floor damage is difficult to quantify and is likely vastly underestimated in our carbon report. We estimate that a lifetime supply of incontinence pads contributes eight tonnes of CO2 equivalent (tCO2e) per person.

- Advise women to start perineal massage from 34 weeks.
- Normalise perineal massage and increase confidence and uptake by designing information resources with women and pregnant people.
- Identify staff barriers to discussion (knowledge, time, workload) and provide additional training or resources where required.
- Discussion of perineal massage should be the responsibility of the whole antenatal team. MyHealthLondon has a helpful information video on the correct technique (8).

3.3 A sustainable diet rich in plant based, locally-sourced foods has proven benefits for our long-term health as well as planetary health (9–14)**.** The increased food requirements of pregnancy are a significant contributor to the carbon footprint of the antenatal period (15). This can be altered by adopting a low-carbon diet (16); however, systematic barriers exist preventing equal access to nutritious, low carbon food. The Food Foundation calculated that the most deprived fifth of UK households would need to spend 45% of their disposable income to eat the government-recommended healthy diet (17).

- Call for systemic change addressing the barriers to a healthy and sustainable diet.
- Myth-bust common misconceptions by reassuring women and pregnant people that a well-balanced plant-rich diet is safe in pregnancy, and provides long-term health benefits.

> "Most parents are already well aware of the health and environmental benefits of a plant-based diet but don't have the capacity, time, or money to cook healthy meals from scratch. We need practical advice (e.g. simple recipes on a budget) not just more information."
>
> **Lydia Fraser-Ward, sustainability lived experience group member**

- Provide practical advice and assistance for women wanting to meet the nutritional requirements for pregnancy from non-animal products. Plant-Based Health Professionals UK has free diet factsheets and advice for anyone wanting to eat a lower-carbon diet, including specific advice for pregnancy and young children.
- Eligible women can use the Healthy Start scheme to buy fruit and vegetables and pulses (as well as cow's milk and formula) from 10 weeks if they are claiming certain benefits (18).
- Read about the Plants First Healthcare campaign, and ask your local hospital to put patient health and the planet first by incentivising plant-based meals as the primary* menu option (*meat and other animal products remain on the menu for those who choose them) (19).

3.4 Smoking cessation improves pregnancy outcomes, reduces health inequalities, and positively impacts on women and birthing people's health throughout their lives. However, no studies have directly assessed the effects of smoking cessation in pregnancy on environmental outcomes.

3.5 Events during a current pregnancy can impact a woman or birthing person's health in future pregnancies and later life making secondary prevention of equal importance. Meaningful interventions are often simple, but are inconsistent in provision largely due to errors in information sharing and follow up practices.

- Improve discharge information so GPs and community midwives are fully aware of events during pregnancy and of any ongoing risks and monitoring requirements (e.g. annual blood pressure checks for hypertensive disease or glucose tolerance testing and yearly HbA1c in gestational diabetes).
- Consult with GPs and coding teams to understand system triggers from discharge coding and how to use these to automate GP patient alerts.

3.6 Make high-quality health information easy for women and birthing people to access themselves.

- Call for government to make women's health education a national priority.
- Include messages of ill-health prevention and self-care in antenatal classes.
- Provide antenatal classes in multiple languages appropriate to the local population.
- Collate existing resources into easy-to-access directories.
- Translate patient information resources into all commonly spoken languages or direct women to the existing RCOG translated resources.
- Collaborate with trusted charities and third-party organisations to ensure continuity of messaging. If women and birthing people are already seeking information from a known external source, if possible, work to improve the existing resource rather than duplicating work.

Priority 4: Streamlined outpatient maternity care

Patient travel is a significant carbon contributor in the antenatal pathway. Long and repeated journeys unduly disrupt women and birthing people's home and work lives. Providing care at home or close to where women live improves experience and is better for the environment.

