



Lancaster University
Medical School

**An ethical investigation into
environmental sustainability in
healthcare**

*A thesis submitted to Lancaster University for the degree
of Doctor of Philosophy in the Faculty of Health and
Medicine.*

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Declaration of Original Authorship

I confirm that this is my own work. No work from this thesis has been submitted in substantially the same form for the award of a higher degree elsewhere.

Chapters 5 and 7 have been published.

Word count: 75 010 words. I confirm that this thesis does not exceed the permitted word length.

Abstract

As we witness the effects of a changing climate, with more extreme weather events and broken records for global surface temperatures, societies are scrambling to address climate change. Healthcare organisations are increasingly being called upon to reduce their greenhouse gas emissions, including the National Health Service (NHS). But this creates a puzzle. On the one hand, healthcare systems globally account for around 5% of global emissions and under the threats, including health threats, posed by climate change it seems obvious that healthcare systems should minimise their emissions. On the other hand, a common intuition is that healthcare is special. Where healthcare systems have relied on emissions to provide the manifold benefits associated with technologically advanced healthcare, we may worry about what a low-carbon agenda means for healthcare. As such, the thought that healthcare is special could be taken to ground the idea that in global efforts to address climate change healthcare systems should be treated differently from other polluters.

The overarching question for societies when it comes to addressing climate change is who should do what to minimise the threats posed by climate change? Theorists have tended to answer this at a global level thinking about nations and states. But the same question of distributive justice can be asked of an organisation like the NHS: how should we determine what a fair share of the burdens (and benefits) of climate change mitigation for complex, modern healthcare systems like the NHS should be? Primarily, this thesis focuses on addressing this question of distributive justice. In determining the NHS' fair share of national and global efforts to tackle climate change, the issue of whether healthcare is special becomes relevant. Should the NHS' responsibilities to reduce greenhouse gas emissions be sensitive to its role in social justice through its function in protecting and promoting health, or is this irrelevant?

In response to the primary research question, this thesis defends an ability to pay

principle, understood as a sufficientarian concept where healthcare emissions above and below a threshold of enough are treated differently, to determine healthcare's fair share of the burdens of climate change mitigation. This approach is sensitive to healthcare's primary goal of protecting and promoting health and integrates this role with mitigation. However, healthcare is not exempt from mitigating emissions. The final part of the argument shows how ability to pay allocates responsibilities to reduce healthcare emissions within healthcare, to for example policy makers, professionals and patients.

The thesis is divided into three main parts. The first part is concerned with introducing the topic and relevant background, explaining the method and providing an overview of the main body of work. The second section presents the five papers that form the main body of this work. Paper one takes up the idea of 'healthcare exceptionalism' to answer whether healthcare should be treated differently when it comes to mitigating greenhouse gas emissions. In this paper the main argument that healthcare is exceptional but not exempt is provided and ability to pay is introduced. A polluter pays principle is a common and intuitive way to determine healthcare's fair share of addressing climate change and so paper two is devoted to this. I argue against polluter pays. Papers three and four are dedicated to refining ability to pay and detailing the circumstances in which healthcare does, or does not, have capacities to reduce emissions. The final paper focuses on the issue of how ability to pay can be used to determine who should do what within healthcare to minimise emissions. The thesis is concluded in part three.

Acknowledgments

In 1946 George Orwell wrote *Why I Write*. In it he says, "Writing a book is a horrible, exhausting struggle, like a long bout of some painful illness." There are many reasons why Orwell's experience of writing a large piece of work differ from my own, though that is not to even hint that writing this thesis has been *easy*. Writing has, however, certainly been made easier than a long bout of some painful illness by the wonderful support I have.

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Lastly, my deepest thanks go to my wife, Amy. Orwell also says of those who write, "All writers are vain, selfish, and lazy, and at the very bottom of their motives there lies a mystery... One would never undertake such a thing if one were not driven on by some demon whom one can neither resist nor understand." I've put this quote here because I know exactly what you'll say! I cannot thank you enough for everything you have done over the past 4 years (and more). Whilst I was writing you were pregnant and then raising our two beautiful babies. I am immensely proud of our family and everything we've got through over the past few years. But I am most proud of you. I am grateful that you keep me honest, and you remind me what matters.

List of abbreviations

ATACH - The Alliance for Transformative Action on Climate and Health
APP - Ability to pay principle
BPP - Beneficiary pays principle
CO₂ - carbon dioxide
CO₂e - carbon dioxide equivalent
COP – Conference of the Parties
DALYs - Disability adjusted life years
GDP – Gross domestic product
GHG - Greenhouse gas
GP – General Practitioner
Gt - Gigatonnes
IPCC - Intergovernmental Panel on Climate Change
Mt - Megatons
NHS - National Health Service
NDC - Nationally determined contribution
PPM – parts per million
PPP - Polluter pays principle
QALYs - Quality-adjusted life years
UK - United Kingdom
UNFCCC - United Nations Framework Convention on Climate Change
WHO - World Health Organisation

List of tables

Table 1 - p.202-203

Table of Contents

Abstract	III
Acknowledgments	V
List of abbreviations	VIII
List of tables	VIII
Part I	1
Chapter 1	1
1.1. Introduction.....	1
1.2. The point of departure for the thesis.....	6
1.3. Clarifying the target of the arguments: healthcare defined.....	9
1.4. The problem.....	22
1.4.1. <i>Mitigation commitments</i>	23
1.4.2. <i>Healthcare's Red Queen problem</i>	27
1.5. Justice and climate change mitigation in healthcare.....	33
1.6. Research questions.....	36
1.7. Thesis overview	39
Chapter 2	41
2. The circumstances of justice and method.....	41
2.1. Healthcare emissions and the circumstances of justice	41
2.1.1. <i>The circumstances of justice</i>	42
2.1.2. <i>Against an emissions budget</i>	45
2.1.3. <i>Co-benefits and a harmony of ends</i>	52
2.1.4. <i>The circumstances of injustice</i>	57
2.2. Method - constructive interpretation.....	60
2.2.1. <i>Normative Constructivism</i>	62
2.2.2. <i>Constructive interpretation</i>	68

2.3. Conclusion.....	75
Chapter 3	76
3. Scientific and philosophical background	76
3.1. Reviewing the science: climate change, the effects of climate change on health, and healthcare's contribution to climate change.....	76
3.1.1. <i>The Anthropocene</i>	76
3.1.2. <i>Life in the Anthropocene</i>	81
3.1.3. <i>The health harms of climate change</i>	84
3.1.4. <i>Climate hazards and health impacts</i>	86
3.1.5. <i>Healthcare emissions</i>	89
3.2. Philosophical background: political philosophy and bioethics.....	92
3.2.1. <i>Political philosophy - who is responsible for remedying the problem of climate change?</i>	92
3.2.1.1. <i>Principles of remedial responsibility</i>	93
3.2.1.2. <i>Distributive principles</i>	101
3.2.1.3. <i>Climate change as a structural injustice</i>	105
3.2.2. <i>Bioethics in the Anthropocene</i>	112
3.2.2.1. <i>Is climate change a bioethics problem?</i>	113
3.2.2.2. <i>Clinical ethics issues in climate change</i>	115
3.3. Conclusion.....	119
Chapter 4	121
4. Structure of the thesis	121
4.1. Overview	121
4.2. Summary of the papers.....	122
4.3. Conclusion.....	131
Part II.....	132
Chapter 5	132

5. Healthcare exceptionalism: should healthcare be treated differently when it comes to reducing greenhouse gas emissions?	132
5.1. Introduction	132
5.2. Preliminaries	134
5.3. Methods of isolation	140
5.3.1. <i>Healthcare non-exceptionalism</i>	142
5.3.2. <i>Absolute healthcare exceptionalism</i>	146
5.4. Methods of integration: moderate healthcare exceptionalism.....	151
5.5. Ability to pay	153
5.5.1. <i>Specifying the inability threshold</i>	156
5.6. Conclusion.....	160
Chapter 6	162
6. The Polluter Pays Principle as a rationale for healthcare's responsibility to mitigate their greenhouse gas emissions	162
6.1. Introduction	162
6.2. The polluter pays principle and the normative grounds for healthcare's mitigation responsibilities.....	165
6.3. Causal responsibility: how should the PPP identify the polluter and determine who pays?	168
6.3.1. <i>Problems with identifying the polluter</i>	169
6.3.2. <i>Problems with identifying who pays</i>	172
6.3.3. <i>Holding patients liable is justified</i>	178
6.4. Polluter Pays and Injustice	179
6.5. Conclusion.....	183
Chapter 7	185
7. Sufficiency and healthcare emissions	185
7.1. Introduction.....	185

7.2. What greenhouse gas emissions target should healthcare aim for?.....	188
7.2.1. <i>Independent methods of setting healthcare's mitigation target</i>	190
7.2.2. <i>Accounting for the goals of healthcare in setting a mitigation target</i>	194
7.3. A fair share of the benefits and burdens of mitigation for healthcare	201
7.3.1. <i>Permissible and impermissible emissions</i>	205
7.4. Conclusion.....	207
Chapter 8	209
8. Subsistence emissions, prevention and healthcare decarbonisation	209
8.1. Introduction.....	209
8.2. Subsistence emissions and prevention emissions	211
8.2.1. <i>Subsistence emissions in healthcare</i>	211
8.2.2. <i>The health threshold</i>	216
8.2.3. <i>Subsistence and mitigation exemptions</i>	219
8.3. Prevention and carbon-effectiveness	222
8.3.1. <i>The tension between subsistence and prevention</i>	225
8.4. How to reconcile subsistence and prevention emissions in healthcare	229
8.4.1 <i>The value of securing enough health</i>	229
8.5. Objections	233
8.6. Conclusion.....	235
Chapter 9	237
9. The agents of climate justice in healthcare	237
9.1. Introduction.....	237
9.2. Net zero healthcare systems.....	241
9.3. The site of climate justice in healthcare.....	245
9.3.1. <i>Division of labour and the site of justice</i>	248
9.3.2. <i>Ability to pay</i>	251

9.4. The agents of climate justice in healthcare	254
9.4.1. <i>First-order and second-order responsibilities</i>	256
9.5. Conclusion.....	260
Part III.....	261
Chapter 10.....	261
10. Conclusion.....	261
10.1. Review of the thesis	261
10.2. Review of the principal arguments.....	262
10.3. Limitations and future research.....	268
10.4. Final reflections.....	272
Bibliography.....	273

Part I

Chapter 1

1.1. Introduction

We have just witnessed the hottest year on record. Another climate record is broken as global surface temperatures reach 1.6°C higher in 2024 than pre-industrial levels.¹ Global warming is, as scientists have long predicted, happening. In 2015 the Paris Agreement, a landmark in international climate negotiations, set a goal to limit global mean surface temperature increases to “well below” 1.5°C. Breaching the 1.5°C threshold marks a profound failure in humanity’s efforts to combat climate change.² Surpassing 1.5°C exacerbates the threats posed by climate change, bringing humanity closer to the brink of climate catastrophe. Governments continue to fall well short of their Paris commitments and scientists believe that if the world continues along its current path global warming will reach 2.7°C this century.³

While climate negotiations have traditionally focused on international commitments and state-level action, growing attention is being paid to the role of

¹ Poynting M, Rivault E and Dale B. (January 2025). 2024 first year to pass 1.5C global warming limit Retrieved from: <https://www.bbc.co.uk/news/articles/cd7575x8yq5o> Indeed, at the time of revising the thesis in February 2025, another climate record was broken. Scientists are reporting that, contrary to their expectations, January 2025 was the hottest on record by 0.1°C. Scientists were predicting that the presence of a natural weather pattern in the Pacific Ocean known as El Niño in January 2024 would make this hotter than January 2025. See: Poynting M. (February 2025) Record January warmth puzzles climate scientists. Retrieved from: <https://www.bbc.co.uk/news/articles/cwyjk92w9k1o>

² See: Jamieson, Dale (2014). *Reason in a Dark Time: Why the Struggle Against Climate Change Failed – And What It Means for Our Future*. New York: OUP, for an excellent analysis of why climate negotiations have regularly fallen short.

³ Climate Action Tracker (2024). 2100 Warming Projections: Emissions and expected warming based on pledges and current policies. November 2024. Retrieved from: <https://climateactiontracker.org/global/temperatures/>. Accessed 15 January 2024

other organisations.⁴ In particular, modern healthcare systems, marked by their complexity, scale, and reliance on advanced technology, are increasingly recognised as significant contributors to global greenhouse gas (GHG) emissions. As such, healthcare systems are being called upon to address climate change. Healthcare is the focus of this thesis, where 'healthcare' is understood as an organisation. The thesis is centrally concerned with the English National Health Service (NHS), unless otherwise specified. I use the NHS to refer to the NHS in England here. I go on to expand on this conceptualisation of healthcare in what follows.

Transformative action is thought to be necessary to minimise the GHG emissions that have historically been relied upon to provide the benefits of technologically advanced healthcare. Such a transformation inspires both enthusiasm and scepticism.

On the one hand, healthcare's carbon footprint is substantial. Estimates attribute between 4% and 5% of GHG emissions to healthcare systems globally.⁵ Moreover, between 2016 and 2021 global healthcare emissions rose by 36%, according to some reports.⁶ If this trend of healthcare growth continues, healthcare's global emissions are predicted to triple, amounting to 6 gigatons of carbon dioxide equivalent annually by 2050.⁷ For many, this underscores that business as usual for healthcare is unacceptable

⁴ Collins, Stephanie (2020). Corporations' Duties in a Changing Climate. In Lachlan Umbers & Jeremy Moss, *Climate Justice Beyond the State*. Oxford: Routledge.

⁵ See: Romanello, M., Walawender, M., Hsu, S. C., Moskeland, A., *et al.* (2024). The 2024 report of the Lancet Countdown on health and climate change: facing record-breaking threats from delayed action. *The Lancet*, 404(10465), 1847-1896. Lenzen, M., Malik, A., Li, M., *et al.* (2020). The environmental footprint of health care: a global assessment. *Lancet Planet Health* 4 (7): e271-e279. Healthcare Without Harm. (September 2019) Healthcare's Carbon Footprint: how the health sector contributes to the global climate crisis and opportunities for action. Retrieved from: https://global.noharm.org/sites/default/files/documents-files/5961/HealthCaresClimateFootprint_092319.pdf

⁶ Romanello *op. cit.* note 4.

⁷ Healthcare Without Harm. (April 2021). Global Road Map for Health Care Decarbonization: A navigational tool for achieving zero emissions with climate resilience and health equity. Retrieved from: <https://healthcareclimateaction.org/sites/default/files/2021-08/Global%20Road%20Map%20for%20Health%20Care%20Decarbonization.pdf> p.43

and that healthcare systems must urgently address climate change. An additional rationale for decarbonisation arises from the incongruity of healthcare systems contributing to GHG emissions that exacerbate climate change and thereby threaten health.

On the other hand, many believe that healthcare is special. By special, I mean deserving of different treatment, but I discuss the idea of specialness in more detail below. The sceptics may express alarm that a green agenda could threaten the provision and distribution of healthcare goods. The idea that healthcare is special could form the basis of an argument that says that decarbonisation policies should target the super-rich, oil companies, aviation, and fast fashion, but not healthcare. Healthcare, especially publicly-funded healthcare systems are often believed to be special and should therefore be treated differently.

Both the enthusiasts for healthcare decarbonisation and the sceptics have a point. The enthusiasts are correct in that addressing climate change is urgent, and we expect those with a large carbon footprint to do more. The sceptics' intuition that healthcare is special is widely held, and one might take this as a foundation for an argument that healthcare should not be looked upon like any other polluter given its role in society. Neither view is obviously false and this puzzle merits further investigation. What should healthcare systems do to address climate change given these conflicting intuitions about the nature and societal role of healthcare, and the importance of taking sufficient action on climate change?

How we resolve this conflict in perspectives on healthcare's role in tackling climate change is critically important. The enthusiasts' position tends towards greater action on climate change and will see more radical and transformative change in healthcare to achieve sufficient decarbonisation. Adopting the sceptics perspective, a green agenda may not directly interfere with healthcare's ability to meet its objectives,

though consequently healthcare's emissions are likely to continue to grow. Disentangling and ultimately answering this puzzle has implications for how humanity tackles climate change and questions around the provision and distribution of healthcare goods. Since both climate change and healthcare have great power to alter how well human lives go, answering these questions is imperative.

This thesis undertakes a philosophical analysis of how to determine the mitigation responsibilities of the NHS in England. Mitigation refers to the mitigation of climate change through actions and policies that minimise the threats posed by climate change by reducing emissions and enhancing carbon sinks. Unless specifically mentioned otherwise, 'mitigation' is used throughout the thesis to specify the mitigation of climate change. Mitigation policies contrast with other policies that seek to address climate change like adaptation and compensation.⁸ Mitigation is widely considered to be burdensome for those upon whom these responsibilities fall, though it is not to say that mitigation does not open opportunities too.

This thesis aims to respond to the following research question: How should we determine what a fair share of the benefits and burdens of climate change mitigation for complex, modern healthcare systems like the English NHS should be? The thesis defends an ability to pay principle as an important way to determine a fair share of mitigation burdens for the NHS. Healthcare's ability to mitigate its GHG emissions is understood through a sufficientarian lens where emissions above a threshold of enough health are treated differently in terms of their liability to be mitigated.

It is important to build on the broad sketch of the problem presented earlier to

⁸ Adaptation refers to the process of adjusting social, economic and political systems to reduce the actual, or anticipated, threats of climate change. Adaptation accepts that a degree of climate change is inevitable and looks to protect those who are vulnerable from the harmful impacts of climate change. Compensation considers how we respond to the victims of climate change where mitigation and adaptation have failed. Compensation is usually called 'loss and damage' in climate negotiations.

then fully articulate how this research question arises as well as outline the sub-questions examined in the thesis. However, before doing this, it is vital for the clarity and precision of the arguments presented, as well as for their practical implications, to determine the target of mitigation responsibilities.

The thesis is presented in an alternative format as a multi-part thesis with the main bulk of the argument presented in papers which are published or nearing publication. Within the papers, the target of the arguments is stated as healthcare and 'healthcare as an institution'. 'Healthcare' can potentially refer to a broad range of goods, services, actors, organisations and more. When the arguments point to 'healthcare' as the duty-bearer for mitigation responsibilities, we therefore need to know exactly what entity we are talking about to properly define the scope and level at which these responsibilities fall. Following a review of the dissertation, it became apparent that the concept of healthcare would benefit from being revised and more focused on healthcare being conceptually defined as an organisation and then employed in this way throughout the dissertation. However, within the constraints of a multi-part thesis the papers must remain unchanged. The result is that there is a potential for confusion in what is meant by healthcare through the thesis and what the target of the arguments are.

There is a distinction, however, between what the target of the arguments are, and what that target is. Even if the thesis targets the NHS in terms of mitigation duties, it is still important to explain what healthcare and the NHS *is*. To help answer this it is helpful to start with a methodological issue in how one could go about determining what a fair share of mitigation burdens are for healthcare. The point of departure for the thesis is vital for it sheds light on several questions regarding the scope and intentions of the thesis. I therefore explain the point of departure for the thesis before I then define healthcare and explain how 'healthcare' should be understood throughout the thesis.

1.2. The point of departure for the thesis

It is important to explain why healthcare as an organisation, particularly the NHS, is the point of the departure, rather than an account of individual's entitlements to health. Afterall, climate change threatens health so why not start with an account of health justice and build an account of a decarbonised healthcare system that contributes to fulfilling individual's entitlements within climate constraints. With this picture of a decarbonised healthcare system we could start to think about how to move organisations like the NHS, as they exist in the world, towards this ideal. Alternatively, we can begin with a healthcare system like the NHS as we find it, and enquire as to whether and under what conditions its GHG emissions could be justified.⁹

Let us consider the first method further. This method proceeds through a number of stages. The first stage assumes health is valuable and asks why? Theorists give many different answers to this question,¹⁰ and the precise answer does not matter for the sketch here. For the sake of argument, health could be said to be valuable for how it protects people's opportunities.¹¹ Next, we collate all the different factors that might protect and promote health like water, sanitation, housing, adequate nutritious food, healthcare and so forth.¹² The next issue recognises both that some GHG emissions may be essential to provide some of the factors necessary to protect and promote health, but also that GHG emissions can threaten health through climate change. So,

⁹ This method is also discussed in chapter 5 (Healthcare exceptionalism: should healthcare be treated differently when it comes to reducing greenhouse gas emissions?)

¹⁰ See, for example: Daniels, N. (2007). *Just Health: Meeting Health Needs Fairly* (1st ed.). Cambridge University Press. Venkatapuram, S. (2013) *Health justice: An argument from the capabilities approach*. John Wiley & Sons, Nordenfelt, L. (2007). The concepts of health and illness revisited. *Medicine, Health Care and Philosophy* 10: 5-10. Nielsen, L. (2015). Why Health Matters to Justice: A Capability Theory Perspective. *Ethical Theory and Moral Practice*, 18(2), 403–415. <https://doi.org/10.1007/s10677-014-9526-8>.

¹¹ Daniels (2007), *ibid.*

¹² Marmot, M. (2005). Social determinants of health inequalities. *The Lancet*, 365(9464), 1099-1104.

we need to know what level of emissions is compatible with a fair level of health. This leaves a 'budget' of emissions, and we can use this budget to determine what organisation of the various factors that protect and promote health in society is appropriate. Perhaps we want to use all our emissions on a large, complex, technologically advanced but carbon-intensive healthcare system? Perhaps, instead, we would want to focus on the other elements that protect public health and have whatever healthcare is necessary once the wider elements are secure? Finally, with a healthcare system within our decarbonised society in place, the task is to assess how healthcare systems in the world, like the NHS, transition towards this ideal.

The method described results in a highly idealised healthcare system within a perfectly just society, in so far as the focus is on health. An idealised account has several advantages. Firstly, such an account has a broader scope of enquiry. It pays closer attention to the wider determinants of health and avoids inappropriately privileging healthcare. Consequently, areas like public health ethics are highly relevant given the focus on protecting population health.¹³ Environmental ethics examines the moral value and status of the environment and its non-human contents, as well as humans' relationship with these.¹⁴ Concepts, theories and principles from environmental ethics could also form part of the analysis from this method given the closer attention paid to the relationship between the environment and health, especially if health was defined using concepts like 'planetary health'.¹⁵

¹³ Verweij, M. F. & Dawson, A. The Meaning of 'public' in 'public health' (pp.13-29). in Dawson, A., & Verweij, M. F. (2007). *Ethics, prevention, and public health / edited by Angus Dawson and Marcel Verweij*. Clarendon Press.

¹⁴ Brennan, A., & Norva Y. S. Lo, "Environmental Ethics", *The Stanford Encyclopaedia of Philosophy* (Summer 2024 Edition), Edward N. Zalta & Uri Nodelman (eds.), Retrieved from: <https://plato.stanford.edu/archives/sum2024/entries/ethics-environmental>

¹⁵ Horton, R., Beaglehole, R., Bonita, R., Raeburn, J., McKee, M., & Wall, S. (2014). From public to planetary health: a manifesto. *The Lancet (British Edition)*, 383(9920), 847-847. [https://doi.org/10.1016/S0140-6736\(14\)60409-8](https://doi.org/10.1016/S0140-6736(14)60409-8)

The main issue with building up from the question of why health is valuable is how feasible the resulting normative framework is for addressing injustice in the world as we find it.¹⁶ One goal of this thesis is to provide practical normative guidance to help the NHS decarbonise in a way that is fair. What is challenging about the idealised picture of a decarbonised healthcare system is how to provide practical advice for how the NHS moves from where it is now to fulfilling its fair share of reducing emissions. The NHS, as it stands, does not sit within a perfectly just arrangement of the non-healthcare elements of society that determine health. If we accept that a goal of normative theorising is, as I do and is defended later in this thesis, to help realise moral demands in the real world, we should be cautious about starting from a position of perfect justice to derive our practical recommendations.

Since this thesis has practical normative goals, the starting point then is healthcare as we find it in the world. The task is to engage with principles of justice to help determine how healthcare systems should reduce their emissions fairly. Hence the thesis starts with healthcare, in particular the NHS, and takes an organisational focus. In a moment, I explain what I mean by healthcare and the particular focus of the thesis.

Many areas of practical philosophy could be brought to bear on these complex issues including philosophical bioethics, public health ethics, political philosophy and environmental ethics. The NHS is concerned with population health and climate change threatens public health. Public health ethics has a central concern with government and state action on protecting public health, so is certainly important in how societies address climate change.¹⁷ Similarly, environmental ethics has a rich

¹⁶ See Amartya Sen's discussion of 'transcendental' theorising versus 'realization-focused comparison' for further analysis of the issue of the feasibility of ideal theory. Sen, A. (2010). *The idea of justice*. Penguin, pp.4-12

¹⁷ Faden, R., Bernstein, J., & Shebaya, S. "Public Health Ethics", *The Stanford Encyclopaedia of Philosophy* (Spring 2025). Retrieved from:

<https://plato.stanford.edu/archives/spr2025/entries/publichealth-ethics/>. See also: Verweij, M. F. & Dawson, A (2007) *op. cit.* note 12. See: Dwyer, J. (2023). Responding to the Injustice of Climate

thread on climate change in addition to its broader focus on questions like the value of the environment.¹⁸ Indeed, some scholars have applied ideas from environmental ethics like the 'Land Ethic' to questions of distributive justice in healthcare.¹⁹ While climate change has profound consequences for human populations and beyond, the arguments developed here are situated within the domain of human health and healthcare, and hence the anthropocentric focus.

Furthermore, there is a need in a PhD thesis to maintain a narrow focus. I therefore draw on literatures which have tended to assess the allocation of mitigation responsibilities to organisations and individuals and to examine distributive justice in healthcare. Consequently, there is a tendency to draw on political philosophy and bioethics in this thesis. This is not to arbitrarily privilege these, nor to discount the insights from environmental ethics and public health ethics. However, I leave open opportunities for future work to integrate these conclusions into the wider literature in environmental and public health ethics.

1.3. Clarifying the target of the arguments: healthcare defined.

Having defined the point of departure for the present study and explained how this limits the field of enquiry, it is important to explain the target of the arguments. It is

Change. *Public Health Ethics*, 16(1), 1–8, for an example of a discussion of climate change in public health ethics. Interestingly, Dwyer approaches climate change as a political issue requiring structural change. Similarly, I am concerned with altering healthcare structures to address climate change. So, there is clearly overlap, even if the scope of my study is narrower than Dwyer.

¹⁸ Brennan, A., & Norva Y. S. Lo (2024), *op. cit* note 13.

¹⁹ Wardrope, A. (2020). Health justice in the Anthropocene: medical ethics and the Land Ethic. *Journal of Medical Ethics*, 46(12), 791–796. <https://doi.org/10.1136/medethics-2020-106855>.

Wardrope, A. (2025). Thinking like a mountain: A land ethical approach to healthcare resource. *Bioethics*. <https://doi.org/10.1111/bioe.13355>. As fascinating as the approach taken by Al Wardrope is, the challenge is how to translate ideas like 'thinking like a mountain' into practical advice. This is something Wardrope himself is aware of this when he writes: "The Land Ethic does not provide a step-by-step guide to just action; nor does it definitively adjudicate on how to balance the interests of our patients, other populations now and in the future, and the planet." (Wardrope 2020, p.796) This goes back to the issue of idealisation and feasibility mentioned.

critical to be clear on exactly what healthcare is, for the purposes of the thesis.

Answering who or what has a responsibility to mitigate emissions when I assign responsibilities to healthcare is closely related to an issue in political philosophy known as the 'site of justice'.²⁰ The site of justice is concerned with the kinds of entities or practices to which fundamental principles of justice apply; whether to institutions, or to individual's actions and choices, or something else.²¹ For example, John Rawls claimed that the site of justice was the major social institutions in a society.²² The site of justice in this thesis is healthcare, but when principles of justice are applied to healthcare to allocate mitigation responsibilities, there is further a question as to the level at which the principles apply. Do principles of justice apply at the broad level of healthcare as an organisation changing the character of healthcare as a whole, or do they apply to the distribution of healthcare activities or services, or even to individual conduct and professional practice altering the choices that doctors and patients make, or is it all of the above? The site of justice also shapes the scope of the arguments, so it is important to be clear on this. However, the question of site is distinct from the question of what or who we are talking about when I target healthcare. So even if the thesis takes the site of justice to be healthcare as an organisation this does not clearly define what healthcare is. A second important consideration relates back to the idea of specialness, we need to be clear on what is special, when I say that healthcare is special. It is also the case that how broadly or narrowly healthcare is conceptualised bears on the idea of specialness. First, I define healthcare.

When it comes to defining healthcare, it is important to keep separate the question of what *is* healthcare from what is its *moral significance*? The first question is

²⁰ Rawls, J. (2005). *A Theory of Justice: Original Edition*. Belknap Press.

²¹ Cohen, G. A. (1997). Where the Action Is: On the Site of Distributive Justice. *Philosophy and Public Affairs* 26 (1):3-30.

²² Rawls, J. (2005). *Op. cit.* note 20.

descriptive and the latter normative. These questions are very closely related. Normative theories are concerned with the moral significance of healthcare and what its role in society should be. A normative theory lends itself to the issue of assigning responsibilities. To highlight the difference, it may be that, as a matter of fact, healthcare systems do little to address climate change even if, normatively speaking they ought to. To emphasise, in offering a normative theory the goal is to provide an account of what healthcare systems realistically should do and give direction to organisational actors, policy makers and other stakeholders in the real world.

There are several ways of conceptualising healthcare. Here I briefly explore four: healthcare as services and activities; healthcare as practices; healthcare as an organisation; and healthcare as an institution. Later I distinguish healthcare from a health system.

When we speak about healthcare, we may be referring to a particular activity or service. Healthcare can be what we mean when people are provided with certain goods or resources, or when healthcare workers undertake certain activities. When a surgeon removes an appendix or a GP makes a diagnosis of depression, these are instances of healthcare activities and services. Healthcare is also closely related to practices. A social practice is a pattern of action and interaction regulated by norms. For example, medical practice describes a set of actions regularly undertaken by doctors as well as the professional standards expected in how those actions are performed. Healthcare often involves professional practice, for instance medical and nursing practice. The services that are characteristic of healthcare are often complex and involve various resources, activities and roles. To coordinate and structure such complex services healthcare is organised into an organisation. Healthcare can also be referred to as an institution. Distinguishing organisations and institutions is important for the present study.

A simple way to think about the distinction between organisations and institutions

is offered by Douglass North. North describes institutions as 'the rules of the game' and organisations as 'the players' who operate within the framework of institutions.²³ An organisation is a "collective agent that involves a large number of people who realise a structure that coordinates divided labour via rules and hierarchical command relations, guided by a collective decision-making procedure."²⁴ Organisations exist in the world, like banks, supermarkets and universities. Sometimes organisations can be grouped into meta-organisations, so a meta-organisation is basically just a type of organisation, one formed from other types of organisation. Hospitals, GP surgeries and the ambulance service are all organisations, but they can also be part of a meta-organisation like a healthcare system. In the rest of the thesis, for simplicity, I refer to meta-organisations as organisations.

Institutions, on the other hand, are the formal and informal rules and norms that organise social, political and economic relations.²⁵ Institutions capture broader and more abstract phenomena like marriage and the market which are not organisations, even if they bear on them. Healthcare can be an institution when it is used in an abstract way to refer to an underlying framework that governs how organisations, practices and services are shaped.

Organisations, unlike institutions, are formed from identifiable people who occupy roles and stand in certain relations. The result is that there is a boundary between members of an organisation, and non-members. Nevertheless, healthcare organisations could still be very broad and encompass healthcare as an organisation in general, particular types of healthcare like private or public healthcare organisations, or a particular token of healthcare like the Royal Lancaster Infirmary or the NHS in

²³ North, D.C. (1990) *Institutions, institutional change, and economic performance*. Cambridge University Press, Cambridge, pp.3-4

²⁴ Collins, S. (2023). *Organizations as wrongdoers: from ontology to morality*. Oxford University Press, p.9

²⁵ North (1990), *op. cit.* note 18.

England. This issue of membership is particularly important in whether we are assigning mitigation responsibilities to healthcare in general, to types of healthcare, or tokens of healthcare.²⁶ To identify healthcare, as an organisation, in very general terms can be done by either coming up with the necessary and sufficient conditions of healthcare organisations or by assessing against relevant desiderata which may not amount to individually necessary and jointly sufficient conditions. This thesis focuses on the NHS in England and so will not attempt to develop a general conception of healthcare that accounts for all types of healthcare organisation. However, it is worth reflecting on how different types of healthcare organisation can be distinguished even where the focus here is on a particular token of healthcare, the NHS.

First however, as a short aside, it is important to say something about collective agency and responsibility.²⁷ I claimed earlier that organisations are collective agents. Collective agents are composed of individuals who form a unit for the purposes of making decisions and taking action, and are guided by a decision-making procedure. Collective agents can have goals, make decisions, and act in the world. There is an important question about the relationship between organisations and their members such that an organisation is considered as an agent. This is important for assigning responsibilities. If we say that the NHS is responsible for providing COVID vaccinations, there is a sense in which we assign responsibility for this particular task to the NHS as a collective agent above and beyond the components that make up the NHS. A further

²⁶ This issue is discussed in chapter 6 on the polluter pays principle as well as chapter 9. The polluter pays principle assigns responsibilities to polluters, so we need to have a clear way to determine who is the relevant polluter and how we justify allocating costs to them. Emissions generation in healthcare is very complex and this makes allocating costs to a polluter in healthcare challenging. Similarly, even if we focus on a particular token of healthcare like the NHS, there is a question about who the membership of the NHS is for assigning duties within the NHS and, in particular, does this include patients for the purposes of reducing NHS emissions. This issue is discussed in chapter 9, albeit in slightly different terms.

²⁷ Some may prefer the term 'corporate agency'. I avoid this as 'corporate' has connotations of making profit. While profit may be a goal for kinds of healthcare, it is not part of the NHS which is the focus of the thesis, hence the more neutral term.

account is needed of the internal processes and relationships that make sense of the idea of holding the NHS responsible above and beyond holding individual members responsible. Furthermore, this account needs to explain how the NHS takes action in the world, say to provide COVID vaccines, through its members without simply being reducible to the aggregated actions of individuals. Philosophers answer these by defending various accounts of collective agency.²⁸ The thesis does not defend a particular account of collective agency, rather it assumes that since the NHS is highly organised and unified, with goals and decision-making procedures it can be considered as a collective agent for the purpose of assigning responsibilities. I assume that as a particular collective agent, it is uncontroversial to treat an organisation like the NHS in this way for the purposes of assigning responsibilities, even if collective agency in general can be controversial amongst philosophers. However, this relationship between the NHS as a collective agent and its members is considered further in chapters six and nine.

Responsibility is a word saturated with different meanings. Usually, responsibility, in the most basic terms, refers to a relation between an agent and either a state of affairs, a set of tasks, some action or a realm of authority.²⁹ Moral responsibilities are those where this relationship is grounded in moral considerations. In terms of moral responsibility, a broad distinction is between forward-looking and backward-looking responsibility.³⁰ The latter is concerned with attributing blame for a harm. It is forward-looking accounts of responsibility that this thesis considers. Forward-looking responsibility involves seeing to it that some state of affairs obtains, so is concerned with future action, say because it is somebody's role, because they are able to, because

²⁸ Smiley, M. Collective Responsibility. In *The Stanford Encyclopedia of Philosophy* (Fall 2023 Edition), Retrieved from: <https://plato.stanford.edu/archives/fall2023/entries/collective-responsibility/>.

²⁹ van de Poel, IR. (2011). The relation between forward-looking and backward-looking responsibility. In NA. Vincent, IR. van de Poel, & MJ. van den Hoven (Eds.), *Moral responsibility: beyond free will and determinism* (pp. 37-52). Springer.

³⁰ *Ibid.*

they caused a harm and so forth. Forward-looking accounts are less concerned with conceptions of desert and blameworthiness than backward-looking accounts, however agents may be held accountable for failing to fulfil forward-looking responsibilities. The thesis then is concerned with attributing forward-looking responsibilities to mitigate climate change to collective agents like the NHS.

Two main factors contribute to separating types of healthcare organisation into unitary entities with a distinct membership: their structure and purpose. Organisations are composed of people and physical elements who together form a structure. A structure is an abstract entity that describes the relations between the roles that people occupy and physical goods like buildings, medical instruments, ambulances and the like.³¹ People occupy many roles in healthcare organisations: doctors, nurses, physiotherapists, pharmacists, radiographers, porters, managers, accountants, administrators and so forth. Within these roles, people interact with one another, with patients and with physical goods like CT scanners, buildings, medicines, and others in complex relations that form structures. It is from these structures that healthcare resources and goods are distributed through activities and services. The roles, material elements and relations will define different healthcare organisation types. A highly simplified example will help to illustrate. In a GP surgery there will be clinical and non-clinical roles, as well as material elements like a building, computers, sphygmomanometers, stethoscopes and more. Compared to a hospital, the range of clinical roles and physical elements is much more limited in a GP surgery. For example, a theatre with surgeons, anaesthetists and other operating personnel is rarely found in general practice. Hospitals and GP surgeries have different structures and so are different types of healthcare organisation. Obviously, hospitals and GP surgeries can interact to form a structure of their own and be collected into a meta-organisation as

³¹ Young, I.M. (2011). *Responsibility for Justice*. Oxford University Press USA, p.51-55. Haslanger, S. (2018). What is a Social Practice? *Royal Institute of Philosophy Supplement*, 82, 231–247.
<https://doi.org/10.1017/S1358246118000085>

mentioned.

The purpose and aims of healthcare organisations are important for what structures are established in order to create particular healthcare organisations. Since different aims result in us composing different healthcare structures and therefore different healthcare organisations, the aims that healthcare organisations have are important in how we distinguish them. It is common to believe that healthcare is the primary way that societies sustain health and that modern medical interventions are central in explaining the advances in health and life-expectancy that have occurred over the twentieth century.³² One aim that we could attribute to healthcare then is protecting and promoting health, and this aim could help us distinguish healthcare as an organisation. When defining healthcare, some theorists like Norman Daniels take such an approach and include both medical services and public health measures that are functionally aimed at individual and population health.³³

A view like Daniels' is, however, extremely broad, potentially overemphasising the contribution that healthcare makes to health whilst simultaneously managing to exclude some activities of healthcare like palliative care. Furthermore, some healthcare systems have health as a goal that is instrumental to a broader goal like profit, say in private healthcare organisations. Nevertheless, a key issue that foreshadows the issue of how a healthcare system is defined is that a huge range of factors are important in whether people are healthy or not. Education, socioeconomic status, access to clean drinking water and nutritious food, working conditions, and road safety to name a few all have a substantial impact on health.³⁴ But road safety, education and the like are

³² Daniels, N. (2007), *op. cit.* note 10, p.12

³³ Daniels *ibid*, p.12

³⁴ WHO Commission on Social Determinants of Health., & World Health Organization. (2008). *Closing the gap in a generation: health equity through action on the social determinants of health: final report of the Commission on Social Determinants of Health / World Health Organization*. World Health Organization.

not usually seen as part of healthcare when thinking about healthcare organisations like the NHS. At the same time, care of the dying is typically thought to be an important element of healthcare, but palliative care does little to protect or promote health.

One important distinction then is between healthcare and a health system. The latter is much broader and refers to the parts of a society that have a significant impact on health and can be influenced by government policy.³⁵ A health system encompasses many of the elements mentioned above like education, sanitation, road safety, health and safety at work and the like. If a health system was particularly unified then this could also be considered an organisation, but it is rarely the case that a health system is a unified actor. The challenge is to specify what distinguishes healthcare from other organisations within a health system.

Healthcare organisations tend to have goals that are relevant to health, but one distinguishing feature is how healthcare organisations go about achieving those goals. Healthcare tends to have a central concern with diagnosing and treating illness. If somebody attends hospital with chest pain numerous tests will be requested to investigate the cause. Based on the diagnosis, or likely differentials, treatments are initiated which may include medicines, surgery, nursing care, rehabilitation and so forth. This however doesn't isolate healthcare organisations entirely as, for instance, social care will often be provided to people with mental health problems to help bolster and support their health. It can also be tricky to separate healthcare from public health since both often share goals and may also undertake similar activities like vaccination. There is also the question of how the goals of practices that usually fall under healthcare like medicine, nursing and rehabilitation overlap with the goals of healthcare and other elements of society that contribute to health.

³⁵ Wolff, J. (2011). Ethics and public policy: a philosophical inquiry. Routledge, pp.131-134

The goals and activities that healthcare systems undertake are also shaped by political commitments. As a result, different types of healthcare organisation result from underlying political theories. For example, libertarians place emphasis on individual liberty and property rights meaning that libertarians might conceptualise healthcare as a private good and the limits of healthcare are determined by the market. A socialist, on the other hand, would stress a greater role for the state in addressing social and economic inequalities. Healthcare would therefore be a public good delivered as a collective enterprise. Meanwhile other political theories might land on healthcare systems that mix private and public. For instance, where conservatives stress personal responsibility over state intervention this may lead to a narrower public healthcare system that meets basic needs whilst allowing a private system for 'optional' aspects of care. This is important for healthcare decarbonisation since certain mechanisms of reducing emissions may be more feasible in some healthcare systems compared to others. Carbon taxes as a market mechanism may be much more powerful in fully private systems compared to socialised healthcare system, for instance.

Defining types of healthcare organisation is a complex task involving specifying the goals and structures that distinguish healthcare from other elements of a health system. This thesis is concerned with a particular healthcare organisation, the NHS in England. 'Healthcare' and 'healthcare system' are used interchangeably. To maintain a style that aligns with the published papers, the thesis will continue to refer to healthcare and healthcare system and, unless otherwise specified, this can be taken to refer to the English NHS.

The statutory underpinning of the NHS tasks the state to "continue the promotion in England of a comprehensive health service designed to secure improvement (a) in the physical and mental health of the people of England, and (b) the prevention,

diagnosis and treatment of physical and mental illness".³⁶ The NHS is a publicly funded, tax-based, universal health system organised around providing comprehensive care free at the point of delivery with clinical need prevailing over ability to pay. Preventative, diagnostic, curative rehabilitative and end-of-life services are provided under one comprehensive service. Whilst the boundaries between the NHS and other aspects of a health system are fuzzy in practice, the locus of mitigation responsibilities within the thesis is simply the NHS in England. A second advantage of this approach is that focusing on a publicly funded healthcare system like the NHS can make the practical implications of the arguments presented clearer. For instance, one can utilise the existing structures within the NHS to explain how responsibilities are distributed within the organisation. Although the scope of the thesis is limited by focusing on one healthcare system, this nevertheless provides a foundation for further theorising about mitigation in other healthcare systems, especially those of a similar type: socialised, publicly-funded, free at the point of access and emphasising clinical need over ability to pay.

Reflecting on healthcare organisations as entities with particular structures and goals is helpful for clarifying the target of the arguments in this thesis. A key question concerning the scope of the arguments is the *level* at which mitigation responsibilities apply when considering healthcare as an organisation. Are these responsibilities directed at the NHS as a collective agent, focused on changing its overall structure, governance, and goals, or are they also aimed at individuals within the system, such as healthcare professionals and their day-to-day choices? The primary focus of this thesis is at the *organisational level*, examining how a healthcare system should be structured to fulfil its core functions in lower-carbon, more environmentally sustainable ways. However, as discussed in Chapter Nine, the internal complexity of organisations like the NHS, comprising multiple interacting agents, organisations, and decision-making

³⁶ National Health Service Act 2006

levels, complicates this and invites further discussion of how responsibilities are distributed within such systems.

It is important to be clear from the outset that whilst references to healthcare, healthcare organisation and healthcare system in the thesis are thinking about the NHS, not every paper that forms chapters five to nine will state in the chapter that the focus is narrowly on the NHS. Nevertheless, the chapters should be read as such which is important for the overall argument's interpretation. For example, in chapter five which discusses the idea of specialness, it is easier to establish the idea of specialness in healthcare organisations like the NHS, say compared to private healthcare organisations. This is also a consideration in chapters seven and eight which also mention specialness. Chapter six discusses the polluter pays principle and many of the arguments stress a distinction between healthcare (i.e. the NHS), the wider health system, and other elements of healthcare like pharmaceutical companies in determining the cause of emissions. This distinction is more apparent when the focus is on the NHS. Lastly, distributing responsibilities within a healthcare organisation is considered in chapter nine. In a private healthcare system or organisation, how responsibilities will be allocated to certain actors, especially 'paying customers', but also within organisational hierarchies will be different to that of a public one like the NHS. To emphasise then, whilst the papers refer to healthcare they should be read as talking about the NHS.

A second, crucial point of clarity goes back to the distinction between organisations and institutions mentioned above. At various points in the thesis, the focus is said to be 'healthcare as an institution'. This is a potential source of confusion as, to be absolutely clear, the target is *not institutions* as described above but rather *healthcare organisations* particularly the NHS. When healthcare is discussed, sometimes particular healthcare activities or services are under scrutiny whereas sometimes it is healthcare as a whole organisation. Nonetheless the target is not institutions as an abstract

framework, rather the concern is with identifiable actors like an organisation. It is also important to map where this confusion comes from and what it means for the overall argument presented in the thesis.

Rawls, famously, opens *A Theory of Justice* by claiming that "justice is the first virtue of social institutions".³⁷ Rawls elaborates that "the primary subject of justice is the basic structure of society, or more exactly, the way in which major social institutions distribute fundamental rights and duties and determine the division of advantage from social cooperation".³⁸ This focus on major social institutions is celebrated as a significant innovation in political philosophy.³⁹ Consequently, many philosophers focus on institutions when considering issues of distributive justice. Rawls lists societies' political, economic and societal institutions as the major institutions in the basic structure of society since they are pivotal to determining people's life chances and organising cooperative action.⁴⁰ Rawls, however, does not provide clear criteria for exactly what counts as a major social institution or precisely what the inclusion criteria for being within the basic structure are. This leaves the potential for 'institutions' to be used to refer to any entity in society that influences people's life chances that is also a site of social cooperation, of which many organisations would fulfil these criteria. Institutions can therefore sometimes be used to refer, inappropriately, to organisations. Add to this that in everyday language, 'institution' is often applied to organisations to underscore their importance. A particularly avid Manchester United

³⁷ Rawls (2005), *op. cit.* note 20, p.4

³⁸ Rawls (2005), *op. cit.* note 20, p.7

³⁹ See Bedau, H. (1978). Social Justice and Social Institutions. *Midwest Studies in Philosophy* 3:159-75. As Bedau says, "because institutionalism may now seem so plausible and attractive, we might not realize how relatively novel it is even today" (p. 162). Brian Barry, similarly, writes: "If Rawls had achieved nothing else, he would be important for having taken seriously the idea that the subject of justice is what he calls 'the basic structure of society! . . . Rawls's incorporation of this notion of a social structure into his theory represents the coming of age of liberal political philosophy" (Barry, B. (1995). *Justice as Impartiality*. Oxford: Clarendon Press, p. 214)

⁴⁰ Abizadeh, A. (2007). Cooperation, pervasive impact, and coercion: On the scope of distributive justice. *Philosophy and Public Affairs* 35 (4):318-358.

fan may call this football club an institution to highlight the club's history, global reach and legacy. But Manchester United is not an institution in the technical sense used here, rather it is an organisation.

The thesis is presented in an alternative format, as opposed to a traditional thesis, which is a multi-part thesis where the chapters that form the main body are stand-alone pieces of work which are published papers or nearing publication. Within these papers, the focus is often stated to be upon healthcare as an institution when what is intended is to focus on a *healthcare organisation*, the NHS. The papers are written with a particular scope and focus. In collating the papers as a coherent body of work, the importance of the distinction between organisations and institutions for the target of the arguments became clear but as published papers this error cannot be fully rectified now. I therefore highlight this here for the reader. In the conclusion I offer further reflections on this for the thesis as a piece of work.

1.4. The problem

The main focus of this thesis is what mitigation responsibilities complex and modern healthcare systems like the NHS should undertake. The overarching research question addressed in this thesis is:

How should we determine what a fair share of the benefits and burdens of climate change mitigation for complex, modern healthcare systems like the English NHS should be?⁴¹

Later, the connection between this question and the issue of whether healthcare is special in terms of climate change mitigation is considered. Nevertheless, it is important to explain the problem that gives rise to the primary research question.

⁴¹ As this is a question of justice, we can state the question more narrowly: "what are the most appropriate principle(s) of justice for specifying a fair share of the benefits and burdens of climate change mitigation for the NHS?". I leave the question in its broader form now and refine this later.

There are two main lines of investigation that lead to the problem facing healthcare systems and the question of distributive justice under consideration. One takes a more superficial approach based on pre-existing environmental commitments made by healthcare systems, and I start with this. The second route introduces the idea of 'healthcare's Red Queen problem' and offers a deeper analysis of healthcare's predicament.

1.4.1. Mitigation commitments

Healthcare systems across the world are increasingly committing to respond to climate change and to decarbonise. In 2020, the NHS in England became the first healthcare system in the world to commit to a net zero target and later embedded this into legislation through the Health and Care Act 2022.⁴² At COP26 in 2021, members committed to building climate-resilient health systems. The World Health Organisation (WHO) leads The Alliance for Transformative Action on Climate and Health (ATACH) which supports these members to meet their commitments.⁴³ As of January 2025, 92 health systems had committed to be 'climate-resilient', 81 were committed to 'sustainable low carbon health systems' and 45 members had set a date to achieve net zero healthcare.⁴⁴ I discuss the definitions of such commitments shortly.

Since healthcare systems around the world are making decarbonisation commitments, and in some cases – like the NHS – the commitment is enshrined in law, it is important to be clear on what these responsibilities entail. This is especially true

⁴² National Health Service England. (July 2022). Delivering a 'net zero' NHS. Retrieved from: <https://www.england.nhs.uk/greenernhs/publication/delivering-a-net-zero-national-health-service/>

⁴³ World Health Organisation and Alliance for Transformative Action on Climate and Health. (2022) COP26 Health Programme. Retrieved from: <https://www.who.int/initiatives/alliance-for-transformative-action-on-climate-and-health/cop26-health-programme>

⁴⁴ World Health Organisation and Alliance for Transformative Action on Climate and Health. (2022). Commitments. Retrieved from: <https://www.who.int/initiatives/alliance-for-transformative-action-on-climate-and-health/commitments>

as it is generally recognised that mitigation is often, though not always, burdensome for those upon whom responsibilities fall.⁴⁵ Mitigation can be costly, and in systems like the NHS, those costs will often be zero sum where we cannot make some better off without making others worse off. If resources are taken away from direct patient care to focus on decarbonisation, those patients lose out. In other instances, the trade-offs are not zero sum but there are opportunity costs, and for those who miss out we must be able to justify those decisions even if they are not made worse off. If reducing healthcare emissions carries burdens, we need to know what a fair share of those burdens are. We need to be able to say, that is, when healthcare has fulfilled its responsibilities in national and global efforts to address GHG emissions. This means paying close attention to morally relevant factors in justifying the burdens for healthcare systems.

Healthcare's carbon footprint is one part of its broader environmental footprint.⁴⁶ In addition to GHGs, the latter includes healthcare's reliance on natural resources like precious and rare metals, rubber, water, petroleum and biological materials, as well as the hazardous and non-hazardous waste produced by healthcare. Not to mention the broader environmental impacts of those for land use, deforestation, water and so forth.⁴⁷ Whilst acknowledging the importance of the broader environmental impacts of healthcare, this thesis focuses on climate change mitigation as a case-study for investigating how healthcare should respond to its environmental impacts. The issue is critical, since what responsibilities we think healthcare systems have to address

⁴⁵ See the following articles for a general overview of issues in climate change and distributive justice. Moellendorf D. (2014) Climate Change Justice. *Philosophy Compass*, 10, 173–186, doi: [10.1111/phc3.12201](https://doi.org/10.1111/phc3.12201). 174–177. Caney, S. (2018). Climate Change', in Olsaretti, S. (ed.), *The Oxford Handbook of Distributive Justice*, Oxford Handbooks, OUP, 664–688. Gardiner, S. (2004) Ethics and Global Climate Change. *Ethics*, 114 (3), pp. 555–600, <https://doi.org/10.1086/382247>.

⁴⁶ Lenzen *et al* (2020) *op. cit.* note 4.

⁴⁷ Steenmeijer, M. A., Rodrigues, J. F. D., Zijp, M. C., & Waaijers-van der Loop, S. L. (2022). The environmental impact of the Dutch health-care sector beyond climate change: an input–output analysis. *The Lancet. Planetary Health*, 6(12), e949–e957. [https://doi.org/10.1016/S2542-5196\(22\)00244-3](https://doi.org/10.1016/S2542-5196(22)00244-3)

climate change will fundamentally shape what they actually do, how far they go to tackle climate change and alter what kind of healthcare system we have. What healthcare systems do, or do not do, to mitigate climate change is far from inconsequential to humanity's overall prospects of addressing climate change given healthcare's carbon footprint. This case-study is particularly important in light of the NHS' recent commitments to mitigate its carbon footprint. Since healthcare decarbonisation is increasingly prominent in policy and professional debates, a focus on climate change is timely and important. However, there is an important further question about the extent to which the arguments developed here apply to the wider context of healthcare's environmental footprint.

One response to the climate commitments made by healthcare is to say that they already reflect what mitigations burdens it is fair for them to undertake. That is, the climate commitments mentioned so far do not raise a question of what burdens are morally acceptable for healthcare systems that requires further philosophical examination, instead they answer it. The first thing to note is that some decarbonisation commitments declared through ATACH and the WHO are vague. Three levels of commitment are mentioned: "climate-resilient health systems", "sustainable low carbon health systems", and "net zero".⁴⁸ Climate-resilience could merely mean adaptation and so it is entirely open what degree, if any, of decarbonisation this entails. ATACH and the WHO do not define what a "sustainable low carbon health system" is, how low carbon they must aim to be, nor what makes them sustainable. This makes it quite difficult to know if these healthcare systems have done enough to address climate change. Net zero does however tend to be more clearly defined.

Net zero, as a scientific concept, simply describes a theoretical balance between

⁴⁸ World Health Organisation and ATACH *op. cit.* note 16.

flows of GHGs into the atmosphere and flows of GHGs out such that overall emissions aggregate to zero.⁴⁹ Net zero has become a key policy goal providing a theoretical ledger that is used to organise efforts to decarbonise. As a policy, net zero is where agents reduce their GHG emissions as far as possible and then offset the remainder to leave overall emissions at zero. As much as net zero is the hegemonic framework for addressing emissions, many express concern over the flexibility that it offers when it comes to balancing reducing GHG emissions against offsets.⁵⁰ This includes in a healthcare context.⁵¹ Importantly, with the degree of flexibility offered by net zero, we may worry about whether healthcare systems do, in reality, fulfil their fair share.

At a broad level, lowering the carbon footprint of healthcare involves rethinking what care is provided, where it is delivered, and how healthcare is organised.⁵² Achieving sufficient decarbonisation is expected to necessitate a comprehensive restructuring of healthcare systems, including their organisation, delivery, and underlying infrastructure.⁵³ Healthcare Without Harm says that “the health sector must reinvent itself to address the urgent 21st century health threat of climate change... As health spending continues to grow, the sector must decouple this growth from its climate emissions. The sector must reinvent ways to deliver care and how the products and technologies it uses are made, used, and disposed of. Health financing must be revamped to incentivize climate-smart health care. The health sector must team up with other sectors to accomplish this, while also working collaboratively to reduce the

⁴⁹ Fankhauser, S., Smith, S.M., Allen, M. *et al.* (2022). The meaning of net zero and how to get it right. *Nat. Clim. Chang.* 12, 15–21. <https://doi.org/10.1038/s41558-021-01245-w>

⁵⁰ Armstrong, C & McLaren, D. (2022). Which Net Zero? Climate Justice and Net Zero Emissions. *Ethics and International Affairs* 36 (4), 505–526. Welton, S. (2022). Neutralizing the atmosphere. *Yale LJ* 132, 171.