Case study: West Suffolk NHS Foundation Trust

Full report: Streamlining the multiple pregnancy pathway

Problem: In West Suffolk women can struggle with the burden of appointments in the dichorionic diamniotic (DCDA) twin pregnancy pathway often travelling significant distances for duplicate or non-essential visits.

Solution: By mapping the pathway in full, staff could ensure women attended only the most appropriate location at each gestation.

- A duplicate community appointment at 28 weeks was omitted. Women are seen at the hospital on the same day as their ultrasound.
- In-person consultant appointments were replaced by virtual appointments at 16 and 34 weeks. All necessary physical examination was performed during community midwifery appointments.

Benefits: Savings are modest as the pilot only affected a small cohort of women. However, this model now tested could be adapted for other larger groups with greater potential savings.

576 kgCO2e saved annually

£1,831 saved annually

Collaborative, efficient and patient-centred care.
Less disruption and financial burden for women.
Improved staff confidence and satisfaction.

"The 'non-compliant' label, frequently applied to women who miss appointments, ignores socio-economic barriers such as travel difficulties, caregiving responsibilities and insecure work contracts, which disproportionately affect marginalised groups."

Tahnee Brathwaite, lived experience group member

Case study: Whittington NHS Hospital Trust

Full report: Implementation of Joint Antenatal Care Appointments

Problem: Duplicate appointments in the consultant-led antenatal pathway were causing unnecessary travel, disruption and financial burden to women.

- Midwifery and consultant appointment were taking place within days of each other.
- Tests were conducted unnecessarily as urine samples and observations are taken at all appointments.

Solution: Hybrid midwife and obstetrician consultations were introduced for women over the age of 45. Women attend their midwife appointment in person as usual and, at the appropriate time, the consultant obstetrician joins via video.

Benefits: Coordinating midwifery and obstetric work schedules has proved challenging, but this hybrid model may be particularly valuable in cases of significant medical or social complexity where joined up care is of greatest importance.

230 kgCO2e saved annually

£1,396 saved annually

Unanimous support from surveyed women.
Enhanced relationships within the multidisciplinary team and more holistic care.

Recommendations

4.1 Streamline appointments to minimise duplication, wasted journeys and time. In the UK it is common to have separate midwifery, obstetrician and ultrasound appointments within days of each other. Multiple visits increase travel-related carbon emissions and are a significant barrier to access for parents with insecure or unsupportive work environments, and those on lower incomes.

- Liaise with local women, pregnant people, obstetricians, midwives, sonographers, administrative teams and managers to understand current appointment scheduling processes. Work together to develop efficient pathways that work better for everyone.
- Wherever possible, arrange sonography appointments on the same day and location as antenatal clinic appointments. If repeat journeys are unavoidable, arrange scans at a location closer to the woman's home or work if a service is available.
- Where duplicate midwife and obstetrician appointments are arranged at a similar gestation, consider whether all necessary care could be condensed into one appointment. If both appointments are vital, consider swapping one for a virtual appointment.
- Services should ensure there are adequate numbers of fully trained pathway navigators and administrators to liaise with patients and ensure clinics remain financially and environmentally efficient.

4.2 Offer telehealth/virtual antenatal appointments where appropriate and desired. In-person appointments should still be available if a woman or birthing person feels more comfortable with this format. Some women or birthing people may be put at greater risk by digital health care models (e.g. women at risk of domestic violence) or alienated by the degree of self-responsibility required (20), but for most a virtual appointment offers greater convenience and satisfaction.

- Virtual or telephone consultations should be available as an option for appointments where examination is unnecessary. If a woman is under the shared care of multiple teams, check if appropriate examination has been/will be performed by another professional recently.
- If a woman has additional communication needs (e.g. need for an interpreter), consider whether a virtual appointment could still be safely facilitated, for example, by using a three-way call or video instead of telephone to improve communication.
- Consider whether barriers to digital access can be removed if a woman would like to access virtual appointments but lacks the means. Good Things Foundation has a national digital inclusion network and can help with free data, refurbished devices and digital skills.
- Departments should facilitate remote work for clinicians who are running virtual clinics to minimise staff travel, including providing the necessary equipment and IT access.