⁵¹ Sue-Chue-Lam C, Bhopal A, Parker J, Xie EC. (2024) Net Zero is not enough: ratcheting ambition for sustainable health systems through Reduce and Support. *BMJ Glob Health* 16;8(Suppl 3):e014617. doi: 10.1136/bmjgh-2023-014617.

⁵² Naylor C, Appleby J. (2013). Environmentally sustainable health and social care: Scoping review and implications for the English NHS. *Journal of Health Services Research & Policy*. 18(2):114-121. doi:10.1177/1355819613485672

⁵³ National Health Service England 2022 *op. cit.* note 16

global burden of disease, and therefore the demand for resource intensive health care itself.⁵⁴ Whilst Healthcare Without Harm refers to the whole health sector, the aspects that involve healthcare are extensive. In the face of this, the flexibility of net zero may allow healthcare to be unambitious and fall short of what is required to address global climate change.

As mitigation is burdensome and involves a transition in the structure, organisation, and perhaps even the function of healthcare, healthcare systems that strive to minimise their emissions will look markedly different to ones with no such commitments. Given these challenges, and the substantial changes to healthcare required to achieve meaningful decarbonisation, it is crucial to determine what constitutes a fair share of the mitigation burden for a healthcare system. More fundamentally, the degree to which healthcare should transform, the burdens it should bear in decarbonising, and the resulting structure of a low-carbon, or net zero, healthcare system all depend on what we think healthcare's fair share is. The problem then is that, even if healthcare systems are committing to decarbonisation, we still need to appreciate what level of decarbonisation and what changes to healthcare are fair within the overarching goals and purpose of healthcare and the need to avert a climate catastrophe.

1.4.2. Healthcare's Red Queen problem

Although healthcare systems have made commitments to decarbonise, it is important to consider *why* healthcare should make such commitments in the first place. One way to introduce the problem facing healthcare is through an idea I call healthcare's Red Queen problem.⁵⁵ This is an idea discussed again later in the thesis,

⁵⁴ Healthcare Without Harm *op. cit.* note 6, p.18

⁵⁵ Parker, J. (2025). Ethics, Health (care), and Climate Change In Romanis, E. C., Germain, S., & Herring, J., (Eds), *Diverse Voices in Health Law and Ethics: Important Perspectives* (pp.115-132). Bristol

but it is worth introducing now to help demonstrate the particular problem facing healthcare.

In a speech for the WHO, its Director-General Tedros Adhanom Ghebreyesus highlights an “irony” for healthcare systems:

“The world’s health sector facilities churn out CO₂... this is perhaps ironic - as medical professionals our commitment is to ‘first, do no harm.’ Places of healing should be leading the way, not contributing to the burden of disease.”⁵⁶

I summarise this ‘irony’ in the following three claims:

- 1) A key goal of healthcare systems is to protect and promote health.
- 2) Modern healthcare systems like the NHS make a significant contribution to climate change.
- 3) Climate change threatens health.

This ironic triad forms the basis of healthcare’s Red Queen problem. Each of the three claims in the ironic triad could be controversial. The carbon footprint of healthcare systems has been briefly discussed, but claims 1) and 3) are not going to be defended now. They are covered later as a recurring theme throughout the thesis.⁵⁷ Assume then, for the moment, that each claim is broadly accurate.

At the heart of the ironic triad is a fundamental tension: the harder healthcare works to protect and promote health the greater the chance it has of contributing to the development of poor health through climate change. The problem can be understood by comparing to a passage in *Through the Looking Glass* by Lewis Carroll.⁵⁸ Alice is in

University Press.

⁵⁶ World Health Organization. (May 2019) 72nd World Health Assembly in Geneva, Switzerland. Retrieved from: <https://www.pscp.tv/w/1IDGLrerprqxm?t=1h6m38s> (minute 39)

⁵⁷ See especially chapters 2 and 3.

⁵⁸ This comparison is inspired by the Red Queen Hypothesis in evolutionary theory (see: Van Valen L. (1973). A new evolutionary law. *Evol. Theory.* 1, 1–30) This describes an evolutionary arms race at the

a race with The Red Queen and despite running as fast as she can, Alice finds she remains in the same place. Eventually, The Red Queen says to Alice: "Now, here, you see, it takes all the running you can do, to keep in the same place".⁵⁹ Hence 'healthcare's Red Queen problem'.⁶⁰ Running just to keep still chimes with the tension at the heart of the triad above. Whilst Alice running is not quite futile — her running has purpose — having to work only to stay in the same place pushes in the direction of being self-defeating. Healthcare must continue to adapt and change to cope with the demands placed on it through climate change. But in providing healthcare to deal with the health effects of climate change, healthcare contributes to one key driver of healthcare need: climate change. The relationship between climate change, health and healthcare leaves healthcare threatened with running just to stand still. This is especially true if healthcare emissions grow on the business-as-usual scenario mentioned above. There is purpose in healthcare, it is not completely self-defeating, but it is sub-optimal and herein lies the tension for healthcare.

Of course, the structure of the Red Queen problem is not unique to healthcare emissions. For instance, increasing proportions of GDP are spent on healthcare in high-income countries and yet the health of those nations does not seem to be rising commensurately.⁶¹ Indeed, with aging populations and people living with increasingly

core of evolution. The Red Queen hypothesis relates to the connection between survival and the amount of time that a species has existed. Even though species adapt through evolution, this never makes surviving easier because their competitors are also adapting. As survival is not guaranteed through adaptation, species continually evolve just to keep up with their competitors. Whilst the relationship between healthcare and climate change is not an arms race, the fundamental idea of running to remain static is shared. Even if in evolution the arms race is zero sum, and this is not the case for healthcare, or so I argue, there is still something to the thought of running stand still.

⁵⁹ Carroll L. (1871). *Through The Looking Glass*.

⁶⁰ I call it healthcare's Red Queen problem rather than simply the Red Queen problem because problems with a similar structure are seen elsewhere and also known as Red Queen problems. For instance, the evolutionary arms race mentioned above are also known as Red Queen problems in evolutionary biology.

⁶¹ GBD 2021 Europe Life Expectancy Collaborators. (2025). Changing life expectancy in European countries 1990-2021: a subanalysis of causes and risk factors from the Global Burden of Disease study 2021. *Lancet Public Health* 2025.doi:10.1016/S2468-2667(25)00009-X

complex multi-morbidity this leaves healthcare systems with difficult questions about how to meet rising demand. As such, healthcare again seems to be left running to stand still. It is having to work harder to meet the demands placed on it by populations and, to a certain extent, the demands are as a consequence of healthcare's successes. This structure crops up elsewhere too. Agricultural practices aimed at maximising crop yields can degrade soil quality over time, so additional fertilisers are needed to maintain yields. Indeed, all of climate change might be considered like a Red Queen problem in the sense that we extract fossil fuels from the earth's crust and burn them to produce goods that make people's lives better. In doing so, over time, we threaten to make people's lives worse and have to work harder to produce those goods, or maintain the quality of people's lives. Renewable energy is one way that societies are trying to break the self-defeating cycle captured by climate change.

What separates healthcare's Red Queen problem as considered here from other structurally similar problems is the idea that healthcare is special. Many think health and healthcare are unlike other goods. As some philosophers note, "health[care], unlike income and other social goods and services, seems special to many of us, in that the case for its equal distribution seems more compelling."⁶² Most obviously, healthcare plays an important role in protecting and promoting health.⁶³ Since health features in a life that is going well, say because it is a component of well-being or underpins what opportunities people can pursue, healthcare is special in so far as it is instrumental to safeguard our health. The idea that health is special has a long history. Epicharmus of Kos thought that health is 'the best thing a man can have'. Rene Descartes echoed this 2000 years later when he said health is "without doubt the first good and the foundation of all other goods in life".⁶⁴ On this view, healthcare derives

⁶² Marchand, S., Wickler D., & Landesman, B. (1990). Class, health and justice. *Millbank quarterly* 454. See also, Segall, S. (2007). Is health care (still) special). *Journal of political philosophy* 15 (3):342–36.

⁶³ Daniels, N. (2007), *op. cit.* note 10

⁶⁴ Descartes cited in: Anand, S. (2004). The Concern for Equity in Health. In *Public Health, Ethics, and Equity*. Oxford University Press UK.

its specialness from the specialness of health itself.⁶⁵

The social determinants of health put pressure on the idea that healthcare is special because it protects health. Empirical research consistently demonstrates that factors such as working conditions, deprivation, educational level and so forth have a greater impact on population health than healthcare.⁶⁶ If healthcare is not uniquely responsible for improving health, and if other interventions like reducing poverty are more effective, the claim that healthcare is special because it protects health becomes difficult to sustain.

Some have therefore considered the *expressive* dimension of healthcare as another way healthcare is special. Relational theorists point to non-health goals that healthcare fulfils as being important from the perspective of social justice. Even when healthcare does little to improve health, we may think healthcare is special for the way it treats citizens and expresses respect for individuals in a society of equals.⁶⁷ As Weinstock puts it: "health care has come to matter to people because it betokens the extent to which they are treated as deserving of equal care and respect. The social meaning of health care is tied in with our sense of ourselves as equal citizens in ways that other goods (say education) are not, even if for any objective construal, other goods matter just as much, perhaps even more, than health care per se."⁶⁸ There is something to be said for this expressive dimension, but it is not clear why healthcare, unlike other goods or services, uniquely performs this expressive function.

In this thesis, healthcare is defended as special in the sense that healthcare systems

⁶⁵ Segall, S. (2007). Is Health Care (Still) Special? *The Journal of Political Philosophy*, 15(3), 342–361. <https://doi.org/10.1111/j.1467-9760.2007.00284.x>

⁶⁶ Marmot, M. (2005). Social determinants of health inequalities. *The Lancet*, 365(9464), 1099–1104.

⁶⁷ Voigt, Kristin & Wester, Gry (2015). Relational equality and health. *Social Philosophy and Policy* 31 (2):204-229.

⁶⁸ Weinstock, D. M. (2011). How Should Political Philosophers Think of Health? *Journal of Medicine and Philosophy* 36 (4):424-435, p.429

and certain healthcare activities and services, should be treated differently from other organisations, services and activities. Part of why healthcare is special is because of the ends that it fulfils like alleviating suffering, care of the dying, prolonging life and protecting and promoting health. These are morally important goals tied to social justice. Yet, as critics point out, these goals are not unique to healthcare.

The key claim here is that healthcare is special not simply because of the goals it pursues, but because of *how* it pursues them and the conditions that make healthcare necessary to secure social justice. Human beings are unavoidably vulnerable to illness, injury, and death. While many social and economic factors can mitigate this vulnerability, they are currently unevenly distributed in ways that disproportionately benefit the already advantaged, a pattern widely seen as unjust. Even in a world where the social determinants of health were justly distributed, healthcare would remain necessary because vulnerability to illness is an enduring human condition. Thus, healthcare is special in a narrower sense: it is sometimes the only realistic and immediate way individuals can secure the level of health needed to live a decent life, and therefore should be treated differently. In this way, healthcare remains indispensable to the pursuit of social justice, especially in an unjust world marked by persistent vulnerability.

Although healthcare's Red Queen problem is not structurally distinctive, its dynamics for healthcare are especially troubling. One important way to address healthcare's Red Queen problem is through claim 2) in the triad above: by reducing healthcare's impact on the climate system. In other words, mitigation can help resolve healthcare's Red Queen problem. Mitigation does this by addressing the tension at the heart of the triad, but in doing so it raises questions of justice.⁶⁹ As I mentioned above,

⁶⁹ I want to be clear here that mitigation is not the only way to resolve healthcare's Red Queen problem. Nor do I think that mitigation alone will be sufficient to fully address the tension and instability inherent in it. One could, for instance, deny the connection between health and climate

mitigation is burdensome and so we are back to the question of fair shares. Specifically, healthcare's Red Queen problem forces us to think about how healthcare systems reconcile achieving their goals with mitigation. As healthcare fulfilling its goals is a demand of social justice, and mitigation is there to bring about healthcare stability, then this issue is how to marry social justice and climate justice for healthcare institutions.

1.5. Justice and climate change mitigation in healthcare

Having examined the challenges that face healthcare as a result of emissions and the burdens of mitigation, we are in a position to connect this more clearly to issues of justice. As I have mentioned, the primary question under consideration is one of distributive justice. It is important in this introduction to explain how 'justice' is used in this thesis.

There are many uses of the word 'justice'. We might speak of justice in regards to criminal law or in retribution. We may also use 'justice' to suggest an adequate representation of something, "Joanne's cooking really does justice to her Mum's recipes". There is no universally agreed meaning of the word justice that applies in all contexts and to all ends, and it is unlikely that I am going to overcome that here. Even in restricted contexts, for example in moral and political philosophy, there is disagreement over how 'justice' ought to be understood. Nonetheless, I want to give an idea of how the word justice is understood in the particular moral context here of climate change and healthcare.

change to reduce the tension. Or claim that healthcare's goals are different such that there is no tension. I do not discuss such sceptical responses in this thesis. Sufficiently reducing emissions to break the connection between climate change and health clearly requires action outside of healthcare systems.

For Rawls, justice is about *fairness* and is a measure applied to social institutions just as truth is a measure of systems of thought.⁷⁰ If a belief is untrue, that is grounds to revise that belief and if social institutions are unjust then, similarly, according to Rawls they need to be changed. *Distributive* justice is concerned with giving each person their due in terms of the distribution of burdens and benefits in society. As some philosophers describe, "principles of distributive justice are therefore best thought of as providing moral guidance for the political processes and structures that affect the distribution of benefits and burdens in societies".⁷¹ Whilst, unlike Rawls, this thesis focuses on a particular organisation rather than social institutions or the basic structure, the underlying thinking is the same. To evaluate the actions of organisation, or how they achieve their goals and to provide an account of how they should change we require an account of the demands of justice.

Similarly to Rawls then, concepts and ideas of justice are there to shape the structure, organisation and function of organisations such that just entitlements to goods are fulfilled. We can imagine healthcare as a sort of machine designed to distribute goods such that we end up with a certain desirable pattern of health in society. Ideals of justice are there to adjust the dials on this machine. If we adjust the dials in this way we maximise health per unit of a resource. When the dials are adjusted another way, we minimise unjust health inequalities. Another configuration of the dials leads to ensuring that health needs are met, and so on. The task then is to see how principles of justice in healthcare can help to arrange the dials such that we can reconcile healthcare's overarching mission with minimising its emissions in line with healthcare's fair share of addressing climate change. In this thesis, justice is also concerned with who has what responsibilities to address injustice in the way that the

⁷⁰ For Rawls, justice is "the first virtue of social institutions, as truth is of systems of thought." *Ibid.* p.3

⁷¹ Lamont, J., & Christi, F. Distributive Justice, *The Stanford Encyclopedia of Philosophy* (Winter 2017 Edition), Edward N. Zalta (ed.), Retrieved from:
<<https://plato.stanford.edu/archives/win2017/entries/justice-distributive>

NHS is currently structured, as well as to transform healthcare in line with the requirements of justice.

This thesis is concerned with the principles of justice that help govern what healthcare's fair share of mitigation burdens are. A principle is a statement or proposition that can apply to at least one case.⁷² Usually principles have quantifiers and qualifiers so they can be expressed in the form "for all X, subject to certain conditions, Y is the case". For example, in cardiac physiology, Starling's law of the heart states that the amount of blood pumped out of the left ventricle will increase in proportion to the amount of blood arriving due to increased contractility of cardiac muscle. Under normal cardiac physiology and absent unusual circumstances, this is a principle of cardiac physiology. Some principles can be evaluative if they say that some state of affairs are good or bad. Normative principles are those that guide behaviour by having normative operators like 'ought', 'should', 'permissible' and so forth. Mill's harm principle is an example of a normative principle.⁷³ Principles are understood in this thesis as useful shorthands to guide what morally ought to be done in the world.

Whilst I rely on principles, I want to be clear that I am not adopting or advocating for a form of 'principlism' which is a specific approach to bioethics.⁷⁴ Just as we should not think of cardiologists as adopting a form of principlism because they subscribe to Starling's law and other principles of cardiac physiology, similarly we should not think of this thesis in terms of principlism because it relies on principles of justice. In appealing to principles for normative guidance, the advantage is that we can have a

⁷² List, C., & Valentini, L. (2016). The Methodology of Political Theory. In Cappelen, H., Gendler, T., & Hawthorne, J (eds), *The Oxford Handbook of Philosophical Methodology* (525–553). Oxford Handbooks, OUP. p.11

⁷³ In *On Liberty*, Mill famously states that, "The only purpose for which power can be rightfully exercised over any member of a civilized community, against his will, is to prevent harm to others." Mill, J. S. (ed.) (1991). *On Liberty and Other Essays*. Oxford University Press.

⁷⁴ Beauchamp, T. L., & Childress, J. F. (2013). *Principles of biomedical ethics* (7th ed.). Oxford University Press.

degree of confidence in consistent guidance across the various particular problems healthcare faces in decarbonisation.

In the next chapter I explain further how I go about constructing principles of justice to help answer what healthcare's fair share should be when adopting mitigation policies.

1.6. Research questions

The overarching question this thesis is concerned with healthcare's fair share of the burdens (and benefits) of adopting policies to address their GHG emissions. In turn, I address three main sub-questions:

1. The exceptionalism question: should healthcare (i.e. the NHS in England) be treated differently when it comes to climate change mitigation?
2. The sustainability question: how can healthcare's valuable role in social justice be reconciled with the burdens of addressing climate change?
3. The question of duty-bearers: within a healthcare organisation, how should responsibilities for ensuring that healthcare does its fair share of climate change mitigation be distributed?

All three of these questions are an important part of thinking about how a healthcare system responds to climate change. The issue of healthcare's fair share of the burdens (and benefits) of adopting policies to address their carbon footprint is, in part, comparative. When thinking about a globally distributed issue like climate change that necessitates coordinated action across various actors with divergent historic emissions and different histories of injustice, we are contrasting their different roles in achieving the goals of mitigation.

The core argument of the thesis defends an ability to pay principle. That is, healthcare's fair share of the burdens of mitigation should be determined based on healthcare's capacities to mitigate. In particular, the thesis outlines constraints where

healthcare systems have an *inability* to pay. The ability to pay principle is understood as a sufficientarian concept. As such, a threshold is placed around emissions that are necessary to secure a decent minimum of health, or to secure a capability to be healthy, and treats them differently. The working assumption then is that all healthcare emissions are liable to the burdens of mitigation, unless mitigation would stop healthcare securing a decent minimum of health. In this instance we say healthcare has an inability to pay and these emissions are permissible. Healthcare's special role is therefore acknowledged as excusing some emissions, but healthcare is not exempt from mitigation.

Sufficientarianism is defended primarily in chapter seven. For now, the reason for adopting sufficientarianism can be stated briefly. Sufficientarianism is important for helping the NHS to decarbonise fairly because it is more plausible than rivals, like egalitarianism or prioritarianism, in helping healthcare address the distinctive problems it faces with regards to its emissions in a practical way. Shlomi Segall makes a general point about sufficientarian theories in healthcare, observing that one appeal is that they lead to clear and definitive policy prescriptions compared to rival principles.⁷⁵ The appeal to sufficientarianism here then is similar and made on pragmatic grounds, rather than foundational ideas about the absolute merit of sufficientarianism.⁷⁶ In other words, the positive case for sufficientarianism is based on pragmatism and its ability to solve distinct problems than for foundational reasons, and the negative case is how sufficientarianism fares at this in comparison to rivals. The problem is that there are limits to the amount of GHGs that can be pumped into the atmosphere without damaging ecosystems and in turn threatening harms to people, including health harms.⁷⁷ Healthcare must operate within those boundaries

⁷⁵ Segall, S. 'Health', in Olsaretti, S. (ed.), *The Oxford Handbook of Distributive Justice* (pp. 460-478), Oxford Handbooks, OUP, p.468

⁷⁶ Say for instance, because it is the requirement of a compassionate spectator. Crisp, R. (2003). Equality, Priority, and Compassion. *Ethics*, 113(4), 745–763. <https://doi.org/10.1086/373954>

⁷⁷ Rockström, J., Gupta, J., Qin, D., Lade, S. J., Abrams, J. F., Andersen, L. S., *et al.* (2023). Safe and just

whilst itself providing the goods of healthcare that also can help to avert health harms.

One way to think about how sufficientarianism helps provide practical answers to the moral problem facing healthcare is to examine how sufficientarian principles outline their moral demands as well as how they assess whether these claims have been satisfied. The main sufficientarian claim is that we should evaluate the distribution of goods differently depending on whether people have enough, so sufficientarian principles tend to stress the moral urgency absolute of deprivation. As Joseph Raz describes it, our moral concern is with "the hunger of the hungry, the need of the needy, the suffering of the ill and so on."⁷⁸ Healthcare is oftentimes necessary to help address some of the needs of the needy, the suffering of the ill and the like. Other principles of distributive justice are also concerned with deprivation but, unlike prioritarianism and egalitarianism, sufficientarian principles are non-comparative. That is, sufficiency is concerned with whether individuals have enough which does not require intrapersonal comparisons unlike prioritarianism and egalitarianism, where we must compare relative levels of deprivation to assess whether justice has been fulfilled. For sufficientarians, justice has been fulfilled once individuals have enough, but as prioritarianism and egalitarianism compare claims relatively there is a greater risk of perpetual redistribution.⁷⁹ Being able to mark a point at which justice has been fulfilled by demarcating a morally relevant threshold is useful in placing environmental constraints on healthcare whilst ensuring that urgent needs are met.

The reliance on sufficientarianism leads this thesis to defend treating healthcare differently to other polluters to a certain degree by demarcating emissions that are permissible for healthcare. However, it is important to be clear that this idea is a long way off giving healthcare a "free pass" to pollute. Healthcare systems in wealthy,

Earth system boundaries. *Nature*, 619(7968), 102–111. <https://doi.org/10.1038/s41586-023-06083-8>

⁷⁸ Raz, J. (1988). *The morality of freedom*. Clarendon Press, p.240

⁷⁹ Raz calls these issues satiability, that moral principles can be satisfied fully. *ibid* p.235-244

historically high-emitting countries are argued to have extensive, weighty and burdensome mitigation responsibilities in this thesis. Any changes in healthcare that are brought about as a result of adopting the principles defended here are potentially quite radical. Nevertheless, a key goal of the thesis is to ensure that healthcare's socially valuable role remains fulfilled even amongst transformative sustainable change.

1.7. Thesis overview

This thesis is divided into three main parts. I will give an overview of each part here. A more detailed roadmap of part II is provided at the start of that section.

Part I provides the relevant background context for the thesis and is formed of three chapters. It includes this introductory chapter as well as a chapter on method and a chapter on the scientific and philosophical background.

In the second chapter a further defence of the idea that healthcare's emissions raise questions of justice is provided. There are some who could be taken as arguing that the relevant context in which claims of justice arise is not present regarding healthcare emissions. I argue against this view. Once this is in place, I argue that we need principles of justice to help guide healthcare doing its fair share of mitigation, I spend the rest of chapter two explaining my method of constructing principles of justice. A method known as 'constructive interpretation' is used to develop the principles of justice relied upon in the thesis. It is argued that principles should be constructed by reference to the organisations and practices they are supposed to govern.

Chapter three runs through the relevant scientific background to climate change, healthcare emissions and the health effects of climate change. This helps situate the thesis in the overall debate around climate change. The relevant literature from both

political philosophy and bioethics is reviewed. This highlights where these fields are yet to address the important issue of what principles of justice are necessary for healthcare systems to do their fair share in global efforts to tackle climate change.

This thesis is presented in an alternative format wherein a multi-part collection of papers have been submitted to journals for publication as the thesis progresses. The bulk of the argument is therefore defended through five chapters which are published or 'publishable'. These five chapters are contained in part II of the thesis. At the start of part II, I dedicate a short chapter to providing an overview of these papers and explain how they fit together.

The third and final part of the thesis is the concluding chapter where I draw together all the material that has come before and detail some lines for future research.

Chapter 2

2. The circumstances of justice and method

This chapter has two purposes. First, is to offer a detailed defence of the idea that questions of justice are central to addressing healthcare's GHG emissions. The introduction touched on the problem of healthcare mitigation as one of justice raising questions of fairness, but as some may object it is important to fully defend this. If questions of justice have no place in how we understand what healthcare should do to mitigate its GHG emissions, the prospects for this thesis are particularly limited.

The second task of this chapter concerns method. Since climate change mitigation in healthcare raises questions of justice, it is important to be clear on the method I take in order to construct an answer to such questions. Questions of justice in general, and of climate justice in particular, tend to fall under the purview of political philosophers and so I adopt methods from political philosophy in this thesis. However, much of the philosophical examination of climate justice concerns international negotiations between states, rather than what an organisation like healthcare should do. So, the methods utilised here are sensitive to the organisational perspective taken. It is important to note that analysing healthcare invites methods from bioethics. The arguments presented ought to be of interest to bioethicists even the methods are taken from political philosophy.

2.1. Healthcare emissions and the circumstances of justice

In the introduction, I claimed that how we determine what healthcare should do about its greenhouse gas emissions raises questions of distributive justice. Chapter 3 provides a more detailed background on climate change, the effects of climate change

on health, and healthcare's GHG emissions. For now, the claim that addressing healthcare emissions is fundamentally an issue of distributive justice is defended.

There are numerous tasks that healthcare systems can, and perhaps should, undertake to mitigate their GHG emissions. A detailed exploration of these tasks occurs in chapter 10 when I consider how to allocate these tasks within healthcare. There is no need to get too far into the details of exactly how healthcare systems can mitigate their GHG emissions now. The issue here is what *kind* of problem healthcare faces with regards to its GHG emissions. Is healthcare facing a technical problem where science can track healthcare GHG emissions and show where they can be reduced, or is this a normative problem raising questions of justice in what healthcare *should* do? I argue it is an issue of the latter. Though this is not to say there are no technical scientific issues or that empirical issues are irrelevant.

To investigate how mitigating healthcare's GHG emissions raises questions of distributive justice these issues are considered in light of the 'circumstances of justice'. The circumstances of justice are the background conditions that give rise to justice claims. I argue that such conditions are present in how healthcare addresses its GHG emissions. Furthermore, even if the circumstance in which mitigating healthcare GHG emissions are not those of justice, we still rely on concepts from justice and normative political theory to motivate the transformation of healthcare systems away from generating GHG emissions. Ideals of justice are required to help guide healthcare mitigation fairly, in particular to govern the cooperation and conflict that arises as we establish who should do what to address healthcare emissions, as well as to evaluate why healthcare emissions are unjust in the first place.

2.1.1. The circumstances of justice

Discussions of justice presuppose a certain background context. This context is

known as 'the circumstances of justice'. As Rawls puts it "the circumstances of justice may be described as the normal background conditions under which human cooperation is both possible and necessary."¹ Philosophers have discussed these conditions for some time. Thomas Hobbes, for example, famously describes a state of nature where there is no government, no ruler, no authority and no civil society. The state of nature, according to Hobbes, is anarchy and inevitably leads to a horrifying situation of a 'war of all against all'. In the state of nature, there can, however, be no issues of justice: "To this warre of every man against every man, this also is consequent; that nothing can be Unjust. The notions of Right and Wrong, Justice and Injustice have there no place."² In Hobbes' view, a sovereign *Leviathan* was necessary to avert the state of nature and a war of all against all.

David Hume offers an early analysis of the circumstances of justice. It is Hume's account where more contemporary philosophers like Rawls take inspiration.³ For Hume, the circumstances of justice arise because the world which humans occupy is one where (1) resources are limited, but through coordination and cooperation humans can produce more goods, and (2) human benevolence is limited and there is moral conflict.⁴ In simple terms, there are the 'objective circumstances' of material scarcity and, the 'subjective circumstances' of conflicting goals. Rawls goes beyond material scarcity and conflicting goals in his discussion of the circumstances of justice and makes a number of assumptions to help set up his arguments.⁵ However, for my purposes material scarcity and conflicting goals are sufficient to motivate my arguments. Fundamentally, the circumstances of justice are about when humans must

¹ Rawls, J. (2005). *A Theory of Justice: Original Edition*. Belknap Press. p.126

² Hobbes, T. (2017). *Leviathan*. Penguin.

³ Rawls (2005), *op. cit.* note 1.

⁴ Hume, D., & Selby-Bigge, L. A. (Lewis A. (1902). *Enquiries concerning the human understanding and concerning the principles of morals* (2nd ed.). Clarendon Press. Section 3.1

⁵ For instance, Rawls assumes that individuals live together in the same place, have roughly the same powers, that they are broadly aware their situation raises issues of justice, they are each trying to pursue their own good, that each are not bound by special ties like family and so forth.

cooperate and rely on principles of justice to facilitate the production and fair distribution of the benefits of cooperation. That is, justice is relational for we are interested in justifying the relations between persons engaged in social cooperation. As Forst sketches this: "a "context of justice" must exist: a context of political and/or social relations of cooperation as well as conflict, which calls for a just order, the establishment of which the members of that order owe one another."⁶

Moderate scarcity is key to the objective circumstances of justice. If there was abundance all needs can be met so justice is unnecessary. Under conditions of extreme scarcity questions of justice are not possible. The subjective condition refers to moral disagreement. Rawls points to our differing conceptions of the good and disagreements over how to realise them that lead us to make conflicting claims on resources.⁷ The objective and subjective conditions demarcate when it is meaningful to discuss issues of justice. As Rawls puts it, "Thus, one can say, in brief, that the circumstances of justice obtain whenever mutually disinterested persons put forward conflicting claims to the division of social advantages under conditions of moderate scarcity. Unless these circumstances existed, there would be no occasion for the virtue of justice."⁸ Disagreement over what goals we should have or how we achieve the goals we do agree on, as well as conflicting claims over limited resources, necessitate ideals of justice to adjudicate. If we could eliminate either disagreement over how to resolve conflicting goals or scarcity of resources, then there would be no need for justice. However, the circumstances of justice only dictate that we need principles of justice, not what those principles ought to be. So, there is a further question of what principles of justice we should construct.

⁶ Forst, R. (2011). *The Right to Justification: Elements of a Constructivist Theory of Justice*. Columbia University Press. Edited by Jeffrey Flynn. p.188

⁷ Rawls 2005 *op. cit.* note 1, p.129

⁸ Rawls 2005 *op. cit.* note, p.128

There is a second important point about the circumstances of justice. Hopefully the significance of this point will become more apparent as the discussion of the circumstances of justice proceed. But it should be emphasised now, that the circumstances of justice do not only articulate the background context where claims of justice arise. We also need to be sensitive to the specific circumstances we face and how they raise distinct questions of justice. It is not just that there are general conditions where questions of justice arise, but that in these particular circumstances we face a particular set of questions of distributive justice. This point is important for the principles that we eventually alight upon.

With the objective and subjective conditions in place, let us move on and discuss how some theorists can be read as denying that healthcare emissions create conditions where questions of justice arise. This would negate the need for justice leaving healthcare decarbonisation as a purely practical issue. One objection regards moderate scarcity in healthcare GHG emissions. The basic idea is that if there is no budget of GHG emissions to be distributed, then there is no relevant good to be shared. When it comes to the subjective condition, some claim that reducing healthcare emissions sits squarely within the overarching goals of a healthcare system. If there is no conflict between reducing healthcare emissions and healthcare meeting its goals, then there can be no normative questions. If reducing healthcare emissions is a no-brainer with broad consensus then justice has no place in the discussion.

2.1.2. Against an emissions budget

The objective condition states that issues of justice are not possible in conditions of extreme scarcity. One argument says that the atmosphere's capacity to absorb any further GHG emissions is so limited that there cannot be a meaningful discussion about permissible emissions. If no emissions are permissible, then there cannot be a question of justice about who should be permitted to produce GHGs and under what

circumstances, including for healthcare. If there can be no emissions then, so the argument goes, decarbonising healthcare is just a technical issue.

Tim Hayward makes this sort of argument and suggests that debates around a right to emit GHGs are obsolete in light of the extreme limits on the global absorptive capacity of the atmosphere.⁹ Cristina Richie makes a similar claim in the context of medical Artificial Intelligence. Richie is sceptical that measuring carbon emissions is useful for sustainability and argues,

"the motivation for carbon calculations is to reduce carbon either through carbon capping or carbon allocation. However, this assumes that there is a sustainable amount of carbon that can be emitted on a yearly basis. This is untrue. The amount of "safe" carbon in the atmosphere—calculated to be 350 parts per million—has already been exceeded. Allocating carbon to each country does not work within the current environmental problem that requires a zero, or negative, emission solution."¹⁰

A plausible inference from Richie and Hayward's claims are that if the Earth's absorptive capacity is extremely scarce then there can be no questions of justice regarding healthcare GHG emissions. If the budget has been blown and there is nothing to allocate, what can a fair share of nothing be? At the very least, Richie's comments serve as a starting point to consider what extreme scarcity in the Earth's absorptive capacity means for questions of justice in healthcare.

Start with Richie's claim that we need a zero or negative emission solution. Richie draws this conclusion from the idea that atmospheric limits on GHG absorption have been exceeded. The 350 parts per million figure quoted by Richie is taken from a

⁹ Hayward, T. (2007). Human Rights Versus Emissions Rights: Climate Justice and the Equitable Distribution of Ecological Space. *Ethics and International Affairs* 21 (4):431-450.

¹⁰ Richie, C. (2022). Environmentally sustainable development and use of artificial intelligence in health care. *Bioethics* 36 (5):547-555. <https://doi.org/10.1111/bioe.13018>

scientific paper claiming there are significant risks from going above this threshold, as well as papers demonstrating the threshold has been passed.¹¹ It is important to be clear that a safe limit depends on more than science alone. The scarcity of emissions depends on a balance between reducing the harms of climate change and not imposing excessive costs when it comes to reducing the emissions that are necessary for important human projects. This balance is itself an issue of distributive justice.¹² Distributive justice has already entered the picture, but I will assume that Richie is correct, and the safe limit has been breached. What does this mean for allocation?

Richie is not clear on what she means by 'zero or negative emission solutions'. Zero emissions could mean either net zero or quite literally zero emissions – also known as absolute zero. Net zero and absolute zero however are very different. Net zero, as a descriptive scientific concept describes a theoretical ledger where atmospheric concentrations of GHGs aggregate to zero because flows of GHGs into the atmosphere are balanced by an equivalent absorption of GHGs by carbon sinks.¹³ Healthcare Without Harm describe absolute zero as, "Zero emissions means just that. It is the point where an entity does not produce any CO₂ equivalent emissions and is totally emissions free, without any compensation mechanisms (e.g. offsets)."¹⁴ Absolute zero emissions is different from net zero as the balancing of flows of GHGs and sinks to net out emissions to zero is absent. Negative emissions, like net zero, follows an accounting approach to emissions but the balance between GHG emissions and

¹¹ Hansen, J., Sato, M., Kharecha, P., Beerling, D., Berner, R., Masson-Delmotte, V., *et al.* (2008). Target atmospheric CO₂: Where should humanity aim. *GSA Today*, 18(9),

14. <https://doi.org/10.48550/arxiv.0804.1126>

¹² Caney, S. (2018). Climate Change', in Serena Olsaretti (ed.), *The Oxford Handbook of Distributive Justice* (pp. 664-688.), Oxford Handbooks, OUP.

¹³ Fankhauser, S., Smith, S. M., Allen, M., *et al.* (2022). The meaning of net zero and how to get it right. *Nature climate change*, 12(1), 15-21. <https://doi.org/10.1038/s41558-021-01245-w>

¹⁴ Healthcare Without Harm. (April 2021). Global Road Map for Health Care Decarbonization: A navigational tool for achieving zero emissions with climate resilience and health equity. Retrieved from: <https://healthcareclimateaction.org/sites/default/files/2021-08/Global%20Road%20Map%20for%20Health%20Care%20Decarbonization.pdf> p.53

carbon sinks is not zero; rather, more GHGs are absorbed than released.

Absolute zero, net zero and net negative emissions, as described, refer to scientific concepts. But each can form the basis of a policy framework. For instance, net zero is currently the hegemonic policy framework used to organise global efforts to address climate change where there is a question of how all actors can individually and collectively achieve a balance between sinks and sources of GHGs.

The only policy that is compatible with Richie's claim that there is no carbon to allocate is absolute zero emissions because net zero allows some emissions as long as they are netted out. But absolute zero emissions are impossible. Humans themselves are a source of CO₂ and methane. Healthcare systems rely on treatments that contain GHGs, like metered-dose inhalers.¹⁵ Many metered-dose inhalers can be switched to those that do not contain GHGs, but there are some who would struggle to use an alternative, like young children and those with severe respiratory disease. Perhaps there may be a technology where patients can exhale into some kind of device that captures the hydrofluorocarbons from metered-dose inhalers and deals with these GHGs, but we still have emissions up until that point. Healthcare Without Harm's actions to produce a zero-emission health sector by 2050 include "low-carbon pharmaceuticals" which are not, contrary to their claims, no carbon.¹⁶ Thus, even deep and radical decarbonisation would still leave some residual GHG emissions. Residual GHGs raise the question of how to allocate those emissions. Where GHGs are particularly difficult or impossible to eliminate, which are the ones that we should continue and which activities that generate those emissions do we stop? This is a question of distributive justice since deciding which emissions should cease and which should continue will result in a different distribution of benefits and burdens.

¹⁵ Parker, J. (2023). Barriers to green inhaler prescribing: ethical issues in environmentally sustainable clinical practice. *Journal of Medical Ethics* 49 (2):92-98.

¹⁶ Healthcare Without Harm 2021, *op. cit.* note 14

As an absolute zero emissions target is unfeasible if not impossible, Richie is left with the question of how to allocate any residual emissions. Furthermore, there is a choice of whether to address residual emissions through a net zero framework or a net negative framework. In other words, how far should carbon sinks be utilised to address residual emissions? The choice between net zero and net negative also raises questions of distributive justice. Extensive details of these policies are not necessary to recognise that one policy is more burdensome than the other. That is because net zero is contained within net negative. To achieve net negative GHG emissions, one must have already surpassed net zero, so more is required to go from net zero to net negative. Hence each policy is associated with slightly different burdens (and benefits), and we will require principles and ideals from distributive justice to help adjudicate between each of these.

Under net zero and net negative, it is not just carbon to be allocated but carbon sinks. Carbon sinks are environmental or technological ways of removing carbon from the atmosphere. Forests, oceans and soil all serve as carbon sinks, and humans have opportunities to enhance these to accelerate removing carbon from the atmosphere. But there are also speculative technologies like carbon capture. Neither method of carbon capture offers an unlimited route to removing carbon emissions. A 'Brazil-sized forest' is thought to be necessary to meet a 1.5C target.¹⁷ Vast amounts of land are highly likely to be required to offset emissions. Any residual emissions must be absorbed on net zero, and more than residual on net negative. How much carbon we allocate as residual must be feasibly captured by carbon sinks as anything that is not accounted for in carbon sinks pushes the balance into the positive. Carbon sinks are zero sum. As a limited resource my pollution shrinks the share of carbon sinks for

¹⁷ Gabbatiss, J. (February 2021). Analysis: Shell Says New 'Brazil-Sized' Forest Would Be Needed to Meet 1.5C. *Carbon Brief*. Retrieved from: www.carbonbrief.org/analysis-shell-says-new-brazil-sized-forest-would-be-needed-to-meet-1-5c-climate-goal.

others. Allocation questions occur not just on the emissions side of the equation but on the offsets and sinks side too. Not to mention that carbon sinks only deal with carbon, and healthcare emissions go beyond just carbon dioxide (e.g. the hydrofluorocarbons from metered-dose inhalers).

The objective condition of the circumstances of justice tend to focus on how certain benefits or goods are distributed. However, climate change raises questions about how burdens are distributed. Reducing emissions, whatever target one adopts, entails burdens, as agents must forego certain goods to avoid those emissions, or change how they obtain those goods using fewer emissions.¹⁸ Such changes however often entail costs, including opportunity costs. Though, even on this count, some may deny that there are questions of justice in the distribution of *burdens* because 'burdens' is the wrong framing. Rather, we should see the costs as 'investments' since accepting these burdens have downstream benefits.¹⁹ I recognise that decarbonising healthcare often presents opportunities to improve and invest in healthcare. Investments are, however, still burdens because they entail costs and involve people taking actions they would not otherwise have done. However, not all burdens are investments since some costs simply do not have a downstream payoff, or if they do, the payoff is so remote from the initial action that calling it an investment is a stretch.

Consider catalytic cracking technologies that can take nitrous oxide produced by maternity units and break it down into nitrogen and oxygen. For people giving birth, this means that when they use the analgesic 'gas and air' for pain relief, they are no longer exhaling a greenhouse gas (nitrous oxide).²⁰ This has the potential to reduce

¹⁸ Caney 2018 *op. cit.* note 12

¹⁹ This issue of framing was raised by a peer reviewer for paper 3 'Sufficiency and Healthcare Emissions' raised. (Parker, J. (2025). Sufficiency and healthcare emissions. *Bioethics*, 1–9. <https://doi.org/10.1111/bioe.13400>)

²⁰ Entonox is a 50:50 mix of oxygen and nitrous oxide. Nitrous oxide is a greenhouse gas with a global warming potential around 300 times greater than CO₂. Furthermore, it has a long atmospheric lifespan of around 120 years. It is also ozone depleting. So nitrous oxide is an important GHG to address in

nitrous oxide emissions from maternity care by up to 80%.²¹ However, installing the technology is expensive.²² Catalytic cracking does not improve the experience or safety of childbirth. Catalytic cracking does not make healthcare systems cheaper, more efficient, more effective, facilitate greater access, improve health inequalities or any other goal that policymakers and patients typically have for healthcare. Simply, the technology helps to address global warming. Clearly, mitigating climate change has downstream benefits, but given the distributed nature of climate change and the benefits that may obtain, it seems a stretch to say that catalytic cracking is an investment in the usual sense of the term. Rather, it is easier to say that installing this technology entails burdens. There is then a further question of whether these burdens are justified.

Finally, calling transformations in healthcare in the pursuit of environmental sustainability an investment has the potential to shut down further considerations of justice as investments seem, on the face of them at least, more justified. It is therefore important to be judicious with what we call investments to ensure that changes to healthcare are properly normatively assessed.

Net zero and net negative emissions are targets, and one issue is which target healthcare should adopt. But adopting the target and how we get there are separate

mitigation efforts.

²¹ Pinder, A., Fang, L., Fieldhouse, A., Goddard, A., Lovett, R., Khan-Perez, *et al.* (2022). Implementing nitrous oxide cracking technology in the labour ward to reduce occupational exposure and environmental emissions: a quality improvement study. *Anaesthesia*, 77(11), 1228–1236. <https://doi.org/10.1111/anae.15838>

²² It is challenging to find exact quotes for how much this technology costs. However, a report from the Royal College of Anaesthetists notes that catalytic cracking "is however costly and has not gained popularity in the United Kingdom". See: Raju, & Hickman. (October 2020). Sustainability: medical gases. *Royal College of Anaesthetists*. p.6 Retrieved from: <https://rcoa.ac.uk/sites/default/files/documents/2021-12/Medical%20Gases%20Final.pdf>. See also: Gynther, A., Pearson, F., & McGain, F. (2021). Nitrous oxide use on the labour ward: Efficacy and environmental impact. *Australasian Anaesthesia*, 193–202. p.198 who quote A\$46000 per mobile catalytic cracking unit.

questions. Rapid and fundamental change in healthcare systems undertaken at scale will, at a minimum, reform healthcare but may well be transformative. There must be a transition between healthcare now, and a healthcare system of the future which does not rely on fossil fuels and GHGs in the way it currently does. In some ways then the question of how to mitigate healthcare emissions is a question about what kind of healthcare system we want. There is however likely to be disagreement on both on what kind of healthcare system we should aim for when mitigating emissions as well as the best route to get there. Even under is extreme scarcity of GHG emissions, there are still important questions of justice to answer.

2.1.3. Co-benefits and a harmony of ends

A second objection to the circumstances of justice pertains to the subjective condition. The subjective condition arises from the plurality of views seen in society, leading to moral disagreement and conflicting claims on resources. Justice is necessary to adjudicate such disagreement. However, if efforts to tackle healthcare's environmental footprint align with its goal to protect and promote health, this eliminates important conflicts which concern justice. Part of the Red Queen problem is a tension between how healthcare achieves its goals and the wider consequences of these goals for human health. If there is a harmony of ends regarding the question of climate mitigation in healthcare and the goals of healthcare, justice is redundant.

Interconnections between human health and environmental protection lead many to point out that action to protect the environment frequently holds health benefits.²³

²³ Romanello, M., McGushin, A., Di Napoli, C *et al.* (2021). The 2021 report of the Lancet Countdown on health and climate change: code red for a healthy future. *The Lancet*, 398(10311), 1619-1662. Haines, A. (2017). Health co-benefits of climate action. *The Lancet Planetary Health*, 1(1), e4-e5. Scovronick, N., Budolfson, M., Dennig, F *et al.* (2019). The impact of human health co-benefits on evaluations of global climate policy. *Nature communications*, 10(1), 2095.

Sometimes this is framed using the concept of co-benefits.²⁴ I define a co-benefit as an action, not taken with the express aim of addressing climate change, which nevertheless helps to mitigate climate change. Policies that promote active travel, reduce air pollution and foster dietary change are health co-benefits because they both benefit the environment as well as improve health, by reducing the risk of cardiovascular and respiratory disease for instance. Authors are often keen to emphasise the health benefits of action to mitigate climate change. For example, some claim, "actions that protect the climate nearly always improve health as well."²⁵ If this is the case, then action taken by healthcare systems to reduce their environmental impact nearly always hold downstream, albeit indirect, health benefits.

Reducing healthcare's impact on the climate is also argued to improve healthcare systems, as well as having health co-benefits. It has been suggested that "early evidence indicates that interventions to reduce the long-term environmental damage of healthcare can provide opportunities for more immediate health protection and promotion, as well as improving system resilience, efficiency and financial savings... A sustainable health-care system will provide better and more efficient care, but transforming an entire, highly complex sector is not easy."²⁶ Others make a similar point, "placing sustainability at the core of the NHS's future offers opportunities to deliver better services, support healthier populations, and save costs".²⁷ A recent book highlights the benefits more plainly through its subtitle: "Environmentally Sustainable Primary Care: good for the planet, good for practices, good for patients".²⁸

²⁴ Karlsson, M., Alfredsson, E., & Westling, N. (2020). Climate policy co-benefits: A review. *Climate Policy*, 20(3), 292–316.

²⁵ Mortimer, F., & Pencheon, D. (2022) Do no harm: addressing the environmental impact of health care. *Nat Rev Dis Primers* 8, 38. <https://doi.10.1038/s41572-022-00372-8>

²⁶ *ibid*

²⁷ Issa, R., Forbes, C., Baker, C., *et al.* (2024). Sustainability is critical for future proofing the NHS. *British Medical Journal*, 385:e079259 doi:10.1136/bmj-2024-079259

²⁸ Sawyer, M., & Tomson, M. (2024) *Environmentally Sustainable Primary Care: Good for the planet, good for practices, good for patients*. Routledge

Now, if mitigating healthcare's GHG emissions is good for the planet, good for patients and good for healthcare, what could we disagree over? If sustainable healthcare systems are simply good, offering opportunities to reduce the environmental impact of healthcare as well as protecting and promoting health, increasing system efficiency, reducing costs, and ensuring access to healthcare, then mitigation seems like a no-brainer. A synergy between health promotion and environmental protection, as well as other opportunities to improve healthcare, makes it hard to see how there could be moral disagreements that lead to questions of justice.²⁹ If a sustainable healthcare system is simply better, aligns with healthcare's goals and has broader benefits, where is the room for moral disagreement necessary for the circumstances of justice to arise?

Enthusiasm for radical change in healthcare and the opportunities that environmental concerns have to act as a catalyst for change are understandable. However, the question arises as to what work environmental protection is doing when it comes to policies to change healthcare? If we can transform healthcare in such a way as to be more efficient, more effective, provide better services, reduce costs and overall better protect population health, what does it add if this also happens to be better for the environment? Shouldn't healthcare systems be pursuing this anyway, given their goals? It seems surprising, therefore, that healthcare systems have not already decoupled from environmental damage if this way of providing healthcare is manifestly good. Ideas of sustainability and environmental protection may provide the catalyst we need to bring about the radical changes required to improve healthcare systems, but it is unsurprising that such change has not already happened because the need to protect the environment and to make human practices more sustainable has

²⁹ Macpherson, C., Smith, E., & Rieder, T. (2020) Does Health Promotion Harm the Environment?, *The New Bioethics*, 26:2, 158-175, DOI: 10.1080/20502877.2020.1767918. Richie, C. (2019). *Principles of green bioethics: sustainability in health care*. East Lansing, MI: Michigan State University Press

hardly brought about change in wider society, despite the many benefits. Indeed, GHG emissions have risen exponentially since the first Intergovernmental Panel on Climate Change (IPCC) report, through various Conference of the Parties (COPs) and international negotiations and agreements.³⁰

Much work has been produced attempting to explain our collective failure to tackle climate change. One noteworthy aspect of such failure is a different, and altogether more sceptical challenge, to the idea of the circumstances of justice. If individuals are indifferent to issues of global and intergenerational justice and are unwilling to make important changes to protect the interests of distant persons, are questions of justice still meaningful?³¹ History shows that we are unwilling to make significant changes to societal systems including healthcare in light of environmental concerns, so can there be a question of justice to answer? I do not examine this question further as even if progress is slow, healthcare systems around the world have made commitments to address their environmental impact.³²

Return to the idea that because there are benefits to reducing healthcare's environmental impact that there are no questions of justice. I do not deny that there are potentially benefits and opportunities to healthcare decarbonisation. But we also need to consider the scale of the challenge facing healthcare in achieving sufficient decarbonisation. As I have mentioned, to some extent the scale depends on the target we adopt, and part of the issue is determining what a fair target for healthcare is. Nevertheless, it is worth reflecting on data that has been presented on the levels of decarbonisation required across society and in healthcare.

³⁰ Jamieson, Dale (2014). *Reason in a Dark Time: Why the Struggle Against Climate Change Failed – And What It Means for Our Future*. New York: OUP.

³¹ Brandstedt, E. (2015). The Circumstances of Intergenerational Justice. *Moral Philosophy and Politics* 2 (1):33-56.

³² World Health Organisation and Alliance for Transformative Action on Climate and Health. (2022). Commitments. Retrieved from: <https://www.who.int/initiatives/alliance-for-transformative-action-on-climate-and-health/commitments>

During the first year of the COVID-19 pandemic, scientists estimate that global CO₂ emissions fell by approximately 6% compared to 2019.³³ The IPCC reports that to have a 50% chance of keeping global temperatures below 1.5°C, emissions need to reduce by 48% between 2022 and 2030 and by 80% by 2040 compared to a 2019 baseline.³⁴ The huge disruptions to society caused by COVID-19 through lockdowns, reduced travel, reduced economic activities and so forth resulted in only 6% reduction in GHG emissions. So, we can imagine the level of disruption involved in sufficient decarbonisation along a pathway to the 1.5°C agreed target at the Paris Agreement. In terms of healthcare, Healthcare Without Harm suggest that to meet Paris-relevant targets, healthcare must reduce average global per capita emissions from 0.27 tons of CO₂e in 2014 to 0.05 tons of CO₂e by 2050 (i.e. 80%).³⁵ For reference, healthcare in the USA produces 1.72 tons of CO₂e per capita, in the UK it is 0.54 tons CO₂e per capita,³⁶ and in China it is 0.25 tons CO₂e.³⁷

If healthcare is going to reduce its emissions by 80%, we need to know how to share the burdens of doing that fairly. When healthcare systems put resources in to reducing its emissions, change what services are available, alter how healthcare is accessed and the like we need an account of justice to help navigate the trade-offs. There will be winners and losers and so we need to be able to justify the decisions that are made

³³ Liu, Z., Deng, Z., Zhu, B., Ciais, P., Davis, S. J., Tan, J., *et al.* (2022). Global patterns of daily CO₂ emissions reductions in the first year of COVID-19. *Nature Geoscience*, 15(8), 615–620. <https://doi.org/10.1038/s41561-022-00965-8>

³⁴ IPCC. (2021). IPCC Sixth Assessment Report Working Group III: Mitigation of Climate Change. Retrieved from: https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SummaryForPolicymakers.pdf at C.1.1 p.17. A limit of 2°C has more lenient reductions. A 67% chance of staying within 2°C requires emissions to be reduced by 27% by 2030 and by 52% in 2040 compared to a 2019 baseline.

³⁵ Healthcare Without Harm (2021) *op. cit.* note 14, p.48

³⁶ Bhopal, A., Bærøe, K., & Norheim, O. F. (2022). How do we decarbonise fairly? Emissions, inequities and the implications for net zero healthcare. *Journal of the Royal Society of Medicine*, 115(9), 337–340, p.338

³⁷ Healthcare Without Harm 2021, *op. cit.* note 14

and weigh the conflicting claims that are made on healthcare under emissions scarcity. An account of justice can help with this.

2.1.4. The circumstances of injustice

Hume and Rawls point out that certain background conditions can lead to questions of justice. However, what this view obscures is how questions of justice often arise in response to lived experience and the witnessing of injustice, rather than under idealised Rawlsian conditions. We are often moved to ask questions of justice in the face of *injustice*. As O'Neill reminds us “the circumstances of justice are in the first place, so to speak, the circumstances of injustice: they are the circumstances which generate the problems for whose resolution justice is needed.”³⁸

There are two important points to note from O'Neill's observation. One leads directly out of the Humean and Rawlsian view. Principles and concepts from justice are required to help us resolve problems. The second point, and the one I dwell on further now, is that concepts and principles of justice can help us recognise and understand injustice. Ideals of justice are helpful in highlighting when institutions are falling short of what justice requires. In short, we think healthcare systems should address their emissions not (just) because they can, but because climate change represents an injustice, and healthcare is party to this. So even if we think that the circumstances of justice do not obtain with regards to healthcare emissions and healthcare decarbonisation, justice is still required to help articulate what is wrong with the status quo in healthcare.

Philosophers have observed that humans' sense of injustice can be a powerful

³⁸ O'Neill, O. (1996). *Towards Justice and Virtue: A Constructive Account of Practical Reasoning*. Cambridge: Cambridge University Press. p.99

motivational force for action. Shklar, for example, notes the sense of injustice is "the special kind of anger we feel when we are denied promised benefits and when we do not get what we believe to be our due".³⁹ Injustice as a moral sentiment and special kind of anger also arises when we witness injustice, when others are denied their due or suffer inequalities, subjugation or domination. Amartya Sen also points to the sense of injustice as motivating action:

"What moves us, reasonably enough, is not the realisation of that the world falls short of being completely just - which few of us expect but - that there are clearly remediable injustices around us which we want to eliminate... It is fair to assume that Parisians would not have stormed the Bastille, Gandhi would not have challenged the empire on which the sun used not to set, Martin Luther King would not have fought white supremacy 'in the land of the free and the home of the brave', without their sense of manifest injustices that could be overcome. They were not trying to achieve a perfectly just world (even if there were any agreement on what that would be like), but they did want to remove clear injustices to the extent they could."⁴⁰

Sen makes a couple of helpful points. The first being that injustice must be remediable, there must be something that we can do to address the injustice. The second is that tackling injustice often requires moving towards something better — more rather than less just — not necessarily achieving 'perfect' justice. However, though injustice may arouse strong emotional responses, we cannot just rely on the emotions to highlight injustice. Misfortune may also produce strong feelings, but misfortune is not the same as injustice. Climate change provides a pertinent example of the risks of relying on emotion to point to injustice. Many argue that the diffuse nature of climate change is insufficient to trigger the moral sentiments, and that in part this explains our failures in this regard.⁴¹

³⁹ Shklar, J. N. (1990). *The faces of injustice*. Yale University Press. p.83.