See Imperial NHS's case study: Enhancing sustainable value of the first obstetric antenatal appointment described in Priority 1 for another example of virtual appointments used effectively.

4.3 Minimise travel by providing necessary in-person care close to where women and birthing people live or work. It is usually more carbon efficient to move one healthcare worker than a clinic of women.

- Look for gaps in service provision in your area that cause avoidable travel and consider whether a local service is needed.
- Provide antenatal care in existing community hubs where possible.
- Consider implementing satellite clinics by tertiary specialists at district general hospitals.
- Identify geographical areas with needs based on their population and personalise services to the target community. Read about the Core20PLUS5 approach to reducing health inequalities (21) .

4.4 Encourage active and low carbon transport for patients, visitors and staff. Hospitals are often located on the peripheries of towns and cities with poor and infrequent public transport links and unsafe cycle routes. Systemic change is needed to support efficient, safe low-carbon travel.

- Call on hospital leaders and local government to ensure that all care locations have safe and easy access routes by active and public transport.
- Improve information availability on low carbon travel routes and schemes for patients and staff, including safe travel with a baby.
- Include counselling on the health and environmental benefits of active transport in consultations and combine this with practical advice.

Case study: NHS Orkney

Full Report: Improving access to care in a remote and rural area; local introduction of screening for newborn developmental hip dysplasia

Problem: Families in Orkney currently need to travel to Aberdeen with their newborns for hip dysplasia screening. This is a cause of significant disruption and financial stress to families and a source of unnecessary air travel.

Solution: The team is training sonographers to provide a local service avoiding unnecessary flights to the mainland and improving experience.

Benefits: This is an extreme example but many women and birthing people living in rural areas face long, costly and inconvenient journeys to access care.

7,073 kgCO2e saving in the first year* increasing to 7,615 kgCO2e annually

£15,915 saving in the first year* increasing to £17,000 annually

Reduced disruption and stress for families.
New opportunities and increased job satisfaction for staff.

**First years savings are lower due to travel and financial requirement for staff training.*

Priority 5: Better care for hyperemesis gravidarum

Though hyperemesis gravidarum only affects a small number of pregnancies, these women and pregnant people may need repeated hospital attendances causing huge disruption to their lives. Gaps in the provision of care and conflicting advice result in inefficiencies, preventable hospital visits and hours of wasted time for women and pregnant people.

Case study: Norfolk and Norwich University NHS Hospital Trust

Full Report: Reducing the impact of nausea and vomiting in pregnancy - an ambulatory approach

Problem:

- Service user feedback, clinical outcomes and patient testimony indicate that accessing timely, evidence based, effective care for hyperemesis is challenging.
- 22.9 hyperemesis bed days were recorded per month pre-study. Bed days are known carbon hotspots due to the resource intensity of the hospital environment.

Solution: A virtual ward for hyperemesis gravidarum, providing IV fluids at the ambulatory hospital hub or at home.

Benefits: A reduction to 9.8 hyperemesis bed days in the month following the change.

6,462 kgCO2e saved annually

£762,044 saved annually

Improved patient-centred, effective and timely care.
Reduced impact on family and work life.
Improved multidisciplinary working.

Recommendations

5.1 Engage all stakeholders when planning improvements to care for hyperemesis gravidarum. Care is often spread across disjointed teams (general practice, midwifery, gynaecology, obstetrics, emergency medicine).

- Map local pathways and engage with all key stakeholders at the earliest opportunity.
- Design hyperemesis gravidarum services with the women and pregnant people who use them.

- Familiarise yourself with external support services working in your area and nationally (e.g. Pregnancy Sickness Support) and share resources with women.

5.2 Improve access to quality care for hyperemesis gravidarum. Early treatment may prevent deterioration and more intensive treatment later.

- Improve referral pathways (including self-referral where appropriate) to direct women to the most appropriate service and avoid unnecessary delays and duplication.
- Consider instigating joint training and multidisciplinary meetings to improve team working, standardise treatment pathways and remove barriers to accessing timely care.

5.3 Design convenient, low carbon care models for hyperemesis gravidarum. Patient travel and bed days are carbon hotspots. Provide care at home and minimise hospital stays where safe and feasible.

- Provide an ambulatory care service in the hospital and, where clinically suitable, aim to get women back to their usual activities the same day.
- Link with your trust's 'hospital at home' or virtual ward service and provide the option for fluids and antiemetics at home, where possible. This is supported by RCOG Green-top Guideline No. 69: The management of nausea and vomiting in pregnancy and hyperemesis gravidarum (22).
- Improve wrap around care to facilitate safe early discharge. This could include planned telephone follow up and open access to services if a woman's condition deteriorates.

Priority 6: Straightforward pathways for complex pregnancy

For those pregnancies complicated by a medical or mental health condition*, the additional travel for monitoring and the manufacture of pharmaceuticals required to manage this condition will be a major contributor to the environmental footprint of their care.

**All examples of carbon reduction efforts in medically complex pregnancy so far have been reported in hypertensive disease, but these lessons could be applied to other conditions e.g. gestational* diabetes.

Case study: Imperial College Healthcare NHS Trust

Full report: Postnatal hypertension made simple and sustainable

Problem: Suboptimal postnatal blood pressure management and a lack of confidence in managing medication contributed to long stays and high rates of readmission.

- 10 unplanned postnatal readmissions/reviews for blood pressure control in the month pre-study.
- Little consistency in antihypertensive used.
- 28% of women discharged on multiple agents.

Solution: Cross-departmental standardised postnatal hypertension guideline agreed with nifedipine first line. Quick-access resources developed for resident doctors on starting, titrating and switching agents.

Benefits: 60% of patients received nifedipine post-change and no patients were discharged on more than one anti-hypertensive.

58,645kg CO2e saved annually

£14,465 saved annually

Women had fewer blood tests and a median length of stay 2 days shorter.
There were no unplanned reviews or readmissions.
82% increase in resident doctors feeling confident to manage postpartum hypertension.

Recommendations

6.1 Agree consistent cross-departmental management protocols.

- Bring together all stakeholders and reach a group consensus. Consistency helps the whole team manage patients confidently and avoids delays in appropriate care and discharge.

6.2 Reduce the travel burden associated with complex pregnancy care.

- Map your local pathways and design processes to minimise overall travel (see priority 4: streamlined outpatient maternity care).
- Investigate if your service could offer home blood pressure monitoring and urine screening for stable women with hypertensive disease.

6.3 Think twice before requesting diagnostic tests.

- Carefully consider if blood tests and imaging will change management before requesting.
- Check if a test has been recently completed in community (e.g. urine dipstick) before repeating.
- Add on tests to existing samples where appropriate to avoid unnecessary transport and waste.

6.4 Optimise medicines management in pregnancy. Medications contribute around 25% of the carbon footprint of the NHS in England and can be directly harmful to the environment (23).

- Avoid using multiple medications where control can be achieved with one. Polypharmacy increases the risks of non-use and wastage.
- Use shared decision making and understand barriers to use to avoid medicines wastage.
- When choosing between otherwise equivalent options, consider the environmental impacts of medications. We anticipate this information will become more widely available for healthcare providers to access over time. An early example is the BTS/NICE/SIGN decision aid: asthma, inhalers and climate change (24)
- Familiarise yourself with locally available pharmaceutical recycling schemes (e.g. blister packs, inhalers, insulin pens) and share information with women and birthing people.