⁴⁰ Sen, A. (2010). *The idea of justice*. Penguin. p.vii

⁴¹ Jamieson, 2014. *Op. cit.* note 27. Gardiner, S. M. (2011). *A perfect moral storm : the ethical tragedy of climate change*. Oxford University Press.

There is much room for pessimism about the progress that has been made on climate change and philosophers' role in helping to push for change. But one area that philosophers have been particularly helpful in is articulating climate change as an injustice. There is a huge gulf between those who are most exposed to the threats of climate change and their capacity to cope with climate change, and those who have benefitted from the activities that produce global warming.⁴² Industrial activities have made the rich rich, and left the poor poor, but it is the poor who will suffer the most from climate change and have contributed the least. Such an asymmetry plays into, and feeds off, background conditions of justice as well as historic injustices. Healthcare too reflects this pattern. Advanced healthcare systems in wealthy countries offering state of the art care produce far higher emissions than healthcare systems in developing nations which frequently struggle to offer even basic forms of care. And yet, it is those in the global south who stand to suffer the most from climate change.

To summarise, justice is central to how we understand and address the problem of how to determine what healthcare systems should do to address climate change. Justice is key at three stages. First, concepts and ideas from justice are useful to recognise a problem as one of injustice in the first place. When we look at healthcare's Red Queen problem it is important to be clear on the character of the issue and this is where ideals of justice are useful. Recognising healthcare emissions as contributing to injustice can motivate change. But in changing healthcare, we need to agree on the goals of a sustainable healthcare system. What does a decarbonised healthcare system look like? What climatic targets should healthcare aim for, for example net zero or net negative emissions? What goal we specify also raises questions of justice because of how those goals shift the distribution of benefits and burdens and we frequently disagree over what the acceptable share of benefits and burdens is. But specifying the goal only gets us so far, we still need to decide how to get there. This is the third stage.

⁴² See: Shue, H. (2014). *Climate justice vulnerability and protection*. Oxford University Press, USA.

Justice is necessary in the transition to a sustainable healthcare system to ensure that the transformation undertaken is fair.

2.2. Method - constructive interpretation

The purpose of this section is to articulate the method used in this thesis and provide a rationale for it. Its motivation is to answer the question of how the principles of justice defended in this thesis are justified. Philosophers, unlike scientists, do not always say what methods they are using. But as the method influences the results, it is important to be clear on the approach. The question in the background of this exploration of method is what makes a good piece of political philosophy? To be sure, the goal is not to settle debates about method in political philosophy nor suggest that the methodology adopted here is suitable for all projects in political philosophy.

It is typical to look to disciplinary conventions to help determine the method. Working as an epidemiologist means one can adopt the methodological standards employed in epidemiology, for example. Potentially, this thesis spans two main disciplines depending on how one views such things. On the one hand, the main subject of the thesis is healthcare, meaning the thesis closely aligns with bioethics. Political philosophy is also relevant given the focus on questions of justice. Climate change is the other main subject, and political philosophers have tended to address questions of climate justice. Though the method here is adopted primarily from political philosophy, it is easiest to think of the thesis as an example of 'practical philosophy' or 'engaged philosophy' since it addresses practical, real-world problems and relies on tools from moral philosophy to establish what ought to be done.⁴³

⁴³ Wolff, J. (2018). Method in philosophy and public policy: Applied philosophy versus engaged philosophy. In Lever, A., & Poama, A. (Eds.). (2019). *The Routledge handbook of ethics and public policy* (pp.13-24). Routledge. Sheehan, M., & Dunn, M. (2013). On the Nature and Sociology of Bioethics. *Health Care Analysis* 21 (1):54-69. DOI 10.1007/s10728-012-0234-z p.57

A focus on practical problems means a key aspect of the methodology is that the principles of justice relied upon are action-guiding and morally justified.⁴⁴ That is, the project undertaken here is *normative* in the sense of establishing norms that tell us what we ought to do.⁴⁵ As such, this is a project of practical reason where action-guiding is a measure of the reasons we have for action. When we make normative prescriptions, we are interested in the reasons, especially moral reasons, that determine what one should do overall by factoring in considerations that count in favour or against something. To be clear, the claim that we are interested in moral reasons for action does not see political values like justice as the whole of morality, only one important part.

A quick note on abstraction and how this relates to principles being action-guiding.⁴⁶ One potential barrier to principles being action-guiding is that it tends to be abstract, thereby lacking specificity in the actions it recommends. A form of act utilitarianism could recommend that we 'play the song that gives people the most pleasure on average'. This is action-guiding but makes a less specific recommendation than 'play Radiohead' or 'play Paranoid Android by Radiohead'. Abstraction is, however, part and parcel of practical reasoning.⁴⁷ To build theories we have to make some simplifying assumptions about the world, so we cannot get away from abstraction entirely. Furthermore, it can sometimes be difficult to have a full and accurate picture of the facts one is trying to work from. This is a pertinent issue here

⁴⁴ Brassington, I. (2013). What's the point of philosophical bioethics? *Health Care Anal.* 21:20–30 DOI 10.1007/s10728-012-0220-5.

⁴⁵ This leaves normativity to be very broad including the rules of chess, French etiquette, rules for driving, and so forth, since all of these provide norms for action. See: Broome, J. (2013). *Rationality through reasoning*. Wiley Blackwell. Chapter 2. Especially p.11 and p.26-27

⁴⁶ List, C., & Valentini, L. (2016). The Methodology of Political Theory. In Cappelen, H., Gendler, T., & Hawthorne, J (eds), *The Oxford Handbook of Philosophical Methodology* (525–553). Oxford Handbooks, OUP.

⁴⁷ O'Neill, O. (1987). Abstraction, Idealization and Ideology in Ethics. *Royal Institute of Philosophy Lecture Series* 22:55-69, pp.57-58. See also, O'Neill 1996, *op. cit.* note 30, pp. 38-44

since detailed information about healthcare emissions and what is required to decarbonise healthcare systems is lacking. Avoiding fully specifying exactly what actions are to be taken can also be an advantage of a theory. Specifying reasons for action and formulating principles with a degree of flex allows policy makers to fully utilise them within the realities they find themselves. This is especially important as it becomes clearer what decarbonising a healthcare system actually requires.

In the pursuit of morally justified reasons for action, a method called 'constructive interpretation' is adopted. In short, the constructivist element is part of a family of views whereby normative principles are generated from a certain standpoint, like in relation to practical activities and attitudes, or through a procedure of deliberation like Rawls' original position.⁴⁸ Constructivists believe that moral claims have normative force, not by reference to a mind-independent reality, but because of the way they are generated. The interpretivist aspect claims that, in the construction of moral principles, we should be sensitive to the organisation or practice the moral principles are intended to govern. The goal of normative theorising is to settle on the 'best interpretation' of the institution, organisation or practice under consideration. This sounds highly abstract; however, this section will flesh out exactly what the method of constructive interpretation means.

2.2.1. Normative Constructivism

One place to start in explaining the nature of constructivism is with the distinction between ideal and non-ideal theory. Ideal and non-ideal theory can be understood in several ways.⁴⁹ The main way that ideal and non-ideal theory is discussed here is as it

⁴⁸ Street, S. (2010). What is Constructivism in Ethics and Metaethics? *Philosophy Compass*, 5(5), 363–384. <https://doi.org/10.1111/j.1747-9991.2009.00280.x>

⁴⁹ Valentini, L. (2012). Ideal vs. Non-ideal theory: a conceptual map. *Philosophy Compass* 7/9: 654–664, 10.1111/j.1747-9991.2012.00500.x

relates to idealisation. Idealisation regards the factual constraints that influence the construction of normative principles. On this reading of ideal theory, the issue at stake is what sorts of feasibility constraints should apply when theorising in political philosophy? Should political philosophers be concerned with 'utopian' ideals free from the factual constraints of the real-world,⁵⁰ or should there be an orientation towards realist political philosophy? Similarly, within bioethics, philosophers have been keen to understand the role of exploring speculative scenarios, thought experiments and highly technical and theoretical issues, in contrast to a self-consciously practical bioethics.⁵¹

This issue cuts to the relationship between political philosophy's *purpose* and *method*. They come apart because more practical aims require paying closer attention to the relevant facts and context than pursuing theoretical aims.⁵² A prominent critic of 'fact-infested' political philosophy is Cohen who argues that justice should be thought of as a timeless value.⁵³ The purpose of political philosophy is therefore not to tell us what we should do, but rather what we should think.⁵⁴ Cohen develops his arguments in response to Rawls who, whilst relying on a number of idealising assumptions, does intend that political theory makes a practical difference. Here is not the place to engage with this disagreement between Rawls and Cohen.⁵⁵ The working

⁵⁰ The idea of utopia frequently arises when discussing ideal theory, but it is worth noting that apocalyptic thinking also plays a similar role in political philosophy. Indeed, my reference to the state of nature and arguments in a similar structure to Hobbes may be seen as relying on a degree of apocalyptic-type thinking to motivate some of the arguments.

⁵¹ Wilson, J. (2014). Embracing complexity: theory, cases and the future of bioethics. *Monash Bioeth. Rev.* 32:3–21 DOI 10.1007/s40592-014-0001-z. Brassington, 2013, *op. cit.* note 44. Some bioethicists think about the more theoretical and abstract questions as one of 'speculative bioethics' but I take it that these are broadly similar as they rely on a greater degree of abstraction from real-world contexts. See: Johnson, T., & Romanis, E. C. (2023). The relationship between speculation and translation in bioethics: methods and methodologies. *Monash Bioethics Review* 1:doi: 10.1007/s40592-023-00181-z.

⁵² Wilson 2014 *ibid.*

⁵³ Cohen, G. A. (2003). Facts and Principles. *Philosophy and Public Affairs* 31 (3):211-245.

⁵⁴ Valentini 2012, *op. cit.* note 49.

⁵⁵ See: Sangiovanni, A. (2007). Justice and the priority of politics to morality. *Journal of Political Philosophy* 16 (2):137–164. and Miller, D. (2008). Political philosophy for Earthlings. In Leopold, D. & Stears, M. *Political theory: methods and approaches* (pp. 29–48). New York: Oxford University Press.

assumption is that, whilst Rawls and Cohen see different purposes for political philosophy, there is space for both. The point, however, is that what we see as the purpose of our enquiry will be important for the method.

One way to do political philosophy then is through a division of labour. Some philosophers, in the spirit of Cohen, will seek timeless, fact-free, context-independent, almost Platonic, political values. Whilst other philosophers, in the spirit of Rawls, will use political philosophy to guide action in the world. One way to guide action is to utilise these timeless ideals since, if these moral claims are universally true then we can be confident in them. Ronald Dworkin contrasts this kind of approach, which he describes as 'from the outside in', with philosophy 'from the inside out'. Dworkin sketches the difference as follows:

"Theory can connect with practice in two different ways or directions. It can connect from the outside in: we can construct general theories of justice or personal ethics... and then try to apply those general theories to concrete problems. Or we can proceed in the opposite direction, from the inside out... We can begin with practical problems... and then ask which general philosophical or theoretical issues we must confront in order to resolve those practical problems."⁵⁶

Constructivists take an approach to the truth of moral claims that, like Dworkin, work from the inside out. In part, this is because of the numerous deficiencies with working from the outside in. Jonathan Wolff argues that applying moral or political theory to real-world problems raises issues of dogmatism of starting theory, under-determined policy outcomes, implausible policy recommendations, partial implementation being worse than doing nothing, unaddressed blind spots, and conceptual inadequacy.⁵⁷

⁵⁶ Dworkin, R. (1994). *Life's dominion: an argument about abortion, euthanasia, and individual freedom*. Vintage Books. p.28-29.

⁵⁷ Wolff 2018, *op. cit.* note 43.

Roses, planets, DNA and rivers all exist regardless of our attitude to them. Roads, drums, and knives are different, and whether something counts as a road or a drum or a knife depends on how we use it and thus the attitude we take towards it.⁵⁸ The question we have been looking at so far is whether moral claims are more like roses and planets that are attitude-dependent, or like drums and knives? Constructivists are moved by the latter idea, that moral claims are not true by virtue of a mind-independent reality but because of the relationship they have to our practical activities and attitudes.⁵⁹ This has much in common with pragmatism. As the pragmatist philosopher John Dewey puts it,

"Moral goods and ends exist only when something has to be done.... Morals are not a catalogue of acts nor a set of rules to be applied like drugstore prescriptions or cook-book recipes. The need in morals is for specific methods of inquiry and of contrivance: Methods of inquiry to locate difficulties and evils; methods of contrivance to form plans to be used as working hypotheses in dealing with them. And the pragmatic import of the logic of individualized situations, each having its own irreplaceable good and principle, is to transfer the attention of theory from preoccupation with general conceptions to the problem of developing effective methods of inquiry."⁶⁰

The problems that we confront arise in specific contexts and have features that are peculiar to the situation itself, so our prescriptions for how to navigate these problems should be sensitive to those features. The primary job of the theorist, according to Dewey, is to elaborate 'effective methods of inquiry' not to generate 'general conceptions' ready for application to cases. Constructivism offers a way to "do without the concept of [moral] truth" without thereby landing on anti-realism.

⁵⁸ Sangiovanni, A. (2014). Scottish constructivism and the right to justification. In Flynn, J. (ed), *Justice, democracy and the right to justification: Rainer Forst in dialogue* (pp. 29-64). Columbia University Press.

⁵⁹ Sangiovanni, A. (2015). How Practices Matter. *Journal of Political Philosophy* 24 (1):3-23. Sangiovanni 2007, *op. cit.* note 5; Street 2010, *op. cit.* note 48; Forst 2011, *op. cit.* note 6; Rawls 2005, *op. cit.* note 1.

⁶⁰ Dewey, J. (1921). *Reconstruction in philosophy*. University of London Press.

Rawls presents the most well-known procedural understanding of constructivism. Rawls' concern was to develop principles for action in spite of moral and political disagreement within pluralistic societies. For Rawls, principles of justice are constructed from a hypothetical situation known as the original position. Famously, parties in the original position are free, equal and rational and select principles of justice from behind a veil of ignorance. For contractualists like Scanlon, similarly, principles of justice to govern 'what we owe each other' are only to be adopted if they withstand a procedure of reasonable rejection.⁶¹ One major question is whether such procedures *justify* moral judgements or does the procedure tell us something about the *nature* of moral truths? That is, is constructivism a normative view that produces moral reasons for action, or a metaethical view?

This thesis adopts the less ambitious view of *normative* constructivism since this is compatible with different metaethical views.⁶² In particular, I rely on 'restricted constructivism', similarly to Rawls and Scanlon.⁶³ According to this view, not every moral principle, value or reason is constructed, only some. Rawls, for instance, uses a handful of 'materials' – prior commitments and values – as structuring constraints on the procedure. Conceptions of citizens as free, equal and reasonable are taken for granted and the restricted constructivist then considers how to organise and connect these values, and map out what is entailed by these, within a specified procedure.⁶⁴ The veil of ignorance is not used to defend the idea that individuals are free and equal, but to discover how to organise society fairly based on this assumption. In broad terms, restrictive constructivism is concerned with whether normative judgements withstand

⁶¹ Scanlon, T. (1998). *What We Owe to Each Other*. Cambridge: Harvard University Press.

⁶² Street 2010, *op. cit.* note 42, p.368

⁶³ *Ibid.* Rawls, J. (1980). Kantian constructivism in moral theory. *Journal of Philosophy* 77 (9):515-572. Scanlon 1998, *op. cit.* note 55

⁶⁴ As Rawls puts it: "The search for reasonable grounds for reaching agreement rooted in our conception of ourselves and in our relation to society replaces the search for moral truths interpreted as fixed by a prior and independent order of objects and relations, whether natural or divine, an order apart and distinct from how we conceive of ourselves" (See: Rawls, 1980 *ibid*, p. 519).

scrutiny from the standpoint of our other normative views. Unlike Rawls I do not adopt a formalised procedure like the original position, but I do share the view that principles of justice are morally justified when free and equal moral agents find these principles to be reasonable grounds for action.

One remaining question about the construction of principles of justice is how they relate to the practice or organisation they are intended to govern. Is the goal to construct principles independent of healthcare and the problem of decarbonisation, and then implement them, or should the healthcare as an organisation and the services, activities and practices underpinning healthcare play a role in constructing principles for fair decarbonisation? I argue for the latter. Principles of justice are not specified independent of institutions or organisations, and then we use institutions and organisations to instantiate those principles. Rather, organisations put people into relationships and principles of justice are constructed in light of these relationships. Justice is, recall, a *political* value. So, the principles adopted must withstand scrutiny from those who are engaged in the practices and institutions in question rather than detached from persons. But furthermore, if the principles are to be practical and guide action in the real world, then it is important that those who participate in the institutions and practices the principles are intended to govern recognise those as useful.

This is where the interpretation aspect of 'constructive interpretation' comes in. The goal of this method is to develop principles of justice by normatively reconstructing organisations and practices with the ultimate goal of providing a 'best interpretation' of those practices and organisations. Constructive interpretation is not a descriptive project aiming to say what practices, organisations or institutions *are*. A descriptive component is important, but the interpretative task is normative using moral arguments to reconstruct organisations and practices as they *should* be. This method takes inspiration both from Dworkin's idea of interpretive concepts and of

Sangiovanni's "practice dependent" approach to political philosophy.⁶⁵

This method differs not only in the direction of approach, from the inside out rather than outside in, but in how it views our organisations and social practices. Healthcare systems, medical practice, policies to address climate change and the like are not just instruments for realising some idealised picture of justice. Through the process of constructive interpretation, we can think about these organisations and practices on their own terms, and reflect on whether the values and purpose of these should be accepted or whether other values might better serve our purposes. We can use this to think about how to reform healthcare systems in ways that better fulfil our purposes.

2.2.2. Constructive interpretation

Dworkin argues that, in matters of practical philosophy, we should take the 'interpretative attitude'.⁶⁶ On the interpretive attitude, the job of political philosophy is to critically examine our institutions, organisations and practices and to offer guidance on what practical action should be taken given the nature and character of those practices and institutions.

Sangiovanni calls this idea the "practice-dependence thesis": "The content, scope and justification of a conception of justice depends on the structure and form of the practices that the conception is intended to govern."⁶⁷ Sangiovanni contrasts this with practice-independence which rejects any contingent, practice-mediated relations. According to practice-independence, principles of justice are justified independent of the form or structure of existing practices. Existing institutions, organisations and

⁶⁵ Sangiovanni 2007, *op. cit.* note 55. Sangiovanni 2015 *op. cit.* note 59. Dworkin, R. (1998). *Law's empire*. Hart. Chapter 2. See also, Miller 2008, *op. cit.* note 55 for an example of others who are concerned to take a context-sensitive approach to political philosophy.

⁶⁶ Dworkin 1998, *ibid.* Chapter two.

⁶⁷ Sangiovanni 2007, *op. cit.* note 55, p.138

practices are, for the practice-independence theorist, merely part of the *implementation* of pre-institutional and pre-political principles of justice, rather than their justification.⁶⁸

Both Dworkin and Sangiovanni recognise two main components to interpretation. The first involves identifying the practice or object in question and the purpose or goal it is supposed to serve.⁶⁹ The second moves past this descriptive stance and seeks to understand not just what an object of interpretation is but what it *ought to be*. The 'critical stance' is the point where justice becomes relevant, since this is the normative perspective from which we articulate principles of justice to shape the practice or organisation under consideration. It is here that participants in the institution, organisation or practice construct reasons they have for endorsing that particular object of interpretation, that are sensitive it's to the point. This does not equate to an uncritical acceptance of existing rules. Constructive interpretivists parse these two components in three main steps which I will describe shortly.

First, an example. Dworkin references the practice of courtesy to illustrate this method.⁷⁰ In his imagined society, the practice of courtesy is assumed to have value and serve an important purpose. Second, the behaviours that courtesy demands are not only a matter of tradition or convention, but the underlying point of courtesy also

⁶⁸ To some extent, the difference between practice-dependence and practice-independence maps on to an approach I discuss in the exceptionalism paper (chapter 4) regarding moderate integrationism. Bottom-up approaches could be seen as practice-independent.

⁶⁹ Dworkin 1998 *op. cit.* note 65, p.47

⁷⁰ Here are a couple of other examples to help clarify the point. Rules are frequently changed in professional sport, and this requires interpretation of the point of the activity and whether the rules serve this. Marketing campaigns from the Islay whisky distillery Bruichladdich also illustrate the idea. Bruichladdich has been concerned to discuss what makes a whisky an *Islay* whisky. This is an interpretive task. But as a marketing ploy the idea was to challenge other distilleries on the island who are also branded as an Islay whisky. Other distilleries on Islay, unlike Bruichladdich, only do the core elements of whisky production on the island. If the barley is grown elsewhere, malted and peated on mainland Scotland and once the spirit is produced it is taken in tankers to be put in casks to be aged on mainland Scotland, is your whisky *really* an Islay whisky? Bruichladdich is challenging its customers to interpret what the underlying qualities of Islay whisky are.

means the rules can be extended, modified, qualified or limited by that point. So, if peasants taking off their hats to nobility fails to serve the purpose of courtesy, or cannot be normatively justified to those in this community, then we reconstruct the practice. Perhaps the point of courtesy is to show respect to social superiors. In this case, we may think tipping hats is incomplete and that there are new and unrecognised forms of courtesy. But further still, we may argue about whether these new behaviours are normatively defensible and make proper sense of the purpose of the practice of courtesy and the reasons the community has to endorse it. As Dworkin puts it, "interpretation folds back into the practice, altering its shape, and the new shape encourages further reinterpretation, so the practice changes dramatically, though each step in the process is interpretive of what the last achieved."⁷¹

Following Sangiovanni, two ways that the critical stance depends on the descriptive stance can be distinguished: cultural conventionalism and institutionalist approaches. The cultural conventionalist approach interprets the meanings of social goods in order to generate distributive ideals. Michael Walzer's *Spheres of Justice* exemplifies the cultural conventionalist approach.⁷² For Walzer, the distribution of certain goods depends on the social meaning we attach to them. Healthcare is distributed by need whereas money is distributed by the market, for example. For institutionalism, however, justice varies not with culture but with institutional form. When Sangiovanni talks about institutions, he is talking about an institutional system described as a set of formal and informal rules, norms and decision-making procedures that regulate political or social activities to determine how opportunities and advantages are divided in societies. Sangiovanni distinguishes regimens which govern an issue area from political organisations which have an internal structure and form a collective actor. The institutional system describes how regimens and political organisations fit together.

⁷¹ Dworkin 1998 *op. cit.* note 65, p.48

⁷² Walzer, M. (1983). *Spheres of justice: a defense of pluralism and equality*. Basic Books.

There is no in principle reason that an organisation could not be subject to the same interpretative method as institutions even though institutional systems and organisations are distinct. This is because institutionalism emphasises that institutions put people into certain relations and shape how they interact, and this is what shapes the reasons they have for accepting or rejecting certain principles.⁷³ Similarly, organisations structure and shape how people interact and coordinate to distribute the goods of cooperation.

I follow an 'institutionalist' approach in this thesis even if, strictly, the thesis focuses on healthcare as an organisation rather than an institution. This essentially stems from a rejection of Walzer's approach.⁷⁴ Firstly, it is controversial whether there is a shared social understanding of the goods Walzer considers. This is especially true in the context of climate change and healthcare. It is unlikely that there is one shared understanding of what climatic responsibilities agents should have, given the diverse actions required across societies to address climate change.⁷⁵ Nor is there a consensus on the purpose of healthcare. Whilst many agree that protecting and promoting health is a core purpose of healthcare, there is disagreement over the concept of health, which feeds in to how we conceptualise healthcare. A further issue is the separateness of spheres. The issue that confronts this thesis is how to bring potentially disparate issues together. It is not obvious how one responds to the problem of reconciling healthcare's goals with addressing its GHG emissions if mitigation responsibilities and healthcare are separate spheres, even assuming a shared understanding of these

⁷³ Sangiovanni 2007, *op. cit.* note 55, p.146-147. "For the institutionalist, institutions establish more a network of relationships than a network of beliefs; that is, they establish a set of background conditions which alters the way in which participants interact. And these institutionally mediated relationships, in turn, shape the reasons we might have for endorsing (or rejecting) a given set of principles. For the institutionalist, relationships established by shared institutions condition rather than determine appropriate criteria of justice."

⁷⁴ Some of these considerations are also explored in chapter 4 and the paper on Healthcare exceptionalism

⁷⁵ Caney 2018 *op. cit.* note 12

spheres. Nor is it obvious how these areas can be neatly distinguished as separate spheres given that climate change affects health, and healthcare is contributing to climate change.

On this last point, one could simply embrace that addressing climate change and the purpose of healthcare are not separate spheres. Indeed, existing debates on the responsibilities of healthcare systems to address climate change could be interpreted through the cultural conventionalist lens. Arguments that view healthcare mitigation as aligned with the goals and purpose of healthcare was covered in the last section. As I have rejected this view I do not present those arguments again. But it is interesting to view these arguments as a form of cultural conventionalism about healthcare mitigation. There is no need to critically interpret how healthcare systems reconcile these goals, according to these cultural conventionalists, since they would argue that the shared understanding of the value of health and purpose of healthcare can tell us the extent to which and how healthcare systems should reduce their emissions.

To help see how the institutionalist method is distinct from cultural conventionalism I now walk through the steps involved in constructive interpretation. The first stage identified by Dworkin is the pre-interpretive stage. This stage involves identifying the object of interpretation. The goal of this stage is to identify the basic outline of the organisation prior to interpretation in order to form a foundation for further discussion. So, for present purposes, the main organisation under interpretation is healthcare, in particular the NHS. But other institutions, organisations and practices regarding allocating goods in healthcare as well as the burdens of addressing climate change are relevant. The *pre-interpretative* stage does still involve some interpretation. For example, we need to be clear on what counts as healthcare. For the most part this should be uncontroversial, but there can be fuzziness at the edges, and this is an issue that becomes especially important in the chapter on the polluter pays principle where we need to be able to pick out which GHG emissions

belong to healthcare. But as Dworkin points out, our day-to-day shared understandings suffice for the pre-interpretive stage. We are simply trying to pick out paradigmatic examples to ensure we are talking about the same objects of interpretation.

The interpretive stage involves identifying the purpose and point of the institution or practice in question. What aims and goals does healthcare serve? What is the point of reducing GHG emissions? In this stage, we explore how structure relates to function. As the purpose or aim is characterised this must tie back to the structure identified at the pre-interpretive stage. It is important to separate out how this differs from Walzer's approach. Especially since we may worry that institutionalism suffers the same fate as Walzer's arguments, because institutionalism also appears to apply standards we already endorse. Cultural conventionalism looks to derive a conception of justice from what participants already believe and can endorse it for this reason. Whilst the interpretive step should take seriously a particular community's shared beliefs around the purpose of an organisation, it is not – unlike the cultural conventionalist – reducible to it. The institutionalist does not ultimately derive a conception of justice directly from the participants' beliefs. However, the interpreter's interpretation should be true to the institution, organisation or practice under question and not create some new entity.

Imagine we are interpreting the purpose of healthcare. A society might be like Walzer's where there is a shared understanding that the point of healthcare is to improve health and that healthcare goods should be distributed on the basis of need. On the institutionalist view, we ought to take the shared meanings, beliefs and attitudes of this community seriously. But we need not necessarily accept it as written that this really is the point of healthcare. Of course, we cannot claim that the point of healthcare is to provide financial advice or to design buildings for then we cease to be

talking about healthcare.⁷⁶ There is therefore a difference between taking seriously the reasons we have for endorsing some institution or practice and appealing directly to those reasons to form principles of justice.

The final stage is the post-interpretive, reformatory stage. This involves reconstructing a conception of the object of interpretation which provides its 'best interpretation'. In this stage we think about principles of justice, where "the content, scope, and justification of a conception of justice is worked out in the light of both its intended role within existing institutions and the interpretation of the point and purpose of those institutions."⁷⁷ It is with the constraints of the interpretative step in hand that we can help to formulate principles with determinate content and application to the problems at hand.

It is at this point that I need to say something about how a reconstruction can be geared towards the best interpretation of an organisation, practice or institution. After all, there is likely to be a diversity of plausible answers to the best interpretation of the purpose and the formulation of principles of justice. For my purposes, there are likely to be various answers to the best interpretation of the point of healthcare, and how to align that purpose with mitigating GHG emissions. Since different interpretations will give rise to different normative principles, which in turn will mean that actors take different action on the basis of these, how then are we supposed to properly regulate institutions on the basis of principles we cannot agree on? This is where we go back to construction of principles being those appropriately situated people have good reasons to adopt. The best interpretation is not any interpretation, but that which is normatively justified and offers the most acceptable solution to the problems at hand.

⁷⁶ This is one noteworthy aspect of the current project. How do we reinterpret what healthcare is about in light of its contribution to climate change whilst staying true to the proper purpose of healthcare. If the purpose of healthcare is to address climate change, then it ceases to be healthcare anymore. Rather it may become a policy think tank, a lobbying group, or something else.

⁷⁷ Sangiovanni 2009, *op. cit.* note 49, p.150

The challenge facing the theorist is how to interpret what healthcare is about and what the purpose of healthcare should be when how it currently fulfils that purpose also undermines it. The risk, for healthcare, is that this situation makes healthcare systems unstable and unreliable over time. So, healthcare systems look to stabilise by reducing their GHG emissions. Healthcare systems are committing to reduce their GHG emissions, and some governments have set this down in law. But the question arises as to how the practice of reducing emissions fits in with healthcare's purpose? How can we (re)interpret healthcare, what its purpose is and how it might best serve that purpose in light of the ecological constraints healthcare finds itself within?

2.3. Conclusion

This chapter contributes to laying the background for the core argument of the thesis. First, the idea that questions of distributive justice are core to healthcare's response to its GHG emissions was defended. Secondly, we saw the method by which this thesis proceeds to address these important questions of justice. To complete the necessary background, the next chapter examines the relevant scientific and philosophical background to further situate the thesis within existing scholarship.

Chapter 3

3. Scientific and philosophical background

This chapter provides an overview of the relevant scientific and philosophical background to climate change in order to provide a firm grounding for the discussion to come. The scientific preamble is designed to make the important scientific elements of climate change and healthcare's contribution clear. I also review the relationship between climate change and health.

In the second section, a selection of the philosophical literature is reviewed. I draw upon two main bodies of work. A strand of political philosophy has been concerned with distributing responsibilities to address climate change but, as I will argue, philosophers have tended to overlook organisations, especially healthcare, as the relevant duty-bearer when it comes to addressing climate change. The role of healthcare in addressing climate change is an emerging issue in bioethics and the particular issue of distributive justice that occupy this thesis have not received much attention.

3.1. Reviewing the science: climate change, the effects of climate change on health, and healthcare's contribution to climate change.

3.1.1. The Anthropocene

In 1988, the Intergovernmental Panel on Climate Change (IPCC) was established by the world meteorological society and the United Nations.¹ The mission of the IPCC was to provide governments with robust scientific information about climate change upon

¹ Intergovernmental Panel on Climate Change (IPCC). History of the IPCC. Retrieved from: <https://www.ipcc.ch/about/history/>

which policy can be formulated. Hundreds of scientists, and a handful of philosophers, were involved in drafting the assessment reports. The first assessment report was released in 1990. The philosopher and economist John Broome has written about his experience working with the IPCC to generate assessments reports.² Broome explains that there is a vast amount of work that goes into producing these reports as well as a high level of scrutiny before they are released. This helps to explain why these reports are trusted by scientists, politicians, journalists and scholars around the world.

The IPCC states: "it is unequivocal that human influence has warmed the atmosphere, ocean and land".³ The influence of humanity on the conditions and processes on Earth are now so profound that the period we are living in is often known as the 'Anthropocene'.⁴ This marks a step change in the naming process for periods of time on Earth. Traditionally, periods in Earth's history are marked by geological not human factors. The Holocene, which precedes the Anthropocene, is a 10 000 year period in geological history noteworthy for its unusual environmental stability. Scientists believe this stability was critical for the development of human civilisation.⁵ The Anthropocene is the era since the industrial revolution in the 1800s. Environmental changes are dictated by human activities rather than just natural forces in the Anthropocene and its hallmark is rising global temperatures and climactic instability.⁶

Climate change is a relatively straightforward process to explain.⁷ The Earth is

² Broome, J. (2014). A philosopher at the IPCC. *The Philosophers' Magazine* 66:11-16.

³ IPCC. (2021). IPCC Sixth Assessment Report Working Group III: Mitigation of Climate Change. Retrieved from:

https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SummaryForPolicymakers.pdf

⁴ Crutzen, P. J. (2002). Geology of mankind. *Nature (London)*, 415, 23–23.

<https://doi.org/10.1038/415023a>

⁵ Rockström, J., Steffen, W., Noone, K., *et al.* (2009). A safe operating space for humanity. *Nature (London)*, 461(7263), 472–475. <https://doi.org/10.1038/461472a>

⁶ Steffen, W., Crutzen, P. J., & McNeill, J. R. (2007). The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature. *Ambio*, 36(8), 614–621. [https://doi.org/10.1579/0044-7447\(2007\)36\[614:TAAHNO\]2.0.CO;2](https://doi.org/10.1579/0044-7447(2007)36[614:TAAHNO]2.0.CO;2)

⁷ IPCC. (2007). Historical Overview of Climate Change Science from the report AR4 Climate Change

surrounded by an atmospheric blanket formed from greenhouse gases.⁸ This blanket is a normal part of the climate system and traps solar energy from the sun as it passes into the atmosphere; a mechanism known as radiative forcing. Without the blanket, the Earth would be extremely cold and unable to support life. The fraction of heat energy trapped depends on the makeup of the atmospheric blanket. Higher concentrations of greenhouse gases boost the blanket's ability to trap heat. Trapped solar energy results in a parallel rise in global average surface temperatures.⁹ According to the IPCC, the trend is that global average surface temperatures have increased over time. Compared to records from the start of the Industrial Revolution, in 2021 global average surface temperatures are thought to be 1.3°C higher.¹⁰ Each of the last four decades has been successively warmer than any preceding decade.¹¹ The

2007: The Physical Science Basis. Retrieved from:

<https://www.ipcc.ch/site/assets/uploads/2018/03/ar4-wg1-chapter1.pdf>

⁸ The metaphor of a 'blanket' was first proposed by John Tyndall in the 1850s. He measured the absorption of infrared radiation by carbon dioxide and water. He hypothesised that observed increases in the Earth's surface temperature could be due to changes in atmospheric concentrations of these gases that admit more solar heat than they release. He came up with the following metaphor: "[water vapour] is a blanket more necessary to the vegetable life of England than clothing is to man. Remove for a single summer-night the aqueous vapour from the air... and the sun would rise upon an island held fast in the iron grip of frost".

⁹ The climate system is however more complex than this as the shape and rotation of the Earth can also determine how heat energy is distributed across the Earth. There are also positive and negative feedback loops. For instance, the aforementioned distribution of heat energy means that the poles are warmer causing snow and ice to melt. As this recedes it exposes darker land and sea that tends to absorb the Sun's heat more than the snow or ice did, amplifying warming and causing further ice and snow to melt. There is also the presence of 'tipping points' within the climate system. These are 'large scale discontinuities' with an abrupt and irreversible change in the climate system. They often involve relatively large-scale changes in the climate system brought about by smaller processes through, for example, feedback loops. For instance, there are a number of sheets of sea ice in the Antarctic which can collapse affecting the other sea ice in a domino effect leading to 3-4m of water being added to the ocean. See: Lenton, T. M., Rockström, J., Gaffney, O., *et al.* (2019). Climate tipping points — too risky to bet against. *Nature (London)*, 575(7784), 592–595. <https://doi.org/10.1038/d41586-019-03595-0>

¹⁰ The IPCC estimates the likely range of anthropogenic surface temperature increase from 1850–1900 to 2010–2019 is between 0.8°C to 1.3°C, with a 'best estimate' of 1.07°C. See: IPCC (2021) *op. cit.* note 2

¹¹ IPCC. (2022). Global Warming of 1.5°C: IPCC Special Report on Impacts of Global Warming of 1.5°C above Pre-industrial Levels in Context of Strengthening Response to Climate Change, Sustainable Development, and Efforts to Eradicate Poverty. Retrieved from: <https://www.cambridge.org/core/books/global-warming-of-15c/summary-for-policymakers/31C38E590392F74C7341928B681FF668>

rate of change in global average surface temperatures is unprecedented in the past 2000 years.¹²

Water vapour and carbon dioxide (CO₂) are the main greenhouse gases. In order of abundance following CO₂, other greenhouse gases include methane, nitrous oxide, and human-made greenhouse gases like hydrofluorocarbons and chlorofluorocarbons. Carbon dioxide is the focal point of debates on how to respond to climate change, largely because of its abundance through burning fossil fuels and since it is the primary cause of global warming , unlike water vapour which amplifies the effects of CO₂.

Healthcare's emissions encompass more than CO₂. These other compounds are noteworthy because of their disproportionate impact on global warming. They tend to be more effective at trapping solar energy compared to CO₂ giving them a greater global warming potential and oftentimes last longer in the atmosphere. Therefore, even small volumes of these gases are significant. Nitrous oxide, for example, is mixed with oxygen in a 50:50 ratio to produce the inhaled analgesic Entonox. Compared to CO₂, the same volume of nitrous oxide traps three hundred times more heat energy, not to mention its atmospheric lifespan of 120 years.¹³ Fluorinated hydrocarbons are also used in modern medicine. They are basis of many anaesthetic gases and are found in metered-dose inhalers.¹⁴ Similarly to nitrous oxide, these human-made gases have global warming potentials many times, in some cases thousands of times, greater than CO₂. Owing primarily to its resistance to atmospheric breakdown giving it a particularly long lifespan, one gram of the anaesthetic gas desflurane, for instance, has the same

¹² *Ibid* at A1.2

¹³ Gadani, H., & Vyas, A. (2011). Anesthetic gases and global warming: Potentials, prevention and future of anesthesia. *Anesthesia: Essays and Researches*, 5(1), 5–10. <https://doi.org/10.4103/0259-1162.84171>

¹⁴ Wilkinson, A., & Woodcock, A. (2022). The environmental impact of inhalers for asthma: A green challenge and a golden opportunity. *British Journal of Clinical Pharmacology*, 88(7), 3016–3022. <https://doi.org/10.1111/bcp.15135>

global warming potential as 2540 grams of CO₂.¹⁵ The potency of desflurane has led some to estimate that it alone accounts for 80% of the greenhouse effect from all measured volatile anaesthetics.¹⁶

Since the Industrial Revolution, human activities have been releasing greenhouse gases into the atmosphere in concentrations unprecedented in at least the past 2 million years.¹⁷ In the 1950s the Mauna Loa Observatory in Hawaii was established, allowing a continuous record of atmospheric CO₂.¹⁸ Humanity has been able to directly measure concentrations of other atmospheric greenhouse gases like nitrous oxide since the 1970s. Atmospheric CO₂ was measured at 415 parts per million (ppm) in 2021 and 424ppm in November 2024.¹⁹ In 2019, atmospheric carbon dioxide concentrations were higher than at any time in the past 2 million years at least.²⁰ For comparison, throughout the Holocene atmospheric CO₂ levels were relatively stable and significantly lower than they are now; around 280 ± 20 ppm.²¹ Emissions do not show a linear trend since the Industrial Revolution, however. The IPCC reports that 17% of historical cumulative net CO₂ emissions since 1850 occurred between 2010 and 2019; 42% between 1990 and 2019, and 58% between 1850 and 1989.²² This means the

¹⁵ Sulbaek Andersen, M. P., Nielsen, O. J., Karpichev, B., Wallington, T. J., & Sander, S. P. (2012). Atmospheric Chemistry of Isoflurane, Desflurane, and Sevoflurane: Kinetics and Mechanisms of Reactions with Chlorine Atoms and OH Radicals and Global Warming Potentials. *The Journal of Physical Chemistry. A, Molecules, Spectroscopy, Kinetics, Environment, & General Theory*, 116(24), 5806–5820. <https://doi.org/10.1021/jp2077598>

¹⁶ Vollmer, M. K., Rhee, T. S., Rigby, M., *et al.* (2015). Modern inhalation anesthetics: Potent greenhouse gases in the global atmosphere. *Geophysical Research Letters*, 42(5), 1606–1611. <https://doi.org/10.1002/2014GL062785>

¹⁷ IPCC (2021) *op. cit.* note 3

¹⁸ Keeling, C. D., Bacastow, R. B., Bainbridge, A. E., *et al.* (1976). Atmospheric carbon dioxide variations at Mauna Loa Observatory, Hawaii. *Tellus*, 28(6), 538–551. <https://doi.org/10.3402/tellusa.v28i6.11322>

¹⁹ Daily CO₂. (2025). CO₂ Earth: Numbers for living on Earth. Retrieved from: <https://www.co2.earth/daily-co2>

²⁰ IPCC (2021) *op. cit.* note 2

²¹ Indermühle, A., Stocker, T. F., Joos, F., *et al.* (1999). Holocene carbon-cycle dynamics based on CO₂ trapped in ice at Taylor Dome, Antarctica. *Nature (London)*, 398(6723), 121–126. <https://doi.org/10.1038/18158>

²² IPCC 2022, *op. cit.* note 11.

graph of human emissions over time is curved. Nearly half of emissions have occurred since 1990, ironically the year of the first IPCC report warning of the presence and dangers of human-induced climate change.²³ Almost 20% of emissions have occurred in the last decade or so. Unsurprisingly, similar trends are observed for nitrous oxide where atmospheric concentrations were measured as 332ppm in 2019.²⁴

3.1.2. Life in the Anthropocene

Global warming affects the climate system in numerous ways: warmer land and air; warmer oceans; melting of sea ice and glaciers; rising sea levels; ocean acidification; and extreme weather events.²⁵ This has considerable knock-on effects for life on Earth. The IPCC outlines three routes by which climate change threatens life on Earth.²⁶ Firstly, they mention direct effects mediated through the weather systems: more frequent and more intense heat waves (and less cold spells), extreme weather events (hurricanes, cyclones etc), and increased floods (and weather-related infrastructure damage). The second and third routes are both indirect, mediated through environmental systems and human systems respectively. Environmental systems, for example changing weather patterns, shift the distribution and frequency of disease-carrying insects and can increase waterborne diseases. Threats mediated via human systems include threats to agriculture and food-security leading to malnutrition, damage to infrastructure through extreme weather events, displacement of people and exacerbations of global poverty for example.

It is important to stress that the effects of climate change are not distributed

²³ Ibid.

²⁴ Ibid.

²⁵ IPCC. (2021). IPCC Sixth Assessment Report Working Group III: Impacts adaptation and vulnerability. Retrieved from:

https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_SummaryForPolicymakers.pdf

²⁶ Ibid.

equally. Those who have a greater propensity or predisposition to be negatively affected by climate hazards are vulnerable. One aspect of vulnerability is individuals' adaptive capacity to cope with climate threats. As the IPCC explains, "People who are socially, economically, culturally, politically, institutionally, or otherwise marginalised in society are especially vulnerable to climate change".²⁷ Furthermore, not everyone is exposed to the threats of climate change to the same extent. Exposure describes the chances of a certain place suffering a climate-related hazard. The threats of climate change do not present uniformly across the globe, many parts of the world like sub-Saharan Africa, parts of Asia and low-lying island states are particularly exposed to climate threats. In the next section it will become clearer why this is particularly important. But, in a nutshell, what this tells us is that climate change is not just a problem of GHG emissions and pollution, but also one that interacts with pre-existing vulnerabilities and exposures which are in turn oftentimes a consequence of global injustices.²⁸

In the present study it is important not just to describe the effects of climate change but to have some way to evaluate them. Philosophers and economists have considered a number way of ways to appreciate the moral status of the effects of climate change. Caney, for instance, frames the negative effects of climate change as rights violations.²⁹ Economists on the other hand attempt to calculate the "social cost of carbon" by providing a "monetised value of the present and future damage caused by the emission of a ton of CO₂".³⁰ However the most common way that climate change is

²⁷ IPCC (2021) *op. cit.* note 3

²⁸ Blomfield, M. (2023). Who is Responsible for the Climate Change Problem? *Proceedings of the Aristotelian Society*, 123(2), 126–149. <https://doi.org/10.1093/arisoc/aoad008>

²⁹ Caney, S. (2010). Climate Change, Human Rights, and Moral Thresholds. In Gardiner, S. M., Caney, S., Jamieson, D., & Shue, H. (Eds.). (2010). *Climate ethics: essential readings* (pp. 163–177). Oxford University Press.

³⁰ Fleurbaey, M., Ferranna, M., Budolfson, M., *et al.* (2019). The Social Cost of Carbon: Valuing Inequality, Risk, and Population for Climate Policy. *The Monist*, 102(1), 84–109. <https://doi.org/10.1093/monist/ony023>

understood to have negative impacts is in terms of harm.³¹ Here, like other theorists working on climate change, I understand 'harm' in the counterfactual comparative sense. One is harmed if they are made worse off than they would have otherwise been had the event in question not occurred. It is further worth clarifying that by 'worse off' I follow Feinberg in viewing this as having one's interests thwarted or frustrated.³²

The fact that climate change causes harm should be sufficient to mobilise action to address such harms. However, it is worth noting the peculiar injustice of climate change, primarily that climate change is not just a natural phenomenon but is deeply intertwined with human systems. Broome argues that the harms of climate change are unjust on two counts.³³ The first is that they lack the features that usually justify harms like self-defence, consent, and some forms of punishment. Secondly, he describes seven features of climate harms that he takes to be important: they result from acts not omissions, are non-trivial, non-accidental, difficult to compensate, result from individuals benefitting themselves, are non-reciprocated and easily avoided. Whilst Broome's analysis is useful, he overlooks the background conditions of justice that leave some individuals more vulnerable to climate change.

The harms of climate change are unjust because, as a problem caused by human activities, climate change disproportionately affects the vulnerable who tend to have contributed the least. The effects of climate change will be felt most acutely by those who are disadvantaged, living in poverty, and the populations in low and middle-income countries.³⁴ This is due to three main factors. Climate change will have the biggest impact in tropical areas of the world meaning individuals living in these areas are most exposed and face the highest probabilities of being harmed by climate

³¹ Cripps, E. (2013). *Climate change and the moral agent: individual duties in an interdependent world*. Oxford University Press. Broome, J. (2012). *Climate Matters: Ethics in a Warming World*. W. W. Norton.

³² Feinberg, J. (1984). *Harm to Others*. Oxford University Press USA.

³³ Broome 2012, *op. cit.* note 31 pp.54-59

³⁴ IPCC *op. cit.* note 2.

change. Furthermore, individuals in these areas tend to experience extreme poverty and other forms of disadvantage leaving them with a lesser ability to adapt and reduce their vulnerability and finally their resilience to climate change is greatly diminished through poverty. It is well established that historically emissions were largely produced by wealthy countries and, increasingly now by wealthy individuals. The injustice can be described as compound disadvantage, the position of the worst off is worsened through climate change in part because they are disadvantaged.³⁵

One last short point about climate harms. There is a temptation in a project about healthcare to focus on the *health* harms of climate change. Given the ways that climate change is wrapped up with disadvantage, especially economic disadvantage, and that climate change has been driven by policies around economic growth and development, philosophers have tended to focus on poverty.³⁶ Nevertheless, climate change clearly causes various harms beyond just to health or in terms of poverty, for example through forced migration and violent conflict. Furthermore, we should note that this is an anthropocentric view and some would point out there are non-human interests at stake in climate change too. Whilst there is a tendency in this thesis to focus on health harms, that is not to privilege these over the other consequences of climate change for individual's vital interests.

3.1.3. The health harms of climate change

It is important to review the health harms of climate change to support the claim that climate change affects health as presented in the Red Queen problem in the introduction. The literature on the health impacts of climate change is vast and

³⁵ Shue, H. (2014). *Climate justice vulnerability and protection*. Oxford University Press, USA, p.4 and pp.41-42. Wolff, J., & de-Shalit, A. (2007). *Disadvantage*. Oxford University Press.

³⁶ Moellendorf, D. (2014). The Moral Challenge of Dangerous Climate Change: Values, Poverty, and Policy. Cambridge University

growing. One systematic review aimed to identify and map the scientific literature on health and climate change.³⁷ It estimates that there were more than 15 000 papers published between 2013-2019 on this topic. Another study provides an overview of systematic reviews on the health effects of climate change.³⁸ These authors identified 94 systematic reviews on the health effects of climate change. Synthesising this literature is a daunting task. And yet, these reports arrive at a similar conclusion: climate hazards threaten health globally.³⁹

As global temperatures rise, the health impacts of climate change are predicted to worsen.⁴⁰ Similarly to the IPCC who distinguish three different pathways by which climate change generally has negative effects for humans, it is common to divide the health effects of climate change into direct and indirect effects.⁴¹ When it comes to health, direct and indirect pathways are multiple and interacting.⁴² The Lancet Commission on Planetary Health list the following climate hazards: extreme heat; extreme weather events (wildfires, drought, extreme precipitation, sand and dust storms); infectious disease transmission; food security, nutrition and water; air quality; and other social impacts.⁴³ I sketch the health impacts of climate change based on the

³⁷ Berrang-Ford, L., Sietsma, A. J., Callaghan, M., *et al.* (2021). Systematic mapping of global research on climate and health: a machine learning review. *The Lancet. Planetary Health*, 5(8), e514–e525. [https://doi.org/10.1016/S2542-5196\(21\)00179-0](https://doi.org/10.1016/S2542-5196(21)00179-0)

³⁸ Rocque, R.J., Beaudoin, C., Ndjaboue, R., *et al.* (2021). Health effects of climate change: an overview of systematic reviews. *BMJ Open*, 11:e046333. doi: 10.1136/bmjopen-2020-046333

³⁹ IPCC 2021, *op. cit.* note 25.

⁴⁰ Haines, A., Kovats, R. S., Campbell-Lendrum, D., & Corvalan, C. (2006). Climate change and human health: Impacts, vulnerability and public health. *Public Health*, 120(7), 585–596. <https://doi.org/10.1016/j.puhe.2006.01.002>

⁴¹ Haines, A., & Patz, J.A. (2004). Health effects of climate change. *JAMA* 291(1):99-103. doi: 10.1001/jama.291.1.99. Haines, A., Ebi, K., & Solomon, C. G. (2019). The Imperative for Climate Action to Protect Health. *The New England Journal of Medicine*, 380(3), 263–273. <https://doi.org/10.1056/NEJMra1807873>

⁴² Watts, N., Adger, W. N., Agnolucci, P., *et al.* (2015). Health and climate change: policy responses to protect public health. *The Lancet*, 386(10006), 1861–1914. [https://doi.org/10.1016/S0140-6736\(15\)60854-6](https://doi.org/10.1016/S0140-6736(15)60854-6)

⁴³ Whitmee, S., Haines, A., Beyrer, C., Boltz, F., Capon, A. G., de Souza Dias, B. F., *et al.* (2015). Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation– Lancet Commission on planetary health. *The Lancet (British Edition)*, 386(10007), 1973–2028.

categories used by the Lancet Commission on Planetary Health.

3.1.4. Climate hazards and health impacts

A) Extreme heat

Global mean surface temperatures broke records between May 2023 and April 2024 by reaching 1.61°C above the pre-industrial period.⁴⁴ Extreme heat poses risks to people's survival and health, and we are seeing more extreme heat events. Approximately one-third of heat-related deaths worldwide are attributed to climate change.⁴⁵ Vulnerable populations, such as the elderly, infants, and those with pre-existing conditions, face the greatest risks from heat-related illnesses. Heat stroke, heat exhaustion, kidney disease as well as cardiovascular disease and strokes are all thought to have increased through extreme heat.⁴⁶

B) Extreme weather events

Extreme weather events are increasing in frequency and intensity due to climate change.⁴⁷ Wildfires directly impact physical and mental health through smoke inhalation as well as loss and disruption. Not only do droughts threaten water supplies, food security and the provision of goods and services but they also affect vector-borne and water-borne disease transmission. Extreme precipitation is also putting populations at risk of flooding which has numerous physical and mental health effects. Dust and sandstorms are also exacerbated by climate change as a consequence of

[https://doi.org/10.1016/S0140-6736\(15\)60901-1](https://doi.org/10.1016/S0140-6736(15)60901-1)

⁴⁴ Romanello, M., Walawender, M., Hsu, S.-C., *et al.* (2024). The 2024 report of the Lancet Countdown on health and climate change: facing record-breaking threats from delayed action. *The Lancet (British Edition)*, 404(10465), 1847–1896. [https://doi.org/10.1016/S0140-6736\(24\)01822-1](https://doi.org/10.1016/S0140-6736(24)01822-1)

⁴⁵ Vicedo-Cabrera, A. M., Scovronick, N., Sera, F., *et al.* (2021). The burden of heat-related mortality attributable to recent human-induced climate change. *Nature Climate Change*, 11(6), 492–500.

<https://doi.org/10.1038/s41558-021-01058-x>

⁴⁶ Ebi, K. L., Capon, A., Berry, P., *et al.* (2021). Hot weather and heat extremes: health risks. *The Lancet* 398(10301), 698–708. [https://doi.org/10.1016/S0140-6736\(21\)01208-3](https://doi.org/10.1016/S0140-6736(21)01208-3)

⁴⁷ Whitmee, *et al.* (2015), *op. cit.* note 43

increased droughts and wildfire-burned areas. The particulate matter in sand and dust storms can cause respiratory and cardiovascular illness, as well as death. The threat of climate change and extreme weather also poses challenges for mental health, known as 'eco-anxiety'.

C) Food and water security

In addition to changes in land use, climate change disrupts food security with the potential to lead to undernutrition as well as problems with water supplies. Shifts in rainfall patterns, increased evaporation as well as melting glaciers threaten freshwater supplies. These changes can also make it more difficult for crops to grow and for farmers to rear livestock. Yields of staple crops like maize, rice, wheat and soybean are decreasing due to higher temperatures. This is thought to threaten food security with millions of people across 124 countries experiencing moderate or severe food insecurity.⁴⁸

D) Disease transmission

Water-borne, vector-borne, food-borne and air-borne disease transmission is increased by climate change through complex pathways. Global warming influences the survival, reproduction, abundance and distribution of pathogens, vectors and hosts. Environmental changes are predicted to shift the burden and distribution of water-borne infectious diseases like campylobacter, cholera, leptospirosis as well as vector-borne diseases like dengue, malaria, Lyme, zika.⁴⁹ Not to mention new and emerging pathogens arising in tropical regions.

E) Air quality

⁴⁸ Romanello *et al*, 2024, *op. cit.* note 44.