6.5 Consider the impact of any service changes on women and birthing people with a mental health condition and design improvements with their care in mind. The interaction between mental health, climate change and sustainability is poorly researched and no studies have considered mental health in the perinatal period to date.

- Work with women and birthing people to design sustainable and equitable improvements to mental health care in pregnancy.
- Understand the potential effects of eco-anxiety when discussing climate change and sustainable healthcare.

Case Study: Great Western Hospital NHS Trust* (25)

Full article: 'Go Flo' home hypertension monitoring

Problem: Increasing demand for antenatal appointments for women diagnosed with, or at high risk of, hypertensive disease.

Solution: A home hypertension monitoring service providing education and reminders, blood pressure monitors and home urine testing.

Benefits:

22,209 kg CO2e saved annually

No financial data supplied

Increased capacity in antenatal clinics.
Reduced disruption to women's family life.

* *Case study identified in scoping work and not from the Green Maternity Challenge.*

Priority 7: Green labour and birth

Labour and birth form the most resource-intensive period of maternity care. Major contributors are direct emissions of N2O/O2 (Entonox®), birthplace energy consumption and disposable packs and instruments (26–28). Any improvements to labour care must be designed with women and birthing people and expand rather than limit choice. Care decisions should always be made by women or birthing people in discussion with their healthcare professionals and prioritise safety and experience.

Case study: Hull University Teaching Hospitals* (29)

The Women's Health Sustainability Network Event: Entonox Reduction at Hull University NHS Trust Watch Marc Beaumont, sustainability lead at Hull University NHS, explain how his team achieved an 87% reduction in their Entonox® emissions.

Problem: Large quantities of N2O/O2 are leaked or otherwise wasted before ever reaching the patient. Baseline emissions of 4,164 tCO2e (tonnes CO2e equivalent to 4,164,000 kg CO2e)

Main sources of leaks were identified as the bed head units and demand valves (tube from wall to mouthpiece).

Solution:

- Replacement of bed head unit seals.
- Midwives asked to remove demand valves from wall when not in use.

Benefits:

3624 tCO2e saved annually

£40,000 saved annually

Reduced risk of harm to staff from exposure.
Reduced transport emissions from fewer deliveries.

* *Case study identified in scoping work and not from the Green Maternity Challenge.*

Recommendations

7.1 Support informed birth choices. Whilst considering the environmental impact of labour and birth, healthcare professionals need to ensure we continue to respect maternal choice and keep safety paramount.

- Improve staff and patient awareness and education on how labour and birth can be made safer, for patients and the planet.

- The environmental impact of care decisions is an important consideration for some women and birthing people, and so improving information supports informed choice.
- Address systemic barriers to access homebirth (e.g. due to poor staffing) where it is clinically appropriate and desired. Birth at home has a lower carbon footprint than birth in hospital.

7.2 Ensure equity of access to all forms of pain relief in labour. A recent Scottish study found a lower uptake of epidural anaesthesia amongst women from areas of more significant socio-economic disadvantage. A correlation that was more marked in Black and Asian groups (30).

- Provide high-quality antenatal patient information on all pharmacological and non-pharmacological pain relief options appropriate for all cultures and health literacy levels.
- Include the environmental impacts of options in decision aids.
- Work with communities who experience disadvantage to address implicit biases in access to pain relief in labour.

7.3 Systematically measure and reduce N2O/O2 wastage without affecting patient choice. Entonox is a potent greenhouse gas and prolonged high-level exposure is harmful to staff. From previous work on pure N2O emissions we can assume there is likely high systems wastage of N2O/O2 in maternity. At three units studied as part of The Nitrous Oxide Project estimated systems losses were over 97% (meaning less than 3% of purchased N2O reached the patient) (31).

- Find out if nitrous oxide waste reduction work is already underway in your trust.
- Identify key stakeholders, including hospital leadership, healthcare professionals, estates and facilities and pharmacy procurement teams (which are often represented in medical gas committees).
- Learn about the potential harms to staff from high level nitrous oxide exposure and how to safely manage risks. Using nitrous oxide (gas and air) safely in maternity units - HSE (32).
- Use UCL Partners: nitrous oxide toolkit for reducing waste in NHS trusts to systematically measure and reduce your wastage through leaks and stock management (33).
- Unplug the demand valve from the wall when not in use. This has been identified as a source of large leaks in several units.
- Consider swapping to bedside canisters and decommissioning piped supply.
- Only consider the use of catalytic destruction or ‘cracking’ technology once major wastage has been addressed.

Case study: Hampshire Hospitals NHS Foundation Trust* (34)

Full Report: Streamlining birth and suture packs in maternity care

Problem: Disposable birth and suturing packs have a high carbon footprint associated with manufacture, transport and disposal.

- 80% of staff are worried about the environmental impact of their work
- Staff concerns with the quality of disposable instruments.
- Some items in existing packs (episiotomy scissors, sponge forceps) were rarely needed.

Solution: The purchase of new reusable suture packs, birth packs and two individual items. Removing infrequently used items from packs is more efficient for sterilisation.

Benefits:

2,869 kgCO2e saved annually

£27,692 saved annually

Improved quality of instruments.
Improved staff satisfaction with reusable products.

Case study: University Hospitals Dorset* (35)

Full Report: Reduction in use of local anaesthetic spray

Problem: Ethyl chloride spray, routinely use for testing spinal/epidural blocks, has a high carbon footprint from travel and disposal, is costly and is directly harmful to the environment. Ice was not an option locally due freezer availability.

Solution: CoolSticks® are reusable metal alternative to ethyl chloride spray or ice developed by the team with a local supplier. The product has been shown to have similar efficacy and has since been adopted by multiple units.

Benefits:

2,968 kgCO2e saved annually

£3,109.60 saved annually

Improved links with local suppliers supporting local economy.
Improved staff team working.

** Case studies identified in scoping work and not from the Green Maternity Challenge.*

7.4 Practice sustainable procurement and resource management. We can be confident that reusable items will almost always outperform disposables on carbon emissions and other environmental impact categories (26,36,37). We can anticipate average carbon emissions reductions of 38-56% through switching to reusable products, provided local sterilization facilities are available (38).

- Limit the use of single-use disposables (e.g. gloves, incontinence bed pads, nappies etc.).
- Swap disposable items, instruments and drapes for those that can be reused and sterilised. Priority items are single use surgical gowns and drapes due to their frequent use and high carbon footprint
- Swap ethyl chloride sprays for ice cubes or CoolSticks® when testing epidural and spinal blocks (ice cubes can be stored in an insulated flask in a fridge).
- Rationalise surgical/delivery packs, remove unnecessary items and arrange to maximise the efficiency of sterilisation (for guidance see The Green Surgery Report).
- Explore options for remanufacture, repurposing and recycling of products at their end of life.

7.5 Work with estates teams to improve the energy efficiency of birthing environments.

- Optimise the heating, ventilation and air conditioning (HVAC) system.
- Utilise shut down checklists.
- Install occupancy sensors and low energy lighting.
- Call for a transition to 100% renewable energy in your workplace.

7.6 Read The Green Surgery Report **and the** Intercollegiate Green Theatre Checklist **for a thorough review of greener operative care** (38,39)**.** Many of the suggested actions will be applicable to birthing rooms as well as theatres.

- Share these resources with colleagues.
- Implement the Intercollegiate Green Theatre Checklist in obstetric theatres. The tool is intended to be used at the start of a theatre list similar to the WHO checklist (39).
- Look out for the Intercollegiate Green Theatre Checklist eQIPs, a series of ready-to-go sustainable quality improvement projects for greener theatre care. The first eQIP 'Rub Don't Scrub' is available now and includes all resources you need to make the switch from traditional to alcohol-based surgical scrubbing.