⁴⁹ Costello, A., Abbas, M., Allen, A., *et al.* (2009). Managing the health effects of climate change: Lancet and University College London Institute for Global Health Commission. *The Lancet*, 373(9676), 1693–1733. [https://doi.org/10.1016/S0140-6736\(09\)60935-1](https://doi.org/10.1016/S0140-6736(09)60935-1)

Air quality is closely linked to health with consequences not just for respiratory illness but for cardiovascular disease, dementia, and adverse pregnancy outcomes (e.g. low birth weight).⁵⁰ Increased pollen levels due to warmer and shifting seasons worsen allergies and asthma. Climate change and air pollution are also indirectly linked. Burning fossil fuels for energy, manufacture, transport, and the like reduce air quality as well as producing GHGs, highlighting the intertwined nature of climate and air quality. Addressing the key mechanisms that cause climate change will oftentimes improve air quality.

F) Social systems

Important human systems like healthcare will also be affected by climate change. For instance, flooding and wildfires can interrupt local, national and international systems required to provide healthcare. Health can then be indirectly affected where healthcare systems, and other human systems, are threatened by climate change.

The evidence is clear that climate change poses a profound and multifaceted threat to human health. The Lancet Commission on Planetary Health reports that humanity has been mortgaging the health of future generations to realise economic and development gains now.⁵¹ Such economic gains are unevenly distributed, and the health impacts climate change is already causing are disproportionately experienced by those who have caused the fewest emissions.⁵² The WHO offers a stark warning:

"The climate crisis threatens to undo the last 50 years of progress in development, global health and poverty reduction, and to further widen existing health inequalities between and within populations. It severely jeopardizes the realization of universal health coverage in various ways, including by compounding the existing burden of disease and by exacerbating

⁵⁰ World Health Organisation. (2021). WHO global air quality guidelines. Retrieved from: <https://iris.who.int/bitstream/handle/10665/345329/9789240034228-eng.pdf>

⁵¹ Whitmee, *et al.* (2015), *op. cit.* note 43

⁵² Watts *et al.* 2015, *op. cit.* note 42

existing barriers to accessing health services, often at the times when they are most needed. Over 930 million people – around 12% of the world’s population – spend at least 10% of their household budget to pay for health care. With the poorest people largely uninsured, health shocks and stresses already currently push around 100 million people into poverty every year, with the impacts of climate change worsening this trend.”⁵³

Interestingly, in spite of the clear impact on health, health has only featured more recently in global climate negotiations.⁵⁴ Indeed, the vast majority of studies investigating health and climate change are concerned with health impacts rather than how health might feature in mitigation or adaptation policies.⁵⁵ This thesis is concerned primarily with healthcare, so I look at healthcare emissions next.

3.1.5. Healthcare emissions

According to the Lancet Commission on Climate Change and Health, globally healthcare accounted for 4.6% of GHG emissions in 2021.⁵⁶ Others put the figure for global healthcare emissions at 4.4%.⁵⁷ Some illustrate this by imagining healthcare was a country. In this case healthcare would rank as the fifth biggest emitter on the planet; producing more emissions than Japan but fewer than Russia.⁵⁸ Healthcare emissions are reported to have increased by 10% between 2020-2021 and 36% between 2016-

⁵³ World Health Organisation (October 2023). Climate Change. Retrieved from: <https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>

⁵⁴ I discuss this more in the next section.

⁵⁵ Berrang-Ford, L., Sietsma, A. J., Callaghan, M., *et al.* (2021). Systematic mapping of global research on climate and health: a machine learning review. *The Lancet. Planetary Health*, 5(8), e514–e525. [https://doi.org/10.1016/S2542-5196\(21\)00179-0](https://doi.org/10.1016/S2542-5196(21)00179-0)

⁵⁶ Romanello *et al.* 2024, *op. cit.* note 44.

⁵⁷ Healthcare Without Harm. (September 2019) Healthcare’s Carbon Footprint: how the health sector contributes to the global climate crisis and opportunities for action. Retrieved from: <https://global.noharm.org/sites/default/files/documents->

See also: Lenzen, M., Malik, A., Li, M., *et al.* (2020). The environmental footprint of health care: a global assessment. *Lancet Planet Health* 4 (7): e271–e279.

⁵⁸ *ibid* p.19

2021.⁵⁹ This trend is projected to continue if action is not taken.⁶⁰

Assessments of the carbon footprint of numerous individual healthcare systems have been undertaken (for example USA,⁶¹ Australia,⁶² China,⁶³ and Japan⁶⁴). The English National Health Service (NHS) has regularly tracked and reported its emissions since, under the Climate Change Act 2008, the Sustainable Development Unit was established. This later became Greener NHS following the publication of 'Delivering a 'Net Zero' National Health Service' in October 2020.⁶⁵ Under Greener NHS the focus is now on reducing the carbon footprint of the NHS. This marked the NHS as the first healthcare system in the world to declare ambitions to reach net zero and provided a broad plan for how it would fulfil this commitment. Since the NHS has done more than any other healthcare system in the world to understand, and now to change, its carbon footprint, this thesis will focus on the NHS. A more detailed summary of NHS emissions is necessary to help illustrate the contribution of industrialised healthcare to climate change.

To begin, it is worth getting a sense of the scale of the NHS. The NHS delivers 17 million inpatient admissions over more than 200 hospital trusts.⁶⁶ More than 270

⁵⁹ Romanello *et al*, 2024, *op. cit.* note 44.

⁶⁰ Healthcare Without Harm. (April 2021). Global Road Map for Health Care Decarbonization: A navigational tool for achieving zero emissions with climate resilience and health equity. Retrieved from: <https://healthcareclimateaction.org/sites/default/files/2021-08/Global%20Road%20Map%20for%20Health%20Care%20Decarbonization.pdf>

⁶¹ Chung, J.W., & Meltzer, D.O. (2009) Estimate of the carbon footprint of the US health care sector. *JAMA*;302:1970-2. doi:10.1001/jama.2009.1610 pmid:19903917

⁶² Malik, A., Lenzen, M., McAlister, S., & McGain F. (2018) The carbon footprint of Australian health care. *Lancet Planet Health*;2:e27–e35

⁶³ Wu, R. (2019). The carbon footprint of the Chinese health-care system: an environmentally extended input–output and structural path analysis study. *Lancet Planet Health*;3:e413–e419.

⁶⁴ Nansai, K., Fry, J., & Malik, A. (2020) Carbon footprint of Japanese health care services from 2011 to 2015. *Resour Conserv Recycling*;152:104525. doi:10.1016/j.resconrec.2019.104525

⁶⁵ National Health Service England. (July 2022). Delivering a 'net zero' NHS. Retrieved from: <https://www.england.nhs.uk/greenernhs/publication/delivering-a-net-zero-national-health-service>

⁶⁶ Tennison, I., Roschnik, S., Ashby, B., *et al*. (2021). Health care's response to climate change: a carbon footprint assessment of the NHS in England. *The Lancet. Planetary Health*, 5(2), e84–e92.

million primary care appointments occur across approximately 7000 GP practices each year. In turn GPs prescribe 1.1 billion items annually.⁶⁷ The NHS is the biggest employer in Europe, directly employing 1.7 million people in the UK.⁶⁸ It also has the largest property portfolio in Europe.⁶⁹ In the UK, healthcare consumes close to £1 in every £10 of gross domestic product.⁷⁰

Availability, access and quality of healthcare in a country, especially secondary care, as well as the makeup of the domestic energy system and healthcare expenditure are the key factors in a healthcare system's carbon footprint.⁷¹ In broad strokes, the NHS in England is thought to account for 4% of domestic emissions and 25% of public sector emissions.⁷² An important study on emissions from the NHS in England found that it was responsible for 25 megatons of CO₂e. This is a decrease of 26% compared to 1990 which is largely explained by decarbonisation of UK energy systems. Nevertheless, over the past decade the NHS has increased its activity and workload meaning that its carbon intensity has also decreased. Most emissions come from the global supply chain (62%) but delivery of care accounts for 24%. Anaesthetic gases and metered dose inhalers make a disproportionate contribution of 5% to the total NHS England carbon footprint as emissions occur at the point of use and these are potent greenhouse gases.⁷³

Healthcare systems across the world are increasingly committing to respond to

[https://doi.org/10.1016/S2542-5196\(20\)30271-0](https://doi.org/10.1016/S2542-5196(20)30271-0)

⁶⁷ Ibid.

⁶⁸ Naylor C, Appleby J. (March 2012). Sustainable health and social care: Connecting environmental and financial performance. Retrieved from: <https://www.kingsfund.org.uk/insight-and-analysis/reports/sustainable-health-social-care>

⁶⁹ ibid

⁷⁰ ibid

⁷¹ Pichler, P.-P., Jaccard, I. S., Weisz, U., & Weisz, H. (2019). International comparison of health care carbon footprints. *Environmental Research Letters*, 14(6), 64004-. <https://doi.org/10.1088/1748-9326/ab19e1>

⁷² National Health Service England, 2022 *op. cit.* note 60

⁷³ Tennison *et al*/2021 *op. cit.* note 61

climate change including to decarbonise. Health had been notable absence from many previous COPs. However, in 2021 at COP26 members committed to building climate-resilient health systems. The WHO leads The Alliance for Transformative Action on Climate and Health (ATACH) which supports these members to meet their commitments.⁷⁴ As of November 2024, of the 85 members, 84 had committed to climate-resilient health systems, 77 were committed to sustainable low carbon health systems, and 43 members have set a date to achieve net zero healthcare.

3.2. Philosophical background: political philosophy and bioethics.

I turn now to examine the philosophical discussion regarding climate change and justice. Specific ethical issues that have been considered in relation to healthcare are reviewed at the end of the section.

3.2.1. Political philosophy - who is responsible for remedying the problem of climate change?

There is a broad consensus amongst philosophers, activists as well as international organisations like IPCC and United Nations Framework Convention on Climate Change (UNFCCC) that climate change raises issues of distributive justice. The response in international agreements has been to affirm the idea of 'common but differentiated responsibilities'. The UNFCCC, for example, states, "The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities".⁷⁵ Likewise, the IPCC suggests that issues in climate justice

⁷⁴ World Health Organisation and Alliance for Transformative Action on Climate and Health. (2022) COP26 Health Programme. Retrieved from: <https://www.who.int/initiatives/alliance-for-transformative-action-on-climate-and-health/cop26-health-programme>

⁷⁵ UNFCCC. (1992). United Nations Framework Convention on Climate Change §2.1

should "be understood in terms of their different implications for equity – that is, in the comparative distribution of benefits and burdens for specific states, persons, or generations".⁷⁶ The debate amongst political philosophers has tended to focus on how to understand the issues of justice and equity raised in *international* discussions. In particular, they have been concerned with the question of *who* bears responsibility for climate justice and *what* this entails?⁷⁷

The question of who should do what to address climate change can be separated into two questions:⁷⁸

- The responsibility question: who has a responsibility to act to address climate change?
- Burden-sharing question: what is a fair distribution of the burdens and benefits of addressing climate change?

These questions tend to be answered together in three main ways. One is through principles of remedial responsibility, a second looks to theories of distributive justice to allocate burdens, and the final method relies on the idea of 'structural injustice'. At points, the relevance of these debates for healthcare is considered but the main focus is at the general state level philosophers have discussed these.

3.2.1.1. Principles of remedial responsibility

Commonly, when discussing climate justice, philosophers turn to one of three principles of remedial responsibility: the polluter pays principle (PPP), the ability to pay

⁷⁶ IPCC 2022, *op. cit* note 10, p.55

⁷⁷ This of course is not the *only* question of climate justice. See: Moellendorf, D. (2015). Climate Change Justice. *Philosophy Compass*, 10(3), 173–186. <https://doi.org/10.1111/phc3.12201> for an excellent overview.

⁷⁸ Caney, S. (2021). Climate Justice. *The Stanford Encyclopedia of Philosophy* (Winter 2021 Edition) Retrieved from: <https://plato.stanford.edu/archives/win2021/entries/justice-climate>. Caney, S. (2018). 'Climate Change', in Serena Olsaretti (ed.), *The Oxford Handbook of Distributive Justice* (pp. 664-688.), Oxford Handbooks, OUP.

principle (APP) and the beneficiary pays principle (BPP). Sometimes these are combined into hybrid principles.⁷⁹ These principles underpin a special responsibility to contribute to remedying a problem.⁸⁰ They are special in so far as they single out an agent(s) who is related to the problem in the correct way such that they possess an obligation to act. In terms of climate change, the relevant ways that agents are related to the problem are because: (a) they are causally connected to the problem (polluter pays), (b) they have the relevant capacities to remedy the problem (ability to pay), or (c) because they have benefit from the problem (beneficiary pays).

A central theme in this thesis is the idea that healthcare is 'special' such that it should be treated differently when it comes to climate change. One reason to treat healthcare as special is because a certain relationship that is there for other agents is not there between healthcare and climate change. The opposite is also true, healthcare might not be special because it does indeed have a relationship to climate change captured by (a), (b) or (c).

(a) The polluter pays principle

The polluter pays principle (PPP) is a common principle used to identify duty bearers and distribute a fair share of the burdens of addressing climate change.⁸¹ This is a backwards-looking contribution-based principle. As those who cause a problem are generally thought to be responsible for fixing it, the PPP tracks widely held intuitions about fairly allocating remedial responsibilities.

⁷⁹ Caney, S. (2005). Cosmopolitan Justice, Responsibility, and Global Climate Change. *Leiden Journal of International Law*, 18(4), 747–775. <https://doi.org/10.1017/S0922156505002992>

⁸⁰ Miller, D. (2009). *Global justice and climate change: how should responsibilities be distributed?* Parts I and II. Tanner Lectures on Human Values, 28, 119–156.

⁸¹ Caney 2005 *op. cit.* note 79. See also: Caney, S. (2010). Climate Change and the Duties of the Advantaged. *Critical Review of International Social and Political Philosophy*, 13(1): 203–228. doi:10.1080/13698230903326331. Page, E. (2008). Distributing the burdens of climate change. *Environmental Politics*, 17:4, 556–575.

Usually, GHG emissions are taken as the relevant metric for determining which agents have the relevant relationship to climate change such that they possess a responsibility to act. Producing emissions is the central factor in determining who should act. Pollution offers a relatively, and ostensibly, straightforward way to attribute remedial responsibilities. We simply need to look at emissions data to attribute GHGs to different agents and then this can be translated into some form of concrete action.

Numerous criticisms are levelled at the PPP by philosophers. Some point to the challenge of dealing with historical GHG emissions since those polluters are dead.⁸² Others question whether all GHG emissions are pollution in the relevant sense. If some GHG emissions are necessary to meet basic needs, we may question whether there should be remedial responsibilities associated.⁸³ Further, some point out that the focus on GHG emissions overlooks that there is a 'safe' amount of GHGs that can be emitted. Some then suggest that it is excessive emissions, or unjust emissions, that are the problem rather than GHG emissions in general.⁸⁴ Finally, there are challenges in attributing causation of emissions to some agents.⁸⁵

(b) Ability to pay principle

Some defend a forward-looking capacity-based principle like ability to pay. As Shue explains, "among a number of parties, all of whom are bound to contribute to some

⁸² Neumayer, E. (2000). In Defence of Historical Accountability for Greenhouse Gas Emissions. *Ecological Economics*, 33(2): 185–192. doi:10.1016/S0921-8009(00)00135-X Gosses, A. (2004).

Historical Emissions and Free-Riding. *Ethical Perspectives*, 11(1): 36–60. doi:10.2143/EP.11.1.504779

⁸³ Shue, H. (1993). Subsistence Emissions and Luxury Emissions. *Law & Policy*, 15(1), 39–60.

⁸⁴ Caney, S. (2015). Responding to Global Injustice: On the Right of Resistance. *Social Philosophy & Policy*, 32(1), pp.51–73, p.69. Page, E. A. (2011). Climatic Justice and the Fair Distribution of Atmospheric Burdens: A Conjunctive Account. *The Monist*, 94(3), 412–432, p.417. Baatz, C. (2013).

Responsibility for the Past? Some Thoughts on Compensating Those Vulnerable to Climate Change in Developing Countries. *Ethics, Policy & Environment*, 16(1), pp.94–110, p.95

⁸⁵ Caney, 2005 *op. cit.* note 79

endeavour, the parties who have the most resources should contribute the most to the endeavour".⁸⁶ This principle distributes responsibilities to address climate change not on the basis that agents have caused the problem, but because they have the means to help solve it.

The relevant ability when it comes to a capacity to pay is wealth. As Page describes, "According to the next defence of common but differentiated responsibility, developed countries should shoulder the burden of climate justice as a result of their greater wealth and capacity to act. They should, that is, cover the cost of robust policies of mitigation and adaptation in proportion to their income or wealth."⁸⁷ This seems to side-step the problems with measuring agents' contribution to a problem or a need to distinguish between different forms of pollution. Roser and Sidel, for example, claim one advantage of the APP over the PPP is that "there are hardly any problems with measurability. A country's economic capacity can be operationalized, for example, through its GDP adjusted for purchasing power".⁸⁸

Ability to pay, it is pointed out, is potentially an unfair way to distribute responsibilities. As mentioned, remedial responsibilities are concerned with the appropriate relationship between agents and a problem. Some argue that being wealthy hardly forms a relevant relationship when it comes to addressing a problem like climate change.⁸⁹ At worst, it is arbitrary to hold agents responsible just because they are able to remedy a problem rather than because they caused it. At best, APP is relevant to the fair distribution of burdens, it is simply lacking a robust explanation as to *why* those who have the ability to pay *should*.⁹⁰

⁸⁶ Shue 2014, *op. cit.* note 34, p.186

⁸⁷ Page 2008, *op. cit.* note 81 p.561

⁸⁸ Roser, D., & Seidel, C. (2016). *Climate Justice: An Introduction*. Routledge, p. 141

⁸⁹ Page 2008 *op. cit.* note 81 p.561. Caney, S. (2010). Climate change and the duties of the advantaged. *Critical Review of International Social and Political Philosophy*, 13(1), 203–228.

⁹⁰ Page 2008, *op. cit.* note 81 p.562

(c) Beneficiary pays principle

A final principle defended by philosophers is based on the fact that many benefit from climate change. Countries in the developed world would be worse off if they had not pursued activities that enhance well-being at the expense of the climate. A beneficiary pays principle examines the effects of climate change to assign liability rather than holding agents responsible because they have caused climate change. Unlike APP, the BPP is concerned with how countries wealth arose, not how it can best put it to use. In so far as producing GHG emissions has brought about many of the benefits enjoyed by people in society, this is thought to underpin a remedial responsibility. BPP is essentially a principle of reciprocity designed to prevent climate free-riding. One could, for instance, calculate the wealth enjoyed by a nation and divide up the costs of addressing climate change accordingly. It is not clear however, why benefitting from some activity is always sufficient to leave one liable to pay, especially given that individuals often have no option to refuse those benefits. For example, being born into a wealthy, developed and industrialised nation will offer opportunities for education, healthcare, security and so forth that may not be possible elsewhere in the world, but nobody gets to decide where they are born.

Each of these principles has its merits and proponents, as well as its detractors. Whilst philosophers debate these principles some point out that they all converge on the wealthy doing the most to address climate change. As McKinnon puts, when it comes to assigning responsibility to address climate change 'all roads lead to Rome': "more developed countries should bear primary and remedial responsibility for rapid and aggressive emissions reductions, extensive support for adaptation programmes, and scale-up of renewables".⁹¹

⁹¹ McKinnon, C. (2022). *Climate change and political theory*. John Wiley & Sons. p.107-108

Roser and Seidel also highlight this convergence on the wealthiest bearing the greatest costs in responding to climate change.⁹² Page reaches a similar conclusion, "Developed countries were causally responsible for climate change; they are the main beneficiaries of activities that cause climate change; and they have the ability to tackle the causes and effects of climate change."⁹³ I now examine the idea that 'the wealthy' should pay.

(d) The wealthy pay

As well as wealthy nations and states, 'the wealthy' also tends to identify rich individuals. Indeed, it is increasingly recognised that super-rich individuals make significant contributions to climate change over and above the contributions from wealthy countries. Estimates suggest that the bottom 50% of the world's population in terms of income and wealth were responsible for 12% of global emissions in 2019 (and responsible for 16% of emissions between 1990-2019). Whereas, in 2019, the top 10% were found to have emitted 48% of emissions, and between 1990 and 2019 the top 1% were responsible for 23% of emissions.⁹⁴

The wealthy frequently includes high-emitting companies like fossil fuel giants.⁹⁵ In 2022, Exxon Mobile reported its highest profits ever equating to almost \$56 billion.⁹⁶ They were not alone. BP, Shell, Chevron, Total Energies and Exxon collectively made

⁹² *Ibid* p.160

⁹³ Page 2008 *op. cit.* note 81 p.564

⁹⁴ Chancel, L. (2022). Global carbon inequality over 1990–2019. *Nature Sustainability*, 5(11), 931–938. <https://doi.org/10.1038/s41893-022-00955-z>

⁹⁵ Shue, H. (2017). Responsible for what? Carbon producer CO2 contributions and the energy transition. *Climatic Change*, 144(4), 591–596. <https://doi.org/10.1007/s10584-017-2042-9>

⁹⁶ Milman, O. (February 2023). 'Monster profits' for energy giants reveal a self-destructive fossil fuel resurgence. Retrieved from: <https://www.theguardian.com/environment/2023/feb/09/profits-energy-fossil-fuel-resurgence-climate-crisis-shell-exxon-bp-chevron-totalenergies>

\$199.3 billion in profit. Shell's profits were so massive in 2023 (£22.4 billion) that the average worker in Britain would have to work for 640000 years to outstrip their profits, according to Greenpeace.⁹⁷ The Climate Accountability Institute has found that from 1965 to 2018, the twenty largest fossil fuel companies emitted 35% of the global total GHG emissions (480 Gigatonnes of CO₂e).⁹⁸ Furthermore, 103 fossil fuel and cement companies alone are responsible for 1,221 Gt CO₂e (69.8% of the global total (1.75 Teratons CO₂e) GHG emissions) since 1751. The top twenty fossil fuel companies are estimated to be responsible for 30% (526 GtCO₂e) of all GHG emissions between 1751-2018. One study found that the 142 largest producers of oil, gas and coal have overshot the IPCC emissions requirements to stay within a 1.5°C target, and argue they will continue to do so until 2050.⁹⁹

In summary, the political philosophy literature on climate change is concerned with the fair distribution of the costs of dealing with climate change and this tends to mean the world's wealthy are assigned the greatest share of mitigation, adaptation and compensation costs. The wealthy are mainly identified with states and wealthy individuals, not to mention a handful of corporations like fossil fuel companies. Looking over the bill for addressing climate change, it is understandable why we would send it to the wealthy given their contribution to climate change, their capacity to tackle it and the way they benefit. However, there is an important gap left by the focus

⁹⁷ Evans, J. (February 2024). Activists install burning 'Your Future' sign outside Shell HQ as company announces £22.4 billion annual profits. Retrieved from: <https://www.greenpeace.org.uk/news/activists-install-burning-your-future-sign-outside-shell-hq-as-company-announces-22-4-billion-annual-profits/#:~:text=Greenpeace%20activists%20dressed%20as%20Shell,22.4%20billion%20profit%20in%202023>.

⁹⁸ Climate Accountability Institute. (October 2019). Carbon Majors Update, 1965-2017. Retrieved from: <https://3vu.742.myftpupload.com/wp-content/uploads/2020/12/CAI-PressRelease-Top20-Oct19.pdf>. See also: Heede, R. (2014). Tracing anthropogenic carbon dioxide and methane emissions to fossil fuel and cement producers, 1854–2010. *Climatic Change*, 122(1–2), 229–241.

<https://doi.org/10.1007/s10584-013-0986-y>

⁹⁹ Rekker, S., Chen, G., Heede, R., Ives, M. C., Wade, B., & Greig, C. (2023). Evaluating fossil fuel companies' alignment with 1.5 °C climate pathways. *Nature Climate Change*, 13(9), 927–934. <https://doi.org/10.1038/s41558-023-01734-0>

on states, wealthy individuals and certain corporations. Organisations, especially healthcare are often absent from these debates.

The question is what this organisational gap means for healthcare systems and societies. After all, healthcare produces a significant amount of emissions. Furthermore, healthcare is likely to play an important role in the overall trajectory of reducing emissions. For instance, does the focus on wealthy individuals and companies mean that healthcare should be exempted from mitigation? If not, how should wealthy nations address healthcare emissions? This question is also opened up by international agreements on climate change. The Paris Agreement, which is considered a landmark in climate negotiations, allows countries to set nationally determined contributions (NDCs) to mitigation efforts.¹⁰⁰ So it is up to governments to determine how sectors in society, businesses and so forth will contribute to a country's NDCs. But this leaves open the question of how healthcare fits into a country's NDC. When wealthy countries are sent the bill for mitigating climate change, what proportion of that should be forwarded on to healthcare?

One response is to simply apply one, or some combination, of these distributive principles to healthcare. Indeed, it is common to rely on causal principles in the medical literature to argue that healthcare systems should address their emissions. If healthcare has a duty to 'first, do no harm' then healthcare systems should address their emissions to fulfil such a duty. Paper two explores this issue since contribution-based principles are core to the entire debate around mitigation responsibilities. The thesis also explores what capacity-based principles like APP can contribute to the question of how to determine healthcare's fair share of addressing GHG emissions.

¹⁰⁰ United Nations. (2015). Paris agreement to the United Nations Framework Convention on Climate Change. Report No. TIAS No. 16-1104. UN.

As appealing as adopting one of these principles and applying it to healthcare might be, philosophers point out that these principles are unconcerned with any wider issues of distributive justice in their application. As Page puts it, "The three approaches [PPP, APP and BPP] also share the feature that a principle of burden sharing is selected *independently* of wider distributive concerns [my emphasis]."¹⁰¹ This concern is pertinent for healthcare meaning a key question when it comes to healthcare mitigation is how to reconcile reducing healthcare emissions with healthcare systems achieving their wider goals? How should mitigation rank against other healthcare system priorities? This is not to say that these three approaches are irrelevant to healthcare, nor that they cannot be adapted. Indeed, one project of this thesis is to explore how these approaches might be useful in determining healthcare's fair share of mitigation burdens.

3.2.1.2. Distributive principles

A second approach to distributing responsibilities to address GHG emissions draws on general theories of distributive justice. The purpose of this is that it becomes much easier to integrate climatic concerns with broader issues of distributive justice.¹⁰² Climatic burdens are held within an overall package of burdens and benefits to be distributed and so a distributive ideal is selected on practical grounds rather than a principle like PPP. Put less abstractly, we could, for example, adopt a theory like egalitarianism and use this to distribute a whole range of benefits and burdens, including climatic burdens.

This approach could fit better with healthcare for two reasons. The first is that it is obviously sensitive to distributive concerns above and beyond that of just climate

¹⁰¹ Page 2008 *op. cit.* note 81 p.564

¹⁰² Caney, S. (2012). Just Emissions. *Philosophy & Public Affairs*, 40(4), 255–300.
<https://doi.org/10.1111/papa.12005>

change. This approach could potentially more easily reconcile healthcare's goals with addressing climate change. Secondly, as healthcare systems already rely on general principles of distributive justice, this approach appears to fit more neatly with existing issues of distributive justice in healthcare. Those who defend utilitarian, prioritarian, egalitarian or sufficientarian distributions in healthcare simply need to adapt the costs or burdens to sit within their preferred distributive ideal. There is a practical aspect to this approach since there is not a need to think about how climatic-specific principles apply in the case of healthcare.

One simple approach is based on utilitarianism and relies on cost-effectiveness analysis. This is commonplace in healthcare rationing and so provides an appealing place to start when looking to general distributive principles.¹⁰³ Cost-effectiveness analysis is utilitarian in the sense that it aims to maximise benefits for a unit of cost. Healthcare benefits are typically defined as quality-adjusted life years (QALYs) or disability adjusted life years (DALYs) as these measures combine longevity with a measure of well-being. One QALY equates to one year in perfect health whereas a QALY of 0.5 references one year in a health state approximately half of full health. QALYs and DALYs offer measurable health states that can be compared such that we are able to maximise QALYs or DALYs in a population per sum of money. This approach has been defended for healthcare GHG emissions.¹⁰⁴

Bhopal and Norheim argue that cost-effectiveness analysis is used to set priorities in healthcare in a way that is both fair and efficient.¹⁰⁵ They take this approach as the baseline to ask, "how much health can a tonne of carbon buy?" Carbon then becomes

¹⁰³ Bognar, G., & Hirose, I. *The ethics of health care rationing: an introduction*. Routledge, 2022.

¹⁰⁴ This approach is notable when it comes to the section below on bioethics approaches to determining healthcare's fair share. Bhopal and Norheim are an outlier for addressing this question head on, however I discuss it here rather than in the section on bioethics since they are a good example of a utilitarian approach to addressing healthcare's GHG emissions.

¹⁰⁵ Bhopal, A., Norheim, O.F. (2021). Priority setting and net zero healthcare: how much health can a tonne of carbon buy? *BMJ*, 375 :e067199 doi:10.1136/bmj-2021-067199

another element in the overall package of costs and benefits healthcare systems must allocate. In this way cost-effectiveness analysis integrates climatic concerns with wider distributive issues in healthcare. Lifecycle analyses are applied so that the carbon cost of various interventions can be calculated prior to ranking them. They describe this method stating, "By setting health system priorities in ways that also take carbon emissions into account, more health could be gained within a given carbon budget."¹⁰⁶

There are however several problems with Bhopal and Norheim's account. Firstly, many philosophers raise issues with the discriminatory nature of QALYs and DALYs.¹⁰⁷ For some, this would make Bhopal and Norheim's account a nonstarter. Second, it is not clear how carbon concerns rank against other issues in distributive justice. For instance, a cost-effectiveness ratio is calculated by dividing the cost by the units of benefit. Say there are two treatments which can both generate 0.5 DALYs but to do so one 'costs' 1kg of carbon and the other 2kg. According to cost-effectiveness analysis we should choose the one which costs 1kg of carbon since we can get more DALYs per unit of carbon. Imagine further then that the lower carbon treatment is more expensive, so in this case we get fewer DALYs per dollar (or pound). Should we just combine the different costs and choose the one which is most cost effective overall? Or should we discount either of the financial or carbon costs to help rank these in importance? In other words, how do financial costs weigh against carbon costs when maximising QALYs/DALYs? Bhopal and Norheim have not provided an approach to this common issue in healthcare priority setting.

The final problem is that it is unclear how Bhopal and Norheim's route leads to sufficient healthcare decarbonisation. It may well be that opting for the most carbon

¹⁰⁶ Ibid

¹⁰⁷ Harris, J. (1987). QALYfying the value of life. *Journal of Medical Ethics*, 13(3), 117–123. Davies, B. (2019). Bursting Bubbles? QALYs and Discrimination. *Utilitas*, 31(2), 191–202.
<https://doi.org/10.1017/S0953820818000249>

effective methods of maximising QALYs/DALYs does indeed reduce healthcare's carbon footprint. But this does not tell us whether healthcare has done its fair share of reducing its carbon footprint. We need an additional reason for why carbon efficiency is the fairest way for healthcare to minimise its carbon footprint. This is because Bhopal and Norheim seem to assume a carbon budget for healthcare and then argue for a fair and efficient way of allocating this. But there is no argument for how we get to that carbon budget in the first place.

Equality offers another ideal which could be used to allocate mitigation burdens in healthcare. Many philosophers have egalitarian views when it comes questions of distributive justice in healthcare.¹⁰⁸ Let's say that the overarching goal of healthcare is to minimise unjust health inequalities. In the case, healthcare systems need to ensure that how they provide benefits account both for the local effects on unjust inequalities as well as global and intergenerational effects through emissions. The task then is to balance these such that overall health inequalities are reduced.

There are also defenders of prioritarianism in the just allocation of healthcare benefits.¹⁰⁹ For prioritarians, the worse off an individual is the greater the weight of any healthcare benefits directed to them are.¹¹⁰ Similarly to the egalitarian, the healthcare prioritarian needs to determine what level of mitigation is compatible with healthcare systems improving the lot of the worst off.

One implication of egalitarian and prioritarian ideals in healthcare decarbonisation

¹⁰⁸ Daniels, N. (2007) *Just health: meeting health needs fairly*. Cambridge University Press. Segall, S. (2009) *Health, Luck, and Justice*. Princeton University Press.

¹⁰⁹ Crisp, R. (2002). Treatment according to need: Justice and the British National Health Service. In R. Rosamond, M. P. Battin, & M. Silvers (Eds.), *Medicine and social justice. Essays on the distribution of health care* (pp. 134–143). New York: Oxford University Press.

¹¹⁰ Parfit, D. (1997). Equality and priority. *Ratio* 10 (3):202–221. Holtug, N. (2006). Prioritarianism. In N. Holtug & K. Lippert-Rasmussen (Eds.), *Egalitarianism. New essays on the nature and value of equality* (pp. 125–156). Oxford: Clarendon Press

is a broadening of the scope of healthcare to intergenerational concerns. When it comes to scope in theories of distributive justice, what we are concerned with are determining the beneficiaries of certain acts or the recipients of burdens.¹¹¹ Usually, the legitimate beneficiaries of healthcare are the populations served by a healthcare system. However, at least in terms of how healthcare systems actually operate, rarely is it thought that the distribution of healthcare resources, benefits and any burdens should be global or intergenerational in scope. Whilst making the case for this is not insurmountable, it is not immediately obvious exactly how, practically, a healthcare system can fulfil aspirations of global and intergenerational egalitarianism. Indeed, the issues of applying a global and intergenerational theory of justice to issues like climate change are pointed out by philosophers.¹¹² Where cost-effectiveness analysis is highly practical, relying on egalitarianism or prioritarianism to distribute mitigations burdens in healthcare is potentially less so.

Sufficientarianism is another distributive ideal that may be useful in healthcare. Certainly, some philosophers see promise in the ideal of sufficiency when it comes to climate change.¹¹³ Given that two papers in the thesis examine sufficiency and it has been discussed in the introduction, I do not consider it further here.

3.2.1.3. Climate change as a structural injustice

Let us briefly recap. I have discussed two ways that political philosophers approach the question of who is responsible for mitigation burdens. Three burden-sharing principles were considered but political philosophers tend to discuss these at the level of nations or individuals leaving an institutional gap. Furthermore, these principles tend to focus narrowly on climate change overlooking broader issues of distributive

¹¹¹ Page, E.A. (2007) *Climate change, justice and future generations*. Edward Elgar Publishing, p.50

¹¹² Caney 2012 *op. cit.* note 96

¹¹³ Page, 2007, *op. cit.* note 105

justice. General distributive ideals offer an alternative, but they face problems when it comes to formulating policy in healthcare. One final way that political philosophers think about the distribution of mitigation burdens in the context of climate change is through the idea of structural injustice.

Another criticism that some philosophers raise against principles like the PPP and APP, which are potentially relevant for general distributive principles, is that they misconstrue the kind of problem climate change is. Causal principles and capacity-based principles take it that climate justice is an issue of the fair distribution of the material costs of addressing climate change. Hence the world's wealthy should do the most. Inspired by Iris Marion Young, however, some view climate change as a 'structural injustice'.¹¹⁴

Before looking at the idea of 'structural injustice', it is worth noting how these approaches characterise the burdens of climate change differently. This is key to what separates structural injustice from the approaches mentioned already. On remedial principles and distributive ideals, there are discrete costs and burdens to be allocated. Benefits, like certain resources for example vaccines, can be allocated using similar principles. For instance, vaccines could be allocated on a prioritarian basis, or a new vaccine could be allocated first to those who contributed the most in their development. The same is taken to be the case with discrete burdens. So, principles like PPP assume that there is a discrete burden to be allocated when we talk about polluters paying and distributive ideals similarly allocate discrete units. Remedial principles and distributive ideals draw up an itemised bill for the cost of dealing with

¹¹⁴ Sardo, M. C. (2023). Responsibility for climate justice: Political not moral. *European Journal of Political Theory*, 22(1), 26–50. <https://doi.org/10.1177/1474885120955148> Eckersley, R. (2016). Responsibility for climate change as a structural injustice. In Gabrielson, T., Hall, C., Meyer, J. M., & Schlosberg, D. (eds) *The Oxford handbook of environmental political theory* (pp. 346-361). Oxford University Press. Godoy, E. S. (2017). What's the Harm in Climate Change? *Ethics, Policy & Environment*, 20(1), 103–117.

climate change, and then all we need to know is what is on the bill and where to send it. But, on a structural account, there is not necessarily some discrete burden to be allocated, rather structures that lead to climate injustice must be reformed. Indeed, the way that societies are organised are the target of change with the overall aim of reducing injustice.

Turning to the idea of structural injustice, Young complains that the 'distributive paradigm' is too restrictive and "fails to bring social structures and institutional contexts under evaluation".¹¹⁵ This is important as Young points out that a distributive paradigm will often rely on clear chains of causation, but many injustices do not follow this model. Climate change being a paradigm example. Furthermore, Young claims the liability model is "isolating" where specific agents are held liable for easily identifiable wrongs.¹¹⁶ This is more challenging when the chains of causation that link an agent to a wrong are obscure. Secondly, Young emphasises that the distributive model judges injustice on the basis of existing rules and institutions, but it is those very rules and institutions which need to be called into question. So, if we judge a healthcare system on its ability to, say, reduce unjust inequalities in well-defined populations in the shorter term then we will, on the distributive model, fail to see that it is this very way of organising healthcare that is at issue when it comes to climate change. Finally, Young is keen to take a more forward-looking approach to transforming social structures rather than the backward-looking, fault-finding approaches taken by the distributive account.

Young thinks injustice goes beyond the unjust distribution of benefits (and burdens). The scope of injustice should be broadened to include oppression, which is the 'institutional constraint on self-development' and domination as 'the institutional

¹¹⁵ Young, I.M. (1990). *Justice and the Politics of Difference*. Princeton, NJ: Princeton University Press, p.20

¹¹⁶ Young, I.M. (2011). *Responsibility for Justice*. Oxford: Oxford University Press. p. 100-106

constraint on self-determination'.¹¹⁷ In later work, Young uses the story of Sandy to illustrate how structural forces can lead to oppression and domination.¹¹⁸ The gist of Sandy's story is that Sandy does not face injustice because of bad people doing bad things, but because Sandy is subject to wider social, economic and political forces that create housing insecurity. As Young describes structural injustice:

"Structural injustice is a kind of moral wrong distinct from the wrongful action of an individual agent or the repressive policies of a state. Structural injustice occurs as a consequence of many individuals and institutions acting to pursue their particular goals and interests, for the most part within the limits of accepted rules and norms."¹¹⁹

It is the last sentence of the quote from Young that is particularly relevant to healthcare. Healthcare institutions have been built, designed and organised around improving the health of narrowly defined populations over relatively short time periods. This appears, in the main, to be entirely legitimate and has resulted in the modern, complex and technologically advanced healthcare systems we rely on today. Individuals, professionals and patients alike, operate within the healthcare system on this basis. But this way of building healthcare systems has taken for granted ecological resources and the climate. And this feeds into a broader system where industrial production and consumption, and fossil fuel use have ecological consequences for those who are most vulnerable.

Young's approach could be used to take a more institutional stance on the issues of healthcare emissions than distributive views. At this stage, however, I want to take a step back and show how a similar conclusion can be reached from a view very different to Young's. If the same point can be made from a position opposed to Young's, the focus on structure would be significantly strengthened. Young took aim

¹¹⁷ Young 1990, *op. cit.* note 109, p.37

¹¹⁸ Young 2011, *op. cit.* note 110

¹¹⁹ Young 2011, *op. cit.* note 110, p.52

at Rawls' famous innovation that the primary subject of justice is the basic structure of society and the institutions that form this. Young argues that Rawls list of institutions is too short, and that injustice cannot be limited to the domestic sphere as Rawls thought.¹²⁰ And yet, if we can understand the structural injustice of healthcare emissions in Rawlsian terms, as well as Youngian terms, this makes a powerful point.

In an important discussion on embedding the pursuit of health equity within an overall framework of social justice, Peter contrasts a direct with an indirect approach to health equity.¹²¹ Peter defends the latter, indirect approach, on Rawlsian grounds. It is through Peter's indirect approach that we can understand healthcare emissions as a structural injustice in more Rawlsian terms.

The direct approach is concerned with a morally ideal pattern of health outcomes. For example, a utilitarian will view an ideal pattern of health distribution as one that maximises well-being or utility in a population. A health prioritarian might say the ideal pattern of health is one that maximally improves health for the worst off in a society. An indirect approach, on the other hand, is not concerned with an ideal pattern of health outcomes but rather sees inequalities in health as unjust when they result from unjust economic, social and political institutions. That is, the indirect approach is more concerned with background conditions of justice. The moral status of health inequalities is determined, not by reference to some ideal pattern, but by examining the underlying social and institutional structures in which they originate. Peter ties the indirect approach into a Rawlsian ideal of justice as fairness. Since Rawls is less interested in specific outcomes and more concerned by how social institutions in the basic structure work, Peter argues that inequalities in health are unjust if they result from the basic structure.

¹²⁰ Young 2011, *op. cit.* note 110

¹²¹ Peter, F. (2001). Health Equity and Social Justice. *Journal of Applied Philosophy*, 18(2), 159–170. <https://doi.org/10.1111/1468-5930.00183>

We can think of distributive principles like the PPP and distributive patterns like egalitarianism and prioritarianism as fitting a direct approach. There is an ideal pattern of healthcare systems distributing the benefits and burdens of addressing climate change. For example, on one ideal, the PPP, healthcare systems deviate from an ideal pattern where they fail to pay for their pollution. Such a direct approach is, however, as Peter would emphasise, isolated from other social spheres and in particular distributions of health. We could then, instead recognise an indirect approach and think about how health inequalities arise from healthcare systems that are arranged such that they rely on ecological resources and produce environmental waste. The goal then is to reform the structures of healthcare to bring about a just social arrangement of healthcare.

Where the structural model is particularly compelling is that it overcomes two gaps left by alternative approaches. The first is that distributive principles, with their narrow focus on nations and wealthy individuals are inclined to overlook institutions like healthcare. Whereas the structural model is attuned to the role that institutions like healthcare have in producing and reproducing climate injustice. The social model is well-equipped to place a spotlight on healthcare as an institution with a role to play in addressing climate change. Patterns of distributive justice are quite abstract in their appeal to distributive ideals. Whereas the structural model is rooted in the realities of healthcare and how it is structured and organised. A further advantage is that the structural model avoids a focus on discrete burdens, like changing one treatment to another, and goes beyond discrete burdens to look at the whole of healthcare and systemwide transformation. By focusing on the system of healthcare as a whole it becomes easier to avoid distributing the burdens of addressing climate change in a vacuum, separate from the other goals, priorities and challenges facing healthcare systems.

How does Young suggest we address structural injustice then? Young advocates for the social connection model as a form of *political* responsibility. Young contends that, "individuals bear responsibility for structural injustice because they contribute by their actions to the processes that produce unjust outcomes."¹²² This shifts responsibility towards a forward-looking and relational approach, rather than a more backward-looking liability model. As the net is cast wide to connect individuals with social structures, it is easy to see how this can extend the scope of responsible agents beyond states and individuals.

The social connection model is, however, relatively toothless when it comes to concretely specifying what agents must actually do to address injustice. In the case of healthcare, it still leaves open exactly what healthcare should do to address its GHG emissions. Structural injustice then, may be better at diagnosing injustice than the social connection model is at specifying what justice looks like.¹²³

This problem with the social connection model is also noted by Robin Eckersley.¹²⁴ However, Eckersley does note that some parallels with Young's view and ability to pay could be drawn.¹²⁵ Eckersley contends that the structural position of states could be related to their capacity to mitigate providing differential responsibilities for states.

¹²² Young 2011, *op. cit.* note 110, p.105

¹²³ McKeown, M. (2021). Structural injustice. *Philosophy Compass*, 16(7).

¹²⁴ Eckersley, 2016 *op. cit.* note 108

¹²⁵ Eckersley (*ibid*) is not the only philosopher who applies principles of remedial responsibility in a way that are more sensitive to structural focuses. Megan Blomfield interprets the PPP in such a way. For Blomfield 'polluters' are not limited just to those who generate GHG emissions. She broadens the view of polluters to all those who contribute to injustice of climate change. Blomfield points out that climate injustice entails more than just generating emissions, since climate change disproportionately affects those who are exposed and vulnerable to climate hazards. She argues that many are thought to contribute to the problem of climate change by contributing to the vulnerabilities that some have to climate hazards. Often individuals are vulnerable and exposed through structural forces and those who uphold those structures and therefore liable to pay. This is one way that a PPP might be interpreted in a more social structural way where pay does not just mean paying discrete mitigation burdens but also reforming the structures that keep people exposed and vulnerable to climate change. Blomfield, 2023 *op. cit.* note 27

However, Eckersley does not pursue exactly how an ability to pay principle might apply in a more Youngian way than to note this synergy. Furthermore, Eckersley is clearly interested in the international, state perspective rather than the institutional perspective that concerns me here.

However, I think asking what healthcare can do 'to get the job of addressing climate change done' offers a compelling way forward. I therefore take up the idea that ability to pay is pivotal in how healthcare systems transform to address their emissions. Before I move on to this, I want to briefly cover the contribution of bioethicists to the debate around climate change and especially healthcare's role in this.

3.2.2. Bioethics in the Anthropocene

Given my focus on healthcare, it is important to consider what bioethicists have had to say about these important issues. Bioethical discussion of the responsibilities of healthcare systems to address their environmental impact is relatively new and debate is emerging.

One challenge facing bioethics is the fragmented research landscape around health, healthcare and climate change.¹²⁶ Scholarship on health and climate change tends to occur in siloed disciplines making it challenging to bring together a core research agenda, even in a diverse field like bioethics. Furthermore, health has been largely absent from important climate negotiations until relatively recently. Health was not included on the core agenda of the first 25 United Nations climate change conferences (COP). As mentioned above, at COP26 commitments were made on climate change and health. Health has continued to feature in COPs since. But when

¹²⁶ Sheather, J., Littler, K., Singh, J. A., & Wright, K. (2023). Ethics, climate change and health - a landscape review. *Wellcome Open Research*, 8, 343–343.

health is not included in the highest levels of climate negotiation it becomes harder to highlight what important issues there are for bioethics to address.

Some view the lack of engagement by mainstream bioethics on issues of climate change and border environmental threats as deeply problematic. Stephen Gardiner claims that since confronting climate change is clearly within the remit of bioethics, any perceived neglect of climate change within bioethics "starts to look like a major abdication of responsibility, and perhaps even a dereliction of duty."¹²⁷ Whether bioethicists have a *duty* to engage in environmental issues is controversial. Whilst some might have liked to see more climate-relevant and environmentally sensitive work in bioethics, a field like bioethics sole focus cannot be even a very important issue like climate change.

Interestingly, one key thread in bioethical research has been the question of whether climate change is a bioethics problem at all.¹²⁸ A second thread mentioned here centres around clinical issues raised by climate change.

3.2.2.1. Is climate change a bioethics problem?

Many point out that environmental issues have been core to the field of bioethics since its inception. They refer back to Van Rensselaer Potter's view of bioethics in making this case.¹²⁹ Since Potter took a more inclusive view of bioethics as

¹²⁷ Gardiner, S. M. (2022). Environmentalizing Bioethics: Planetary Health in a Perfect Moral Storm. *Perspectives in Biology and Medicine*, 65(4), 569–585. <https://doi.org/10.1353/pbm.2022.0048>

¹²⁸ Macpherson, C. C. (2013). Climate Change is a Bioethics Problem. *Bioethics*, 27(6), 305–308. Lee, L. M. (2017). A Bridge Back to the Future: Public Health Ethics, Bioethics, and Environmental Ethics. *American Journal of Bioethics*, 17(9), 5–12.. Ray, K., & Cooper, J. F. (2024). The Bioethics of Environmental Injustice: Ethical, Legal, and Clinical Implications of Unhealthy Environments. *American Journal of Bioethics*, 24(3), 9–17.

¹²⁹ Lee 2017, *op. cit.* note 128. Richie, C. (2019). *Principles of green bioethics: sustainability in health care*. Michigan State University Press. p.3

encompassing more than just healthcare, environmental issues are clearly within the remit of bioethics. Furthermore, as climate change threatens health and bioethics is centrally concerned with health, then on some views, climate change is a bioethics problem.¹³⁰ To highlight these connections scholars discuss ideas like "environmental bioethics"¹³¹, "green bioethics"¹³², and using the "land ethic".¹³³

Some highlight that a narrow framing of climate change as a health and therefore bioethics problem risks impoverishing the debate on climate change.¹³⁴ Some worry that mainstream concepts and theories from bioethics are incapable of addressing issues of climate justice.¹³⁵ For instance, in a review of ethical issues in health and climate change, Sheather and colleagues note that the usual focus on individual dignity and autonomy from medical ethics are limited dealing with issues of global and intergenerational concern.¹³⁶ New ideas and concepts in bioethics are therefore thought to be necessary in bioethics to address issues of climate and the environment. Examples include "green bioethics" mentioned above, as well as concepts of health like "planetary health".¹³⁷

This thesis is concerned with healthcare and the ethical issues that arise as it responds to climate change. There are a handful of issues in how healthcare addresses its emissions that have been considered by philosophers. I discuss these next.

¹³⁰ Macpherson 2013, *op. cit.* note 128.

¹³¹ Pierce, J., & Jameton, A. (2004). *The ethics of environmentally responsible health care*. Oxford University Press.

¹³² Richie 2019, *op. cit.* note 124.

¹³³ Wardrope, A. (2020). Health justice in the Anthropocene: medical ethics and the Land Ethic. *Journal of Medical Ethics*, 46(12), 791–796. <https://doi.org/10.1136/medethics-2020-106855>. Wardrope, A. (2024). Thinking like a mountain: A land ethical approach to healthcare resource allocation. *Bioethics*, 1–10. <https://doi.org/10.1111/bioe.13355>

¹³⁴ Ferguson, K. (2020). The Health Reframing of Climate Change and the Poverty of Narrow Bioethics. *The Journal of Law, Medicine & Ethics*, 48(4), 705–717.

¹³⁵ *Ibid.* Gardiner 2022, *op. cit.* note 121.

¹³⁶ Sheather *et al* 2023, *op. cit.* note 120.

¹³⁷ Gardiner 2022, *op. cit.* note 121.

3.2.2.2. Clinical ethics issues in climate change

A number of philosophers take on specific issues within healthcare where environmental concerns might challenge existing approaches to biomedical issues. For example, scholars have discussed environmental issues around numerous areas within clinical medicine: artificial intelligence,¹³⁸ reproductive technologies,¹³⁹ inhalers,¹⁴⁰ volatile anaesthetic gases, pharmaceuticals,¹⁴¹ informed consent,¹⁴² physicians' duties,¹⁴³ global health,¹⁴⁴ medical research.¹⁴⁵ I do not examine these important contributions further since they largely focus on specific issues within healthcare rather than healthcare as a whole.

Cristina Richie's book, *Principles of Green Bioethics: Sustainability in health care* proposes bioethical principles to decarbonise healthcare. As she is similarly interested

¹³⁸ Richie, C. (2022). Environmentally sustainable development and use of artificial intelligence in health care. *Bioethics*, 36(5), 547–555. <https://doi.org/10.1111/bioe.13018>

¹³⁹ Richie, C. (2015). What would an environmentally sustainable reproductive technology industry look like? *Journal of Medical Ethics*, 41(5), 383–387. <https://doi.org/10.1136/medethics-2013-101716>.
Richie, C. (2024). *Environmental ethics and medical reproduction*. Oxford University Press.

¹⁴⁰ Parker, J. (2023). Barriers to green inhaler prescribing: ethical issues in environmentally sustainable clinical practice. *Journal of Medical Ethics*, 49(2), 92–98. <https://doi.org/10.1136/jme-2022-108388>

¹⁴¹ Richie, C. (2022). Environmental sustainability and the carbon emissions of pharmaceuticals. *Journal of Medical Ethics*, 48(5), 334–337. <https://doi.org/10.1136/medethics-2020-106842>

¹⁴² Richie, C. (2023). "Green informed consent" in the classroom, clinic, and consultation room.

Medicine, Health Care and Philosophy 26.4, 507-515. Resnik, D.B., & Pugh, J. (2024) Green bioethics, patient autonomy and informed consent in healthcare. *Journal of Medical Ethics* 50.7, 489-493.

¹⁴³ van Gils-Schmidt, H. J., & Salloch, S. (2024). Physicians' duty to climate protection as an expression of their professional identity: a defence from Korsgaard's neo-Kantian moral framework. *Journal of Medical Ethics*, 50(6), 368–374. <https://doi.org/10.1136/jme-2023-109203>

¹⁴⁴ Pratt, B. (2023). Expanding health justice to consider the environment: how can bioethics avoid reinforcing epistemic injustice? *Journal of Medical Ethics*, 49(9), 642–648. <https://doi.org/10.1136/jme-2022-108458>.

Pratt, B. (2022). Sustainable global health practice: An ethical imperative? *Bioethics*, 36(8), 874–882. <https://doi.org/10.1111/bioe.13071>

¹⁴⁵ Samuel, G., Lucivero, F., & Lucassen, A. M. (2022). Sustainable biobanks: a case study for a green global bioethics. *Problemi Di Bioetica*, 33(1), 50–64. <https://doi.org/10.1080/11287462.2021.1997428>.

Samuel, G., & Richie, C. (2023). Reimagining research ethics to include environmental sustainability: a principled approach, including a case study of data-driven health research. *Journal of Medical Ethics*, 49(6), 428–433. <https://doi.org/10.1136/jme-2022-108489>.

in how healthcare systems can undertake a just transition to environmentally sustainable care, I will briefly examine her approach and point to a couple of limitations.

Like myself, Richie is primarily concerned with justice. Inspired by Beauchamp and Childress' four principles of biomedical ethics: autonomy, beneficence, non-maleficence and justice, Richie proposes four principles of Green Bioethics. She lists her four principles of Green Bioethics as:¹⁴⁶

1. Distributive justice: allocate basic medical resources before special-interest access.
2. Resource conservation: provide health-care needs before healthcare wants.
3. Simplicity: reduce dependence on medical interventions.
4. Ethical economics: humanistic healthcare instead of financial profits.

Unlike Beauchamp and Childress's principles, Richie states that principle 1 has lexical priority over the others, but principles 2-3 have no ranking. The first half of the book is devoted to discussing each principle.

I make two points about Richie's principles. The first is that it is unclear how distinct each of these principles really is. For example, when discussing the first principle, distributive justice, Richie says,

"In order for health care to be distributed proportionally many people will need more resources while some people require less. Those in the developed world who have their basic health needs met will not require additional resources. Indeed, some people who have accessed basic health care have already been afforded proportional justice. Many more people have violated the demands of justice by using too much."¹⁴⁷

¹⁴⁶ *Ibid*, p.19

¹⁴⁷ *Ibid*, p.31-32

Proportional justice, according to Richie, equates to 'proportional equality', which means responding to the ever-changing needs of individuals.¹⁴⁸ Richie goes on to say that "special-interest access exceeds health-care needs... More specifically, special-interest access goes beyond general health care for a particular individual."¹⁴⁹

Richie's first principle appears to rely on a distinction between needs and wants when allocating healthcare resources. But in this case, how are principles 1 and 2 distinct? Indeed, it is difficult to tell how special-interest healthcare avoids simply boiling down to addressing healthcare wants, and healthcare needs are fulfilled by basic healthcare. If this is the case, then how are the principles distinct?

Moving to principle 3, simplicity, we could ask a similar question. A consequence of focusing on healthcare needs is, according to Richie, that we reduce dependence on medical interventions. Again, we are led to the same issue: why do we require a separate principle of simplicity if it is part and parcel of principle 1 (and 2)? The same point can be made for principle 4 as a focus away from profits seems to straightforwardly follow from focusing on healthcare needs rather than wants. Principle 1 does not just have lexical priority of principles 2, 3 and 4. Principle 1 is the same as principles 2, 3 and 4.