Priority 8: Improved infant feeding support

Breastfeeding has a lower carbon footprint than formula feeding due to the high emissions associated with dairy farming (40–43). Improving services for those who struggle to breastfeed due to a lack of meaningful support should be a priority for women and birthing people, babies and the planet. At the same time we must strive to better support the physical and emotional needs of all women and birthing people (regardless of feeding method used).

Case study: Great Western Hospital NHS Trust

Full Report: Improving breastfeeding support

Problem:

- Between 74-86% of women initiate breastfeeding but 8% (338 per year) stop by the time they leave hospital and a further 20% stop during the first two weeks at home.
- Information from patient feedback and regular complaints indicate that lack of adequate support is a major contributor in this early postnatal period.
- Half of midwives surveyed (6/12) felt they rarely or very rarely had the time to support families with infant feeding.

Solution: A daily facilitated infant feeding support group on the maternity ward, providing a comfortable setting for women and birthing people (antenatal and postnatal) to attend to ask questions, get advice and support, and join others who may be having similar issues.

Benefits:

1,585 kgCO2e saved annually

£4,641 saved annually

Lifelong health benefits to women and babies from improved breastfeeding rates.
Empowers women and birthing people.
Improved staff confidence and job satisfaction.

Recommendations

8.1 Enable fully informed choice of infant feeding methods, free from the influence of formula marketing.

- Ensure universal access to high-quality information on the health and environmental benefits of breastfeeding. This should be available for all cultures and literacy levels.

- Resources should include information on minimising the environmental impacts of all feeding methods.
- Call on the UK Government to fully adhere to The WHO International Code of Marketing of Breastmilk Substitutes ('The Code'), including the marketing of 'follow on' and 'growing up' formulas (44).

8.2 Improve access to practical infant feeding support for all women and birthing people. Though over 85% of pregnant women in the UK, when surveyed, wanted to breastfeed their child (45), by 6-8 weeks only 43% are still doing so (46).

- Ensure high-quality infant feeding guidance and support are consistent throughout pregnancy and the postnatal period.
- Improve access to specialist infant feeding teams.
- Consider whether group support, or innovative models of care, could improve access to infant feeding support where resources are limited.
- Breastfeeding rates are lower amongst young parents and those with lower levels of education (47). Work with these groups to define additional support needs and targeted interventions.
- Check if your hospital is signed up to the UNICEF UK Baby Friendly Initiative (48).

8.3 Work collaboratively to understand how maternity care fits into the wider landscape of infant feeding support services.

- Consult with women and people with lived experience of maternity care to understand local infant feeding service utilisation. Identify gaps in care provision.
- Work with women and birthing people, local council services, charities and third party providers to create joined up support systems.
- Call for an expansion of workplace protections and facilities for breastfeeding women and parents.

9. Recommendations for local and national healthcare leaders

> "The group emphasised the importance of systemic reforms, not just isolated projects, to create a sustainable and equitable maternity care system. Pockets of innovation and enthusiasm exist, but progress will remain limited without coordinated action and investment."
>
> **Tahnee Brathwaite, lived experience group member**

9.1 Engage meaningfully with patient, public and partner lived-experienced representatives to establish priorities for sustainable service improvement.

- Add sustainability as a standing agenda item to your local Maternity and Neonatal Voices Partnership meeting.
- Actively seek the views of those who may face particular disadvantages or are seldom heard. For example, disabled women and people, individuals living on low incomes and those from religious or ethnic minorities. This may mean engaging in new ways e.g. via community or faith groups.
- Draw on the broad experience of patient representatives. Often, they may be active members of charities or advocacy groups and may hold professional roles in relevant industries.