The arguments made here are sympathetic to healthcare systems prioritising the most urgent needs. Indeed, this is an idea that is developed later around a sufficientarian theory of distributive justice. However, what is lacking from Richie's picture is a story about why these are principles of *environmental*, or in Richie's terms *Green*, bioethics. Bioethicists could endorse the idea that healthcare needs should be prioritised above healthcare wants for a variety of non-environmental reasons. For

¹⁴⁸ *Ibid*, p.30

¹⁴⁹ *Ibid*, p.32

instance, Schramme is keen to focus on healthcare needs above healthcare wants to avoid problems like healthism and medicalisation.¹⁵⁰ Others think that prioritising healthcare needs is simply the proper way to allocate healthcare resources.¹⁵¹ Richie provides lots of examples of healthcare interventions she thinks carry too high an environmental cost: menopause treatments, reproductive technologies, joint replacements and so forth. But what is lacking is an argument for why this is a distinct principle of *Green Bioethics*, rather than simply just of resource allocation in healthcare.

This is important because it is not necessarily obvious that just meeting healthcare needs will reduce healthcare's environmental impact. It may well be the case that fulfilling healthcare needs and not healthcare wants does reduce healthcare GHG emissions. However, healthcare emissions are not just about what healthcare does, but about *how* it does it. Richie seems to place a lot of faith in the idea that focusing on needs and basic healthcare alone will reduce healthcare emissions, but this is not guaranteed without an explicitly environmental principle to moderate it. There is nothing in Richie's account to say that healthcare systems would not produce huge amounts of pollution and environmental destruction in how they fulfil healthcare needs. The point is essentially a variation on the 'bottomless pit' objection to prioritarianism. Prioritising only those with significant healthcare needs could still expend a huge amount of resources so it is unclear how needs alone guarantee a sustainable healthcare system. In the absence of a deliberate reference to the environment there is nothing to constrain or keep in check how healthcare fulfils and secures needs, no matter how Richie specifies a healthcare need as opposed to a healthcare want.

¹⁵⁰ Schramme, T. (2018). *Theories of Health Justice: Just Enough Health*. Rowman & Littlefield International.

¹⁵¹ Crisp, R. (2002). Treatment according to need: Justice and the British National Health Service. In R. Rhodes (Ed.), *Medicine and social justice: Essays on the distribution of health care* (pp. 134–143). New York: Oxford University Press.

3.3. Conclusion

This chapter has served two main purposes. First, it outlined the relevant scientific background on climate change, its impacts on human health and well-being, and the contribution of healthcare systems to greenhouse gas emissions. Second, it surveyed how political philosophers and bioethicists have responded to the ethical and political challenges posed by climate change.

Political philosophy has made important progress in identifying key normative issues in humanity's response to climate change, offering a range of frameworks for allocating responsibility and motivating action. Nevertheless, there is a rich and growing debate about who should act, how, and why. What remains underexplored, however, is the role of organisations, especially healthcare, that are central to achieving social justice but also contribute substantially to climate change.

Bringing these threads together it is worth reflecting on why healthcare organisations have been relatively, albeit not completely, neglected in philosophical discussions of climatic duties. Given that climate negotiations typically occur at the level of states, it is understandable that much philosophical attention has followed suit. What is noteworthy, however, is that if healthcare globally was a nation, it would rank in the top 10 polluters. A focus on the wealthy could indeed lead to an investigation of private healthcare, but perhaps the focus would be more on the wealthy individuals behind these corporations rather than healthcare itself. The wealthy also neglects healthcare systems like the NHS. Another thought is that if healthcare is defined by a commitment to health, it may be simply assumed that healthcare will, or ought to, reduce its emissions. Alternatively, if there was consensus that healthcare is special such that it is exempt from mitigation then this could also explain this research gap. These latter two points are controversial and incompatible, and therefore merit further investigation.

Although the bioethics literature on climate change is expanding, fundamental questions remain around the responsibilities of healthcare in responding to the climate crisis. This thesis aims to help bridge that gap by examining how healthcare, as both a contributor to and potential mitigator of climate change, ought to be positioned within broader discussions of climate justice.

Chapter 4

4. Structure of the thesis

4.1. Overview

This thesis consists of five independent papers that collectively form a cohesive body of work addressing the research questions outlined in chapter one. Each paper examines a distinct issue related to healthcare's responsibilities in mitigating GHG emissions. While the papers explore diverse topics and themes, they are interconnected in their contribution to the overarching goals of the thesis by either directly addressing the primary research questions or by building on issues raised in earlier papers. Together, they form a coherent narrative about the responsibilities of healthcare systems to mitigate their GHG emissions.

The style of the chapters in Part II reflects the format of the thesis wherein each chapter is written with the goal of undergoing peer-review for publication in an appropriate journal. Hence each chapter is composed of a paper that has been either published, is under review, or is considered publishable and awaiting submission. Since each chapter is a self-contained paper, it presents a distinct argument concerning a specific issue in how healthcare systems address climate change fairly. As a result, the length and style of the chapters vary, depending on the requirements of their target journals.

Before presenting the papers themselves, it is worth reiterating the target and scope of the arguments as introduced in chapter one. The central concern of this thesis is the English NHS. Although each paper refers to 'healthcare' and to 'healthcare systems' in general terms to have broad appeal to academic audiences, their

arguments should be read as being specifically about the NHS for the purpose of the thesis. Furthermore, whilst the papers frequently invoke an institutional focus, this is not strictly accurate. As clarified in the introduction, the thesis adopts an *organisational* focus, and this should be kept in mind.

Additionally, certain elements — such as background context, the identification of specific problems, or key arguments regarding principles of justice — are often repeated across chapters. This repetition reflects the nature of the PhD wherein there is a collection of publishable papers, and distinguishes this thesis from a traditional one. Whilst the chapters may not read as conventional thesis chapters, they build cumulatively and coherently to address the central research question.

Mindful of the specific approach taken in this thesis, I therefore provide an overview of the papers, explain how they fit together and note their publication status. Each summary is accompanied by the papers' abstract.

4.2. Summary of the papers

To further support the coherence of the thesis, it is useful to present the overall argument as unfolding in three stages with each stage comprising one or more of the individual papers.

Papers one and two form the first stage of the main argument of the thesis. The overarching purpose of these papers within the thesis is to introduce some of the key ideas, concepts and arguments, as well as lay the foundation for the second stage. The first paper answers the question of whether healthcare should be treated differently to other polluters because of its socially valuable role. It sets the stage for the broader discussion by examining whether healthcare warrants special consideration in climate ethics. The second paper challenges the application of the polluter pays principle to

healthcare, arguing that this widely used framework is inappropriate for allocating mitigation responsibilities in this context.

In the second stage of the argument, I build upon ideas of sufficientarianism and an ability to pay principle which were introduced in the first stage. Papers three and four form the second stage of the thesis where ability to pay, understood as a sufficientarian concept, is defended as the best way to determine healthcare's mitigation responsibilities. They argue that this approach provides a fairer and more practically relevant framework for assessing what healthcare systems owe in the context of climate change.

The fifth and final paper accounts for the third stage of the thesis. This chapter explores the practical implications of adopting an ability to pay principle. It asks: if healthcare's responsibilities are grounded in an ability to pay principle, what follows in terms of allocating concrete duties and designing fair decarbonisation strategies?

What follows next is a list of the five papers, including their titles, publication status, and a brief explanation of how each paper contributes to the overall argument of the thesis. Each entry is accompanied by the paper's abstract.

Paper one: Healthcare exceptionalism: should healthcare be treated differently when it comes to reducing greenhouse gas emissions?

Status: published.¹

A central question in understanding what principles of justice should govern

¹ Parker, J. (2025). Healthcare exceptionalism: should healthcare be treated differently when it comes to reducing greenhouse gas emissions? *Medicine, Health Care, and Philosophy*, 28(2), 233–245.
<https://doi.org/10.1007/s11019-025-10254-x>

healthcare systems' mitigation responsibilities is whether healthcare should be treated differently to other polluters. This question is taken up in paper one. This question is important because the extent to which we treat healthcare differently will change what principles of justice we adopt in order to determine what healthcare should do to address its emissions. In particular, the issue is whether those principles should be sensitive to the role that healthcare plays in social justice. It is through this discussion that I introduce ability to pay as a way to determine healthcare's mitigation responsibilities.

Abstract

Healthcare systems produce significant greenhouse gas emissions, raising an important question: should healthcare be treated like any other polluter when it comes to reducing its emissions, or is healthcare special because of its essential societal role? On one hand, reducing emissions is critical to combat climate change. On the other, healthcare depends on emissions to deliver vital services. The resulting tension surrounds an idea of healthcare exceptionalism and leads to the question I consider in this paper: to what extent (if any) should the valuable goals of healthcare form an exception to the burdens of reducing greenhouse gas emissions?

The goals of this paper are twofold. One is to think about how to address the issue of healthcare exceptionalism. Second is to discuss the extent of healthcare's climatic responsibilities. I examine two perspectives on healthcare exceptionalism. The first treats a responsibility to reduce emissions and the delivery of healthcare as separate issues, each governed by its own principle. I reject this view, proposing instead that we consider healthcare's environmental responsibilities in conjunction with its essential functions. I defend an "inability to pay" principle, suggesting that while healthcare should indeed contribute to mitigating climate change, its obligations should be constrained by the necessity of maintaining its core goals like protecting health and preventing disease. Healthcare should be treated differently from other sectors, but

not to the extent that it is entirely exempt from efforts to reduce emissions.

Paper two: The Polluter Pays Principle as a rationale for healthcare's responsibility to mitigate their greenhouse gas emissions

Status: awaiting submission

In paper two, I argue against a polluter pays principle since it is insensitive to healthcare's role in securing social justice. However, a polluter pays principle has powerful intuitive appeal and is frequently used to ground healthcare's mitigation responsibilities. It is therefore important to devote a whole paper to considering the role of the polluter pays principle. Having completed a deeper analysis of causal, backwards-looking principles like the polluter pays principle and found it wanting, the thesis is in a better position to consider a forward-looking principle like ability to pay.

Paper two marks the completion of the first part of the main argument of the thesis. With the key components in place, we can move to the next part of the thesis.

Abstract

Healthcare systems make a significant contribution to climate change leading to calls for healthcare to adopt mitigation policies. One rationale for this is the polluter pays principle (PPP) which says that polluters, like healthcare, must pay the cost of mitigating their greenhouse gas emissions. This paper presents two limitations to applying this principle to healthcare's mitigation responsibilities. First, the PPP relies on causation to identify a polluter and determine who pays. On one account of causation, however, it is difficult to identify 'healthcare' as a polluter. An alternative causal account can find healthcare as a polluter but fails to require that healthcare pay. Second, the PPP allocates costs in proportion to emissions, meaning that

disadvantaged groups, who often have greater healthcare needs and therefore emissions, would bear a larger share of mitigation costs. I argue this is unfair. The paper concludes that while healthcare is liable for mitigation, a different approach is needed to assign responsibility fairly.

Paper three: Sufficiency and healthcare emissions

Status: Published in *Bioethics*²

Within the thesis, the purpose of paper four is to provide a more detailed analysis of the idea of ability to pay. It builds upon paper one and helps to address the central question of what healthcare's fair share of mitigation burdens is. Although the paper is not framed as being about ability to pay, but rather being about sufficiency and healthcare emissions, the paper can be read in this way. Indeed, the relationship to ability to pay is mentioned in the paper. To make this relationship more explicit, in paper two I argue that an ability to pay can help delineate exceptions to mitigation for healthcare on the basis that healthcare is sometimes necessary to secure individual's basic needs but emissions beyond this are liable to mitigation. The core idea then is that it is important to set limits on what capabilities healthcare systems have to address their emissions. Sufficientarianism is particularly well-equipped to do this because it can help demarcate emissions that are permissible from those that ought to be mitigated. This paper discussed how to delineate permissible from impermissible emissions which corresponds to when healthcare has an ability to pay and when it does not.

Abstract

² Parker, J. (2025). Sufficiency and healthcare emissions. *Bioethics*, 1–9.
<https://doi.org/10.1111/bioe.13400>

In this paper I am concerned with how healthcare systems ought to transition away from the greenhouse gas emissions that they have historically relied on to provide care. I address two questions in relation to this issue. The first is what emissions target should healthcare systems adopt? Second, is how should the burdens of mitigation be shared fairly in light of that target? I argue that sufficientarianism offers an attractive way to answer both of these questions because it is better situated to strike the right balance between healthcare benefits and the costs of mitigation than rivals. Sufficiency describes the view that what is important from the perspective of distributive justice is that individuals have enough. I argue that this ideal can be used to set a threshold of enough health from which an emissions threshold can be set. Once an emissions threshold is in place, this can be used to demarcate permissible from impermissible emissions in healthcare. In turn, the emissions threshold provides guidance on which emissions are liable to mitigation and when it would be fair for healthcare to shoulder the associated burdens. Permissible emissions, on the other hand, are necessary to secure sufficiency and so healthcare's mitigation responsibilities should be altered in light of this. I also discuss various alternative methods of setting an emissions target like net zero, zero emissions, emissions grandfathering and emissions egalitarianism. I point to several issues with these approaches.

Paper four: Subsistence emissions, prevention and healthcare decarbonisation

Status: submitted to the *Journal of Bioethical Inquiry*

Since I understand ability to pay in sufficientarian terms, it is important to consider some challenges that sufficientarian theories of justice face. Sufficientarian theories of justice rely heavily on the idea that there is a threshold of sufficient goods, whereby benefits above and below the threshold are treated differently. In the thesis it is therefore important to clarify how the threshold is set and how emissions above and below the threshold are distributed. There is a longstanding debate in political

philosophy about these issues for sufficientarians. In contrast, many see prevention of illness as pivotal to decarbonise healthcare. Prevention, however, seems to stand in opposition to a sufficientarian way of decarbonising healthcare. By discussing sufficientarianism and prevention it is possible to clarify how the threshold is set and how emissions distributed in light of the threshold.

Abstract

This paper addresses the challenge of decarbonising healthcare while maintaining its essential role in protecting and promoting health. With healthcare systems worldwide committing to reduce their greenhouse gas emissions, policymakers must navigate how to reconcile emissions reduction with delivering high-quality care.

Two main distributive ideals have emerged to guide a just transition to decarbonised healthcare: subsistence emissions and efficiency. The subsistence view holds that healthcare emissions necessary to meet a threshold of enough health are permissible, while emissions exceeding this threshold should be mitigated. The efficiency approach, in contrast, prioritises directing emissions toward prevention and health promotion, as this is the most cost-effective use of limited emissions.

Although both frameworks aim to reconcile healthcare's goals with reducing healthcare's carbon footprint, they appear to conflict. Subsistence emissions tend to prioritise those below a threshold of enough health, whereas efficiency focuses on maintaining health in the already relatively well-off. As subsistence emissions offers a compelling strategy for decarbonising healthcare fairly, the question arises: can it accommodate prevention?

This paper argues that these two perspectives can be reconciled. Although subsistence emissions typically emphasise achieving a health threshold, it can also endorse emissions for preventive measures to prevent individuals from falling below

this threshold. Thus, a more nuanced view emerges, where emissions are not strictly categorised as permissible or impermissible. Instead, some preventive emissions are justified as necessary to secure the health threshold, helping healthcare systems reduce their emissions fairly while meeting their goals systems.

Paper five: The agents of climate justice in healthcare

Status: Under peer review in *Bioethics*

This final paper marks the third part of the main argument of the thesis. It adopts a more practical focus, examining what it means to decarbonise healthcare systems under a framework of an ability to pay principle. The paper provides a more detailed account of how mitigation responsibilities might be fairly allocated within healthcare systems. This is done through a framework of first-order and second-order responsibilities. The overarching question regards the fair share of the burdens of healthcare mitigation and this paper moves from normative theory to issues of implementation in sharing the burdens of mitigation within healthcare organisations.

A number of scholars argue against bringing issues of environmental sustainability into the doctor-patient relationship. The thought seems to be that decarbonising healthcare is an organisation level problem, not the responsibility of individuals. These bioethicists draw a distinction between what organisations and individuals should do to mitigate climate change. The paper argues that such a division is overly simplistic and risks obscuring the scale and complexity of decarbonising healthcare. Even if we accept that both organisational and individual-level action is necessary to sufficiently decarbonise healthcare, it is still an open question how to fairly allocate responsibilities for realising climate justice in healthcare across various actors.

This paper contributes to ongoing debates by clarifying the site of justice in

healthcare decarbonisation and how it relates to who the agents of climate justice are in this context. It argues that understanding how different actors share responsibilities is essential for advancing climate justice in healthcare. Given the scale of the transformation required to transition to low-carbon environmentally sustainable systems, understanding this issue is a critical step in ensuring healthcare's contributions to addressing climate change are just.

Abstract

This paper addresses the critical issue of decarbonising healthcare systems to combat climate change. I focus on identifying the 'agents of justice' responsible for this transformation. Beginning with the claim that healthcare greenhouse gas emissions cause injustice, the paper assumes that achieving a net zero healthcare system is essential for climate justice. The discussion centres on two prevailing perspectives: one that assigns responsibility to healthcare institutions and another that holds individual healthcare professionals accountable. The paper advocates for a pluralistic approach to responsibility, contending that the complexity and scale of reducing healthcare emissions necessitate allocating responsibilities based on effectiveness. This leads to the identification of two types of responsibility: first-order responsibilities, which involve direct actions to reduce emissions, and second-order responsibilities, which involve supporting and ensuring the fulfilment of first-order duties. The paper challenges the traditional institutional versus individual dichotomy, expanding the scope of responsibility to include a broader range of agents, both within and beyond the healthcare sector. By distinguishing between first-order and second-order responsibilities, the paper offers a clearer framework for understanding the distribution of obligations in achieving climate justice in healthcare. Ultimately, it underscores that focusing solely on direct mitigation efforts by institutions or clinicians is inadequate, and a more comprehensive, multi-agent approach is required to effectively decarbonise healthcare systems.

4.3. Conclusion

This chapter has outlined the title of each paper, its publication status, a brief summary of each paper along with its contribution to the overarching thesis argument, as well as the corresponding abstract. In the next section the five papers that form the main body of the thesis are presented.

Part II

Chapter 5

5. Healthcare exceptionalism: should healthcare be treated differently when it comes to reducing greenhouse gas emissions?

5.1. Introduction

A tension results from our intuitions about the importance of tackling climate change and how this affects institutions we think of as special, like healthcare. Healthcare is a significant source of greenhouse gas emissions and in the face of climate breakdown healthcare emissions should be reduced. And yet, if healthcare is special because of its role in protecting goods like health, then this offers a justification for thinking of healthcare differently in the allocation of mitigation responsibilities. So, is there something special about healthcare that means that when it comes to tackling climate change, healthcare does not have the same responsibilities as other polluters like air travel or fashion?

The issue of how complex and technologically advanced healthcare systems reconcile providing the benefits of healthcare with the challenge of minimising the emissions they have historically relied on to provide those benefits is central to questions of healthcare's climatic responsibilities. This paper is concerned with how to resolve this tension. The question I raise is one of exceptionalism: to what extent (if any) should healthcare be treated as exceptional when it comes to mitigation burdens?

At its core, this question examines whether healthcare is, or should be, considered special and thereby treated as distinct from other sectors, particularly when it comes to climatic responsibilities. Healthcare exceptionalism suggests that there are ways in which we take healthcare to be an exception to general rules or obligations. Take the idea that polluters should pay in proportion to their emissions, healthcare exceptionalism would object to a general principle of treating all polluters alike due to healthcare's perceived importance. In the context of climate policy, this concept implies that healthcare should be exempt from certain duties, such as reducing its emissions, due to healthcare's vital role in safeguarding and promoting health.

My goals in this paper are twofold. One objective is to offer a framework for thinking about the issue of healthcare exceptionalism in mitigation responsibilities. Mitigation refers to actions that limit the impact of emissions on climate change either by preventing emissions or enhancing activities that remove greenhouse gases from the atmosphere. Healthcare exceptionalism is a scalar concept as healthcare could be treated more or less differently in the allocation of mitigation burdens. Where one falls on this spectrum influences what is considered healthcare's fair share of mitigation burdens. To articulate this spectrum I use Caney's distinction between 'isolationism' and 'integrationism'.¹ This distinction relates to whether mitigation responsibilities and providing the benefits of healthcare should be treated as separate issues, or integrated. Isolationism treats mitigation responsibilities and healthcare benefits as separate issues, while integrationism combines them. In this paper I reject isolationist positions and sketch a view that integrates concerns about climate change with meeting the goals of healthcare.

¹ Caney, S. (2012). Just Emissions. *Philosophy & Public Affairs*, 40(4), 255–300.
<https://doi.org/10.1111/papa.12005>. Caney, S. (2018). Climate Change', in Serena Olsaretti (ed.), *The Oxford Handbook of Distributive Justice* (pp. 664–688.), Oxford Handbooks, OUP.

My second goal is to argue for a moderate position on this spectrum. I propose that healthcare's mitigation responsibilities should be determined based on ability to pay, or more precisely on when healthcare has an *inability* to pay. Healthcare is liable to mitigate its emissions unless doing so would threaten its ability to satisfy basic needs. This means some emissions are morally permissible and leaves a sphere of healthcare emissions that are treated differently, but not all healthcare emissions are exempt.

The paper is structured into three main sections. The first section is concerned with clarifying the nature of the problem and furnishing the distinction between isolationism and integrationism. This is fundamental to how I resolve the issue of healthcare exceptionalism. The first section also clarifies what I mean when I refer to 'healthcare' as having certain responsibilities. In the second section I discuss two approaches that compartmentalise the goals of healthcare and mitigation responsibilities: 'healthcare non-exceptionalism' and 'absolute healthcare exceptionalism'. The first view, 'healthcare non-exceptionalism' rejects the idea that healthcare is special and disregards the goals of healthcare focusing just on mitigation responsibilities. I argue against this and turn to examine whether treating healthcare as special means we should exempt it from mitigation responsibilities. The final section of the paper concerns how to reconcile the goals of healthcare with mitigation responsibilities. It is here that I make the case for an inability to pay principle. Using ability to pay, it is possible to delineate some exceptions to mitigation for healthcare on the basis that healthcare is sometimes necessary to secure individual's basic needs but emissions beyond this are liable to mitigation. Healthcare should be treated differently from other sectors, but not to the extent that it is entirely exempt from efforts to reduce emissions.

5.2. Preliminaries

To begin, I clarify the nature of the problem before explaining the method by which exceptionalism can help frame the conflict between these two important goals.²

Healthcare accounts for 4-5% of emissions globally.³ Healthcare emissions in different countries account for a greater or lesser proportion of national emissions. The National Health Service (NHS), for example, makes up 4% of emissions in England. This equated to 25 megatons of CO₂ equivalent in 2019.⁴ Compare this to healthcare in the United States where healthcare emissions are closer to 10% of national emissions.⁵ The threats posed by climate change and the need to stay within climatic targets creates a strong impetus to reduce emissions. As healthcare has a significant carbon footprint, we may think a responsibility to mitigate emissions extends to healthcare.

When discussing healthcare's climatic responsibilities, it is important to be clear on what I mean by 'healthcare'. I use 'healthcare' and 'healthcare system' interchangeably to refer to the organised efforts of societies to promote health, prevent disease and provide medical care. Despite different funding models and structures worldwide, healthcare systems share the common goals of promoting and protecting health,

² That is not to say that these two goals can never coincide. Examples include waste reduction or avoiding activities like "overdiagnosis" that are not thought to contribute to the goals of healthcare. Where reducing the emissions of healthcare makes no difference to the distribution of benefits and burdens provided by a healthcare system, there is no question of justice to answer. However, these goals may not always coincide and there is still a question of transitional justice in terms of how healthcare systems shift away from these activities. Hence, I assume that there are areas where reducing healthcare emissions are in tension with providing the benefits of healthcare.

³ Healthcare Without Harm. (September 2019) Healthcare's Carbon Footprint: how the health sector contributes to the global climate crisis and opportunities for action. Retrieved from: <https://global.noharm.org/sites/default/files/documents->

See also: Lenzen, M., Malik, A., Li, M., *et al.* (2020). The environmental footprint of health care: a global assessment. *Lancet Planet Health* 4 (7): e271–e279.

⁴ Tennison, I., Roschnik, S., Ashby, B., *et al.* (2021). Health care's response to climate change: a carbon footprint assessment of the NHS in England. *The Lancet. Planetary Health*, 5(2), e84–e92. [https://doi.org/10.1016/S2542-5196\(20\)30271-0](https://doi.org/10.1016/S2542-5196(20)30271-0)

⁵ Eckelman, M. J., & Sherman, J. (2016). Environmental Impacts of the U.S. Health Care System and Effects on Public Health. *PLoS One*, 11(6), e0157014-. <https://doi.org/10.1371/journal.pone.0157014>

alleviating symptoms, preventing premature death, and providing end-of-life care.⁶

Healthcare systems are complex as a result of the increasing complexity of the problems they address, the array of technologies and methods of addressing healthcare problems and the numerous people—politicians, managers, healthcare professionals and staff—who play roles in organising and delivering care. When I refer to ‘healthcare,’ I am referring to this group of individuals responsible for ensuring the system functions effectively and fulfils its core purposes. These individuals are the main duty-bearers responsible for reducing healthcare's emissions.

I do not go so far as to describe healthcare as a collective agent with moral responsibilities beyond those of its members, rather I view it as a group of individuals with shared responsibilities.⁷ Therefore, when I use the term ‘healthcare,’ it should be understood as shorthand for the group of people responsible for making sure healthcare systems can function and meet their goals. There is a further question of how to allocate responsibilities amongst these various actors, but in this paper, I am interested in the responsibilities healthcare has regarding climate change.

There is no canonical blueprint for a low-carbon or net-zero healthcare system. Nonetheless, 81 healthcare systems around the world have committed to become sustainable and low carbon, and 45 have committed to net-zero.⁸ It is difficult to

⁶ Schramme, T. (2017). Goals of Medicine. In Edwards, S. (ed) *Handbook of the Philosophy of Medicine* (pp. 121–128). Springer Netherlands. Hastings Centre. (1996) Challenges to traditional medical goals: The Goals of Medicine: Setting New Priorities. *The Hastings Center Report*, 26(6), S2-.

Pellegrino, E. D. (2001). The Internal Morality of Clinical Medicine: A Paradigm for the Ethics of the Helping and Healing Professions. *The Journal of Medicine and Philosophy*, 26(6), 559–579.
<https://doi.org/10.1076/jmep.26.6.559.2998>. Brulde, B. (2001). The goals of medicine. Towards a unified theory. *Health Care Analysis*, 9(1), 1–13. <https://doi.org/10.1023/A:1011385310274>

⁷ Smiley, M. (2023). Collective Responsibility. *The Stanford Encyclopedia of Philosophy*. Retrieved from: <https://plato.stanford.edu/archives/fall2023/entries/collective-responsibility/>

⁸ World Health Organisation and Alliance for Transformative Action on Climate and Health. (2022) COP26 Health Programme. Retrieved from: <https://www.who.int/initiatives/alliance-for-transformative-action-on-climate-and-health/cop26-health-programme>

specify precisely what actions healthcare systems can and should take to reduce their emissions where there are commitments without fully worked out plans for sustainable healthcare systems. To make a start on reducing healthcare emissions, it is important to first appreciate the makeup of healthcare's carbon footprint. To use the English NHS as an exemplar, one study found that the supply chain which includes medicines, equipment and the like, account for most of its greenhouse gas emissions (62%).⁹ Direct patient care results in 24% of emissions and the remaining carbon footprint is from patient and staff travel, and commissioned services.

Driving healthcare emissions down means targeting the sources of emissions cited. At the most general level, reducing the carbon footprint of healthcare is thought to entail changing what, where and how healthcare is provided.¹⁰ A comprehensive and wide-ranging shift in how healthcare is structured, organised and delivered is expected to be required to decarbonise healthcare.¹¹ This includes, but is not limited to: creating a culture of sustainability, tracking and reporting the carbon footprint of healthcare, offering financial incentives to reduce emissions, green supply chain sourcing, shifts in energy use including renewables and energy conservation, low carbon transportation, low carbon foods and packaging as well as minimising waste, prioritising disease prevention and chronic disease management, and, reducing overtreatment and overprescribing.¹² Investments in infrastructure and low-carbon technologies, as well as shifts in how and what healthcare is offered, can lead to opportunity costs, especially in the shorter term, as funds spent on mitigation are diverted away from direct patient care. But more fundamentally, the extent to which healthcare should change, the

⁹ Tennison *et al*/2021 *op. cit.* note 4

¹⁰ Naylor C, Appleby J. (March 2012). Sustainable health and social care: Connecting environmental and financial performance. Retrieved from: <https://www.kingsfund.org.uk/insight-and-analysis/reports/sustainable-health-social-care>

¹¹ National Health Service England. (July 2022). Delivering a 'net zero' NHS. Retrieved from: <https://www.england.nhs.uk/greenernhs/publication/delivering-a-net-zero-national-health-service>

¹² Salas, R. N., Maibach, E., Pencheon, D., Watts, N., & Frumkin, H. (2020). A pathway to net zero emissions for healthcare. *BMJ (Online)*, 371, m3785–m3785. <https://doi.org/10.1136/bmj.m3785>

burdens it should shoulder in decarbonising and what the resulting healthcare system looks like all depend on the principles of justice we adopt in guiding the transition to lower carbon healthcare.

As mitigation is burdensome and involves a transition in the structure, organisation, and perhaps even the function of healthcare, healthcare systems that seek to minimise their emissions will be quite different to ones with no such commitments. There are two goals to consider here. The goals in question are (1) minimising the threats of climate change through mitigation, and (2) the ends of healthcare like treating disease, minimising suffering, protecting health and so forth. As each goal shapes what decisions are made and what constraints are placed on healthcare, how each goal is adopted, implemented, and constrains and disrupts the other sculpts healthcare systems and consequently the distribution of benefits and burdens within it. Put another way, policy makers, managers and clinicians will make quite different decisions if their primary goal is to reduce emissions, to promote the health of certain populations, or both. When stakeholders make decisions on this basis, the nature of healthcare systems, and in turn the distribution of certain goods like health in a population, alter. The issue at stake is one of distributive justice – the fair distribution of the burdens of climate change mitigation and the benefits of healthcare – and is essential in understanding what healthcare systems should do when it comes to climate change.

Healthcare exceptionalism enters the debate as a response to the idea that healthcare should carry the burdens of reducing its emissions. Some may object that imposing a green agenda on healthcare is unfair. Policymakers may worry that environmental goals could negatively impact the delivery of care, while doctors might see climate change as unrelated to their duty to treat patients. Patients may also resist efforts to reduce emissions if they feel it compromises their healthcare entitlements. These reasonable concerns ultimately stem from the belief that healthcare is special

and should be treated differently.¹³ Even those who support reducing healthcare emissions may argue that there should be limits on the extent of these efforts, based on the idea of healthcare exceptionalism and concerns about fairness.

There are two methods for resolving the conflict between healthcare's overarching goal to protect health and mitigation burdens: an isolationist method and integrationist one. Isolationism is the idea that principles of justice should focus on just one good and be applied in isolation from wider considerations. Integrationism, on the other hand, applies a general principle of justice to a whole package of goods, considering them as a whole.¹⁴ The methodological distinction between isolationism and integrationism helps us understand the different ways to approach the conflict between the goals of healthcare and the demands of climate change mitigation. The first method views each goal as a stand-alone issue bracketing out any broader concerns. The second is interested in reconciling the goals of healthcare with mitigation burdens. When considering healthcare and climate change mitigation we can adopt either:

1. Isolationism: Separate and treat each goal in isolation. One way to isolate these goals is to formulate and apply principles that surround each goal separately. One principle would determine mitigation responsibilities without consideration of healthcare's role in social justice, like a polluter pays principle. Alternatively, principles of justice can be applied to healthcare in isolation of environmental considerations, i.e. maintain the status quo.
2. Integrationism: formulate principles of justice that help balance and integrate the goals of healthcare and mitigation responsibilities.

¹³ As an anonymous peer reviewer points out, people may also have *unreasonable* concerns about healthcare reducing its carbon footprint. For example, because they believe that climate change is a hoax. Those who believe climate change is a hoax, or who depart significantly from the scientific consensus on climate change are unlikely to be moved by my arguments here. Their objections to healthcare, or any other institution or individual for that matter, reducing their greenhouse gas emissions would have to be dealt with quite differently to the approach I take here.

¹⁴ Caney 2012 and Caney 2018, *op. cit.* note 1

Based on the distinction between isolationism and integrationism we can place these issues on a spectrum. This spectrum essentially tracks the degree to which healthcare emissions are treated differently. At one end, we insulate the goals of healthcare from mitigation burdens and treat the goals of healthcare as an exemption from mitigation burdens. That is, we say healthcare is special and healthcare emissions are different because they are essential for providing the benefits of healthcare. I call this view 'absolute healthcare exceptionalism'. At the other end, lies a different isolationist position where we allocate mitigation burdens independently of the goals of healthcare. Healthcare is regarded as no different to any other polluter and the purpose of healthcare emissions are irrelevant to how mitigation burdens are allocated. I call this view 'healthcare non-exceptionalism'. Between these isolationist views lies a degree to which exceptions are made for healthcare depending on how these ideals are conjoined. In theory, there are several ways of integrating these goals which I discuss later in section 3. I argue for one moderate position which attempts to balance these two potentially competing issues.

5.3. Methods of isolation

Over the course of this section I discuss each isolationist stance. Two examples of isolationism are considered. As I mentioned above, I contrast 'healthcare non-exceptionalism', the standpoint that mitigation burdens should be allocated to healthcare independently of its goals, with 'absolute healthcare exceptionalism', the position that healthcare should be exempt from mitigation because healthcare is special. Although isolationism is the shared underlying methodology, these views come down quite differently on the extent that healthcare emissions should be treated differently. For each argument I provide separate reasons to reject these. What is clear from these arguments however are the important connections between health, healthcare and climate change. As these issues of distributive justice are interconnected, it is very difficult to separate out how we think about healthcare's

emissions, what healthcare should do regarding climate change and how to provide the benefits of healthcare.

One might be tempted to think of these issues in Walzerian terms as separate spheres of justice.¹⁵ Famously, Walzer defends the idea that a shared understanding of goods like health, education, wealth, political power and so forth determine how they are distributed. The result is that different goods are distributed using different principles. Each sphere has a corresponding principle of distribution, health is distributed based on need, wealth by the market and so forth. A central concern of Walzer's is that each sphere is prevented from dominating another. The meaning and understanding of one social good is not used to shape the intrinsic meaning of another.¹⁶ So wealth, which is distributed by market ideals, should not be used to buy health since the social meaning of health dictates this should be distributed by need. Thus, isolationist views on healthcare exceptionalism could be a way of preventing issues of climate change dominating the distribution of health or vice versa.

It is not obvious that there is a shared understanding over climatic responsibilities with a resulting sphere of justice.¹⁷ More importantly, even if healthcare should be distributed by need as Walzer suggests, emissions are required to meet healthcare needs. Healthcare emissions reflect how healthcare meets its goals and what principles of justice are adopted for distributing healthcare resources. As the sphere of health has implications for emissions through healthcare it is therefore difficult to see how these issues can in principle be kept separately. In a similar vein, emissions have consequences for health, and healthcare systems will increasingly have to respond to the health threats posed by climate change. Again, on a Walzerian view it is hard to see how these issues can be isolated into separate spheres.

¹⁵ Walzer, M. (1983). *Spheres of justice: a defence of pluralism and equality*. Basic Books.

¹⁶ *Ibid* p.10-11

¹⁷ Caney 2018, *op. cit.* note 1.

I raise the example of separate spheres to provide an overview of how isolationism might work and why it should be rejected. However, it is important to consider these arguments in more detail and so I discuss both healthcare non-exceptionalism and absolute healthcare exceptionalism next.

5.3.1. Healthcare non-exceptionalism

Let us turn to healthcare non-exceptionalism, the view that mitigation responsibilities should be allocated based on criteria that make no reference to the goals of healthcare.

One key principle for sharing mitigation burdens is a polluter pays principle (PPP). The PPP is widely discussed when it comes to allocating mitigation burdens, and is frequently endorsed by economists.¹⁸ This principle is an intuitive way of allocating responsibilities to address climate change and is familiar from other moral and legal practices as we generally consider it to be fair when the one causing a problem is the one who fixes it. The PPP is a principle of causal responsibility and assigns responsibility based on, and to the extent that, one is a polluter.¹⁹ As a contribution-based principle, the PPP is a principle of formal, as opposed to substantive, equality. Principles of formal equality have two components: equality as universality where a principle applies to all in the same way, and equality as impartiality meaning that we treat like cases alike.²⁰

¹⁸ Caney, S. (2005). Cosmopolitan Justice, Responsibility, and Global Climate Change. *Leiden Journal of International Law*, 18(4), 747–775. <https://doi.org/10.1017/S0922156505002992>. Cripps, E. (2013). *Climate Change and the Moral Agent: Individual Duties in an Interdependent World*. Oxford University Press. Shue, H. (2014). *Climate justice vulnerability and protection*. Oxford University Press, USA. Page, E. (2008). Distributing the burdens of climate change. *Environmental Politics*, 17:4, 556-575. Meyer, L. H., & Roser, D. (2010). Climate justice and historical emissions. *Critical Review of International Social and Political Philosophy*, 13(1), 229–253. <https://doi.org/10.1080/13698230903326349>. Vanderheiden, S. (2008). *Atmospheric justice: a political theory of climate change*. Oxford University Press.

¹⁹ Shue 2014, *ibid*, pp.182-183.

²⁰ Gosepath, S. (2021). Equality. *Stanford Encyclopedia of Philosophy*. Retrieved from:

All polluters are identified and treated the same by the PPP. If one is producing emissions the PPP is exclusively interested in recognising one as a polluter and quantifying their emissions such that remedial responsibilities can be allocated in proportion to pollution.

Under a PPP, the goals of healthcare and the purpose of healthcare emissions are irrelevant to whether, and to the extent that, healthcare should undertake mitigation. Equality as impartiality leads the PPP to treat like cases alike, where the criterion of interest is being a polluter and likeness is determined emissions. The PPP is not interested in any other factors and so as a polluter healthcare is met with neither favour nor discrimination. The PPP is therefore insensitive to the goals of healthcare. All that matters for a PPP is that healthcare is in fact a polluter, meaning that the PPP is isolationist. Furthermore, because the goals of healthcare provide no reason to treat healthcare as exceptional on a PPP, I adopt the label 'healthcare non-exceptionalism'.

The problem with setting any wider considerations of justice aside via a PPP are that two forms of injustice result: that mitigation costs are disproportionate and unfairly distributed. Demanding healthcare systems pay in proportion to emissions without consideration of the purpose of those emissions is overly demanding. If healthcare systems are responsible for all their emissions, the result is that both historic as well as current emissions must be accounted for. The NHS, by way of illustration, was established in 1948. Whilst there is no empirical data for NHS emissions stretching back this far, nor modelling of exactly what this would cost for the NHS, it seems reasonable to assume that mitigation costs would be substantial. Emissions dating between 1990 and 2019 equate to approximately 1 gigaton of CO₂ equivalent for the NHS in England.²¹ Mitigation costs in proportion to emissions from healthcare that we

<https://plato.stanford.edu/entries/equality/>

²¹ Tennison *et al*/2021 *op. cit.* note 4

can measure are likely to be extensive never mind those stretching back further.

Indeed, the above may partly explain why many healthcare systems, including the NHS, have committed to a target of net-zero rather than a strict target accounting for all greenhouse gas emissions.²² Net-zero requires emissions neutrality: any emissions must be counterbalanced by offsets. Net-zero is also forward-looking, aiming to bring current emissions down and then offset the remainder which offers much more flexibility in how mitigation is achieved. The PPP, however, is backwards-looking and healthcare is liable for all its historic as well as current emissions. Whether net-zero is the policy for polluters is open to debate,²³ the critical point here is that since mitigation is burdensome and there is a concern about how healthcare meets its primary goals whilst reducing emissions, it is better to aim for emissions neutrality which requires substantially less than mitigating all one's emissions.

One may object that addressing climate change is not in principle different to any other large cost for healthcare systems.²⁴ For instance, there are legal requirements that carry burdens for healthcare systems but are part of meeting individual's fundamental entitlements like pay for parental leave. We do not, however, make an exception for healthcare even if such requirements are very burdensome. Something similar might be said for GHG mitigation. It may be burdensome for healthcare, but if that's what it takes to protect people from the threats of global warming then it is simply another cost for healthcare.

This is a powerful objection to making climate change mitigation a special case where healthcare should be treated differently to other polluters. However, even if we do not think that the magnitude of mitigation burdens for healthcare should effect

²² National Health Service England 2020, *op. cit.* note 11

²³ Welton, S. (2022). Neutralizing the atmosphere. *The Yale Law Journal*, 132(1), 171–249.

²⁴ I am grateful to an anonymous peer reviewer for pushing me on this point.

their fundamental responsibilities to address their emissions, we may be concerned that healthcare non-exceptionalism results in a *distribution* of mitigation burdens that is unfair.

The second problem then concerns not the size of mitigation burdens but their distribution. It would be unfair if mitigation costs were to fall disproportionately on those who are disadvantaged, or who in general terms contribute less to climate change. Such a situation is a potential result of adopting a PPP in healthcare. Bhopal and colleagues plotted healthcare's carbon footprint as a proportion of total per capita carbon footprint by decile.²⁵ They found that emissions follow a social gradient where the poorest decile in England use 20% of their carbon emissions on healthcare whereas the wealthiest decile spend 10 times less (2%) of their total carbon emissions this way. In general, wealth is strongly associated with greater emissions.²⁶ According to Bhopal and colleagues the wealthiest 10% in England emit around 28 tonnes of CO₂ equivalent annually compared to 3 tonnes from the poorest. In global terms, the bottom 50% of the world's population were responsible for 12% of global emissions as opposed to 48% of emissions coming from the wealthiest 10% in 2019.²⁷

What Bhopal and his co-authors demonstrate is how those who in general emit the least, and who are already most disadvantaged, are most vulnerable to policies to reduce the carbon footprint of healthcare because a greater proportion of their emissions are wrapped up in healthcare. Since the PPP allocates mitigation burdens in proportion to emissions, the greatest emitters should do the most. And as those who pollute the most tend to be wealthy, then a PPP would usually shift burdens on

²⁵ Bhopal, A., Bærøe, K., & Norheim, O. F. (2022). How do we decarbonise fairly? Emissions, inequities and the implications for net zero healthcare. *Journal of the Royal Society of Medicine*, 115(9), 337–340. <https://doi.org/10.1177/01410768221113069>

²⁶ Chancel, L. (2022). Global carbon inequality over 1990–2019. *Nature Sustainability*, 5(11), 931–938. <https://doi.org/10.1038/s41893-022-00955-z>

²⁷ Ibid

to the most advantaged. However, this situation becomes flipped when applied to healthcare. Emissions in healthcare follow the greatest need, and those with the greatest need tend to be disadvantaged. But when the PPP brackets out the purpose of healthcare, or any wider concerns of justice, and simply says 'polluters should pay in proportion to their emissions', in healthcare this results in the costs falling disproportionately on those who are disadvantaged and who contribute the fewest emissions overall.

Worse still, economic inequality is associated with worse health outcomes,²⁸ and even in the UK it is the disadvantaged who are most vulnerable to the health effects of climate change.²⁹ Consequently, asking healthcare to decarbonise in proportion to their emissions risks asking those who are poor, suffer ill health, contribute the least to global warming and stand to lose the most from its effects to make the greatest sacrifices. This is unfair. At the very least, healthcare decarbonisation efforts ought to be sensitive to pre-existing inequalities as well as the distribution of the benefits of healthcare and the burdens of mitigation. Healthcare non-exceptionalism is incapable of this because it is concerned exclusively with mitigation.

5.3.2. Absolute healthcare exceptionalism

To guard against the injustices of a PPP we could look to the other face of isolationism, namely 'absolute healthcare exceptionalism'. One possibility is to rely on the idea that healthcare is special in order to treat healthcare differently in terms of any wider concerns of justice, including mitigation burdens.

²⁸ Marmot, M. (2020). Health equity in England: the Marmot review 10 years on. *BMJ*, 368, m693–m693. <https://doi.org/10.1136/bmj.m693>

²⁹ Paavola, J. (2017). Health impacts of climate change and health and social inequalities in the UK. *Environmental Health*, 16(Suppl 1), 113–168. <https://doi.org/10.1186/s12940-017-0328-z>

Achieving climatic targets do not necessarily mean that all must contribute equally. If some mitigate to a greater extent or at a faster rate, it is still possible, though increasingly difficult, to keep global warming below 1.5°C or 2°C while others emit. As a target of 1.5°C is compatible with a certain budget of greenhouse gas emissions,³⁰ that budget could be distributed such that some actors emit as long as others pull in the slack. Similarly, net-zero is possible at a national or global level with some emitting so long as the emissions books are balanced by the mitigation efforts of others.

One reason to exempt healthcare from mitigation responsibilities is because it is special. Philosophers have tended to discuss the idea that healthcare is special with regards to wealth inequality. For example, Segall describes the specialness thesis as: "to say that healthcare is special is to say that it is morally significant in ways that justify distributing medical resources *in isolation* from the way in which other social goods, and wealth in particular, are distributed [my emphasis]".³¹ Fundamentally, the specialness thesis is about treating healthcare differently when it comes to issues of distributive justice. The basic idea is that how healthcare resources are used to organise, structure and deliver healthcare should be done separately from considerations of the just distributions of other social goods (and bads). Indeed, this is typical of how healthcare resources are allocated currently; they are isolated from wider concerns of justice in so far as they are concerned with particular health distributions amongst narrowly defined populations over relatively short time horizons.³² For instance, a health system in Greater Manchester is concerned with, say,

³⁰ Rogelj, J., Schaeffer, M., Friedlingstein, P., *et al.* (2016). Differences between carbon budget estimates unravelled. *Nature Climate Change*, 6(3), 245–252. <https://doi.org/10.1038/nclimate2868>

³¹ Segall, S. (2007). Is Health Care (Still) Special? *The Journal of Political Philosophy*, 15(3), 342–361, p.343

³² Albertsen, A., & Knight, C. (2015). A framework for luck egalitarianism in health and healthcare. *Journal of Medical Ethics*, 41(2), 165–169. <https://doi.org/10.1136/medethics-2013-101666>. Munthe, C., Fumagalli, D., & Malmqvist, E. (2021). Sustainability principle for the ethics of healthcare resource allocation. *Journal of Medical Ethics*, 47(2), 90–97. <https://doi.org/10.1136/medethics-2020-106644>. Peter, F. (2001). Health Equity and Social Justice. *Journal of Applied Philosophy*, 18(2), 159–170. <https://doi.org/10.1111/1468-5930.00183>

maximising health for those living in Greater Manchester or reducing health inequalities amongst residents of Greater Manchester. Climate change has a far wider international and intergenerational perspective, however. As healthcare is special, we can treat it as exceptional when it comes to the distribution mitigation burdens and benefits.³³

Daniels offers the most influential argument for the specialness thesis.³⁴ Daniels claims healthcare is special because of its role in protecting and promoting health. Health, read as species typical normal functioning,³⁵ holds strategic importance for protecting one's share of the 'normal opportunity range' according to Daniels. Borrowing from a Rawlsian conception of justice as fairness, Daniels makes the case for an egalitarian distribution of opportunities. As health protects opportunity and healthcare protects health, healthcare, according to Daniels, is afforded special moral importance as per the specialness thesis.³⁶

³³ As a minor point of clarification, there are two further considerations. One is to say that that neither Segall, nor others who endorse the specialness thesis like Norman Daniels, view health as the most important good. For Daniels, opportunity is the most important good, not health or anything else. Furthermore, the separateness thesis treats healthcare as a separate sphere of justice. This separateness thesis builds on the idea of specialness to argue that only medical criteria should be used in allocating healthcare resources (See: Brock, D. W. (2003). Separate spheres and indirect benefits. *Cost Effectiveness and Resource Allocation*, 1(1), 4–4.). Charting a path from the separateness thesis to absolute healthcare exceptionalism is straightforward enough. If healthcare is a separate sphere and forbids allocation on the basis of non-medical criteria like wealth, then as mitigation burdens are non-medical criteria, they are simply irrelevant and thus healthcare is exempt. The separateness thesis is, however, more demanding as it entails the specialness thesis. As the specialness thesis does not rely on the separateness thesis, and the separateness thesis is likely to be less widely acceptable as it is more demanding, I focus on the specialness thesis (see: Lippert-Rasmussen, K., & Lauridsen, S. (2010). Justice and the allocation of healthcare resources: should indirect, non-health effects count? *Medicine, Health Care, and Philosophy*, 13(3), 237–246. Persad, Govind & du Toit, Jessica (2019). The Case for Valuing Non-Health and Indirect Benefits. In Ole Frithjof Norheim, Ezekiel J. Emanuel & Joseph Millum, *Global Health Priority-Setting: Beyond Cost-Effectiveness* (pp. 207-222.) Oxford University Press.) However, much of what I have to say is relevant to the separateness thesis.

³⁴ Daniels, N. (2007) *Just health: meeting health needs fairly*. Cambridge University Press.

³⁵ Boorse, Christopher (1977). Health as a theoretical concept. *Philosophy of Science* 44 (4):542-57

³⁶ Daniels 2007, *op. cit.* note 34, p.49

It became apparent to Daniels, however, that the social determinants of health like working conditions and income inequality had a far greater impact on health than healthcare. Healthcare was, so to speak, "the ambulance waiting at the bottom of the cliff".³⁷ In response, Daniels adjusted his theory maintaining the central position of health in protecting the normal opportunity range, but Daniels extended the scope of the specialness thesis to cover any health need. Both those health needs customarily dealt with by healthcare as well as those identified by the social determinants of health were included. So, the specialness thesis can be revised: to say that health is special is to say that it is morally important in ways that justify distributing resources that meet health needs like healthcare and the social determinants of health in isolation from other concerns of distributive justice.

Daniels does not make the case that environmental determinants of health are also a health need and fall under the specialness thesis. However, it is a plausible extension of his arguments and would mean environmental determinants of health, like the social determinants, are special.

Climate change is predicted to have significant impacts on health, mediated through environmental determinants of health, as well as compounding social determinants like increasing poverty for instance.³⁸ The World Health Organisation estimates that between 2030 and 2050 climate change will lead to approximately 250 000 additional deaths per year from malaria, diarrhoea and heat stress.³⁹ Not to mention the effects extreme weather has for air quality, crop survival, drinking water

³⁷ Daniels 2007, *op. cit.* note 34, p.79

³⁸ Haines, A., & Patz, J.A. (2004). Health effects of climate change. *JAMA* 291(1):99-103. doi: 10.1001/jama.291.1.99. Haines, A., Ebi, K., & Solomon, C. G. (2019). The Imperative for Climate Action to Protect Health. *The New England Journal of Medicine*, 380(3), 263-273.

<https://doi.org/10.1056/NEJMra1807873>

³⁹ World Health Organisation (October 2023). Climate Change. Retrieved from: <https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>

and habitable areas.⁴⁰ Some claim that "climate change is the greatest threat to public health in the 21st century".⁴¹ As climate change threatens health, then tackling climate also meets a health need. As a health need, climate change mitigation would therefore also fall under the specialness thesis.

This is where arguments like Daniels', that want to treat healthcare as special because of its role in protecting and promoting health, run into trouble. Absolute healthcare exceptionalism rests on treating healthcare as special because it protects health needs and therefore is exempt from mitigation burdens. Mitigation efforts, by reducing climate change threats, also address health needs, specifically the environmental determinants of health. If health needs are special, including those met by healthcare, the social determinants of health and the environmental determinants of health, then mitigation is also special. So, the specialness thesis could be taken to imply that healthcare is special and exempt from mitigation burdens. But, by the same token, the specialness thesis also suggests that mitigation is special because it meets health needs, challenging the idea that healthcare should be exempt from mitigation. The specialness thesis implies both that healthcare is treated differently when it comes to mitigation and that it is not.

Once we acknowledge that healthcare generates emissions, and these emissions can contribute to health needs, we cannot allocate mitigation burdens separately to healthcare on the basis that health, and therefore healthcare, is special. Given that the social determinants of health make it difficult to construct a theory of health justice in isolation from general considerations of justice,⁴² it becomes even harder to do this

⁴⁰ Watts, N., Adger, W. N., Agnolucci, P., *et al.* (2015). Health and climate change: policy responses to protect public health. *The Lancet*, 386(10006), 1861–1914. [https://doi.org/10.1016/S0140-6736\(15\)60854-6](https://doi.org/10.1016/S0140-6736(15)60854-6)

⁴¹ Costello, A., Abbas, M., Allen, A., *et al.* (2009). Managing the health effects of climate change: Lancet and University College London Institute for Global Health Commission. *The Lancet (British Edition)*, 373(9676), 1693–1733. [https://doi.org/10.1016/S0140-6736\(09\)60935-1](https://doi.org/10.1016/S0140-6736(09)60935-1)

⁴² Segall 2007, *op. cit.* note 31. Segall, S. (2010). Is Health (Really) Special? Health Policy between

when it comes to the environmental determinants of health given the complex relationship between health needs, healthcare, emissions from healthcare and climate change. Any view that seeks to exempt healthcare from mitigation on the basis that healthcare protects health will face the difficulty of justifying this when mitigation also contributes indirectly to health. Indeed, if climate change is the greatest threat to public health this century, it may well be that climate change mitigation, including for healthcare systems, does more to protect health than healthcare alone.

5.4. Methods of integration: moderate healthcare exceptionalism

Allow me a brief recap. I am concerned with the relationship between two issues in distributive justice: the goals of healthcare and the allocation of mitigation responsibilities. Their relationship raises a question of whether, and to what extent, we should make an exception to mitigation responsibilities for healthcare. I have claimed that there are two ways to understand this relationship. We can separate these distributive concerns or attempt to integrate them. The isolationist method leads us to argue either for absolute healthcare exceptionalism where there is an exemption for healthcare, or healthcare non-exceptionalism where mitigation responsibilities are allocated on criteria independent of healthcare's role. I have rejected these. This leaves integrationism. If, when assessing what a fair share of the burdens of tackling climate change are for healthcare systems, we cannot ignore the morally valuable role of healthcare but nor can we exempt healthcare, then they must be balanced. This is the next task of this paper.

Before going on to make my argument for when it would be justified to make exceptions to mitigation burdens for healthcare, I want to make a few comments on

Rawlsian and Luck Egalitarian Justice. *Journal of Applied Philosophy*, 27(4), 344–358.
<https://doi.org/10.1111/j.1468-5930.2010.00499.x>. Wilson, J. (2009). Not So Special After All? Daniels and the Social Determinants of Health. *Journal of Medical Ethics* 35 (1):3 - 6.

integrationism. Caney makes a further distinction between moderate and strong integrationism.⁴³ The main difference between these is the scope of goods that each considers. "Moderate Integrationism: This holds that we should apply principles of justice to a good X, but in doing so we should also take into account other considerations." Whereas strong integrationism applies a general principle of justice to a whole package of benefits and burdens that include a good X.⁴⁴

Now, as my concern is with thinking about how to combine two issues of distributive justice, healthcare and climate change, I am operating under the auspices of moderate integrationism.⁴⁵ However, Caney argues in favour of strong integrationism because of the way that climate change is wrapped up in a whole host of distributive concerns.⁴⁶ The issue for my purposes is that, as compelling as a comprehensive theory of individuals' just entitlements that account for the global and intergenerational nature of climate change might be, it is lacking practical force. For healthcare systems faced with the question of how to decarbonise fairly, pointing to, say, a global difference principle does not provide much practical guidance in how to reconcile the competing concerns of providing quality care whilst minimising emissions.

⁴³ Caney 2018, *op. cit.* note 1.

⁴⁴ In particular, Caney writes, "Strong Integrationism: This holds that we should treat X merely as one element in the total package of burdens and benefits and then this total package should be regulated by a general principle of justice (such as a global difference principle or a commitment to basic rights)."

⁴⁵ There is a further issue regarding integrationism. To what extent should various issues of justice should in healthcare be addressed together? Healthcare systems are facing a raft of challenges that raise issues of distributive justice and how we structure and organise healthcare systems beyond just climate change mitigation. Post-COVID recovery, meeting rising demands for healthcare services, aging populations, the ever-increasing cost of new technologies and treatments, stalling life-expectancies in high-income nations and so forth. As healthcare systems change and adapt to these challenges, there is an issue of the extent to which these should be integrated with how healthcare systems address climate change. I simply note these here and limit myself to integrating healthcare mitigation with the goals of healthcare.

⁴⁶ Caney 2012 & 2018, *op. cit.* note 1.

One further, and final, note on method. As the approach taken here is a moderately integrationist one, there are two ways that we could view one distributive issue as our primary concern whilst also factoring in a second consideration. One way is to start with justice in health and factor in concerns about climate change. Alternatively, we could run this the other way, starting with an account of mitigation responsibilities and making concessions for healthcare. In the first, bottom-up method, given that both healthcare and climate change mitigation contribute to health, we could start with the question of why health matters to justice and work towards the emissions that are compatible with meeting individuals' just entitlements to health. In theory, a bottom-up method could be used to derive a healthcare system's permissible emission. With the space I have remaining, I want to say something relatively practical and so my argument takes a top-down approach. That is, I start from mitigation responsibilities and work in justified exceptions to this on the basis that healthcare has a valuable function.

5.5. Ability to pay

An ability to pay principle (APP) can accommodate some mitigation exceptions for healthcare without necessarily providing an exemption. An APP is often used to allocate mitigation burdens fairly.⁴⁷ The idea being that those with the greatest capacity to shoulder the burdens of climate change mitigation should. According to Miller, the APP is a principle of *capacity* where "remedial responsibilities ought to be assigned according to the capacity of each agent to discharge them."⁴⁸ Capacity is usually interpreted in the climate context as wealth.⁴⁹ Remedial responsibilities are those responsibilities that we have to remedy some injustice.

⁴⁷ Shue 2014, *op. cit.* note 18, pp.186-189,

⁴⁸ Miller, D. (2001). Distributing Responsibilities. *The Journal of Political Philosophy*, 9(4), 453–471.

⁴⁹ Page 2008, *op. cit.* note 18

Miller starts from the thought that, amongst a pool of potential duty-bearers, an APP can be used to determine who is best placed to act.⁵⁰ Miller imagines a rescue case. Several potential candidates could save an endangered swimmer, the question is how to figure out who? Determining who is best placed to undertake the rescue is based on two criteria: capacity as effectiveness and capacity as cost. Capacity as effectiveness leads to ranking swimmers according to swimming strength. Capacity as cost is then used to sort through candidates where the strongest swimmer might be ruled out if the costs are too great. Accordingly, responsibility then falls to the next most able. Who is best placed becomes a ratio of most effective with the least costs.

Miller is correct in identifying cost and effectiveness as the relevant criteria in the APP. However, his concern is to single out *the* agent who is best placed to perform some remedial action. Here, I use an APP slightly differently. Rather than seeing the APP in more of a binary way as Miller does, where individuals either do or not have an ability to pay, I take it to be a scalar concept. Instead of asking who is responsible to undertake remedial actions X, my view asks, 'what can agents do to help towards X?'. What agents can do is shaped by their effectiveness and the costs to them in contributing to solving some problem.

Tackling climate change is a collective issue. Adequate action to mitigate the threats of climate change will require a response from many actors and institutions. My default assumption is that all, including healthcare, have some responsibility to undertake mitigation. There are potentially three reasons we could assume healthcare has a *prima facie* responsibility to mitigate. First, as mentioned in section 3.2, climate change has impacts on health. The second reason could refer to healthcare's emissions as a reason to say healthcare ought to do something without yet specifying precisely what that something is, unlike a PPP. The third is effectiveness. Climate change

⁵⁰ Miller 2001, *op. cit.* note 48

mitigation is most effective if we start from a default that all must mitigate unless we have reasons to rule them out.

The question then is not whether healthcare should mitigate or not, but what can healthcare do to tackle climate change? This is where an APP comes in to help provide both the degree to which, and the limits upon, mitigation responsibilities. Like the PPP, the APP also relies on one aspect of formal principles of equality: equality as universality. All, *prima facie*, have some ability to mitigate. Where the APP diverges from a PPP however is in equality as impartiality. On causal principles, like a PPP, if A caused a harm to B, then A should pay regardless of costs (Miller 2001). The APP is partial, however. What agents do increases in line with effectiveness and their ability to bear the costs. Those who are less effective, or where action is too costly, do less. When an agent's action would be more effective and less costly all things considered, they are expected to do more. The appeal of the APP is the way that, in asking not just what would be effective when trying to bring about a goal, but who is able to bear the costs of doing so, it can be adjusted for the position or valuable social role of potential contributors.

Allow me to specify what I mean by effectiveness and costs regarding policies to decarbonise healthcare. Effectiveness depends, in part, on the goals one adopts. If effectiveness is measured in general ways like 'to prevent climate change', the goal is unrealistic. For climate mitigation, the goal is simply to reduce one's emissions. Costs for a healthcare system are in reference to its capacity to meet its primary goal of protecting and promoting health, the relief of suffering, prolonging life and the like. Whilst the APP is typically interpreted in terms of wealth when it comes to climate change - the wealthy should pay most - health being the primary function of healthcare makes this a more appropriate way to consider reasonable costs.

To get more precise on what the mitigation responsibilities of healthcare systems

are, I specify the point at which healthcare systems have an *inability* to pay. That is, the limit at which healthcare systems are excused from mitigation burdens. It is one thing to suggest that healthcare systems can take various actions to limit emissions, with adjustments based on effectiveness and cost. However, to avoid vagueness about what this entails in practice and to better integrate mitigation efforts with healthcare goals, it is necessary to specify a threshold beyond which emissions are no longer justified. In other words, it is important to say when healthcare cannot mitigate, as well as suggesting when it can. Beyond this limit, the costs for healthcare systems are disproportionate at which point we can say that healthcare has an *inability* to pay and thus is not expected to shoulder mitigation burdens. Although it could be the case that ineffectiveness also provides a reason to say that a healthcare system has an inability to mitigate, this circumstance is unlikely in practice. Ineffectiveness suggests that an act is not likely to reduce emissions. But we can always reduce emissions by ceasing to perform the emitting act, the reason we do not is because of the costs in failing to realise an important goal. Hence, capacity as cost is the predominant threshold in determining an inability to pay.

5.5.1. Specifying the inability threshold.

Many theorists accept that there is some limit on what costs we should accept when it comes to averting climate-mediated harms.⁵¹ One way to demarcate that limit is through a distinction between luxury and substance emissions. As emissions themselves are of instrumental importance, Shue points out the importance of distinguishing “the fact that some sources [of greenhouse gas emissions] are essential and even urgent for the fulfilment of vital needs and other sources are inessential or

⁵¹ Vanderheiden 2008, *op. cit.* note 18, p.243. Duus-Otterström, G. (2023). Subsistence Emissions and Climate Justice. *British Journal of Political Science*, 53(3), 919–933.

<https://doi.org/10.1017/S0007123422000485>. Shue, H. (1993). Subsistence Emissions and Luxury Emissions. *Law & Policy*, 15(1), 39–60. Baer, P., & Rao, N. (2012). “Decent Living” Emissions: A Conceptual Framework. *Sustainability*, 4(4), 656–681. <https://doi.org/10.3390/su4040656>

even frivolous.⁵² For Shue those emissions that are necessary to protect a basic need are “subsistence” whereas everything else he calls “luxury”. For healthcare, a dichotomy of luxury emissions on the one hand and subsistence on the other is a little coarse. Nevertheless, the concept of subsistence emissions serves as a useful threshold on those healthcare emissions that we make an exception for whilst accepting that all other emissions are treated differently and liable to mitigation costs.

The limit on mitigation burdens for a healthcare system should lie where emissions are necessary to protect something of fundamental moral value. Subsistence emissions have two necessary and jointly sufficient features: (i) emissions must satisfy a basic need; and, (ii) the emissions must be necessary to achieve that (i.e. there must be no reasonable way of achieving the same end with fewer emissions).⁵³ Basic needs are often taken to be a subset of humans’ most fundamental needs without which they would be harmed.⁵⁴ Some level of health is, on most accounts, of moral value because of the role it plays in securing opportunity, well-being or flourishing for example.⁵⁵ As such, at least some activities of healthcare would widely be considered to meet a basic need. However, to be considered subsistence, the greenhouse gases emitted in securing basic healthcare needs must also be the minimum necessary.

An example serves to highlight the difference between subsistence and luxury emissions. Consider metered-dose inhalers.⁵⁶ These inhalers are used to treat

⁵² Shue 1993 *ibid*.

⁵³ Duus-Otterström 2023, *op. cit.* note 51

⁵⁴ Wiggins, D. (1987). Claims of need. In *Needs, values, truth: Essays in the philosophy of value*. Oxford, OUP.

⁵⁵ Daniels 2007, *op. cit.* note 34. Nordenfelt, L.(2006). The concepts of health and illness revisited. *Medicine, Health Care and Philosophy* 10 (1):5-10. Powers, M., & Faden, R. (2008). *Social Justice: The Moral Foundations of Public Health and Health Policy*. Oup Usa. Venkatapuram, S. (2011). *Health justice: an argument from the capabilities approach*. Polity Press.

⁵⁶ Parker, J. (2023). Barriers to green inhaler prescribing: ethical issues in environmentally sustainable clinical practice. *Journal of Medical Ethics*, 49(2), 92–98. <https://doi.org/10.1136/jme-2022-108388>

respiratory illness but contain powerful greenhouse gases.⁵⁷ Most would agree that managing respiratory problems like asthma is a valuable goal and would help secure individual's basic needs. So metered-dose inhalers pass the first test: they meet a basic need. The follow up is whether these emissions are *necessary* to achieve the end of treating respiratory disease. The question as to whether they are necessary, however, depends on the characteristics of the patient requiring treatment. Some patients can use alternative inhalers which do not contain greenhouse gases. For those who cannot use an alternative, the greenhouse gases emitted when they use a metered-dose inhaler are subsistence emissions and therefore permissible. There is no alternative way of meeting the same end of protecting their respiratory health with fewer emissions. Switching inhalers amongst those who can then ensures that emissions are the minimum necessary.

Clearly the inhalers example is highly simplified and is itself somewhat exceptional in terms of healthcare mitigation because higher carbon inhalers can often be straightforwardly switched. In some instances this may actually be *better* for patient care, and oftentimes it is no worse, though this is not to say switching is always without burdens.⁵⁸ As much as inhalers provide a useful example of how policy could be drawn from the APP, we might worry that in more challenging, and more typical cases of healthcare decarbonisation, the APP is insufficiently action-guiding.⁵⁹ In section 2 I alluded to the fact that there is an extensive and diverse range of actions that healthcare systems can undertake to reduce their emissions which requires reconfiguring services, investments in lower carbon technologies, focusing on disease prevention rather than treatment and so forth. It may be that in pursuing these actions there are not always substitutions that leave health unaffected and basic needs met,

⁵⁷ Wilkinson, A., & Woodcock, A. (2022). The environmental impact of inhalers for asthma: A green challenge and a golden opportunity. *British Journal of Clinical Pharmacology*, 88(7), 3016–3022. <https://doi.org/10.1111/bcp.15135>

⁵⁸ Parker 2023, *op. cit.* note 56

⁵⁹ An anonymous peer reviewer helpfully raises this point.

as is regularly the case with inhalers.

The APP does not necessarily rule out any of these actions and indeed the variety of things healthcare can do to reduce its carbon footprint highlights that there is a huge opportunity for healthcare systems to radically reduce their carbon footprint. Nevertheless, the APP places a threshold on what level of burdens should be accepted by agents, and in particular here how much health they should be required to sacrifice, in order that healthcare systems mitigate their emissions. It is difficult to review every instance of a mitigation policy to assess whether the costs are excessive in a paper of this nature. But the APP provides an overarching principle to guide the extent of healthcare's responsibilities and how healthcare systems can reconcile protecting and promoting health with sustainability. Three questions can be drawn from the APP to help guide healthcare mitigation policy.

Take mitigation policies like replacing ambulances with electric versions or installing photovoltaics. The first question is whether they meet a basic need? Clearly ambulances are required to protect health, and healthcare systems have energy requirements that could be met, in part, through photovoltaics. Indirectly at least, ambulances and photovoltaics are part of meeting basic needs through healthcare. Where healthcare systems are producing emissions that are not directed to meeting basic needs there are strong reasons to address these emissions. The next question is whether they are the minimum reasonably necessary. Again, an electric ambulance appears to generate the minimum necessary emissions that are reasonable in attending emergencies and transporting patients. Of course, bicycles and sending paramedics on foot would produce fewer emissions, but this would be an unreasonable way of meeting the needs identified. The final question is whether replacing the ambulance fleet with electric vehicles or changing energy infrastructure presents an unreasonable or excessive cost. This is possibly the most complex issue requiring greater empirical data than is currently available. However, the test we should

apply is whether meeting these costs would prevent healthcare systems securing sufficient health. At this point, we can say that healthcare has an inability to pay.

In sum, an APP in terms of healthcare is more concerned with when healthcare systems have an *inability* to pay. Phrased in the negative we start from the observation that there are various ways for healthcare systems to curb their emissions, but that we say the costs are excessive where it asks healthcare to further mitigate emissions that are already the minimum necessary to meet certain valuable goals. In this way, we can combine mitigation responsibilities with the morally valuable goals of healthcare demarcating the limits on which healthcare systems should and should not mitigate given these dual, and potentially conflicting, goals.

5.6. Conclusion

Theories of social justice frequently concern themselves with the fair distribution of health. Recently, attention has shifted from healthcare alone to consider how other social bases of health contribute to health justice. The challenge now is to examine how healthcare not only contributes to health but how complex and technologically advanced healthcare systems simultaneously undermine health through climate change. I have argued that the key to understanding healthcare's role in mitigation is an exploration of the ways that healthcare, and mitigation burdens, are exceptional.

Various ways of viewing mitigation burdens and healthcare systems as exceptional are possible. Here I explored several potential views based on a distinction between isolationism and integrationism. I have argued against isolationist approaches that treat these goals as separate. One conclusion from my analysis is that theories of health justice must accommodate climate change mitigation. I have provided one such way of doing this by taking a moderate integrationist stance that relies on an ability to pay principle. An ability to pay principle provides the degree that healthcare should engage

in mitigation by highlighting the limits to this responsibility. This allows policies that address climate change to be sensitive to the value of the role of healthcare without making healthcare exempt.

The strength of my view lies in it being relatively practical by offering guidance on how to balance the potentially conflicting demands of both reducing healthcare emissions whilst still providing quality care. This is important because how policy makers, hospital managers and health professionals determine when and the ways that healthcare or climate change burdens are exceptional will shape the kinds of healthcare systems that societies have. Nevertheless, it may be that pragmatic solutions do not align well with a comprehensive theory of just distributions. One important implication of my arguments regarding exceptionalism is how healthcare climate policies sit with ideals of a just distribution and how to reconcile these issues of distributive justice with a need for healthcare systems to take robust action on their emissions.

Chapter 6

6. The Polluter Pays Principle as a rationale for healthcare's responsibility to mitigate their greenhouse gas emissions

6.1. Introduction

Healthcare systems around the world are committing to decarbonisation targets like net zero.¹ To achieve these targets, healthcare systems must employ mitigation policies that reduce greenhouse gas emissions and enhance carbon sinks.² However, mitigation carries burdens because some emissions must be foregone and there are opportunity costs in the transition away from emissions. The challenge for healthcare is to continue its core mission to protect and promote health, care for the sick and reduce suffering, all whilst reducing the emissions it has historically relied upon.

For some healthcare systems, reducing their emissions is a statutory duty. The National Health Service (NHS), for instance, is committed to net zero under the Health and Care Act 2022 and Climate Change Act 2008.³ Despite these legal obligations, the rationale behind why healthcare systems should decarbonise, given the associated

¹ World Health Organisation and Alliance for Transformative Action on Climate and Health. (2022) COP26 Health Programme. Retrieved from: <https://www.who.int/initiatives/alliance-for-transformative-action-on-climate-and-health/cop26-health-programme>

² IPCC. (2022). Global Warming of 1.5°C: IPCC Special Report on Impacts of Global Warming of 1.5°C above Pre-industrial Levels in Context of Strengthening Response to Climate Change, Sustainable Development, and Efforts to Eradicate Poverty. Retrieved from: <https://www.cambridge.org/core/books/global-warming-of-15c/summary-for-policymakers/31C38E590392F74C7341928B681FF668>

³ National Health Service England. (July 2022). Delivering a 'net zero' NHS. Retrieved from: <https://www.england.nhs.uk/greenernhs/publication/delivering-a-net-zero-national-health-service>

burdens, is not always clear. A common argument is that healthcare, as a contributor to emissions, has a responsibility to mitigate; that those causing emissions should bear the costs of mitigating them. Some articulate this in terms of a principle of 'do no harm'.⁴

This paper examines causal principles used to determine healthcare's fair share of taking action on climate change. In particular, I focus on the polluter pays principle (PPP) because this is the most frequently discussed causal principle for allocating mitigation responsibilities.⁵ However, what I have to say should be relevant for any principle that establishes what healthcare should do to address its emissions based on healthcare's contribution to climate change. In short, my target is the idea that healthcare's normative responsibilities in terms of emissions can be derived from causal responsibility and the PPP can be used as an exemplar of this kind of thinking. As causal principles are critical for understanding healthcare's moral and potentially legal obligations to reduce their emissions, philosophical analysis of their potential limitations is essential in the discourse around sustainable healthcare and what healthcare systems should do about climate change in practice.

When talking about the mitigation responsibilities of 'healthcare' or 'healthcare systems' it is crucial to be clear on what healthcare is. In broad terms, healthcare is a system made up of various organisations and individuals structured to fulfil a set of

⁴ Wabnitz, K.-J., Gabrysch, S., Guinto, R., *et al.* (2020). A pledge for planetary health to unite health professionals in the Anthropocene. *The Lancet (British Edition)*, 396(10261), 1471–1473.

[https://doi.org/10.1016/S0140-6736\(20\)32039-0](https://doi.org/10.1016/S0140-6736(20)32039-0). Sherman, J. D., McGain, F., Lem, M., Mortimer, F., Jonas, W. B., & MacNeill, A. J. (2021). Net zero healthcare: a call for clinician action. *BMJ (Online)*, 374, 1–6. Schroeder, K. (2013). *Sustainable healthcare*. John Wiley & Sons. Mortimer, F., & Pencheon, D. (2022). Do no harm: addressing the environmental impact of health care. *Nature Reviews. Disease Primers*, 8(1), 38–38. <https://doi.org/10.1038/s41572-022-00372-8>

⁵ Shue, H. (1999). Global Environment and International Inequality. *International Affairs (London)*, 75(3), 531–545. Caney, S. (2006). Cosmopolitan Justice, Rights and Global Climate Change. *The Canadian Journal of Law and Jurisprudence*, 19(2), 255–278. Page, E. A. (2008). Distributing the burdens of climate change. *Environmental Politics*, 17(4), 556–575.

socially valuable functions that surround health. When I say, 'healthcare should do X', I am saying 'those involved in delivering healthcare should do X'. Those functions include restoring and promoting health, the alleviation of symptoms, preservation of life and care of the dying; but this list is not exhaustive. Principally these functions are achieved through medical care, but healthcare systems often use public health measures too. What counts as healthcare and where its boundaries lie turns out to be a complicating factor for the PPP and so this is an issue to which I will return.

Most healthcare provision relies on generating emissions: energy is needed to power hospitals; ambulances are required to transport patients; medical equipment must be manufactured, transported and disposed of; and, some medicines like metered-dose inhalers and volatile anaesthetic gases rely directly on greenhouse gases.⁶ Healthcare emissions are often embedded in the ways that care is provided and so to address these emissions healthcare systems must alter what, where and how care is delivered.⁷ Healthcare systems could mitigate their emissions to a greater or lesser extent, meaning this is an issue of identifying healthcare's fair share of addressing climate change. Principles like the PPP require healthcare to do more, as all emissions are liable. In contrast, alternative principles like 'ability to pay' or 'beneficiary pays' have different implications for mitigation burdens. The principle we adopt will govern the mitigation burdens that healthcare should shoulder and alter how healthcare is organised to deliver services in line with its fair share. Therefore, it is important to be clear on what healthcare's mitigation responsibilities are.

In this paper I examine the ways that the PPP might be adopted as the sole rationale to determine the nature and extent of healthcare's mitigation responsibilities⁸ I argue

⁶ National Health Service England, 2022, *op. cit.* note 3.

⁷ Salas, R. N., Maibach, E., Pencheon, D., Watts, N., & Frumkin, H. (2020). A pathway to net zero emissions for healthcare. *BMJ (Online)*, 371, m3785–m3785. <https://doi.org/10.1136/bmj.m3785>

⁸ I say 'sole rationale' to distinguish uses of the PPP as part of hybrid principles. Simon Caney and, Erik Malmqvist and colleagues use the PPP as part of hybrid principles for example. Caney 2006, *op cit.*

that the PPP is inadequate when it comes to healthcare's mitigation responsibilities. In particular, I argue that the PPP either fails to assign mitigation responsibilities to healthcare, or when it does that it leads to an issue of fairness. In a nutshell, the PPP struggles to identify healthcare as the polluter or to require that healthcare pays, depending on the account of causation one adopts. Furthermore, even if healthcare is identified as a polluter, the PPP risks distributing mitigation burdens unfairly. Since disadvantaged populations often have the greatest health needs—and therefore the highest healthcare emissions—this principle could require them to shoulder a disproportionate share of the costs.

My examination of the PPP when applied to healthcare unfolds as follows. In the first section I clarify the nature of the PPP and explain how it applies to healthcare emissions. The second section of the paper is concerned with different accounts of causation and how they underpin the PPP. The PPP needs to be able to both identify 'healthcare' as the polluter *and* require that healthcare pays, and it does this on the basis that healthcare causes emissions. I contrast two accounts of causation and argue that one account cannot identify healthcare as the polluter, and that whilst the second account can label healthcare as the polluter it cannot then require that healthcare pay. The issue of fairness in the distribution of mitigation responsibilities on a PPP is discussed in the third section. By allocating mitigation responsibilities in proportion to emissions, the PPP dictates that those with the greatest healthcare emissions should pay the most. As it happens, the least advantaged tend to have the greatest healthcare emissions and so would pay the most. I argue that this is unfair.

6.2. The polluter pays principle and the normative grounds for healthcare's mitigation responsibilities

note 5. Malmqvist, E., Fumagalli, D., Munthe, C., & Larsson, D. G. J. (2023). Pharmaceutical Pollution from Human Use and the Polluter Pays Principle. *Public Health Ethics*, 16(2), 152–164.
<https://doi.org/10.1093/phe/phad012>

The PPP is a straightforward and intuitive principle for determining responsibility to bear the costs of mitigation. Indeed, the simplicity of the PPP and its familiarity from other areas of moral life contribute to its broad appeal in distributing responsibilities to address climate change.⁹ This has been especially true when it comes to states, with a core idea driving international climate negotiations being that those states who have produced the most emissions should do the most to tackle climate change.¹⁰ A core idea underlying the PPP is that those who cause a problem should pay for fixing it, a notion that is relatively uncontroversial.¹¹

The appeal of linking contribution to a problem with one's corrective responsibilities in climate change is apparent in healthcare too. In healthcare, this responsibility tends to be framed as 'do no harm'. Health Care Without Harm, for example, commissioned a report on healthcare's global carbon footprint and conclude: "Given its mission to protect and promote health, the health sector also has a responsibility to implement the Hippocratic Oath to "first, do no harm" as it relates to its own climate footprint, while influencing other sectors to do the same".¹² Tedros Adhanom Ghebreyesus, the director-general of the World Health Organisation similarly claims, "The world's health sector facilities turn out CO₂... this is perhaps ironic - as medical professionals our commitment is to 'first, do no harm.' Places of healing should be leading the way, not contributing to the burden of disease."¹³ Whilst the framing is slightly different, the PPP and 'do no harm' share causation as the primary

⁹ Shue 1999, *op. cit.* note 5. Caney 2006, *op. cit.* note 5. Page 2008 *op. cit.* note 5. Neumayer, E. (2000). In defence of historical accountability for greenhouse gas emissions. *Ecological Economics*, 33(2), 185–192.

¹⁰ Shue 1999, *op. cit.* note 5. Neumayer *ibid.*

¹¹ Miller, D. (2001). Distributing Responsibilities. *The Journal of Political Philosophy*, 9(4), 453–471.

¹² Healthcare Without Harm. (September 2019) Healthcare's Carbon Footprint: how the health sector contributes to the global climate crisis and opportunities for action. Retrieved from: <https://global.noharm.org/sites/default/files/documents->

¹³ World Health Organization. (May 2019) 72nd World Health Assembly in Geneva, Switzerland. Retrieved from: <https://www.pscp.tv/w/1IDGLrerprqxm?t=1h6m38s> (minute 39)

mechanism for identifying those who owe remedial mitigation responsibilities.

The PPP is formed of the following three conditions:

- i. A polluter, the one causing emissions.
- ii. Payment condition: the criterion by which a polluter pays, typically in proportion to their emissions. Payment means mitigating pollution which tends to carry costs and burdens.
- iii. Liability refers to an account of responsibility that describes the relationship between the polluter and the problem such that the polluter is liable to pay. The polluter is liable to pay because they are causing emissions.

To be useful in answering the question of healthcare's fair share of mitigation burdens, the PPP needs to be able to pinpoint the polluter and require that they pay. First, the PPP needs to be able to identify the appropriate duty-bearer of remedial responsibilities. Second, it needs to outline the actions that the duty-bearer should take to discharge those remedial duties. For the PPP to apply to healthcare in the way intended by proponents of causal principles, it must first be able to identify 'healthcare' as the relevant polluter. Once the PPP has identified healthcare as the polluter, it must then require that healthcare pay. Clearly there is an important, but separate question of how the requirements of the PPP are enforced and how to deal with non-compliance.

Moreover, the PPP must ensure that mitigation costs are fairly distributed. It is understood that causal responsibility is a precondition for remedial responsibility on the PPP.¹⁴ So, as a contribution-based principle, the PPP relies heavily on causation to both identify the appropriate duty-bearer, in this case healthcare, and dictate what

¹⁴ Miller 2001, *op. cit.* note 11.

they ought to do to address climate change. Remedial costs are proportionate to contribution to the problem: it is fair if those who contribute the most do the most.

The next section addresses the first two conditions of the PPP—identifying the polluter and determining the payment obligation. Causation is critical both to the method by which the PPP identifies the polluter as well as how it allocates payment. To begin the next section, I distinguish two accounts of causation and assess their ability to connect healthcare to emissions. I argue that one account fails to identify healthcare as the polluter. The other account of causation succeeds in recognising healthcare as a polluter but raises issues for the payment condition aspect of the PPP. In particular, this second account fails to require that healthcare pay. If two common methods of attributing causation cannot assign emissions to healthcare on the PPP or allocate payment to healthcare, then these are serious limitations when relying on the PPP to apportion mitigation responsibilities to healthcare.

6.3. Causal responsibility: how should the PPP identify the polluter and determine who pays?

According to the PPP, the polluter is the entity generating emissions. Causal responsibility for emissions is therefore key to determining who the polluter is. This is critical for the PPP as, after all, it is polluters who pay. If the PPP is to underpin a responsibility for healthcare to mitigate, then it must correctly single out *healthcare* as both the polluter and as liable to pay. Here I argue that on standard accounts of causation, the PPP fails to correctly label healthcare as the polluter.

Causal responsibility is basically the idea that an agent caused some event. It links an action with an outcome. Roughly, there are two methods of assigning a polluter on the basis of causation: a *retrospective* and *prospective* account. The retrospective route starts with emissions and traces backwards to polluters. The second, prospective view, starts with a potential polluter and examines their activities to see what emissions

they produce. The difference between these is time. On the retrospective account, we take emissions at a point in time and work back to their origin. This approach is concerned with the cause that makes a difference to an outcome. On the prospective account, an agent is followed over time to see what emissions they produce, or, theoretically, we project forwards predicting what emissions they are likely to produce based on what we know about their activities. This account focuses on the processes and mechanisms that result in certain outcomes. The retrospective account is the standard way of attributing emissions to polluters, so I examine this first before considering prospective accounts.

6.3.1. Problems with identifying the polluter

In working backwards to establish causal responsibility it is typical to divide necessary and sufficient causes.¹⁵ If I say that "A painted a picture", A is seen as causally responsible for the picture since A is the author of the series of brush strokes that produced that painting. We attribute the painting to A because A is the necessary cause of the painting. Without A this picture would not exist. A is not, however, the sufficient cause as this describes *all* the components needed to produce a painting. Sufficient causes would also include the steps in making the brushes, the paint, the canvas, and so forth that A used to create the painting. So, to use causation to identify the polluter, it is important to know if 'the polluter' is the sufficient cause, the necessary cause or both when it comes to emissions.

Steve Vanderheiden suggests that, in terms of climate change, we are concerned with necessary causes as this is the most efficient way to reduce emissions.¹⁶ The causal

¹⁵ Menzies, P., & Beebe, H. (2024). Counterfactual Theories of Causation. *The Stanford Encyclopaedia of Philosophy*. Retrieved from: <https://plato.stanford.edu/archives/sum2024/entries/causation-counterfactual/>

¹⁶ Vanderheiden, S. (2008). *Atmospheric Justice: A Political Theory of Climate Change*. Oxford: Oxford University Press. p.147

complexity in identifying sufficient causes, where we look at all the variables involved in generating emissions is too difficult compared to necessary causes. And even if we could identify all the sufficient causes, we only need to remove the necessary ones to remove the pollution, meaning that focusing on necessary causes is both easier and also more effective. Following Vanderheiden, this suggests that the polluter is the link that, when removed, collapses the entire causal chain of emissions. In the complex chains of causation, we compare possible worlds to discover links which are difference-making. Discovering a cause that makes a difference, such that without that link emissions would not have occurred, equates to uncovering the polluter.¹⁷ If the PPP relies on this account of causation then, for my purposes, we expect that if we work backwards from certain instances of emissions, we will find healthcare as the necessary cause.

Consider the example of metered-dose inhalers.¹⁸ Reflecting on this medication helps to highlight how looking to identify the necessary cause of emissions does not always lead to singling out healthcare in the way needed. Metered-dose inhalers are used to treat respiratory illness like asthma. Hydrofluorocarbons are powerful greenhouse gases, and metered-dose inhalers use them as a propellant to deliver the active medication.¹⁹ One commonly used inhaler, Ventolin, carries greenhouse gases that equate to a 175-mile trip in a midsized family car, for example.²⁰ As such, metered-

¹⁷ This might be taken to map on to a distinction between production and consumption-based emissions counting. (See: Lee, L. (2015). A critical examination of the consumption-based accounting approach: has the blaming of consumers gone too far. *WIREs Clim Change*, 6, p.1-8.) The idea is that where production-based emissions counting is immensely complex given the various steps in the causal chains, if we focus on the necessary cause, the consumer, this is easier and more effective. The emissions in a supply chain are immensely complex, but if we take a consumption-based view and remove the demand, we remove the necessary cause. As the necessary step and the one that makes a difference, the consumer is the polluter.

¹⁸ Parker, J. (2023). Barriers to green inhaler prescribing: ethical issues in environmentally sustainable clinical practice. *Journal of Medical Ethics*, 49(2), 92–98.

¹⁹ Wilkinson, A., & Woodcock, A. (2022). The environmental impact of inhalers for asthma: A green challenge and a golden opportunity. *British Journal of Clinical Pharmacology*, 88(7), 3016–3022.

²⁰ Green Inhaler. Green Inhaler: Making your inhaler more environmentally friendly. Retrieved from: <https://greeninhaler.org/>

dose inhalers are an important area for healthcare decarbonisation.

If healthcare is considered the polluter when it comes to metered-dose inhaler emissions, then healthcare must be the necessary cause. That is, to be the polluter healthcare must be the cause of emissions that makes a difference to whether hydrofluorocarbons are released from a metered-dose inhalers or not. I argue that it is not straightforward to identify healthcare as the necessary cause and therefore as the polluter.

Oftentimes, when we think of the necessary cause of emissions, we think of the polluter being the last step in a chain of causality. In the inhaler case, the most proximate cause to emissions is the patient using the inhaler. And whilst it seems plausible to say patients are a necessary cause, this approach does not pinpoint healthcare as the polluter. This complicates the identification of healthcare as the polluter because patients, not healthcare systems, are directly responsible for the emissions. While this approach intuitively identifies the most immediate cause, it fails to attribute responsibility to healthcare itself.

What about other necessary causes of inhaler emissions? One might object that it seems arbitrary to say the proximate cause is necessary as the various links in the supply chain like manufacture, transport, storage, prescription, dispensing and so the like all seem necessary in generating inhaler emissions. Each step from manufacture to the use and disposal of metered-dose inhalers makes a difference in the generation of hydrofluorocarbon emissions from inhalers. Each step is critical; removing any link could prevent inhaler emissions. We might therefore be tempted to say that all those involved in the various steps are a polluter. What we are left with is multiple agents who are considered polluters: pharmaceutical companies that manufacture inhalers, those responsible for transporting inhalers, the professionals involved in prescribing and dispensing inhalers as well as the patient who uses the inhaler and those who

dispose of them. This does appear to help make some progress towards identifying necessary causes of inhaler emissions, but the result is a diffuse set of polluters rather than to single out healthcare as the relevant polluter. The retrospective account can identify relevant polluters, but it does not attribute emissions to healthcare as the polluter in the way proponents of the PPP want. The upshot of the retrospective account is that it identifies several necessary causes, but the downside is that it does not distinctly identify healthcare as the main polluter.

A potential solution to this problem of multiple necessary causes is to gather these causes up under the banner of 'healthcare' and treat them as a collective. For simplicity, we could just call all these polluters 'healthcare' for the purpose of payment. Of course, this seems to expand the boundaries of what is considered healthcare. Whilst pharmaceutical companies might be part of the health sector more broadly, they are rarely thought of as healthcare. Similarly, while patients are integral to healthcare delivery, referring to them as 'healthcare' stretches the term's meaning. Indeed, patients are likely to be important in healthcare decarbonisation if we think of problems like inhaler emissions so completely excluding patients in mitigation responsibility may also be problematic. Relying on the retrospective account of causation in the PPP leads to challenges and ambiguities in pinpointing healthcare as the polluter, unless we expand the notion of what is considered healthcare. Hence, it is worth considering the prospective account of causation to see if this fares any better.

6.3.2. Problems with identifying who pays

One lesson from thinking about necessary and sufficient causes is that perhaps it is best to think of polluters, rather than a single polluter. Rather than starting with emissions and working backwards to identify the polluter(s), we could consider the various processes involved in healthcare and examine the emissions they produce. The apparent complexity in healthcare activities and the emissions they generate means

that we could acknowledge there are various processes and agents that are necessary for healthcare emissions, but we call those 'healthcare' and work forwards to the emissions that result. This forward-looking approach acknowledges the complexity of healthcare activities and the diverse sources of emissions, grouping them under the label of "healthcare" as a unified entity. Instead of expanding the notion of healthcare as the retrospective account does, 'healthcare' is understood in the usual sense mentioned in the introduction: as a system formed of various institutions, structures and actors tasked with performing a certain function. From here we ask which emissions belong to healthcare so understood.

To distinguish between different ways of holding polluters accountable, a fruitful distinction is between a micro-version and a macro-version of the PPP.²¹ According to Simon Caney, the micro-version of the PPP is interested in an individual actor's emissions and making that actor pay for the ill-effects of their emissions. This aligns with the retrospective account discussed earlier, which tends to identify specific polluters like patients or doctors. Caney contrasts this with the macro-version of the PPP, which is concerned with polluters as a "class", rather than a single polluter. I understand 'class' as a collective, so the macro-version says that a collective which is generating pollution should pay for the negative effects of the emissions that they cause as a whole.

Distinguishing between an individual-level and a collective-level, might make it easier to identify necessary causes by gathering up a group of causes together into a collective and treat that collective as the polluter. The advantage being that we can avoid the difficult philosophical and empirical questions about the degree of causal responsibility each component plays. By reducing the causal indeterminacy involved in working backwards from emissions to polluters, we also avoid responsibility gaps

²¹ Caney 2006, *op. cit.* note 5.

where emissions are unaccounted for. Instead, all we need to know is the relevant class. In the case of healthcare, we could say that the unified entity 'healthcare' is the one causing emissions. Basically, we assume the polluter is healthcare because we know that healthcare has emissions.

Saying healthcare, as a collective, is causally responsible for certain emissions certainly simplifies the task of the PPP when it comes to polluter identification: if healthcare is responsible for emissions, then healthcare should pay for their mitigation. This view hinges on the concept of collective responsibility, which goes beyond simply aggregating individual responsibilities. That is, if healthcare as a group of organisations and individuals is the polluter, and polluters pay, then it is this collective that must pay.

One key aspect of collective responsibility is that this is not just individual responsibility aggregated. Collective responsibility rejects the idea of 'methodological individualism'.²² This means that we cannot reduce or redescribe the class 'healthcare' in terms of the various individual components of healthcare that produce emissions such that they should pay. It is 'healthcare' the collective, above and beyond the individuals within this collective, that is accountable. To be sure, to make sense of healthcare emissions we treat healthcare the collective as the polluter, and if it is polluters who pay, then it is healthcare the collective, not just various individuals, who pay.

Return to the example of metered-dose inhalers. Saying that healthcare should pay for inhaler emissions because healthcare released hydrofluorocarbons is not the same as saying that those who manufacture, transport, prescribe, dispense and use inhalers should individually pay. We cannot simply explain holding the class 'healthcare'

²² Smiley, M. (2023). Collective Responsibility. *The Stanford Encyclopaedia of Philosophy*. Retrieved from: <https://plato.stanford.edu/archives/fall2023/entries/collective-responsibility/>

responsible in terms of facts about individuals and their interrelations. Rejecting methodological individualism means holding healthcare above and beyond these components as responsible.

There are, of course, difficult and controversial philosophical questions about precisely how to hold an entity like healthcare responsible and whether a collective can be responsible above and beyond the aggregation of its members.²³ One way that proponents of the PPP could do this is through the work of Christian List and Philip Pettit. They refer to groups like institutions as "corporate agents".²⁴ Corporate agents have moral agency due to governance structures and decision-making procedures that provide a sense of identity as well as an ability to have representational states, motivational states, goals and the ability to act on these such that they are fit to be held responsible, according to List and Pettit.²⁵ In so far healthcare systems have these features, on List and Pettit's view, healthcare would be considered a "corporate agent", and the PPP would view healthcare as fitting for collective responsibility.

Since polluters pay, and healthcare is the polluter, then it is healthcare the collective who will pay according to a PPP. The concept of collective responsibility is central to this argument. In rejecting methodological individualism, a PPP based on collective responsibility means we cannot reduce payment to individuals. It must be the 'corporate agent' healthcare itself who pays. Attributing mitigation responsibilities to healthcare, as healthcare causes emissions, requires that healthcare as a collective agent pays, not just an aggregation of payment amongst various individual agents. The problem is that there is no meaningful way that healthcare can pay without this collapsing into individuals, primarily patients, who pay.

²³ Giubilini, A., & Levy, N. (2018). What in the World Is Collective Responsibility? *Dialectica*, 72(2), 191–217. <https://doi.org/10.1111/1746-8361.12228>

²⁴ Pettit, P. (2007). Responsibility Incorporated. *Ethics*, 117(2), 171–201. <https://doi.org/10.1086/510695>

²⁵ List, C., & Pettit, P. (2011). *Group agency: the possibility, design, and status of corporate agents*. Oxford University Press

Healthcare has two main ways it can mitigate its carbon footprint. Healthcare can either reduce its emissions or enhance carbon sinks. The latter option is the most straightforward, even if the more controversial in terms of efficacy for, in the case of a healthcare system, this essentially amounts to a healthcare system spending money on offsetting. Reducing the carbon footprint of healthcare is more complex. The mechanics of healthcare decarbonisation involves a shift in what, how and where care is delivered. For instance, low carbon healthcare focuses on reducing low value care, reducing high carbon interventions like anaesthetic gases and metered dose inhalers, and on reducing demand for health services through preventative healthcare.²⁶ Additionally, healthcare systems can examine their supply chains and procurement to attempt to find lower carbon alternatives and well as reducing the energy intensity of buildings and so forth.²⁷ To illustrate, the example of metered dose inhalers is useful.

As metered-dose inhalers contain powerful greenhouse gases, the NHS in England aims for a 50% reduction in the impact of metered-dose inhalers by 2028.²⁸ To achieve this, doctors and patients must switch to alternative inhalers which do not contain greenhouse gases. Studies suggest that, for the majority of patients, these alternative inhalers are equivalent in terms of effectiveness.²⁹ Nevertheless, switching inhalers may be inconvenient as patients have to attend additional appointments and need to learn to use the alternative inhaler. A switch may also be worrying in terms of a temporary deterioration in a patient's lung condition, especially for those whose lung problems have been historically well-controlled with less environmentally friendly inhalers. A second concern with switching inhalers is financial.³⁰ The issue is that some lower

²⁶ Sherman *et al* 2021, *op. cit.* note 4.

²⁷ NHS England 2020 *op. cit.* note 3.

²⁸ British Medical Association. (2020). Update to the GP contract agreement 2020/21-2023/24. Retrieved from: <https://www.bma.org.uk/media/2024/gp-contract-agreement-feb-2020.pdf>

²⁹ Wilkinson & Woodcock 2022, *op. cit.* note 19.

³⁰ Wilkinson, A. J. K., Braggins, R., Steinbach, I., & Smith, J. (2019). Costs of switching to low global warming potential inhalers. An economic and carbon footprint analysis of NHS prescription data in

carbon inhalers are more expensive. Funds that are diverted to lower carbon inhalers, which tend to be no better for lung disease overall but instead are equal to higher carbon options in terms of efficacy, must be found elsewhere within a system with a fixed budget like the NHS. It is ultimately patients who pay these opportunity costs whether through changes in care they receive or in how healthcare systems are funded.

I do not dispute whether the burdens or costs of switching inhalers are considered minor, or whether they are 'worth it' in light of climate change. My concern is that it is not really a healthcare system that shoulders those burdens. If the polluter is healthcare, and the polluter pays, in these instances it is not healthcare who pays. Shifting funds to pay for lower carbon inhalers, means that something else within the system cannot be paid for. If finding the money to pay for lower carbon inhalers means not funding something else, it is patients who ultimately pay this cost.

Alternatively, funding for healthcare could be increased to pay the bill of expensive low carbon inhalers. But, if healthcare is the polluter, then it is not the polluter paying higher taxes to provide healthcare systems with sufficient funding to pay for these inhalers. Furthermore, moving away from financial senses of 'pay', attending appointments, discussing whether to switch, switching inhalers, monitoring one's health to see if the new inhaler is effective and following up if there are problems are burdensome for patients, not healthcare. The question is not whether these costs are justifiable, it is about who shoulders the burdens of these costs. The point is that there is a disjoint between the polluter and who pays, if we assume the polluter is healthcare.

Let us now summarise the proceeding arguments. If we want to hold healthcare responsible for mitigation on the basis of a PPP then a PPP must be able to correctly identify healthcare as the polluter and require that healthcare pay by attributing

emissions to them. On a counterfactual account of causation, the polluter is the necessary cause of emissions. This however does not lead to healthcare as the polluter, instead a web of actors involved in providing care are highlighted. A prospective, collective responsibility approach fares better by attributing emissions to healthcare as a class. But this account cannot meaningfully require that healthcare pay. The costs and burdens of healthcare minimising its emissions are difficult to keep within healthcare and this inevitably has consequences for other stakeholders in particular patients.

The result is that the PPP, as traditionally conceived, is inadequate for assigning mitigation responsibility to healthcare. Either we must reject the idea that healthcare has a responsibility to mitigate emissions under the PPP, or we must acknowledge that attributing responsibility to healthcare is metaphorical and that the burden of payment will fall on patients. This disjoint leads to the question of whether it is justifiable to make patients pay for emissions linked to healthcare. I consider this next.

6.3.3. Holding patients liable is justified

The gap between who pollutes and who pays in healthcare could be resolved if it is thought that making patients pay is justifiable. Indeed, one objection to the criticism of the separation between the polluter and who pays is that this problem is not unique to healthcare. A state may be held responsible as the polluter, but it is difficult to hold a nation liable without eventually making citizens pay. For instance, Vanderheiden writes:

"Some Americans produce very high levels of annual emissions while others emit far less, but all are held to be equally responsible when the nation itself is assessed [for] responsibility based on its aggregate emissions. It seems unfair to assign equal remedial burdens between Americans with widely disparate

individual contributions, but collective national responsibility implies, though it need not entail, undifferentiated group fault.”³¹

Two justifications for individuals paying even if strictly they are not seen as the polluter are usually offered in the example of nations and their citizens.

One argument is based on democratic systems. Vanderheiden points out that democracy produces a certain relationship between citizen and state, such that citizens are accountable for the decisions of democratically elected governments. Citizens then, could pay mitigation costs even if the state is the polluter because the state was democratically elected. Assuming that the argument from democracy is correct, it is not obvious that there is a parallel relationship in healthcare.

A different argument for why individuals should pay for the emissions of a state is because they benefit from the emissions of the wealthy nations they live in.³² In this way, the PPP is supplemented with a beneficiary pays principle.³³ Of course, this means that we are now considering a hybrid principle rather than a pure PPP I am concerned with, but it is worth pursuing this argument further. With regards to healthcare, the question for this hybrid principle is whether patients benefit from healthcare such that they are liable to pay the mitigation costs? A parallel could be drawn with money. Individuals typically pay for healthcare, at least to some degree, including through taxation depending on the healthcare system, because they benefit. If healthcare relies on emissions, then mitigation is another cost patients should be prepared to pay to enjoy the benefits of healthcare. I consider this argument further in the next section, taking the position that this may well lead to injustice.

6.4. Polluter Pays and Injustice

³¹ Vanderheiden 2008, *op. cit.* note 16, p.168.

³² Page 2008, *op. cit.* note 5.

³³ Caney 2006, *op. cit.* note 5.

The discussion so far has considered two parts of the PPP: (i) the polluter, and (ii) determining who pays. I have identified problems with each aspect when applied to healthcare. However, one might still argue that healthcare, as a collective, is the polluter because it encapsulates the various structures and processes that generate emissions during care delivery, while patients should bear the cost of mitigating these emissions since they benefit from healthcare. Let us now, in this final section, consider the third remaining aspect of the PPP: (iii) the criteria by which a polluter pays. I argue that expecting patients to pay for healthcare mitigation costs in proportion to emissions is unjust and that this approach should be rejected.

Payment, under a PPP, is typically tied to the proportion of greenhouse gas emissions produced. If we expect those making the mess to clean it up, then cleaning seems relative to the mess at hand. An exclusive focus on emissions as the metric to determine costs leaves the PPP insensitive to agent-centred factors and emissions-centred factors, however. In other words, the PPP is uninterested in agent's ability to pay or why they are emitting, it only cares about the volume of emissions to calculate costs. My concern is that costs of a certain magnitude may lead to injustice in healthcare because when we consider health inequalities, it becomes apparent that disadvantage affects both health and emissions.³⁴

If a PPP dictates that payment is in proportion to emissions, then it follows that those with the greatest emissions will pay the most. A complex relationship exists between disadvantage and health but the headline is that inequalities in the circumstances in which people live and work translate into inequalities in health.³⁵

³⁴ Caney 2006, *op. cit.* note 5.

³⁵ Marmot, M. (2005). Social determinants of health inequalities. *The Lancet (British Edition)*, 365(9464), 1099–1104. [https://doi.org/10.1016/S0140-6736\(05\)71146-](https://doi.org/10.1016/S0140-6736(05)71146-). Marmot, M. (2020). Health equity in England: The Marmot review 10 years on. *BMJ (Online)*, 368, m693–m693. <https://doi.org/10.1136/bmj.m693>.

These are the social determinants of health like poverty and education. The consequence is that healthcare resources tend to be concentrated on the disadvantaged.³⁶ Despite using more healthcare services, these individuals often experience worse health outcomes compared to their wealthier counterparts. Thus, in spite of healthcare resources being directed towards those who are already disadvantaged, this remains insufficient to close the health gap.³⁷

This correlation between disadvantage and higher healthcare emissions is evident in research by Anand Bhopal *et al*, which shows that healthcare emissions follow a social gradient.³⁸ They plotted healthcare's carbon footprint as a proportion of total per capita carbon footprint by decile and found that,

"healthcare carbon emissions represent almost one-fifth of the per-capita footprint in the poorest decile, it follows a social gradient and is under a *fiftieth* in the richest decile. Due to the variation in healthcare consumption across income deciles this difference is likely to be substantially higher, representing perhaps around one-quarter of the carbon footprint among the worst off."

In other words, the poorest decile in England use 20% of their total carbon emissions on healthcare whereas the wealthiest decile spend 10 times less (2%) of their total carbon emissions this way.

The distribution of healthcare emissions is significant because the PPP is insensitive to pre-existing disadvantage, how this affects individual's utilisation of healthcare, as well as their differential ability to pay. If the PPP's exclusive interest in allocating costs

³⁶ Cookson, R., Propper, C., Asaria, M., & Raine, R. (2016). Socio-Economic Inequalities in Health Care in England. *Fiscal Studies*, 37(3–4), 371–403. <https://doi.org/10.1111/j.1475-5890.2016.12109>

³⁷ Marmot *et al* 2020, *op. cit.* note 35.

³⁸ Bhopal, A., Bærøe, K., & Norheim, O.F. (2022) How do we decarbonise fairly? Emissions, inequities and the implications for net zero healthcare. *Journal of the Royal Society of Medicine*, 115(9):337-340. p.339 doi:10.1177/01410768221113069

are emissions, the greater healthcare emissions of the disadvantaged mean they are going to be liable to greater mitigation costs, even though their emissions are higher because of disadvantage and their ability to shoulder the costs is limited, again because of disadvantage. This is deeply unjust and is an example of compound injustice, where one disadvantage (deprivation) paths the way to another (poor health) and then a further burden (proportionate mitigation costs).³⁹ Individuals have disproportionate health needs because they are disadvantaged, this leads to greater healthcare emissions, which oftentimes fails to correct health inequalities, but on a PPP they must shoulder mitigation burdens in proportion to emissions, which further disadvantages them. It is also worth noting that, just as emissions generally and healthcare emissions specifically follow a social gradient, even in the United Kingdom, it is the vulnerable who will disproportionately experience the negative effects of climate change, and in particular the health effects.⁴⁰

It is for this reason that I am unconvinced by supplementing the PPP with a beneficiary pays principle. While patients do benefit from healthcare, the benefits are often insufficient to overcome the health inequalities faced by disadvantaged groups, and these groups are typically least able to bear the burden of mitigation costs in healthcare. Simply put, the fact that individuals benefit from healthcare does not justify holding them liable for mitigation costs in a way that perpetuates and entrenches inequalities.

It is worth making one final, broader point about the PPP and the magnitude of costs to be shouldered. The PPP is not just insensitive to disadvantage and to individual ability to pay, but also to the goals emissions are aimed at. The PPP treats all emissions

³⁹ Shue, H. (2014). *Climate justice vulnerability and protection*. Oxford University Press, USA, p.4 and pp.41-42. Wolff, J., & de-Shalit, A. (2007). *Disadvantage*. Oxford University Press.

⁴⁰ Paavola, J. (2017). Health impacts of climate change and health and social inequalities in the UK. *Environmental Health*, 16(Suppl 1), 113–168. <https://doi.org/10.1186/s12940-017-0328-z>

as morally equal and equally liable for mitigation. Henry Shue argues this is a mistake. For Shue, to treat all greenhouse gas emissions as equal regardless of their purpose, is to "ignore the fact that some sources [of greenhouse gas emissions] are essential and even urgent for the fulfilment of vital needs and other sources are inessential or even frivolous."⁴¹ The important point here is that emissions are *instrumental* in meeting certain morally valuable purposes.⁴² In the case of healthcare, we might claim that emissions are instrumentally valuable in fulfilling the morally valuable end of health. The risk is that if all polluters are to be treated the same, and that the PPP is insensitive to what emissions are for, then paying in proportion to emissions might undermine those morally valuable ends.

Of course, whether healthcare paying in proportion to its emissions undermines its goals of protecting and promoting health is an empirical question. Whilst there have been various suggestions about how to bring about a net zero healthcare system, we do not yet know the full implications of achieving a net zero healthcare system. There is a risk that forcing healthcare to pay mitigation costs in strict proportion to emissions could compromise its ability to deliver care effectively. This concern warrants caution when applying the PPP in the context of healthcare.

6.5. Conclusion

I offered two arguments against a PPP as the way to resolve the question of the nature and extent of healthcare's responsibilities to address climate change through mitigation. If we want to say that healthcare is the appropriate entity to be held responsible, then the PPP both needs to identify healthcare as the polluter and as liable

⁴¹ Shue, H. (1993). Subsistence Emissions and Luxury Emissions. *Law & Policy*, 15(1), 39–60.

⁴² Hayward, T. (2007). Human Rights Versus Emissions Rights: Climate Justice and the Equitable Distribution of Ecological Space. *Ethics & International Affairs*, 21(4), 431–450.
<https://doi.org/10.1111/j.1747-7093.2007.00117.x>

to pay. I have demonstrated that the PPP is unable to do this. The second argument is designed to allay the temptation to rely on the PPP anyway, because patients benefit from healthcare. Even if we are willing to live with the PPP's conceptual issues, the consequences for the disadvantaged of applying the PPP in a healthcare system means it ought to be avoided.

My criticism of the PPP is not intended to be exhaustive. I have stressed some of the most important challenges in the context of healthcare. One conclusion of my arguments that ought to be avoided is that contribution to climate change is irrelevant in determining healthcare's responsibilities. My target is the PPP and the way it allocates burdens, but it may be that more nuanced pluralistic views that combine contribution-based principles with other burden-sharing principles, like ability to pay for example, can mitigate some of the more problematic features of the PPP. Such approaches could help ensure that the burden of climate action is shared equitably, without exacerbating existing health and social inequalities. This may prove to be a productive avenue in figuring out healthcare's fair share of the burdens of climate change mitigation.

Chapter 7

7. Sufficiency and healthcare emissions

7.1. Introduction

Historically, change in medicine has been characterised by addition. Medical power increases through scientific advances such that healthcare can utilise new technologies and increased knowledge to offer new treatments, new diagnostics, new diagnoses and so forth. Theories of distributive justice in healthcare concern themselves with how to distribute the benefits of these developments in medical knowledge and power fairly. That is, justice in healthcare has been interested in justified claims to the benefits of healthcare, and ensuring patients receive a fair share of the benefits of limited medical resources.