9.2 Develop your workforce's knowledge and capacity to tackle the drivers and effects of climate change.

- Set up a local multidisciplinary sustainable maternity working group to build capacity and drive consistent progress.
- Identify named champions with allocated time to lead sustainability work.
- Include sustainability in staff training. The following resources are free to access (require an account):
    - Climate and health|RCOG Learning
    - Building a Net Zero NHS|eLearning for Healthcare (e-lfh)
    - Carbon Literacy for Healthcare|eLearning for Healthcare (e-lfh)
- Set up forums for staff to share sustainability progress or use existing forums to showcase work.
- Incorporate sustainability into local and national healthcare curricula (Royal Colleges and undergraduate healthcare programmes).

9.3 Embed sustainability into existing processes, procedures and practices.

- Environmental outcomes should be considered in all new and ongoing service improvement at a local and national level. High-quality care must mean sustainable care.
- Add sustainability as a standing item in governance meetings and regularly assess progress.
- Consider clinical, experiential, social, financial and environmental impacts in all business cases.

9.4 Consider environmental impacts when planning meetings, training and events.

- Support remote working where appropriate including providing the necessary equipment and technical support.
- Consider whether needs could be met through a virtual or hybrid format when organising meetings, training and events and actively discourage travel if so.
- If travel is unavoidable incentivise active travel and the use of low-carbon public transport.
- Offer a fully plant-based or plant-based by default (attendees must opt in for high-carbon options) menu if serving food at events.

10. Recommendations for future research

10.1 Future sustainability research in maternity must prioritise inclusive patient and public involvement. Given the significant social, economic and emotional impacts of maternity care on the lives of women, birthing people and whole families, we must involve these groups in any future research.

- Actively include those who may face disadvantages and are seldom heard. For example, disabled women and people, individuals living on low income and those from religious or ethnic minorities. This may mean engaging in new ways e.g. via community or faith groups.
- Use the push for net zero as an opportunity to define what good maternity care looks like for women and birthing people, their families and the planet.
- Ensure women and birthing people's voices are heard in the efforts to reduce N2O/O2 wastage and to improve infant feeding support. This has been largely absent from research to date.
- Explore women and birthing people's views and preferences for how (if at all) information on the environmental impact of care choices would best be integrated into counselling and patient information resources.

10.2 Integrate sustainability into all future healthcare research.

- Information on the environmental outcomes for any proposed treatment, product or service must be available to the clinical decision makers of the future.
- Make holistic assessment of clinical, experiential, social, financial and environmental impacts the norm in all research.

10.3 Design and fund research addressing knowledge gaps in sustainable maternity care. Poorly researched areas of maternity care include but are not limited to:

- Preventative healthcare (including secondary prevention) and pre-conception care.
- Early pregnancy including hyperemesis gravidarum.
- General antenatal care.
- Fetal and maternal medicine.
- Perinatal mental health.
- Labour and birth including induction of labour.
- Postnatal care.
- Pelvic floor health.

10.4 Design and fund research using action-focussed methodology and focussing on implementation.

- Future research should continue to harness the power of grassroots innovation by healthcare professionals, patients and the public.
- Use implementation science to support the widespread uptake of best practice at pace.

Conclusion

While early efforts to decarbonise NHS services have focussed on estates and supply chain transformation, we believe maternity staff and leadership teams are an underutilised and powerful force for sustainable change. The Green Maternity Challenge proved that maternity teams, when given the opportunity and supported appropriately, can bring about rapid improvements in their local pathways. Their case studies clearly show how environmental sustainability, health service efficiency and better, kinder, more equitable care for women, birthing people and their families all go hand in hand.

We now need the widespread uptake of sustainable best practice at pace. Success will require collaboration from all maternity care staff, wider hospital and community teams, the public, academic institutions and industry. Crucially, this cannot be achieved without better organisational support from healthcare leadership and government.

The RCOG is in the process of turning this work into easy-to-action tools for clinicians and departments. We call upon hospital leaders, governments and other established institutions (e.g. Royal Colleges & NICE) to work with us to expedite the path to sustainable maternity care. Given the urgency of the climate and environmental crisis we must act quickly and cohesively to ensure a happy and healthy future for the babies born under our care today.

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