A new challenge for theories of justice in healthcare is present. This challenge arises from healthcare systems reliance on greenhouse gas (GHG) emissions: how can theories of justice in healthcare accommodate not addition but a transition to sustainable systems, and the burdens, rather than benefits, that entails? Instead of thinking about the *benefits* brought about by distributing medical resources, theories of justice in healthcare are having to consider how to distribute *burdens* as healthcare systems transition to low-carbon, sustainable, models of care.

As a source of a significant volume of GHGs, healthcare is recognised as contributing to the threats of climate change. I take an institutional perspective on the locus of responsibility when it comes to reducing healthcare emissions. I use 'healthcare' and 'healthcare system' interchangeably to refer to the organised efforts of societies to promote health, prevent disease and provide medical care. Modern healthcare systems have a complex organisational pattern and are formed of various

organisations like hospitals and clinics, as well as individuals like managers and healthcare staff. It is this collective that I am concerned with when thinking about healthcare's responsibilities to address climate change.

Globally, healthcare systems are thought to be responsible for around 4% of GHG emissions;¹ though each healthcare system's contribution is different. Consequently, healthcare is tasked with reducing GHG emissions. One problem, however, are the burdens associated with addressing climate change and shifting away from the GHG emissions that healthcare systems have historically relied upon to meet its goals like protecting and promoting health. Three main burdens are associated with tackling climate change: mitigation, adaptation and compensation.² Whilst each is potentially relevant to healthcare systems, as efforts to reduce GHG emissions form the bulk of how healthcare systems have responded to the threat of climate change so far, I focus on mitigation here.

This paper is concerned with two questions of distributive justice regarding healthcare emissions: (1) what goal should healthcare systems adopt when reducing GHG emissions? And (2) what is a fair share of the burdens (and benefits) of healthcare systems adopting policies that meet this goal? The climate target question is important because it determines the extent of emissions reductions for a healthcare system. Take a target of net zero where some GHG emissions are permissible as long as they are balanced by enhancing carbon sinks. Net zero demands far less of healthcare than a target of zero emissions whatsoever. I discuss these positions in more detail later. The second question is concerned with how the target is achieved fairly.

¹ Manfred, L. *et al.* (2020). The environmental footprint of health care: a global assessment. *The Lancet Planetary Health* 4.7, e271-e279.

² I note that some may object to my framing of these actions to address climate change as 'burdens'. I address this concern in the next section and consider whether mitigation is burdensome or whether it is actually better seen as an investment.

These questions raise two methodological issues. First, since climate change mitigation entails burdens, and theories of justice in healthcare are primarily concerned with benefits, a key methodological question is how to integrate a theory of justice in healthcare with climatic responsibilities. In particular, how can healthcare simultaneously meet its goals like promoting health and treating disease whilst also doing its fair share to address climate change? An alternative methodology would be to adopt separate, climate-specific principles to determine healthcare's mitigation responsibilities; for example, a polluter pays principle. A second, related methodological issue arises regarding the question of the appropriate target. Should the climatic goals that healthcare aims for, and how they are achieved, be examined independently or do they share a common normative grounding? Should these two questions be addressed simultaneously or separately?

An example helps to highlight these two methodological issues. Take a polluter pays principle. This states that polluters ought to mitigate because of, and to the extent to which, polluters contribute to a problem. Polluter pays offers a common normative grounding to both the target question and the fair shares question. A polluter's emissions should be eliminated on a polluter pays principle, and doing so means the polluter has done their fair share. The target is based on a polluter's emissions, as is their fair share, and so both questions are addressed by the same principle. Nevertheless, allocating mitigation responsibilities on the basis of being a polluter leaves this principle insensitive to the wider goals of justice, in particular the goals of healthcare because healthcare's goals are irrelevant to the question of whether healthcare is categorised as a polluter. Hence, polluter pays offers a separate principle to a theory of distributive justice in health and is a non-integrated principle.

Here I take an integrated approach to both the just target and the fair shares questions. I do not defend an integrationist methodology, rather I hope that my arguments provide an example of how this might work. I argue that sufficientarianism

is particularly well suited to strike a balance between the distribution of healthcare benefits as well as the burdens of mitigation compared to rivals.

The paper is formed of two sections one devoted to each of the two questions above. In the first section I consider alternative ways to set a mitigation target for healthcare and point to specific problems with each method. I then lay out the sufficientarian perspective pointing to several attractive properties in the sufficiency view's ability to navigate problems left by rival views. Following this I move to consider what a fair share of the burdens of climate change mitigation are for healthcare. My position is that sufficientarianism leaves healthcare with a budget of permissible and exempt emissions. Any emissions beyond this budget are liable to mitigation. This framework for distinguishing permissible from impermissible emissions can determine a fair share of mitigation burdens for healthcare allowing it to reconcile its valuable goals with tackling climate change.

7.2. What greenhouse gas emissions target should healthcare aim for?

In this section I address the question of what mitigation target a healthcare system should adopt. First, however, I briefly cover the idea that mitigation in healthcare entails burdens. This is not a universally accepted claim.³

As mentioned above, mitigation refers to actions that limit the impact of GHGs on global surface temperatures. There are generally two ways agents can mitigate. One is to directly reduce GHG emissions, and the second is indirect through enhancing carbon sinks or offsetting emissions. I claim that mitigation is burdensome because it places responsibilities on some agents, and to discharge those responsibilities they will have to shoulder costs in taking action to address their GHG emissions. Now, some

³ I thank an anonymous peer reviewer for pressing me on this issue.

may object to this, claiming that mitigation in healthcare has longer-term and globally distributed benefits in terms of protecting health and reducing healthcare costs. For example, as alternatives to fossil fuels are increasingly affordable and scalable, there are opportunities to reduce healthcare's reliance on fossil fuel-generated energy.⁴ More renewable energy has downstream benefits by reducing healthcare's overall energy expenditure. Furthermore, as mitigation tackles climate change, and climate change threatens health, we can protect health by moving healthcare systems away from fossil fuels. Better to call mitigation an 'investment', so the argument goes, not a burden.

I do not deny that there are benefits to mitigation. Moreover, I recognise the political advantages to naming the costs of mitigation 'investments' rather than burdens to help accelerate the transition to an environmentally sustainable healthcare system. Reducing the GHG emissions of healthcare is, however, thought to go far beyond energy systems and to entail fundamentally altering how, where, and crucially *what* healthcare is provided.⁵ Widespread change across healthcare systems is thought to be critical for reducing GHG emissions and this includes: changing how healthcare is structured and delivered, changes in the norms and culture of healthcare and behaviour change amongst professionals and patients in terms of how they access healthcare, what is offered and how medicine is practiced.⁶ So the main burdens arise from the structural changes, new technologies, foregone consumption opportunities, attitudinal and practice changes in healthcare, as well as investments, that are necessary to reduce emissions. The problem then is that investments take too narrow a view on the costs that a healthcare system undertakes to minimise its emissions.

⁴ Romanello, Marina, et al. "The 2023 report of the Lancet Countdown on health and climate change: the imperative for a health-centred response in a world facing irreversible harms." *The Lancet* 402.10419 (2023): 2346-2394.

⁵ Naylor, C and Appleby J. (2013) "Environmentally sustainable health and social care: Scoping review and implications for the English NHS." *Journal of Health Services Research & Policy* 18.2 114-121.

⁶ Salas, Renee N., et al. (2020) A pathway to net zero emissions for healthcare. *BMJ*, 371

Not all burdens are investments and not costs are financial. Changing to low-carbon inhalers offers one example.⁷ Switching a patient's inhaler to one which contributes less to climate change may be inconvenient requiring additional appointments and reviews, as well as potentially leading to the management of their lung condition, temporarily, worsening. Such switches are thought to have lower overall GHG emissions and there may be health benefits in the future through reducing the threats of climate change. But for the patient being asked to switch inhalers, it hardly seems right to call this an 'investment'. Rather, they are being asked to accept, albeit small, burdens.

There are potentially benefits to addressing healthcare GHG emissions, but as healthcare systems act, we must be mindful that those actions may carry costs. So, there is a question of how those costs (or investments) and any benefits are distributed fairly. One important aspect of answering this question is addressing what emissions target a healthcare system should adopt. Let us first consider the question of the appropriate goal of climate policies in healthcare then. A key aspect is whether the target should be developed internally or externally to healthcare. Should there be a generic target formulated independently of healthcare's purpose which is later adopted by healthcare, or should the target come from healthcare itself? Two methods to determine the appropriate target result: one which is sensitive to the purpose of healthcare and one which sets the target independently of healthcare. I explore the latter method first.

7.2.1. Independent methods of setting healthcare's mitigation target

⁷ Parker J. (2023) Barriers to green inhaler prescribing: ethical issues in environmentally sustainable clinical practice. *JME*49:92-98

Three commonly discussed approaches to mitigation set a target independently of healthcare: zero emissions, net zero and emissions egalitarianism. I discuss each approach. The primary issue with methods that are insensitive to the goals of healthcare is that they tend to strike the wrong balance between sufficient emissions reduction and ensuring that healthcare can fulfil its valuable goals.

Zero emissions are considered briefly. This is because producing no emissions at all is an unrealistic target for healthcare, at least for now. It may well be that eventually zero emissions are feasible. But as some treatments rely on GHGs directly, like certain inhalers and volatile anaesthetic gases,⁸ even a complete shift away from fossil fuels would still leave residual emissions from these medicines.

Emissions egalitarianism garners support from many philosophers.⁹ In essence, this view claims that the relevant good to be distributed is emissions as opposed to welfare, capabilities or something else. Emissions are then distributed on an equal *per capita* basis. Egalitarians may have other methods of setting a target for GHG emissions reductions based on metrics other than emissions. But emissions egalitarianism is one common way that a global budget of emissions is determined.

To set the budget, the emissions egalitarian must first determine what global surface temperature rise they are willing to accept. The precise details involve complex empirical issues as well as normative considerations of what level of temperature rise

⁸ Shelton CL, *et al.* (2022). Towards zero carbon healthcare: anaesthesia. *BMJ*. 13;379. Wilkinson A & Woodcock A. (2022). The environmental impact of inhalers for asthma: A green challenge and a golden opportunity. *British Journal of Clinical Pharmacology*. 88(7):3016-22.

⁹ Singer P. (2010) One atmosphere. In S. Gardiner *et al*, *Climate ethics: Essential readings* (pp181-199). Oxford: OUP. Broome, J. (2012). *Climate matters: Ethics in a warming world*. W. W Norton and Company. Caney, S. (2009). Justice and the distribution of greenhouse gas emissions. *Journal of Global Ethics*, 5(2), 125–146. Torpman, O. (2019). The case for emissions egalitarianism. *Ethical Theory and Moral Practice*, 22(3), 749–762. Vanderheiden, S. (2008). *Atmospheric justice: A political theory of climate change*. Oxford University Press.

is considered dangerous. To help illustrate this consider the following forecasts from the Intergovernmental Panel on Climate Change (IPCC). The IPCC claim that, from 2020 onwards, to have a 50% chance of limiting global warming to 1.5°C leaves a remaining carbon budget of 500 Gigatonnes of CO₂ equivalent. For a 67% probability of staying within 2°C leaves a budget of 1150 GtCO₂, according to the IPCC.¹⁰ Emissions egalitarianism states that whatever emissions budget we have, based on whether we opt for 1.5°C, 2°C or something else, should be shared equally. As the absorptive capacity of the atmosphere is seen as a global commons, rights to emit GHGs are divided equally.¹¹ This appears to be self-evidently fair as no individual has a greater claim to the atmosphere than anyone else. The result is equal *per capita* emissions.¹²

It is not immediately obvious how an equal *per capita* share of emissions translates into an emissions target for healthcare systems. Broadly we could either allocate a budget to each individual, or states could be provided a GHG budget based on equal *per capita* emissions. But the issue is how to go from this allocation to one for healthcare.

A further consideration for resourcist egalitarian views like emissions egalitarianism is that individuals' ability to convert resources into welfare differ.¹³ Individual's healthcare needs vary as do their capacities to benefit from healthcare interventions that cannot be provided without producing emissions. Allocating emissions on a *per capita* basis, potentially overlooks that an equal share of emissions may be insufficient

¹⁰ Intergovernmental Panel on Climate Change. (2023) 6th assessment report. (B. 1.3. p.10). Retrieved from: https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SPM.pdf

¹¹ Broome, J. (2012). *Climate matters: Ethics in a warming world*. W. W Norton and Company p.69. See: Blomfield, M. (2013), Global Common Resources and the Just Distribution of Emission Shares. *Journal of Political Philosophy*, 21: 283-304. for an opposing view on this characterisation of atmospheric absorptive capacity.

¹² Meyer L and Roser D (2006) Distributive justice and climate change. The allocation of emission rights. *Analyse & Kritik* 28(2), 223–49

¹³ Cohen, G. A. (1989). On the Currency of Egalitarian Justice. *Ethics* 99 (4): 906–44.

to meet healthcare needs fairly. This could be avoidable, depending on how emissions are distributed once we have set a *per capita* share. For instance, a state could be allocated a share of emissions and then redistribute those emissions such that entitlements to healthcare were met fairly. Of course, if further redistribution of emissions beyond the initial *per capita* allocation is required to meet individual's just entitlements, then we may question the fairness of, and the basis for relying upon, emissions egalitarianism in the first place.

The problem for zero emissions and emissions egalitarianism then are that they are insufficiently sensitive to the valuable role that healthcare plays. Emissions egalitarianism risks that burdens are distributed unfairly or requires other distributive principles to further allocate emissions fairly. Net zero as an emissions target, on the other hand, faces the opposite problem. It has the potential to be too lenient towards healthcare when reducing emissions by not specifying a precise target but rather by describing a mitigation procedure.

Net zero represents a ledger where the goal is to ensure an agent's aggregate emissions are zero.¹⁴ GHG emissions reductions and by enhancing carbon sinks, or offsetting can all contribute to achieving net zero. Under net zero, agents have significant freedom to decide how to balance their books helping to explain why this has become such a popular organising framework. Indeed, many healthcare systems have committed to net zero.¹⁵ Instead of specifying a certain level of reduction or an emissions target then, net zero offers a balancing framework. It is only the date that net zero is to be achieved by that is concretely specified.

¹⁴ Fankhauser, S. *et al.* (2022). The meaning of net zero and how to get it right. *Nat. Clim. Chang.* **12**, 15–21

¹⁵ World Health Organization. (2023) Alliance for Transformative Action on Climate and Health. Retrieved from: <https://www.who.int/initiatives/alliance-for-transformative-action-on-climate-and-health/country-commitments>

Net zero, as well as being politically palatable, has the advantage of allowing healthcare to continue to use GHG emissions to provide care, as long as these are eventually balanced by offsets. Unlike zero emissions and emissions egalitarianism, net zero can therefore be sensitive to the goals of healthcare. Healthcare can go ahead and emit GHGs to treat disease, ameliorate symptoms and such like, it just needs to make sure those emissions are sufficiently offset. But this balancing process is potentially opaque leaving the possibility that emissions balance only on paper. The flexibility afforded by net zero can facilitate 'accounting failures'.¹⁶ That is, net zero provides a cover to give the impression emissions are neutralised when in reality they are not. In theory, net zero enables a process of balancing emissions whereby healthcare can do its fair share whilst simultaneously reducing the impact of its emissions, but the risk is that in practice healthcare ends up falling short of meaningful mitigation efforts.¹⁷

7.2.2. Accounting for the goals of healthcare in setting a mitigation target.

I now discuss two methods of setting an emissions target for healthcare which account for the goals of healthcare. Rather than follow a nationally or internationally determined target like net zero, healthcare organisations could develop their own trajectory according to the specifics of healthcare. I dwell briefly on an account known as 'grandfathering emissions'. I then advocate for an ideal of sufficiency.

A view which has had some political support is grandfathering.¹⁸ Emissions grandfathering is the idea that previous levels of emissions should serve as a guide to future emissions targets. Since healthcare has historically produced a large volume of

¹⁶ Welton S. (2022) Neutralizing the Atmosphere. *Yale Law Journal*, 1–56.

¹⁷ Sue-Chue-Lam C *et al.* (forthcoming) Net Zero is not enough: ratcheting ambition for sustainable health systems through Reduce and Support.

¹⁸ Schulan A *et al.* (2023) Distributive justice and the global emissions budget. *WIREs Clim Change*, e847

emissions to provide goods like treating disease and care for the sick, on an emissions grandfathering view, healthcare should continue to have a substantial carbon budget. At the extreme, one might conclude that healthcare's emissions should remain unchanged because of healthcare's historic carbon footprint. But milder versions of grandfathering could still justify a large emissions budget for healthcare, even if only temporarily in a transition to lower emissions.

Like net zero, grandfathering has the potential to demand too little from healthcare as societies take action on climate change. At worst grandfathering gives healthcare a free pass on mitigation. At best it risks leaving a gap between what healthcare could do to reduce emissions and what is being asked of it. A key criticism of grandfathering is that it perpetuates the injustices of climate change, and this issue is reflected in healthcare.¹⁹ Grandfathering can perpetuate a pattern whereby those who contribute the least to climate change will continue to suffer the most. Further, by locking in historical emissions patterns, grandfathering prevents the redistribution of emissions to healthcare systems in developing countries preventing them providing care on a par with wealthy countries.²⁰

An alternative view that is capable of accounting for the purpose of healthcare is sufficientarianism. Where sufficientarianism is particularly useful is in setting an emissions target for healthcare systems and ensuring healthcare does its fair share through the way it deploys thresholds. I further discuss the advantages that the sufficiency view holds over alternatives as well as showing how the two thresholds it leaves (the health threshold and the emissions threshold) can determine a fair share of mitigation burdens for healthcare in the next section. First, I lay out the basic idea behind sufficientarianism and explain how it corresponds to an emissions target.

¹⁹ Caney, S. (2009). Justice and the distribution of greenhouse gas emissions. *Journal of Global Ethics*, 5(2), 125–146

²⁰ Bhopal, A. & Norheim, O.F. (2023) Fair pathways to net-zero healthcare. *Nat Med* 29, 1078–1084

Sufficientarianism describes a family of views that share the idea that what matters from the perspective of social justice is that everyone has enough.²¹ Two theses capture a sufficientarian pattern of distribution.²² The positive thesis is accepted by all sufficientarians, and it states that it is especially morally important for individuals reach a threshold of enough. This is the key intuition captured by sufficientarianism, that it is unjust when individuals fall below a threshold of enough. The second thesis endorsed by sufficientarians is either the negative thesis or the shift thesis.²³ The negative thesis claims that above a threshold of enough, inequalities are irrelevant to justice and no further distributive concerns apply. The shift thesis is weaker than the negative thesis and states that above a threshold of enough different distributive criteria apply as compared to below the threshold.

Through the sufficientarian's reliance on a threshold of enough, an emissions target for healthcare can be set indirectly. The sufficientarian is interested in knowing whether a specified volume of GHG emissions is enough to provide for basic needs, a decent life, some set of capabilities, or another metric of justice. So, to distribute emissions in a sufficientarian fashion we need to know 'sufficient for what?'. We cannot simply stipulate some volume of emissions as enough without reference to a more fundamental goal of distributive justice which, as I discuss further later, refers to a threshold of enough. We cannot know, for example, whether 5 megatons of carbon dioxide equivalent or 25 megatons is enough without setting a threshold which we have weighty reasons to secure.²⁴

Setting a threshold of emissions and hoping this is enough to meet the demands

²¹ Frankfurt, H. (1987) Equality as a Moral Ideal. *Ethics*, 98 (1) 21–43..

²² Casal, P (2007). Why sufficiency is not enough. *Ethics* 117 (2):296-326.

²³ Shields, L (2020). Sufficientarianism. *Philosophy Compass* 15 (11):1-10.

²⁴ *Ibid.*

of justice fails to recognise the instrumental value of emissions. Rather, the sufficientarian threshold references a more fundamental demand of justice and from this we ask which emissions are necessary to achieve sufficiency.²⁵ Starting with a sufficiency threshold we can work indirectly to an emissions target. In other words, some volume of emissions corresponds with sufficiency meaning we have two thresholds: a sufficiency threshold (which I call the health threshold later) and from this, an emissions threshold. The key question then is: 'to secure sufficiency, how much carbon does healthcare *need*?'. Utilising increased scientific understanding of the emissions from healthcare we can calculate the emissions required to secure sufficiency. This emissions threshold forms the target for healthcare systems.

Two issues in relying on sufficientarianism to set an emissions target are worth discussing. One is how to set the sufficientarian threshold and second is the distributive principles used above and below the threshold.²⁶ How each of these are answered has implications for what the precise target and emissions budget is. My comments on these will necessarily be brief for these details do not change my core claim, which is that sufficientarianism, by setting a threshold of enough is able to set an emissions target and offers advantages over its rivals. The advantages are discussed in the next section.

Where to place the sufficientarian threshold is the subject of much debate and

²⁵ It could be pointed out that other theories of distributive justice could similarly set an emissions target the same way as I am describing for sufficientarianism here. The egalitarian, for example, could claim there is some threshold of emissions that is compatible with healthcare systems fulfilling the demands of egalitarian health justice, for instance. A prioritarian might make a similar claim but derive the emissions threshold from prioritarian concerns. Whilst any number of theories of distributive justice could be used to set an emissions threshold, I defend sufficientarianism in the next section as I argue this is better at ensuring that mitigation burdens for healthcare systems are fairly distributed.

²⁶ Timmer, D. (2024). The sufficiency theory of justice and the allocation of health resources. *Bioethics*, 38, 796–802. <https://doi.org/10.1111/bioe.13338> See also, Timmer, D. (2021). Thresholds in Distributive Justice. *Utilitas* 33 (4): 422–41

sufficientarians defend various thresholds.²⁷ Similarly, philosophers debating climate change will defend thresholds inspired by sufficientarian considerations. For example, Simon Caney talks about “emissions required for [people] to attain a minimal decent standard of living”.²⁸ Steve Vanderheiden refers to “emissions sufficient to allow for ... basic human functioning”.²⁹ There are two important considerations for a threshold of enough, however. The threshold ought to be unambiguous and non-arbitrary.

Take the threshold suggested by Rodger Crisp of 80 years of good quality life.³⁰ Crisp cannot be accused of being vague in where the threshold is placed, but we might feel that 80 years is somewhat arbitrary. On the other hand, a decent standard of living as suggested by Caney, or Vanderheiden’s threshold of fulfil basic human functioning do not seem arbitrary but they are more ambiguous.

David Axelsen and Lasse Nielsen point out that for the threshold to be plausible, we must be able to justify the positive thesis, where bringing people up to the threshold is particularly important as well as the negative thesis where disadvantages above the threshold are less morally concerning.³¹ This is important because if the threshold is very low, for instance at survival, then the positive thesis is much easier to justify, but the negative thesis looks particularly harsh. Similarly with a higher threshold, the negative thesis is easier to justify, but we may disagree with the positive

²⁷ Casal, P (2007). Why sufficiency is not enough. *Ethics* 117 (2):296-326. Huseby, R. (2020). Sufficiency and the threshold question. *Journal of Ethics*, 24, 207–23. Axelsen, D.V. and Nielsen, L. (2015), Sufficiency as Freedom from Duress. *J Polit Philos*, 23: 406-426. <https://doi.org/10.1111/jopp.12048>.

Axelsen, D & Nielsen L (2016) Essentially Enough: Elements of a Plausible Account of Sufficientarianism. In Carina F & Rid A (eds), *What is Enough? Sufficiency, Justice, and Health* (New York, 2016). Benbaji, Y. (2005). The doctrine of sufficiency: A defence. *Utilitas* 17(3): 310–332

²⁸ Caney, S (2009) Justice and the distribution of greenhouse gas emissions. *Journal of Global Ethics* 5, 125–146.

²⁹ Vanderheiden, S (2008) *Atmospheric Justice: A Political Theory of Climate Change*. Oxford: Oxford University Press, p.243

³⁰ Crisp, R. (2003). Equality, Priority, and Compassion. *Ethics*, 113(4), 745–763, p.762
<https://doi.org/10.1086/373954>

³¹ Axelsen, D & Nielsen L (2016) p.102 *ibid.*

thesis for every sub-threshold benefit when the threshold is high. Axelsen and Nielsen argue that the threshold should therefore be determined by 'thick' normative concepts in the sense that we can articulate both a description of a morally concerning situation as well as evaluating it. Caney and Vanderheiden's thresholds are thick as a decent standard of living or basic human functioning are both descriptive, but we also have moral reasons to care about such thresholds.³²

The challenge of where the sufficiency threshold is set may be easier in healthcare however as it seems obvious that health is the relevant metric.³³ Some level of health is important for one's ability to lead a decent life and at least some healthcare will be necessary to secure enough health. 'Enough health', or a health threshold of 'sufficient health' however, is not a complete answer. How we define and deploy concepts like health, and parallel concepts like disease, illness, malady and so forth, impact the threshold. In brief, a threshold based on health as biostatistical normal functioning will be quite different to one where health is associated with meeting one's goals or flourishing.³⁴ This points to another issue regarding metric. Even if we accept a certain view of health, whether we see health as a basic need, as featuring within a decent life or as a capability will also shift the threshold.³⁵

³² A second, way that philosophers avoid arbitrary thresholds is to propose multiple thresholds. (see: Benbaji, Y. (2005). The doctrine of sufficiency: A defence. *Utilitas* 17(3): 310–332 Huseby, R. (2020). Sufficiency and the threshold question. *Journal of Ethics*, 24, 207–23.) By having more than one threshold, say a higher and a lower threshold, the positive and negative thesis can be more easily justified and appear less arbitrary. One could adopt the positive thesis below the lower threshold and the negative thesis above a higher threshold with further distributive principles used between these thresholds, for instance.

³³ Timmer, D. (2024). The sufficiency theory of justice and the allocation of health resources. *Bioethics*, 38, 796–802. <https://doi.org/10.1111/bioe.13338>

³⁴ Boorse, C. (1977). Health as a theoretical concept. *Philosophy of science* 44.4 542-573. Boorse, C. (1975). On the distinction between disease and illness. *Philosophy & public affairs* 49-68. Nordenfelt, L. (2007). The concepts of health and illness revisited. *Medicine, Health Care and Philosophy* 10: 5-10.

³⁵ For an example of this approach see: Ram-Tiktin, E. (2012). The Right to Health Care as a Right to Basic Human Functional Capabilities. *Ethical Theory and Moral Practice*, 15(3): 337-351 See also Venkatapuram, Sridhar. (2013) *Health justice: An argument from the capabilities approach*. John Wiley & Sons

In spite of these issues, I assume that health is the relevant currency when it comes to a threshold of enough for a healthcare system. Health should be understood in accordance with functional states of human bodies. This is so that a continuum of health states can more easily drawn up and a threshold on that continuum be clearly drawn. However, such functional states should be viewed broadly as those that we have reason to value, because they are necessary for a decent life. Whilst this specification of the threshold of sufficient health in terms of bodily function that is necessary for a decent life is somewhat vague in practice, it should not be a particularly controversial threshold and as thick conception of health ought to suffice for this paper. The emissions threshold then, is the minimum amount of emissions that is necessary for healthcare systems to secure sufficient health for a decent life.

What if it turns out that the emissions budget for healthcare surpasses the global emissions budget needed to stay within a certain temperature threshold? In so far as crossing this climatic threshold is seen as posing an unjustified threat to others, we are left with a challenging question. What needs to be decided is whether there ought to be further adjustments to the sufficiency threshold based on the global emissions threshold or not. This goes back to the issue of how the positive and negative thesis are justified by different thresholds. The basic idea is that setting a high sufficientarian threshold may result in an inflated emissions threshold. On the other hand, setting the threshold low will tighten the emissions budget; but a threshold that is too low and particularly austere makes the negative, or shift thesis, harder to justify as individuals have lives barely worth living. Broadly, one option is to bite the bullet and argue that if the necessary emissions for healthcare to meet the demands of justice exceed climatic thresholds, then this is a price that we must accept and shift the climatic threshold. Alternatively, the sufficientarian threshold could be altered. I discuss this further in the next section.

A final question concerns how we allocate above and below the threshold. This

issue comprises several further questions. What principles should determine how medical resources are distributed above and below the threshold? Should we endorse the negative or the shift thesis mentioned above? Should individuals below the threshold be given lexical (absolute) priority, or rather weighted priority compared to those above? What is the value of securing sufficiency at the threshold? Like the question of setting the threshold, this is an important issue for fully fleshing out a sufficientarian distribution of emissions. I simply note these questions here, however. Clearly endorsing the negative thesis above the threshold, for example, will leave fewer emissions than accepting a distribution that includes those above the sufficiency threshold. Nevertheless, accepting that there may be different answers to these does not undermine the primary point which is that setting a threshold of enough can be used to guide an emissions target in healthcare.

7.3. A fair share of the benefits and burdens of mitigation for healthcare

The proceeding section defends two thresholds. One is the sufficientarian threshold of enough or the 'health threshold', the second is an emissions threshold that is instrumental to securing sufficiency. To begin this section, I discuss the merits of a sufficientarian approach in order to set up the argument for how the ideal of sufficiency can also answer what a fair share of the burdens of tackling climate change is for healthcare. In short, the emissions threshold demarcates permissible from impermissible emissions. The latter are liable to mitigation and signal where healthcare ought to shoulder mitigation burdens.

Let us first recap the problems that other approaches have to help make clear the challenge that a sufficientarian account of an emissions threshold must meet. So far, I have only suggested that sufficientarianism could be used to set an emissions threshold, hence it is important to examine why we ought to adopt this method. In setting an emissions target for healthcare there are three main challenges left by other

accounts.

- i. Avoiding the status quo. Grandfathering and net zero both result in potentially unambitious and unjust emissions targets.
- ii. Sensitive to the goals of healthcare. Emissions egalitarianism and zero emissions are insensitive to the goals of healthcare. The risk is that healthcare is left with insufficient emissions to achieve its valuable role.
- iii. A fair share of the burdens of decarbonisation. How the target is set has the potential to unfairly distribute burdens towards those with the greatest health needs who tend to be most disadvantaged.

Whilst keeping these problems with rival accounts in mind, a helpful place to start is with the question of under what conditions are emissions justified and thereby permissible? After all, emissions contribute to climate change and in turn the threats it poses. Emissions do not discriminate in asserting their effects based on whether they were generated in the pursuit of basic goods or frivolous luxuries. Emissions then must be justified.

One defence of the idea that some emissions are permissible is to argue that there is a limit to what individuals can be expected to sacrifice in minimising the threats posed by their emissions.³⁶ That limit is those emissions which are released in the pursuit of subsistence. When Henry Shue distinguished between luxury and subsistence emissions, he was pointing out that we should not treat all emissions equally when it comes to mitigation, and that those emissions which are necessary to meet basic needs should be treated differently.³⁷ In essence, Shue places a constraint mitigation through the concept of subsistence emissions. Subsistence emissions, unlike luxury emissions, are permissible and thereby exempt from mitigation.

³⁶ Duus-Otterström G. (2023). Subsistence Emissions and Climate Justice. *British Journal of Political Science*;53(3):919-933.

³⁷ Shue, H. (1993), Subsistence Emissions and Luxury Emissions. *Law & Policy*, 15: 39-60. Shue builds on the idea of 'survival emissions' widening this to subsistence, see: Agarwal A, Narain S (1991) *Global Warming in an Unequal World: A Case of Environmental Colonialism*. New Delhi, India: Centre for Science and Environment.

Göran Duus-Otterström cautions that the mere fact that emissions are devoted to subsistence is not enough to make them exempt, however.³⁸ Wealthy individuals have subsistence needs and produce emissions to secure them, but that does not make them subsistence emissions. This is because of the substantial differences that some have in their ability to mitigate their emissions, including those that are to meet subsistence. For instance, the wealthy still need to use energy to cook food. But since the wealthy have vastly more opportunities to minimise these emissions, we should not take it for granted that these emissions are subsistence. So, it is important not just to consider the ends to which emissions are instrumental, but agents' capacity to mitigate their emissions, including subsistence. To be permissible, and exempt from mitigation, Duus-Otterström argues that agents must have exhausted all reasonable steps to ensure emissions are the minimum necessary to secure subsistence. Even if emissions do pose threats through climate change, claiming that they are the minimum that one could reasonably emit to secure a decent life offers a plausible defence.

As a constraint then, the concept of subsistence emissions is useful in placing a ceiling on permissible emissions. To be permissible then, on my view, GHG emissions must be the minimum necessary to secure a threshold of a decent life. Emissions that provide benefits below a threshold of enough and that agents have taken reasonable action to minimise are permissible and should be treated differently from those which are not necessary to secure enough. These are the necessary and jointly sufficient criteria for permissibility and exemption.

The health threshold is based on the sufficientarian idea that it is especially morally

³⁸ Duus-Otterström G. (2023). Subsistence Emissions and Climate Justice. *British Journal of Political Science*;53(3):919-933.

important to secure enough health. An emissions threshold corresponds to the idea of securing enough. But for those GHG emissions to be exempt from mitigation burdens, we must also ensure they are the minimum necessary and that there is nothing further we could reasonably expect healthcare to do to reduce those emissions. The emissions threshold then is not static and should shift in response to healthcare's available options for minimising emissions. If new technologies mean that healthcare can be provided with fewer emissions, in the absence of competing considerations, this ought to ratchet down healthcare's emissions threshold.³⁹

Assessments reasonableness when healthcare is minimising emissions should reference the health threshold as well as other important goals like efficiency. For example, if a treatment offers a relatively minor reduction in emissions compared to an alternative, equally effective and vastly cheaper treatment, then the latter should be preferred. Excessive costs may undermine healthcare's ability to secure the health threshold through opportunity costs and so it would be unreasonable for healthcare to accept large mitigation costs, especially if the emissions reductions were minor. Similarly, imagine replacing ambulances used for patient transport with bicycles. Whilst this would minimise the emissions necessary to transport patients to hospital, it is highly ineffective and again may risk individuals securing the health threshold so would be unreasonable.⁴⁰

There are several advantages to a sufficientarian method of setting the emissions threshold. For one, it is sensitive to the role of healthcare. In so far as healthcare performs tasks that are instrumental to securing enough health for a decent life, the sufficientarian threshold accounts for this. As sufficientarianism is primarily concerned with those below a threshold of enough, defending an emissions target that is

³⁹ I thank Bridget Pratt for pushing me on this point.

⁴⁰ I am grateful to Thomas Schramme for drawing my attention to this example.

instrumental in securing enough means that any burdens of mitigation are unlikely to fall on the least advantaged. As those who have the greatest health needs tend to be the least advantaged, and as the least advantaged tend to have contributed the least to climate change, by allocating GHG emissions based on achieving sufficiency which tends to focus on the disadvantaged, we can avoid unfairness in the distribution of the burdens associated with climate change mitigation. Since GHG emissions are the minimum necessary to secure a decent life, this also avoids the problems of net zero and grandfathering where healthcare systems can continue to emit unabated. As I discuss momentarily, as strict limits are placed on emissions that are considered permissible, healthcare is left liable for various emissions over a threshold of those necessary to secure a moral minimum.

7.3.1. Permissible and impermissible emissions

I have argued that the emissions threshold demarcates a distinction between healthcare emissions which are permissible and exempt from mitigation and impermissible emissions which are liable. Permissible emissions are those below the emissions threshold, these are determined by assessing which emissions are the minimum necessary for healthcare to secure sufficiency. Any remaining healthcare emissions are therefore above the emissions threshold and ought to be subject to mitigation and any costs this entails. Excess emissions above the threshold include those used for medical benefits above a threshold of sufficiency. Furthermore, those emissions that, whilst contributing to securing sufficiency, can nonetheless reasonably be reduced are also above threshold.

It is worth emphasising that this demarcation between permissible and impermissible should not be taken to correlate with the positive and negative thesis of sufficientarianism respectively. Of course, it is tempting to see impermissible emissions above the threshold as reflecting the negative thesis, because once

sufficiency is reached there is no need for further emissions. Whilst this does capture the sufficientarian ethos, as I am rejecting resourcist sufficientarianism, this rests on a confusion. Sufficiency regards a threshold of a currency like a decent life. The health threshold, however, corresponds to a second separate threshold of necessary emissions, instrumental in securing the health threshold. Below the emissions threshold, there are several ways that emissions could be used to secure sufficiency. It may be that some do advocate the negative thesis and that above a threshold of sufficiency there is no need for further distribution in which case the sufficiency threshold and the emissions threshold are the same. However, we may, for example, use some emissions for individuals above the sufficiency threshold who are at risk of falling beneath it. This would be in the spirit of *securing* individuals at the sufficiency threshold. In this case, however, the emissions threshold is above the sufficiency threshold and the negative thesis does not apply.

What we are left with then is a sphere of healthcare emissions which are permissible. In my view, these GHG emissions are exempt from mitigation burdens because of the role that healthcare plays in securing social justice. But at the very least these GHG emissions should be treated differently in healthcare's overall mitigation strategy. For instance, these emissions should be addressed later with GHG emissions above the emissions threshold tackled first. Outside of this sphere of permissible emissions, however, any remaining healthcare emissions are liable to mitigation, and it is fair for healthcare to shoulder the associated costs and burdens. So, healthcare's GHG emissions are reduced both by applying the test as to whether the emissions are necessary to secure sufficiency but also that emissions are reduced as far as can reasonably expected for healthcare.

Before concluding, I would like to highlight some commonalities between my approach and a modified ability to pay principle. Ability to pay is a popular way to allocate mitigation burdens and is the main rival to polluter pays which was mentioned

in the introduction.⁴¹ Ability to pay may be thought of as a capacity-based principle, where mitigation responsibilities are allocated on the basis of agent's capacity to fulfil these responsibilities. In the main, ability to pay equates to the wealthy paying as they are seen as having the greatest capacities and surplus resources to reduce GHG emissions.

When it comes to wealth as the primary marker for being allocated mitigation responsibilities, it is not immediately obvious whether healthcare has the relevant ability to pay. Healthcare systems may have significant sums of money at their disposal, but this tends to be earmarked for providing healthcare. However, if we think of ability to pay in terms of the simple question of 'what actions can healthcare systems take to reduce their emissions?' then healthcare does clearly have numerous capacities to minimise emissions. Everything from changing prescribing patterns and moving away from volatile anaesthetic gases to electric ambulance fleets and switching energy supplies shows that there are manifold opportunities for healthcare to reduce emissions without needing to enquire as to whether healthcare is wealthy. Here I have argued that healthcare should be especially inclined to address their emissions where they are not the minimum emissions necessary to secure sufficient health for a decent life. We might think of instances where healthcare emissions are the minimum necessary to secure a threshold of enough as a case when healthcare has an *inability* to pay, since this would threaten individuals just entitlements and be unfair. We could then think of the emissions threshold as treating some healthcare emissions differently to others according to when healthcare does and does not have an ability to pay.

7.4. Conclusion

⁴¹ Caney, S. (2005). Cosmopolitan justice, responsibility, and global climate change. *Leiden Journal of International Law*, 18(4), 747–775. Page, E. A. (2008). Distributing the burdens of climate change. *Environmental Politics*, 17(4), 556–575.

In this paper I have sought to integrate two issues. One is to bring together both the benefits offered by healthcare but also the burdens of GHG emissions reduction. Second is to provide a common basis for determining both the emissions target for healthcare and its fair share of mitigation burdens. Sufficientarianism, I have argued, offers a method of distributing both benefits and mitigation burdens in healthcare that can meet these challenges of integration. I have defended the idea that establishing a sufficientarian threshold of securing enough health can be used to derive a sphere of permissible emissions that are exempt from mitigation burdens. In this way, an ideal of sufficiency offers a theory of distributive justice that can account for both healthcare benefits and mitigation burdens whilst providing a common normative foundation for answering what emissions target healthcare should aim for and their fair share of mitigation burdens.

My goal was to sketch an argument for how sufficiency can answer these important questions of distributive justice. One key issue is how to marry an emissions threshold for healthcare, based on the healthcare's position in fulfilling social justice, with global emissions targets that address issues in global and intergenerational justice. Furthermore, for this account to be suitable in practice, there are complex empirical questions of how to derive an emissions budget from the sufficiency threshold. Sufficiency nevertheless holds promise in guiding the transition to low carbon healthcare.

Chapter 8

8. Subsistence emissions, prevention and healthcare decarbonisation

8.1. Introduction

The urgent need to address climate change has driven healthcare systems worldwide to commit to reducing greenhouse gas emissions.¹ Mitigation policies aim to either directly reduce greenhouse gas emissions (henceforth simply 'emissions') or reduce the impact of emissions by enhancing carbon sinks. In some countries, like England, there is a legal requirement to reduce healthcare emissions.² A central challenge for policymakers and scholars is how healthcare systems can balance their mission to protect health with minimising the emissions that have traditionally enabled healthcare delivery.

This paper analyses two promising methods of marrying healthcare decarbonisation with securing the benefits of modern healthcare. One approach relies on the idea of subsistence emissions (or simply 'subsistence'). Subsistence can help demarcate permissible healthcare emissions that are essential to meet basic needs from non-subsistence which are liable to mitigation.³ Alternatively, healthcare systems can prioritise carbon-effectiveness and drive down emissions by mitigating inefficient

¹ World Health Organisation and Alliance for Transformative Action on Climate and Health. (2022). Commitments. Retrieved from: <https://www.who.int/initiatives/alliance-for-transformative-action-on-climate-and-health/commitments>

² Health and Care Act 2022. Climate Change Act 2008. National Health Service England. (July 2022). Delivering a 'net zero' NHS. Retrieved from:

<https://www.england.nhs.uk/greenernhs/publication/delivering-a-net-zero-national-health-service>

³ Parker, J. (2025). Sufficiency and healthcare emissions. *Bioethics*, 1–9. Bhopal, A., Bærøe, K., & Norheim, O.F. (2022) How do we decarbonise fairly? Emissions, inequities and the implications for net zero healthcare. *Journal of the Royal Society of Medicine*;115(9):337-340. p.339
doi:10.1177/01410768221113069

uses of healthcare carbon.⁴ This latter approach tends to emphasise prevention. Despite the appeal of both subsistence and efficiency, they can conflict. Subsistence prioritises those with the greatest healthcare needs, justifying those emissions that are necessary to fulfil such needs.⁵ In contrast, efficiency-driven prevention tends to benefit the comparatively well-off, health-wise. This raises a critical question, should healthcare decarbonisation policies favour subsistence emissions or efficiency, or can these concepts be combined?

In this paper I defend both approaches as serving a useful purpose in healthcare decarbonisation and argue that these approaches can be reconciled by recognising that subsistence emissions should include prevention measures that secure sufficient health. The paper has three main objectives: (1) clarifying subsistence emissions and the role of prevention in healthcare decarbonisation, (2) explaining their potential conflict, and (3) resolving this tension to ensure fair and effective mitigation policies. Despite their central role in healthcare decarbonisation, these concepts have received little bioethical analysis. Furthermore, appreciating and addressing a tension between subsistence and prevention is critical for how healthcare systems decarbonise fairly. When considering healthcare's responsibility to reduce its carbon footprint, it is healthcare as an institution—comprising professionals, managers, patients, and infrastructure—that bears the burden of mitigation.

The argument unfolds in three sections. First, it clarifies subsistence emissions as a sufficientarian concept that treats emissions above and below a health threshold differently, permitting only the emissions necessary for a decent level of health, and

⁴ Bhopal, A., & Norheim, O. F. (2021). Priority setting and net zero healthcare: how much health can a tonne of carbon buy? *BMJ*, 375, e067199–e067199. <https://doi.org/10.1136/bmj-2021-067199>

⁵ Shue, H. (1993). Subsistence Emissions and Luxury Emissions. *Law & Policy*, 15(1), 39–60. <https://doi.org/10.1111/j.1467-9930.1993.tb00093.x>.

Duus-Otterström, G. (2023). Subsistence Emissions and Climate Justice. *British Journal of Political Science*, 53(3), 919–933.

<https://doi.org/10.1017/S0007123422000485>

contrasts this with prevention as a carbon-effective strategy. The second section maps the tension between subsistence emissions and prevention, highlighting how each distributes emissions differently based on what constitutes 'enough' health. The final section argues that *securing* sufficient health is essential to sufficientarianism. Since prevention enhances long-term health security, some preventive measures should be included within subsistence emissions. The paper concludes by addressing objections and refining how emissions should be allocated for fair and effective healthcare decarbonisation. By integrating subsistence emissions with prevention, this paper offers a framework for balancing healthcare's duty to protect health with its responsibility to mitigate climate change.

8.2. Subsistence emissions and prevention emissions

This opening section clarifies the concept of subsistence emissions and explains how this is in tension with prevention emissions. Subsistence emissions here are understood within a sufficientarian pattern of distributive justice. Sufficientarians rely on thresholds when distributing goods, and it is how mitigation burdens are allocated around those thresholds that put subsistence emissions in tension with ideals of prevention.

8.2.1. *Subsistence emissions in healthcare*

Ever since Henry Shue introduced the concepts of luxury and subsistence emissions, they have been an important feature in the climate justice debate.⁶ Building on the idea of 'survival emissions',⁷ Shue argued that not all emissions should be

⁶ Shue, 1993 *ibid*. Shue, H. (2019). Subsistence protection and mitigation ambition: Necessities, economic and climatic. *British Journal of Politics & International Relations*, 21(2), 251–262.
<https://doi.org/10.1177/1369148118819071>

⁷ Shue credits Agarwal and Narain with the distinction. They distinguished between 'survival emissions' from luxury emissions though it was of course Shue who developed and popularised the concept by

treated equally when it comes to mitigation. Rather, those emissions that are necessary to fulfil vital needs should be protected from market mechanisms of reducing emissions.⁸ Shue claims, it would be a mistake to "ignore the fact that some sources [of greenhouse gases] are essential and even urgent for the fulfilment of vital needs and other sources are inessential or even frivolous."⁹ However, he goes beyond just pointing out that some greenhouse gas emissions are necessary to secure more morally urgent ends, he also suggests that this should mark a difference in how such emissions are treated in terms of the associated mitigation burdens.

In general, there are constraints on the burdens agents can reasonably be expected to shoulder in the pursuit of effective mitigation. Subsistence emissions capture this moral ideal by claiming such emissions are morally justified and permissible, or even exempt from mitigation responsibilities.¹⁰ Non-subsistence emissions, on the other hand, are unjustified and therefore are liable to mitigation and ought to be addressed as a priority.¹¹ If emissions are necessary to meet basic needs then they should be spared from mitigation, or at least should feature later in mitigation policies according to Shue.¹²

expanding the notion of survival to subsistence. Agarwal A, Narain S (1991) Global Warming in an Unequal World: A Case of Environmental Colonialism. *New Delhi, India: Centre for Science and Environment*. See also, Shue, 2019 *ibid*.

⁸ Shue 2019, *op. cit.* note 6.

⁹ Shue 1993, *op. cit.* note 5, p.55.

¹⁰ Duus-Otterström 2023, *op. cit.* note 5.

¹¹ The term 'non-subsistence' is preferred in this paper as opposed to 'luxury'. This terminological preference is largely because of the topic at hand. A distinction between luxury and subsistence in healthcare seems a little coarse. Moreover, it can be difficult to always neatly divide activities into either luxury or subsistence. Roser and Seidel contrast the emissions that somebody living in extreme poverty uses to take a bus to secure work with those emitted during an intercontinental flight to attend a wedding. Whilst the former emissions appear to be clearly subsistence, they are less convinced that the second example are obviously non-subsistence. But by the same token, these latter emissions are not uncontroversially subsistence emissions either. See: Roser, D., & C. Seidel. (2017). *Climate Justice: An Introduction*. London: Routledge. p.176

¹² Shue 2019, *op. cit.* note 6.

Many theorists recognise the sufficientarian spirit of subsistence emissions.¹³ Sufficientarianism describes a pattern of distributive justice where emphasis is placed on everyone securing enough of some good(s).¹⁴ Sufficientarianism is frequently described as a commitment to two theses.¹⁵ The first is the 'positive thesis'. This states that we have weighty non-instrumental reasons to secure enough of some good(s).¹⁶ The positive thesis captures the thought that it is especially morally important that individuals have enough and that those without enough ought to be prioritised. The second thesis is an area where sufficientarians diverge. Some endorse the 'negative thesis'.¹⁷ This states that once people have secured enough no further distributive criteria apply. Meanwhile others accept the shift thesis, that above a threshold of enough our reasons to benefit change.¹⁸ The positive thesis is accepted by all sufficientarians, and this is accompanied by either the negative thesis or the shift thesis.

Subsistence emissions are sufficientarian since they adopt both the positive and negative theses. Firstly, subsistence emissions endorse the positive thesis by putting significant moral weight on those individuals below a threshold of enough. Subsistence emissions recognise the instrumental value of emissions in securing

¹³ Duus-Otterström 2023, *op. cit.* note 5. Caney, S. (2012). Just Emissions. *Philosophy & Public Affairs*, 40(4), 255–300. <https://doi.org/10.1111/papa.12005> pp.262-264. Vanderheiden, S. (2008). *Atmospheric justice: a political theory of climate change*. Oxford University Press, p.243. See also: Holland, B. (2021). Capabilities, Future Generations, and Climate Justice. In Gardiner, S., (ed.), *The Oxford Handbook of Intergenerational Ethics*. Oxford: OUP, and Holland, B. (2008). Ecology and the Limits of Justice: Establishing Capability Ceilings in Nussbaum's Capabilities Approach. *Journal of Human Development*, 9(3), 401–425. <https://doi.org/10.1080/14649880802236631>, as well as Page, E. (2006). *Climate change, justice and future generations*. Edward Elgar for a discussion where authors do not rely on the concept of subsistence emissions but still use thresholds to help resolve questions of distributive justice in climate change.

¹⁴ Frankfurt, H. (1987). Equality as a Moral Ideal. *Ethics*, 98(1), 21–43.

¹⁵ Casal, P. (2007). Why Sufficiency Is Not Enough. *Ethics*, 117(2), 296–326.

¹⁶ Shields, L. (2012). The prospects for sufficientarianism. *Utilitas* 24.1: 101–117. p.106. Timmer, D. (2022). Justice, Thresholds, and the Three Claims of Sufficientarianism. *The Journal of Political Philosophy*, 30(3), 298–323. <https://doi.org/10.1111/jopp.12258>

¹⁷ Frankfurt 1987, *op. cit.* note 14. Axelsen, D.V., & L. Nielsen. (2015). Sufficiency as freedom from duress. *Journal of Political Philosophy*, 23, 406–26. Crisp, R. (2003). Equality, Priority, and Compassion., 113(4), 745–763. <https://doi.org/10.1086/373954>

¹⁸ Shields 2012, *op. cit.* note 16.

certain goods. We might disagree on the goods required to secure enough, but the message from subsistence is clear: it is especially morally important, that those without enough are prioritised and this justifies producing emissions in the pursuit of certain basic goods. For Shue, there is a basic moral minimum that people are entitled to as a matter of justice, and we have strong moral reasons to benefit those below this threshold. Shue describes this threshold as, "the line beneath which no one is to be allowed to sink".¹⁹

Moving to the negative thesis, this states that above a threshold of enough no further distributive criteria apply. Once individuals have secured enough, they have had their basic needs met or have reached a basic moral minimum, emissions are no longer subsistence. Above this threshold of enough non-subsistence emissions are unjustified. Hence subsistence emissions endorse the negative thesis because there is a threshold above which emissions are impermissible, regardless of their purpose. The result is emissions under the threshold of enough being given absolute, or lexical, priority over benefits above the threshold.

It is important to be clear that emissions hold instrumental value and are simply a means to fulfilling certain ends. For subsistence emissions, this end is the sufficientarian concern of ensuring that everyone has enough. The emphasis then is on the *ends* of subsistence and benefitting those below the threshold, rather than the means to achieve this. As Shue points out, the connection between emissions and satisfying basic needs is contingent.²⁰ If individuals could access energy for things like transportation and heating, for example, without producing greenhouse gases then the concept of subsistence emissions for energy would be useless. Similarly, if healthcare could be provided without emissions then subsistence emissions in

¹⁹ Shue, H. (2020). *Basic rights: subsistence, affluence, and U.S. foreign policy* (40th anniversary edition.). Princeton University Press, p. 18.

²⁰ Shue 2019, *op. cit.* note 6.

healthcare would also be redundant.

The question then is which ends in particular are worthy of the label subsistence? This issue is particularly pertinent in healthcare where there may be a temptation to view all healthcare activities as serving morally salient ends given the value that we tend to place on health. By the same token, it is also important to be careful that any list of non-subsistence medical activities is not cherry picked or arbitrary.²¹ This speaks to the idea of having a clear way to distinguish between subsistence and non-subsistence emissions. Ultimately, this depends on the theory of basic needs one adopts.²² Furthermore, since the sufficientarian threshold of enough is central to the distinction between subsistence and non-subsistence, the practical success of subsistence emissions also depends on this threshold being set appropriately.²³ How to set the health threshold is discussed in the next section.

A further issue is that, since emissions are contingent on *how* we ensure everyone has enough, we cannot simply point to the ends which emissions serve and conclude they are *always* justified. Rather, those emissions must be necessary to provide sub-threshold benefits. It hardly seems right to say emissions that are unnecessary to provide even a morally urgent benefit are subsistence. Furthermore, there must be no other opportunities to reduce emissions. For example, there are broadly two types of

²¹ Cristina Richie, for instance, lists various treatments of healthcare carbon as inappropriate: fertility treatments, hormone replacement therapy for menopause, joint replacement for osteoarthritis, and other 'lifestyle prescriptions' like psychostimulants for attention deficit hyperactivity disorder or medication for lactose intolerance, amongst others. For Richie these are clear examples of non-subsistence emissions, as they rely on healthcare wants not healthcare needs. The challenge however is that Richie does not offer a principled way to distinguish healthcare wants from needs. The risk then is that any list appears arbitrary without a thoroughgoing way to separate these. Richie, C. (2019). *Principles of green bioethics: sustainability in health care*. Michigan State University Press, pp. 60-62. Richie, C. (2022). And Environmental sustainability and the carbon emissions of pharmaceuticals *Journal of Medical Ethics*, 48:334-337.

²² Duus-Otterström 2023, *op. cit.* note 5.

²³ See Axelsen & Nielsen 2016, *op. cit.* note 17, for a discussion of setting a non-arbitrary threshold especially regarding health and healthcare.

inhalers that can be used to treat chronic respiratory diseases like asthma. Metered-dose inhalers produce significant amounts of greenhouse gases, whereas dry-powder inhalers produce fewer.²⁴ Both types of inhalers are potentially necessary to secure the benefits of well-controlled asthma, but it is not always the case that metered-dose inhalers are subsistence. This is because dry-powder inhalers can offer similar benefits to metered-dose inhalers but with fewer emissions. It is therefore important to assess the capacities agents have to minimise their emissions when meeting basic needs to be considered subsistence.²⁵ For emissions to be subsistence they must both be instrumental for sub-threshold benefits, and also be the minimum necessary for agents to satisfy the sufficientarian threshold.

8.2.2. The health threshold

Subsistence emissions are a threshold concept that take a sufficientarian threshold of enough and describe how emissions should be allocated in light of that threshold. Below the threshold, emissions are justified when they are essential to produce certain goods and so are not subject to the same mitigation burdens as above threshold emissions. Consequently, the positive thesis is a necessary but insufficient component of subsistence emissions as emissions must also be *necessary* to secure certain goods. Those emissions generated above the threshold of enough are unjustified and ought to be mitigated. But where should the threshold be set? And what theory of interests captures the moral concerns of subsistence emissions?

The question of what the relevant currency for sufficientarians ought to be, and where the threshold should be set are subject to intense debate amongst

²⁴ Wilkinson, A., & Woodcock, A. (2022). The environmental impact of inhalers for asthma: A green challenge and a golden opportunity. *British Journal of Clinical Pharmacology*, 88(7), 3016–3022. <https://doi.org/10.1111/bcp.15135>

²⁵ Parker, J. (2023). Barriers to green inhaler prescribing: ethical issues in environmentally sustainable clinical practice. *Journal of Medical Ethics*, 49(2), 92–98. <https://doi.org/10.1136/jme-2022-108388>

sufficientarians.²⁶ Philosophers offer different thresholds when it comes to subsistence emissions too. Shue sets the threshold at "survival or decency",²⁷ whereas Caney is concerned with a "minimal decent standard of living".²⁸ Vanderheiden opts for a threshold of "basic human functioning".²⁹ Finally, Roser and Seidel suggest a complex threshold including: "survival... a minimally decent life... and to ensure human dignity".³⁰ Whilst there are apparent variations in where these scholars place the subsistence threshold, the idea of a decent life features prominently. Clearly there is not the space to offer a full defence of a decent life as the relevant threshold. However, this should have intuitive appeal as something we have reason to value and is clearly a shared threshold amongst various philosophers.

The concern in this paper is healthcare, and hence the sufficientarian threshold of interest is a 'health threshold'³¹ (or just 'the threshold' unless otherwise stated). It is widely accepted that health is a fundamental good that is instrumental to leading a decent life. Whilst there is disagreement over what health is and why it matters morally,³² few would doubt that health should feature in an overall package of goods

²⁶ Crisp, R. (2003). Equality, Priority, and Compassion. *Ethics*, 113(4), 745–763. <https://doi.org/10.1086/373954>. Benbaji, Y. (2006). Sufficiency or Priority? *European Journal of Philosophy*, 14(3), 327–348. <https://doi.org/10.1111/j.1468-0378.2006.00228.x>. Benbaji, Y. (2005). The Doctrine of Sufficiency: A Defence. *Utilitas*, 17(3), 310–332. <https://doi.org/10.1017/S0953820805001676>. Huseby, R. (2020). Sufficiency and the Threshold Question. *The Journal of Ethics*, 24(2), 207–223. <https://doi.org/10.1007/s10892-020-09321-7>. Casal, P. (2007). Why Sufficiency Is Not Enough. *Ethics*, 117(2), 296–326. <https://doi.org/10.1086/510692>. Shields, L. (2012). The prospects for sufficientarianism. *Utilitas* 24.1: 101–117. Axelsen, D., & Nielsen, L. (2016). Essentially enough: Elements of a plausible account of sufficientarianism. In F. Carina & A. Rid (Eds.), *What is enough? Sufficiency, justice, and health* (pp.101–118). Oxford University Press.

²⁷ Shue, H. (1993). Subsistence Emissions and Luxury Emissions. *Law & Policy*, 15(1), 39–60. <https://doi.org/10.1111/j.1467-9930.1993.tb00093.x>. p.55

²⁸ Caney, S. (2009). Justice and the distribution of greenhouse gas emissions. *Journal of Global Ethics* 5, 125–146 p.138

²⁹ Vanderheiden, S. (2008). *Atmospheric Justice: A Political Theory of Climate Change*. Oxford: Oxford University Press. p.243

³⁰ Roser, D., & Seidel, C. (2017). *Climate Justice: An Introduction*. London: Routledge. p.144

³¹ Timmer, D. (2024). The sufficiency theory of justice and the allocation of health resources. *Bioethics*, 38(9), 796–802. <https://doi.org/10.1111/bioe.13338>

³² See: Barnes, E. (2023). *Health Problems: Philosophical Puzzles about the Nature of Health*. Oxford University Press, 2023, especially chapters one and two, as well as Schramme, T. (2018). *Theories of*

that are necessary for a decent life. Later, a capabilities approach is adopted as the relevant metric of justice for subsistence emissions. However, it is not necessary at this stage to defend this, so for now I assume that health is the relevant currency for healthcare systems and that resources, specifically those that rely on emissions, are distributed in light of the idea of having 'enough health', if we adopt subsistence emissions.³³ I understand health in a broad sense where health refers to functional states of human bodies that are valuable and important for individuals to have. Threshold views assume that goods can be placed on a continuum.³⁴ I therefore take it that different health-states can be placed on a continuum and compared between individuals. Health-states on a continuum of health that give rise to claims on healthcare resources are referred to as 'healthcare needs'.³⁵

With this in place, we can state the two criteria for subsistence emissions in healthcare:³⁶

Subsistence emissions in healthcare are those healthcare emissions that, (1) are necessary to secure the health threshold and (2) at the time of emitting,

health justice: Just enough health. Rowman & Littlefield, 2018 for important overviews of these debates.

³³ Axelsen, D., & Nielsen, L. (2016). Essentially enough: Elements of a plausible account of sufficientarianism. In F. Carina & A. Rid (Eds.), *What is enough? Sufficiency, justice, and health* (pp.101-118). Oxford University Press. Powers, M., & Ruth, F. (2006). *Social Justice: The Moral Foundations of Public Health and Health Policy*. Oxford: Oxford University Press. Ram-Tikitin, E. (2012). The right to health care as a right to basic human functional capabilities. *Ethical Theory and Moral Practice* 15: 337-351. Ram-Tikitin, E. (2016) Basic human functional capabilities as the currency of sufficientarian distribution In F. Carina & A. Rid (Eds.), *What is enough? Sufficiency, justice, and health* (pp.144-163). Oxford University Press. Schramme, T. (2018) *Theories of health justice: Just enough health*. Rowman & Littlefield, chapter 7. Timmer, D. (2024). The sufficiency theory of justice and the allocation of health resources. *Bioethics*, 38(9), 796-802. <https://doi.org/10.1111/bioe.13338>. Gustavsson, E., Juth, N. (2019) Principles of Need and the Aggregation Thesis. *Health Care Anal* 27, 77-92. <https://doi.org/10.1007/s10728-017-0346-6>

³⁴ Timmer, D. (2021) "Thresholds in distributive justice." *Utilitas* 33.4: 422-441.

³⁵ Schramme, T. (2018) *Theories of health justice: Just enough health*. Rowman & Littlefield. Gustavsson, E., Juth, N. (2019) Principles of Need and the Aggregation Thesis. *Health Care Anal* 27, 77-92. <https://doi.org/10.1007/s10728-017-0346-6>

³⁶ This closely resembles Göran Duus-Otterström helpful clarification of the necessary and sufficient criteria for an instance of greenhouse gas emissions to count as subsistence. Duus-Otterström 2023, *op. cit.* note 5, p.922.

there is no reasonable way of satisfying the health threshold using fewer emissions.

These two criteria are individually necessary and jointly sufficient to label an instance of healthcare emissions as subsistence. Emissions falling above the sufficientarian threshold, or that are below the sufficiency threshold but are unnecessary or could reasonably be reduced are non-subsistence.

8.2.3. Subsistence and mitigation exemptions

One final clarification regarding the moral status of emissions above and below the health threshold is in order. So far, the claim is that subsistence emissions are justified and therefore permissible, and non-subsistence emissions as unjustified and therefore impermissible. In terms of mitigation responsibilities, as subsistence emissions are permissible, this is often taken to mean that they are exempt from mitigation burdens, unlike non-subsistence emissions.

Duus-Otterström rejects subsistence emissions as being exempt from mitigation burdens.³⁷ Instead, he argues that even if it is permissible to produce subsistence emissions, what agents must do about these depends on their capacities to compensate for these emissions. As some, for example the wealthy, have greater resources and opportunities to mitigate or compensate for even those emissions that are necessary to meet their vital needs, permissible does not equate to an exemption in all cases. Duus-Otterström therefore accepts the positive thesis, that sub-threshold emissions have absolute priority over above threshold emissions, as well as the negative thesis that above threshold emissions are impermissible. However, he rejects the idea that the positive thesis means that emissions are exempt from mitigation and

³⁷ Duus-Otterström 2023, *op. cit.* note 5.

argues that we must ask if below threshold emissions can be compensated for in some way.

For healthcare systems then, it is not enough to say that it was necessary to produce emissions to satisfy healthcare needs below the threshold. For subsistence emissions to be exempt from mitigation, it must also be the case that healthcare systems are unable to mitigate or compensate for these emissions. I contend that a healthcare system is unable to further mitigate its subsistence emissions where doing this would undermine a healthcare system's ability to meet healthcare needs. Where the resources required to, and costs of, further mitigating subsistence emissions, say by paying for offsets, would have broader consequences and potentially compromise care, then these emissions are exempt from mitigation burdens.

An example will help illustrate the point about exemptions from mitigation burdens. Imagine there is a medication (A) that treats an important medical problem like rheumatoid arthritis, but that has a substantial carbon footprint. Assume that the healthcare needs associated with rheumatoid arthritis are below a health threshold. As such, the emissions associated with medication A is a candidate for being considered subsistence. However, we must also ask if these emissions are the minimum necessary to secure these benefits. If there were a second drug, medication B, which is equally effective, efficient, safe and well tolerated but with a substantially smaller carbon footprint than medication A, then it would only be medication B that satisfies the requirements of subsistence. However, we could ask whether a healthcare system is able to reduce the emissions from medication B further, perhaps through offsetting. If offsetting was particularly costly or burdensome for a healthcare system such that this limited the ability of others to have similar opportunities for sub-threshold benefits, then this would count in favour of making the emissions from medication B exempt from mitigation burdens.

The concept of subsistence emissions set within a sufficientarian structure around a health threshold provides a useful framework for healthcare systems to reduce their emissions whilst still meeting their goals. Subsistence emissions place special moral importance on helping individuals with healthcare needs below the health threshold. Where emissions are the minimum that are reasonably possible for a healthcare system to produce in order to meet those healthcare needs below the health threshold, they are subsistence. These emissions ought to be treated differently to non-subsistence emissions. Emissions directed towards benefits below the health threshold are non-subsistence if healthcare systems have reasonable opportunities to minimise these without compromising care. Further, due to the negative thesis, emissions associated with above threshold benefits are non-subsistence and unjustified. With this structure in place healthcare has a framework for emissions reductions. Non-subsistence emissions are the priority to be eliminated. Emissions that contribute to benefits above the health threshold, and sub-threshold emissions that are unnecessary or can reasonably be reduced ought to be mitigated. Healthcare's subsistence emissions should be treated as permissible and exempt from mitigation.

For healthcare systems attempting to drastically cut their emissions, being able to point to some emissions as indispensable in meeting certain healthcare needs is useful. Before moving on to discuss prevention, it is worth highlighting four main advantages of subsistence emissions in healthcare: (a) the concept of subsistence emissions provides a practical framework for addressing healthcare emissions by directing mitigation efforts towards those emissions that are unnecessary or frivolous, against those emissions which should be treated differently; (b) by focusing on individuals below a threshold of health, the notion of subsistence emissions tends to shield the worst off from bearing the brunt of mitigation burdens; (c) it provides a degree to which we are justified in treating healthcare as exceptional when it comes to

mitigation;³⁸ and, (d) under most schemes of emissions reduction in healthcare, including net zero, some emissions will be very difficult to mitigate and subsistence emissions can explain why these residual emissions are permissible.³⁹

8.3. Prevention and carbon-effectiveness

Prioritising prevention, rather than subsistence, offers an alternative way to decarbonise healthcare systems. The logic of prevention is straightforward enough. It takes much more carbon to treat the sick, so if we can prevent people needing carbon-intensive healthcare in the first place we can both protect health and minimise healthcare emissions. In its outline of how to deliver a net zero healthcare system, the NHS in England state “preventing ill health not only benefits patients but also increases efficiency and reduces emissions”.⁴⁰ Bioethicists too endorse prevention within carbon-light healthcare systems. Richie, for instance, argues for ‘simplicity’ in healthcare interventions which involves reducing reliance on medical technology and one aspect of this is focusing on prevention.⁴¹ Verweij and Ossebaard also note that “in case of interventions with a very large carbon footprint it makes of course sense to look for alternative, more sustainable interventions, for example by prioritising prevention to care”.⁴²

The mantra “prevention is better than cure” is at the heart of trends in healthcare over the past 50 years that direct medical resources towards interventions that

³⁸ Parker, J. (2025). Healthcare exceptionalism: should healthcare be treated differently when it comes to reducing greenhouse gas emissions? *Medicine, Health Care, and Philosophy*, 28(2), 233–245.

<https://doi.org/10.1007/s11019-025-10254-x>

³⁹ Sue-Chue-Lam, C., Bhopal, A., Parker, J., & Xie, E. C. (2024). Net Zero is not enough: ratcheting ambition for sustainable health systems through Reduce and Support. *BMJ Global Health*, 8(Suppl 3), e014617-. <https://doi.org/10.1136/bmjgh-2023-014617>

⁴⁰ National Health Service England, 2022, *op. cit.* note 2, p.39.

⁴¹ Richie, C. (2019). *Principles of green bioethics: sustainability in health care*. East Lansing: Michigan State University Press. pp 75-79.

⁴² Verweij, M., & Ossebaard, H. (2024). Sustainability as an Intrinsic Moral Concern for Solidaristic Health Care. *Health Care Analysis*, 32(4), 261–271. <https://doi.org/10.1007/s10728-023-00469-5>

mitigate risk rather manage symptoms.⁴³ Prevention refers to strategies intended to ward off illness, disease and disability and keep people in reasonable health. Prevention is taken at a population level by identifying those at risk and acting to mitigate the risk of certain health outcomes materialising. Actions and policies that aim to avoid health problems in the first place are called primary prevention. Primary prevention frequently involves interventions outside healthcare through tackling the social determinants of health.⁴⁴ Public health strategies that emphasise physical activity, dietary improvement, minimising tobacco and alcohol as well better air quality and so forth are examples of primary prevention.⁴⁵ Some primary prevention does however occur within healthcare, vaccination for example.

The goal of secondary prevention is early detection and management to improve health outcomes. Typically, it is healthcare systems that undertake secondary prevention, particularly in primary care. Identifying and treating those at risk of developing illness — for example those with dyslipidaemia and hypertension who are at risk of cardiovascular disease — are important ways that primary care can contribute to prevention. Chronic disease management can also prevent complications and further health problems. Appropriate management of diabetes can ameliorate its complications like cardiovascular disease, blindness and kidney problems for example. Furthermore, screening programmes to detect diseases like cancer early are also examples of secondary prevention.

The treatment of disease and illness, as well as managing symptoms turns out to

⁴³ Rothstein, W.G. (2008). *Public health and the risk factor: a history of an uneven medical revolution*. University of Rochester Press.

⁴⁴ Andermann, A. (2016). Taking action on the social determinants of health in clinical practice: a framework for health professionals. *Cmaj* 188.17-18: E474-E483.

⁴⁵ Romanello M, *et al.* (2023). The 2023 report of the Lancet Countdown on health and climate change: the imperative for a health-centred response in a world facing irreversible harms. *Lancet*. Dec 16;402(10419):2346-2394. doi: 10.1016/S0140-6736(23)01859-7.

be far more carbon intensive than prevention.⁴⁶ This is especially true in hospital. Estimates suggest that for inpatients, approximately 105.5kg of CO₂e is produced per patient per day.⁴⁷ This comes from all the goods and services required to care for patients in hospital. Pharmaceuticals, staff and patient travel, food, dealing with waste, consumables like syringes as well as the infrastructure like buildings and energy required to deliver healthcare all have a carbon cost.⁴⁸ People rarely stay in hospital for just 24 hours and so these greenhouse gas emissions add up. Compare the emissions of an inpatient stay to the 76 kg CO₂e thought to be produced in one outpatient appointment or estimates that a general practice visit generates 66kg CO₂e.⁴⁹ Of course, outpatient visits will not always involve prevention, but it does help to highlight that hospital care is, in general, more polluting. If we can prevent patients needing hospital in the first place, or manage their health problems in the community, it is thought there could be big carbon savings.

Prevention policies tend to be carbon efficient.⁵⁰ They rely on the logic that the best way to ration a scarce and limited resource is through cost-effectiveness analysis. This method is familiar from priority setting in healthcare but expands the 'costs' from financial to carbon.⁵¹ Just as with financial cost-effectiveness analysis, what we are looking for is the best ratio of maximal health outcomes for minimal carbon costs. By producing these ratios, we can rank various policies for carbon effectiveness and

⁴⁶ Tennison, I., Roschnik, S., Ashby, B., *et al.* (2021). Health care's response to climate change: a carbon footprint assessment of the NHS in England. *The Lancet Planetary Health*, 5(2), e84–e92. [https://doi.org/10.1016/S2542-5196\(20\)30271-0](https://doi.org/10.1016/S2542-5196(20)30271-0). Malik, A., Lenzen, M., McAlister, S., & McGain, F. (2018). The carbon footprint of Australian health care. *The Lancet Planetary Health*, 2(1), e27–e35. [https://doi.org/10.1016/S2542-5196\(17\)30180-8](https://doi.org/10.1016/S2542-5196(17)30180-8)

⁴⁷ Tennison *et al*, *Ibid*.

⁴⁸ Salas, R. N., Maibach, E., Pencheon, D., Watts, N., & Frumkin, H. (2020). A pathway to net zero emissions for healthcare. *British Medical Journal*, 371, m3785–m3785. <https://doi.org/10.1136/bmj.m3785>

⁴⁹ Tennison *et al*, 2021 *op. cit.* note 46.

⁵⁰ Richie, C. (2024). Environmental sustainability and the paradox of prevention. *Journal of Medical Ethics*, 50(8), 534–538. <https://doi.org/10.1136/jme-2023-109437>

⁵¹ Mortimer, F., Isherwood, J., Wilkinson, A., & Vaux, E. (2018). Sustainability in quality improvement: redefining value. *Future Healthcare Journal*, 5(2), 88–93. <https://doi.org/10.7861/futurehosp.5-2-88>

choose the ones with the most favourable ratios.⁵² For example, some life cycle assessments have found that emergency caesarean section averts many more disability adjusted life years than robot assisted prostatectomy per tonne of carbon.⁵³ On a cost-effectiveness analysis view then, we should use our limited healthcare carbon budget to perform emergency caesarean sections rather than robot assisted prostatectomy, if the budget precludes both.

Small, cumulative benefits across populations means prevention can maintain health using far smaller volumes of emissions. Prevention will have very favourable cost-effectiveness ratios because it requires much less carbon emissions to keep people well than to treat them once they are sick. For healthcare systems, this is a much more efficient use of emissions because the volume of emissions required to produce a unit of health is much lower. Prevention allows healthcare systems to simultaneously reduce their carbon footprint by reducing reliance on much more carbon intensive healthcare, whilst maximising health outcomes through prevention. The idea is that a much more efficient use of emissions in healthcare is to drive down the demand for healthcare in the first place. Healthcare systems can cut their emissions through 'lean service'⁵⁴ provision whilst also meeting its goals to protect and promote health through preventative strategies.

8.3.1. The tension between subsistence and prevention

We can now contrast subsistence understood as a sufficientarian concept with prevention and sketch how these differing decarbonisation policies are in tension. Briefly, the tension arises from where the health threshold is set as well as how benefits

⁵² Bhopal, A., & Norheim, O. F. (2021). Priority setting and net zero healthcare: how much health can a tonne of carbon buy? *BMJ*, 375, e067199–e067199. <https://doi.org/10.1136/bmj-2021-067199>

⁵³ *Ibid.*

⁵⁴ Mortimer *et al*, 2018, *op. cit.* note 51.

above and below the threshold are distributed. Mapping out this tension is critical for appreciating a potential problem in how healthcare systems fulfil their fair share of mitigation burdens. In the next section, a way to address this tension is proposed.

From the proceeding analysis it should be easy to see how these differing decarbonisation policies pull in different directions. In short, subsistence emissions are concerned with benefits below a health threshold and focus on the worst-off, whereas prevention attempts to keep people who are above the health threshold there. A few examples of how these policies work will help illustrate this tension.

Take a lower health threshold. Imagine the health threshold is set such that prevention emissions are above a threshold of enough. This is an intuitive place to set the threshold to express the difference between subsistence and prevention. As prevention emissions fail to meet criterion (1) of being subsistence since they lie above the health threshold, the negative thesis states they are unjustified. Below threshold emissions are given absolute priority and so any healthcare emissions must be sub-threshold to be justified. Subsistence emissions rule out prevention emissions because prevention targets those who have enough, and subsistence gives absolute priority to those who do not. With a threshold between subsistence and prevention it is clear how the negative thesis pulls emissions away from prevention.

The advantage of a low threshold is it makes the positive thesis easier to justify.⁵⁵ To claim that individuals should not suffer health deprivation below some level and that those individuals should be prioritised makes subsistence emissions appear most compelling. However, the negative thesis makes it harder to justify prevention with a lower threshold. Some may think prevention emissions being ruled out by the negative thesis is not much of a problem if emissions are directed towards those without

⁵⁵ Casal, 2007, *op. cit.* note 15.

enough health. Perhaps, in the context of a real need to limit emissions, healthcare emissions should be minimised to those with the greatest health needs marked by being below a threshold of enough.

As much as prioritising those without enough is of moral importance, I resist the idea that prevention emissions are necessarily unjustified. As I argue further below, there are reasons for sufficientarians to give some weight to prevention as they also help *secure* the threshold. However, a further reason not to reject prevention emissions as unjustified is that they provide comparatively easy wins in healthcare decarbonisation. Low-emissions healthcare is likely to require a small budget of emissions that are necessary to keep people well. A key challenge for sustainable healthcare systems is to simultaneously protect and promote health all whilst minimising its emissions, prevention offers one compelling way of doing this. It would therefore be useful if prevention remained part of healthcare's overall emissions reduction strategy and a low-emissions healthcare system.

Setting a high threshold, one that includes prevention, offers one way to bring prevention under the auspices of subsistence, making these emissions justified. The advantage of a high threshold is that it makes the negative thesis particularly justified.⁵⁶ Where 'enough' is set high enough to include those who are comparatively healthy and only at risk of becoming unwell without intervention, it is easier to say that any emissions above this are unjustified.

As obvious as setting a high threshold to justify both subsistence and prevention emissions in healthcare is, it does not resolve the tension between prevention and subsistence. To illustrate, consider two principles for distributing under the threshold: prioritarianism and headcount principles.

⁵⁶ Casal, 2007, *op. cit.* note 15

Prioritarianism under a higher threshold that includes prevention emissions gives priority to the worst off. Prevention emissions are directed towards the relatively well off and so these individuals are likely to be close to the higher threshold. Under a prioritarian distribution of emissions under the threshold, limited emissions are pulled down away from those near the threshold who would benefit from prevention. That is, prioritarianism under the health threshold focuses emissions on something like subsistence since, for the prioritarian, benefits matter more the worse off a person is. Prevention emissions, whilst still being theoretically justified, are unlikely to receive much, if any, of a share of emissions in practice. Being prioritarian under the threshold negates the purpose of raising the threshold as emissions are moved away from prevention anyway.

Headcount principles, on the other hand, attempt to maximise the number of people who secure enough.⁵⁷ Under the threshold, headcounting holds that justice is concerned with how many people reach the threshold rather than the size of the benefits to individuals, unlike prioritarian views. The risk of headcounting however is 'excessive upwards transfers'.⁵⁸ A large group who are near the threshold, and who are comparatively well off, would be prioritised over a slightly smaller, very badly off group. Headcounting would therefore prioritise prevention over subsistence and transfer emissions to the relatively well-off compared to the worst off. Subsistence, whilst justified, would receive little emissions on headcounting principles as prevention uses emissions more efficiently.

Subsistence emissions offer a compelling path to reducing healthcare emissions because they prioritise the worst off using the minimum healthcare emissions possible.

⁵⁷ Shields 2012, *op. cit.* note 16. Timmer 2021, *op. cit.* note 16.

⁵⁸ Shields 2012, *op. cit.* note 16, p.103.

The negative thesis is a second powerful aspect of subsistence emissions for it differentiates certain emissions as unjustified. Prevention, on the other hand, is attractive for it utilises limited emissions to offer healthcare comparatively easy wins in achieving its overarching goal of protecting health. But the negative thesis potentially precludes emissions for prevention. Furthermore, raising the threshold still means choosing between subsistence and prevention because of excessive upwards or downwards transfers, depending on the distributive principle adopted under a higher threshold.

8.4. How to reconcile subsistence and prevention emissions in healthcare

Let us now consider how healthcare systems can utilise both subsistence and prevention in policies to reduce their emissions. To reconcile these, I argue that sufficientarians have reason to care about prevention and place some weight on this, as well as by deploying multiple thresholds. The result is that sub-threshold benefits have weighted rather than absolute (lexical) priority leaving space for the distribution of above threshold benefits whilst maintaining the ideal of subsistence emissions. As the negative thesis holds particular appeal in emissions reductions, a further threshold above prevention where the negative thesis applies is suggested. Below this second, higher threshold (but above the health threshold), I advocate for the 'shift thesis'.

8.4.1 The value of securing enough health

To begin, again assume that the health threshold lies between subsistence and prevention. Intuitively, those with cancer, heart failure and so on to have legitimate claims that they are below a health threshold unlike activities directed at prevention, vaccination for example. Why then should subsistence emissions assign weight to above threshold benefits? After all, if subsistence emissions place special moral importance on securing enough, as they have a sufficientarian structure, how can

subsistence emissions justify above threshold benefits?

The core argument can be stated briefly. One reason that sufficientarians might care about above threshold benefits is because of the significant moral weight they place on having enough. As the health threshold has moral importance for sufficientarians, it is not enough that individuals only achieve the threshold. Individuals must be *secure* at or above the threshold and not face material risks that they will fall below the threshold. On this view of sufficientarianism, the negative thesis is rejected since there is a moral reason to place some weight on above threshold benefits, in so far as they help secure the threshold. Where some weight is given to above threshold benefits, prevention is of value to the sufficientarian, and some emissions ought to be dedicated to this end.

To build on this sketch, I rely on a capabilities approach as the metric of distributive justice. Different theorists place different emphasis on why securing sufficient health is of moral value. Some argue that having enough health is necessary for opportunity,⁵⁹ or because health is a core capability.⁶⁰ Others point to the connection between health and well-being and that having enough health is necessary to avoid suffering.⁶¹ Here, I adopt a capabilities approach since, in my view, the idea of secure functioning is key to why sufficientarians should put weight on some above threshold benefits and the idea of security has been most developed within the context of the capabilities approach.⁶² However, it is plausible that other theorists will place weight on certain health states being secure, a thought I explore further after discussing security of

⁵⁹ Daniels, N. (2008). *Just health: meeting health needs fairly*. Cambridge University Press.

⁶⁰ Nielsen, L. (2015). Why Health Matters to Justice: A Capability Theory Perspective. *Ethical Theory and Moral Practice*, 18(2), 403–415. <https://doi.org/10.1007/s10677-014-9526-8>. Venkatapuram, S. (2013). *Health justice: An argument from the capabilities approach*. John Wiley & Sons. Ruger, J. P. (2010). *Health and social justice*. Oxford University Press.

⁶¹ Powers, M., & Faden, R. *Social justice: The moral foundations of public health and health policy*. Oxford University Press, USA.

⁶² Wolff, J., & de-Shalit, A. (2007) *Disadvantage*. Oxford: Oxford University Press, pp.64-68

health capabilities.

The capabilities approach is essentially a theory of opportunities. They describe certain conditions or states that allow people to do or be the things they value. Capabilities are, according to Sen, "a set of vectors of functionings, reflecting the person's freedom to lead one type of life or another"⁶³. Functionings describe what individuals can do and be, like being healthy, well-nourished, educated and so forth. Well-being, on a capabilities approach, is about the functionings that people have based on sets of capabilities that provide opportunities to enjoy such functioning, rather because they possess certain resources or have their subjective preferences satisfied. Functioning to a certain level is important to lead a decent life and one must have a sufficient set of capabilities to provide the opportunity for that. To be unhealthy, diseased and so forth can prevent people pursuing certain life opportunities and consequently their capability to lead a life they have reason to value. Numerous scholars defend health as mattering to justice from a capabilities approach and would view it as an important, if not central, functioning.⁶⁴

An important distinction present in the capabilities approach is between having the opportunity to achieve a functioning and actually achieving that functioning. Wolff and de-Shalit recognise this distinction arguing that capabilities should be genuine and secure opportunities to exercise a central functioning.⁶⁵ What Wolff and de-Shalit draw particular attention to is that one can not only be disadvantaged by the absence of opportunities to exercise central functionings, but also if the opportunities they do have are not genuine or are insecure. An opportunity, according to Wolff and de-Shalit, is genuine if one can exercise a functioning without risk to other central functionings and secure if it is reliable going forward. If a functioning is insecure, where there is little

⁶³ Sen, A. (1992). *Inequality reexamined*. Oxford University Press, Oxford, p.40

⁶⁴ Nielsen 2015, *op. cit.* note 60. Venkatapuram 2013 *op. cit.* note 60. Ruger 2010 *op. cit.* note 60.

⁶⁵ Wolff & de-Shalit 2007, *op. cit.* note 62, pp.64-68.

realistic prospect of sustaining the function such that people cannot rely on it then this too represents a disadvantage.

Take somebody with stage 1 hypertension. Their day-to-day functioning should be unaffected by their blood pressure as an asymptomatic risk factor. Stage 1 hypertension does not disadvantage in the same way a problem like chronic obstructive pulmonary disease does. Those suffering the day-to-day symptoms of cough and shortness of breath due to respiratory disease are more obviously disadvantaged by chronic obstructive pulmonary disease than the mild hypertensive. But hypertension is a risk factor for serious problems: heart disease, cerebrovascular disease, renal disease and so forth. Having hypertension then does not necessarily mean one's overall health can be relied upon as they are exposed to risk. Their health is therefore insecure, to a degree, and as this risk threatens other important functionings it is a form of disadvantage.

Stage 1 hypertension is managed through prevention. As an above threshold benefit, it would not count as subsistence and if we endorse the negative thesis these emissions are unjustified. However, if what matters is that individuals *secure* the threshold such that not only do individuals achieve the threshold but can rely on staying there, then this provides a reason to place weight on above threshold benefits. Prevention is important from the perspective of sufficientarianism because it contributes to securing the threshold of enough, even if this means providing some threshold benefits.

On the account of subsistence emissions provided, however, emissions required to produce above threshold benefits are precluded by the negative thesis. However, some sufficientarians adopt the shift thesis instead.⁶⁶ Once individuals have secured

⁶⁶ Shields 2012, *op. cit.* note 16.

enough, on the shift thesis our reasons to benefit them further change. Adopting the shift thesis would still lead us to prioritise below threshold benefits though they would now have weighted rather than lexical priority. Further, emissions above and below the threshold are still treated differently when it comes to mitigation. However, this becomes a difference of degree with proportional weighting depending on whether they are above or below the health threshold.

8.5. Objections

Adjusting the concept of substance emissions to include the shift rather than the negative thesis may be seen to go against the spirit of subsistence emissions. When Shue originally proposed subsistence emissions, his concern was the way that the most economically efficient ways to reduce emissions could impact on the most disadvantaged:

"What if, as is surely in fact the case, some of the sources [of greenhouse gases] that would cost the least to eliminate are essential and reflect needs that are urgent to satisfy, whilst some of the sources that it would cost the most to eliminate are inessential and reflect frivolous whims?"⁶⁷

Admittedly the concern for Shue is starker than here, but the point is clear: the very reason behind subsistence emissions is to guard against calculations of cost-effectiveness that result in the worst off shouldering the brunt of mitigation burdens. If the most effective way to decarbonise healthcare is to use carbon more efficiently and this means maintaining health in the well, one potential consequence is that the worst off pay the most in terms of healthcare mitigation. Combining subsistence emissions with prevention seems to run contrary to subsistence emissions if the point of subsistence emissions is to protect the worst off from calculations of carbon-effectiveness.

⁶⁷ Shue 1993, *op. cit.* note 5, p.55.

It is worth pointing out that subsistence emissions and prevention through cost-effectiveness take somewhat different approaches to minimising greenhouse gases in healthcare. This difference presents an opportunity to marry these approaches without making the worst off pay the most. Subsistence emissions essentially generate a carbon budget around the idea of a health threshold.⁶⁸ By treating a set of emissions differently in terms of mitigation, healthcare can direct its mitigation efforts towards other non-subsistence sources of greenhouse gas emissions and that determines the carbon budget for a healthcare system. What I am proposing then, is that the subsistence budget is extended slightly to allocate some emissions that are necessary for prevention given the moral importance of securing the threshold. Both projects can run in parallel, and emissions can be reduced in healthcare by focusing on non-subsistence, but also through some efficient uses of emissions to prevent ill health.

Another potential issue is the focus on risk to identify those above the threshold whose health is insecure. Everyone who is above the health threshold will at some point, due to the nature of being human, be at risk of falling below it. Humans are vulnerable to disease, sickness, disability and death. To clarify then, for one's health to be insecure there must be a reasonable risk of their health falling below the health threshold. Credible health threats may be because of the size of the risk, or because of how serious the risk is, or because of the way this risk is multiplied by other relevant risks. The person with stage 1 hypertension is at a reasonable risk of having a myocardial infarction if left unchecked. Myocardial infarctions can be fatal, but even those that survive can be left with further cardiac problems like heart failure. Where the heart cannot function properly because of damage from a myocardial infarction this seriously disadvantages individuals in terms of their symptoms and functioning. But furthermore, this exposes them to risks of other health problems. Hypertension is

⁶⁸ Parker, 2025, *op. cit.* note 3.

an insecure health state then because it poses a reasonable risk.

One way to help cap an unfettered expansion of the 'at risk' category above the health threshold, is with the addition of a second, higher threshold as an emissions ceiling. Reasonably secure health could denote a second threshold above the lower health threshold set earlier. Where individuals' health is relatively secure as the health risks are small, we can apply the negative thesis that further emissions would be unjustified. Individuals under the threshold of secure health would then have absolute priority over those whose health is reasonably secure. I will not, however, pursue this idea of a further threshold further.

8.6. Conclusion

This paper has examined the role of both subsistence emissions and prevention in enabling healthcare systems to meet critical objectives like protecting health whilst reducing emissions. A key aim was to advance a more systematic understanding of the concept of subsistence emissions in healthcare. Here, subsistence emissions were defended through a sufficientarian framework as the minimum emissions that healthcare can reasonably produce to benefit those below the health threshold. While subsistence emissions are an intuitive way for healthcare systems to reduce emissions fairly, they may be in tension with prevention, which offers a promising alternative for emissions reduction.

Both approaches have distinct advantages. Subsistence emissions prioritise the disadvantaged, ensuring they do not bear disproportionate mitigation burdens, while also providing a practical framework for policymakers. Prevention emissions, meanwhile, offer an efficient means to achieve healthcare goals while reducing emissions. Rather than favouring one over the other, this paper advocates their integration. Ensuring individuals secure the health threshold justifies some prevention

emissions while reinforcing the need for subsistence emissions. However, subsistence emissions should remain a fundamental exception to mitigation obligations. To help limit the number of prevention emissions, a second threshold that places a ceiling on justified healthcare emissions was suggested. Any emissions above this second threshold are unjustified, as well as non-subsistence emissions other than prevention emissions.

This discussion clarifies subsistence emissions in healthcare and demonstrates their compatibility with prevention. However, further development is needed. Establishing precise, non-arbitrary thresholds is a critical, albeit challenging, task when guiding policymakers. Additionally, while this sufficientarian approach distinguishes permissible from impermissible emissions, it does not address the allocation of emissions within the subsistence budget. Emissions above the health threshold should be allocated based on carbon effectiveness, but the distribution of limited subsistence emissions remains an open question. Addressing these considerations will be essential for implementing subsistence emissions within healthcare policy and practice.

Chapter 9

9. The agents of climate justice in healthcare

9.1. Introduction

To help avert the threat of climate change, there is a need to decarbonise healthcare systems. When reducing healthcare greenhouse gas (GHG) emissions, one important question is who are the duty-bearers in healthcare's response to climate change? Who are the 'agents of justice', responsible for achieving climate justice in healthcare?¹

In this paper I assume that healthcare GHG emissions cause injustice and that a net zero healthcare system represents part of healthcare systems achieving climate justice.² Healthcare GHG emissions contribute to the threats of climate change.³ Furthermore, most healthcare GHG emissions come from wealthy countries with technologically advanced healthcare systems, while the greatest effects of climate change are felt by those who contribute the least and are the least equipped to deal

¹ It is worth noting early that the terminology 'agents of justice' arises from Onora O'Neill's discussion of global justice. O'Neill was concerned with who has an obligation to fulfil the demands of global justice, especially if we cannot be confident that institutions will fulfil these demands. O'Neill, O (2001). *Agents of Justice*. *Metaphilosophy* 32 (1-2):180-195.

² I say 'part of' for several reasons. First is that mitigation does not exhaust responses to climate change and adaptation will also be necessary for healthcare systems to cope with climate change that is inevitable. Second is that net zero is necessary in emissions reductions but it is controversial whether it is also sufficient. Net zero also leaves open issues of historic responsibility as well as responsibilities to help others respond to climate change or, from a healthcare perspective, minimise the health effects of climate change. Further net zero alone does not fully describe how to reconcile providing the benefits of healthcare without reliance on emissions. So net zero does not tell the whole, nor a completely uncontroversial, story about achieving climate justice in healthcare. Nevertheless, it is widely thought to be a significant aspect of that story.

³ Costello, A., Abbas, M., Allen, A., *et al.* (2009). Managing the health effects of climate change: lancet and University College London Institute for Global Health Commission. *The lancet*, 373(9676), 1693-1733.

with the effects of climate change.⁴ At the very least, healthcare must mitigate its GHG emissions to remedy this injustice. Net zero has become a powerful organising framework for policy responses to climate change across society and many healthcare systems have committed to net zero.⁵ Some healthcare systems have also outlined plans on how to become net zero.⁶ Hence, we have a better, though not complete, idea of what a decarbonised healthcare system looks like under net zero compared to other potential climate targets. Nevertheless, my arguments regarding the agents of justice should be compatible with alternative targets for achieving climate justice in healthcare, even if I discuss net zero here.

Two camps have emerged in the debate over who has a responsibility to help achieve climate justice in healthcare. One places responsibility at an institutional level, with a healthcare system being the primary duty-bearer.⁷ The reasoning is that institutions have the necessary resources, authority, and systemic influence to

⁴ Lenzen, M., Malik, A., Li, M., *et al.* (2020). The environmental footprint of health care: a global assessment. *The Lancet Planetary Health*, 4(7), e271-e279.

⁵ See: Fankhauser, S., Smith, S. M., Allen, M., *et al.* (2022). The meaning of net zero and how to get it right. *Nature Climate Change*, 12(1), 15-21. Boyd, R., Ashby, B., & Steele, K. *Healthcare without harm*. (2019). Healthcare's climate footprint—how the health sector contributes to the global climate crisis and opportunities for action. Available: <https://global.noharm.org/resources/health-care-climate-footprint-report>. World Health Organisation and the Alliance for Transformative Action on Climate and Health. (2024). *Commitments to climate change and health*. Available: <https://www.who.int/initiatives/alliance-for-transformative-action-on-climate-and-health/commitments>.

⁶ National Health Service. (2020) Delivering a 'net zero; National Health Service. Available: <https://www.england.nhs.uk/greenernhs/wp-content/uploads/sites/51/2020/10/delivering-a-net-zero-national-health-service.pdf>

⁷ See: Parker, J., Hodson, N., Young, P., & Shelton, C. (2023). How should institutions help clinicians to practise greener anaesthesia: first-order and second-order responsibilities to practice sustainably. *Journal of Medical Ethics*, jme-2023-109442-. <https://doi.org/10.1136/jme-2023-109442>. Samuel G, Briggs S, Hardcastle F, Lyle K, Parker E, Lucassen AM. (2024) Focusing attention on physicians' climate-related duties may risk missing the bigger picture: towards a systems approach to health and climate. *J Med Ethics*. May 22;50(6):380-381. doi: 10.1136/jme-2024-109953. Lignou S, Hart J. (2024) Navigating climate responsibility: a critical examination of healthcare professionals' moral duties. *J Med Ethics*. 22;50(6):376-377. doi: 10.1136/jme-2024-109883. Herlitz A, Malmqvist E, Munthe C. (2023). 'Green' bioethics widens the scope of eligible values and overrides patient demand: comment on Parker. *J Med Ethics*;49(2):100-101. doi: 10.1136/jme-2022-108849. Della Croce Y, Nicole-Berva O. (2024) Duties of healthcare institutions and climate justice. *J Med Ethics*.15:jme-2024-109879. doi: 10.1136/jme-2024-109879.

implement large-scale changes. I take it that institutions are systems made up of formal and informal rules, norms and decision-making procedures that regulate a political or social activity.⁸ Others, however, see healthcare professionals as having responsibilities to reduce healthcare emissions.⁹ This view emphasises the ethical obligations of professionals to contribute to climate justice through their practice. The discussion therefore revolves around an institutional versus individual professional divide.

Healthcare systems are already committed to decarbonise and are formulating policies in light of this commitment. Shifting healthcare systems away from the emissions that they have relied on to deliver the benefits of healthcare is thought to require a radical transformation of healthcare and thereby represents an enormous challenge.¹⁰ How healthcare reconciles meeting its goals with the burdens of reinvention to low-carbon systems raises questions of distributive justice.¹¹ One question, is where principles of justice that are intended to govern healthcare decarbonisation apply? What is the site of climate justice in healthcare? Whilst the institutional versus individual divide relies on this question of the site of justice, to date this framing is absent from the debate and so its implications are unexplored. Furthermore, the simplification of the institutional versus individual divide overshadows the scale and complexity of decarbonising healthcare. As such, our account of how to allocate responsibilities for realising climate justice in healthcare

⁸ Sangiovanni, A. (2007). Justice and the priority of politics to morality. *Journal of Political Philosophy* 16 (2):137–164.

⁹ Parker, J. (2023). Barriers to green inhaler prescribing: ethical issues in environmentally sustainable clinical practice. *Journal of Medical Ethics*, 49(2), 92-98. van Gils-Schmidt, H. J., & Salloch, S. (2024). Physicians' duty to climate protection as an expression of their professional identity: a defence from Korsgaard's neo-Kantian moral framework. *Journal of Medical Ethics*, 50(6), 368-374.

¹⁰ Healthcare Without Harm. (2021). Global road map for health care decarbonization: A navigational tool for achieving zero emissions with climate resilience and health equity. Available: <https://healthcareclimateaction.org/roadmap>

¹¹ Parker J. (2025). Healthcare exceptionalism: should healthcare be treated differently when it comes to reducing greenhouse gas emissions? *Medicine Health Care and Philosophy*. DOI: 10.1007/s11019-025-10254-x

needs to be sensitive to this. This paper contributes to the debate by clarifying the site of justice and how it relates to who the agents of climate justice in healthcare given the challenge facing healthcare in the transition to low-carbon environmentally sustainable systems. Understanding this issue is critical for making progress on how healthcare systems contribute to addressing climate change.

I defend a plural account of responsibilities to reduce healthcare emissions. I argue that the complexity and scale of reducing healthcare emissions means that responsibilities should be allocated based on agents' capacity to reduce emissions. A focus on effectiveness leads to me to identify two distinct responsibilities: first-order and second-order responsibilities. First-order responsibilities are necessary to directly reduce healthcare emissions, and I argue that numerous agents, not just healthcare institutions nor clinicians, are necessary to successfully achieve a net zero healthcare system. In other words, my view is that whilst institutional and clinician action is necessary to achieve climate justice in healthcare, it is insufficient. Moreover, to be effective, others must also take action to ensure that first-order responsibilities are fulfilled. These are second-order responsibilities. Hence my arguments further the debate by broadening the scope of the tasks required to decarbonise healthcare from first-order to second-order responsibilities, moving beyond an institution versus individual dichotomy and considering how responsibility is shared amongst various agents. Ultimately, I underscore that focusing solely on direct mitigation efforts by institutions or clinicians is inadequate, and a more comprehensive, multi-agent approach is required to effectively decarbonise healthcare systems.

The paper is structured as follows. To begin I describe how healthcare systems can reduce emissions. Net zero healthcare requires transformative change across healthcare and various tasks are necessary to achieve this. This context foregrounds the analysis of the site of justice and the agents of justice. Next, I discuss the institutional versus individual divide in terms of the site of justice. I take a Rawlsian

view arguing that whilst the site of justice is healthcare institutions, this need not limit us to excluding action from individuals like professionals (or patients). I then make the case that responsibilities to reduce healthcare emissions should be allocated based on agents' power to effect change. Numerous actions across the health sector and beyond are required to reach a net zero healthcare system necessitating action beyond the institution-clinician divide. I rely on a distinction between first- and second-order responsibilities to highlight the variety of methods necessary to reduce healthcare emissions. Finally, I discuss how various agents including governments, non-state actors, healthcare institutions, clinicians and patients have first- and second-order responsibilities to achieve climate justice in healthcare.

9.2. Net zero healthcare systems

Disentangling healthcare emissions is complex. Modern healthcare systems have a complex structure and organisational pattern, and the provision of healthcare is complicated by this as well as by the multifaceted nature of the problems that healthcare systems face. To establish the carbon footprint of healthcare scientists must identify the boundaries of healthcare and then determine all the structures and processes required to provide healthcare. In other words, we need to say what counts as healthcare as well as drilling down to understand how healthcare works to track healthcare emissions. With this in place, life cycle assessments of healthcare products and processes can begin to reveal the carbon footprint of healthcare.¹²

Global appraisals of healthcare's carbon footprint range between 4-6% of all emissions in 2016.¹³ Healthcare emissions also vary by country with the United States

¹² Salas, R.N., Maibach, E., Pencheon, D., Watts, N., & Frumkin H. (2020) A pathway to net zero emissions for healthcare. *BMJ* Oct 1;371:m3785. doi: 10.1136/bmj.m3785.

¹³ See: Lenzen *et al op cit.* note 3, and Watts N, Amann M, Arnell N, *et al.* (2019). The 2019 report of The Lancet Countdown on health and climate change: ensuring that the health of a child born today is not defined by a changing climate. *Lancet.* Nov 16;394(10211):1836-1878. doi: 10.1016/S0140-

(27%), China (17%) and the European Union (12%) accounting for more than half of the world's carbon footprint.¹⁴ In order to get an idea of where healthcare emissions come from I focus on the NHS as there is reasonable data. The proportion of emissions from various sources in the NHS is broadly similar to global estimates however.¹⁵

To gauge the emissions of the NHS in England, Tennison and colleagues use a hybrid method, combining top-down and bottom-up approaches.¹⁶ This helps to provide the most accurate and comprehensive measures to date. In accordance with the Greenhouse Gas Protocol framework, they divide their findings across three scopes: scope one refers to emissions under direct control of healthcare like anaesthetic gases (17% of emissions), scope two emissions are essentially purchased electricity (12% of emissions) and scope three contains all other indirect emissions for example those embedded in medical supply chains (71% of emissions). In 2019, the total carbon footprint of the NHS in England was 25 megatons of CO₂ equivalent (CO₂e). Predictably, most emissions come from the supply chain (62% [15.6 megatons]) followed by the delivery of care (24% [6.1 megatons]). With scope three accounting for the lion's share of healthcare emissions, it is apparent that action beyond the NHS will be necessary to meet the NHS in England's target of an 80% reduction in emissions by 2039.¹⁷

Decarbonising healthcare entails changing how, where and what healthcare is provided.¹⁸ As all care contributes, at least indirectly, to emissions most healthcare

6736(19)32596-6.

¹⁴ Healthcare Without Harm *op cit.* note 16 p.34

¹⁵ *ibid*

¹⁶ Tennison, I., Roschnik, S., Ashby, B., *et al.* (2021). Health care's response to climate change: a carbon footprint assessment of the NHS in England. *The Lancet. Planetary Health*, 5(2), e84–e92.
[https://doi.org/10.1016/S2542-5196\(20\)30271-0](https://doi.org/10.1016/S2542-5196(20)30271-0)

¹⁷ National Health Service *op cit.* note 6.

¹⁸ Naylor C and Appleby J. (2012). *Sustainable health and social care: connecting environmental and financial performance*. The Kings Fund. Available:
https://assets.kingsfund.org.uk/f/256914/x/5087eae6fd/sustainable_health_and_social_care_march_201

emissions are embedded in the complicated pathways and processes that make up the delivery of modern healthcare.¹⁹ Consequently, it is uncommon to find interventions with a substantial carbon footprint that can be easily identified and substituted. Exceptions include metered-dose inhalers and volatile anaesthetic gases which rely on greenhouse gases and so can be switched for alternatives.²⁰ Overall, achieving net zero healthcare involves reducing demand for high-carbon care, minimising emissions from care delivery, decarbonising the healthcare supply chain and offsetting any residual emissions.²¹

A systematic blueprint for a net zero healthcare system is lacking.²² However, the National Health Service has laid out the most detailed and comprehensive plan to achieve net zero to date.²³ Transforming healthcare systems to net zero is thought to be highly distributive involving system-wide transformative change. Key areas of decarbonisation include: the supply chain, energy use, transportation, food systems, waste management, transformative low-carbon models of care, as well as changing the culture, norms and financial incentives that structure and organise healthcare.²⁴ Healthcare without Harm, for instance list: power healthcare with 100% clean renewable energy; invest in zero emissions buildings and infrastructure; transition to zero emissions, sustainable travel, and transport; provide healthy, sustainably grown food and support climate-resilient agriculture; incentivise and produce low-carbon pharmaceuticals; implement circular healthcare and sustainable healthcare waste management; and, establish greater health system efficiency.²⁵

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¹⁹ McGeoch L, Hardie T, Coxon C, *et al.* (2023) Net zero care: what will it take? *The Health Foundation*. Available: <https://www.health.org.uk/reports-and-analysis/briefings/net-zero-care-what-will-it-take>

²⁰ Parker *et al* *op cit* note 7 and Parker *op cit* note 9.

²¹ Salas *et al* *op cit* note 12

²² Issa, R., Forbes, C., Baker, C., *et al.* (2024). Sustainability is critical for future proofing the NHS. *BMJ (Online)*, 385, e079259-. <https://doi.org/10.1136/bmj-2024-079259>

²³ National Health Service *op cit* note 6.

²⁴ See: Salas *et al* *op cit* note 12 and Issa *et al* *op cit* note 22

²⁵ Healthcare Without Harm *op cit* note 16

I do not suggest these are a definitive list. Rather, I hope to give a sense of the scale of reducing healthcare emissions. Numerous tasks are therefore necessary to achieve sufficient overall carbon reductions in healthcare (Table 1).²⁶ With an outline of the complicated tasks necessary to put us on a path to a net zero healthcare system, the question is who has what responsibilities to achieve such tasks?

Target area for emissions reduction	Tasks to achieve emissions reduction
Supply chain	Green supply chain sourcing of low greenhouse gas products for example pharmaceuticals with lower manufacturing energy requirements
	Local procurement where possible
	Avoid plastic products
	Reduce downstream demand
	Use of purchasing power and relationships with suppliers to set emissions reduction targets and environmental standards
Infrastructure: Buildings, facilities and energy	Convert gas boilers to heat pumps
	Electrify buildings
	On-site wind power and photovoltaics
	Retrofit existing buildings to provide insulation and increase energy efficiency
	Water collection and water recycling facilities
	Enhance lighting efficiency
	Green building design
	Shutdown checklists in energy intensive areas like theatres
Transportation	Reduce transport requirements: reduce staff and patient travel through active travel, carpooling etc.

²⁶ See: National Health Service *op cit* note 6, Salas *et al* *op cit* note 12, Issa *et al* *op cit* note 22 and Schroeder, K., Thompson, T., Frith, K., & Pencheon, D. (2012). *Sustainable healthcare*. John Wiley & Sons.

	Carbon-efficient fleet vehicles
	Community-based services
Food systems	Reduce food waste
	Low carbon foods and packaging
Waste management	Reduce reliance on single-use consumables
	Water efficiency projects and reduce wastewater and solid waste
Low carbon models of care	Disease prevention and public health promotion through tackling the social determinants of health, patient education, and public health campaigns.
	Improving management of chronic disease
	Prevent unnecessary and low-value healthcare through for example reducing overtreatment and overdiagnosis. Reduced wasteful and inefficient care practices.
	Low-carbon alternatives and green prescribing, for example metered-dose inhalers and volatile anaesthetic gases. Social prescribing.
	Innovative technologies like telemedicine and remote healthcare. Digital health technologies like eHealth and mHealth apps. Capture technologies for volatile anaesthetics.
	Move care out of acute hospitals and provide more healthcare in the community.

Table 1: Key target areas for achieving a net zero healthcare system as well as the important tasks to mitigate emissions. Adapted from: NHS England (2020), Tennison *et al* (2021), Salas *et al* (2020), Issa *et al* (2024), Schroeder *et al* (2012).

9.3. The site of climate justice in healthcare

I mentioned in the introduction that one aspect of the debate surrounding healthcare decarbonisation is where the relevant responsibilities fall? This is closely related to, and shares features with, a different issue in political philosophy regarding the site of justice. It is worth drawing out these parallels to help better understand the debate on healthcare decarbonisation as well as how it connects to the question of

the agents of climate justice in healthcare.

The site of justice is concerned with where principles of justice are primarily directed. When we attempt to determine which entities or interactions are governed by principles of justice, we are enquiring as to the locus of justice. John Rawls is famous for reorientating political philosophy to take the "basic structure of society" as the site of justice. For Rawls, "the primary subject of justice is the basic structure of society, or more exactly, the way in which the major social institutions distribute fundamental rights and duties and determine the division of advantages from social cooperation."²⁷

27

A distinct, but as I will argue related, issue is who are the agents of justice? In asking who has what responsibilities to realise justice, and why, we are concerned with the agents of justice.²⁸ The question regarding the agents of justice is however linked to the site of justice. Where the site of justice is located, that is where principles of justice apply, will limit the scope of certain justice-relevant duties and in turn who the agents of justice are. One key debate regarding the site of justice is whether this includes personal conduct or not.²⁹ For institutionalists, like Rawls, principles of justice ought to govern the structure of institutions and their policies and practices rather than the conduct of individuals. Should egalitarians factor egalitarian considerations into their day-to-day decisions? For example, once an egalitarian has paid their fair share of tax are they free to spend their remaining earnings as they please or should this money

²⁷ Rawls, J (1971). *A Theory of Justice*. Oxford, Harvard University Press p.7 and Rawls, J (1993). *Political Liberalism*. Columbia University Press.p.257

²⁸ Hickey, C., Meijers, T., Robeyns, I., & Timmer, D. (2021). The agents of justice. *Philosophy Compass* 16.

²⁹ See: Cohen, G. A. (1997). Where the Action Is: On the Site of Distributive Justice. *Philosophy and Public Affairs* 26 (1):3-30. Murphy, L. (1998). Institutions and the Demands of Justice. *Philosophy and Public Affairs* 27 (4):251-291. Pogge, T. (2000). On the Site of Distributive Justice: Reflections on Cohen and Murphy. *Philosophy and Public Affairs* 29 (2):137-169. Tan, Kok-Chor (2012). *Justice, Institutions, and Luck: The Site, Ground, and Scope of Equality*. Oxford: Oxford University Press. pp19-49.

be subject to egalitarian considerations? For the sake of argument, let's say we are Rawlsians and think that the site of justice does not include personal decisions. In this case, we would struggle to say that one has a responsibility for realising justice in their personal life. They cannot therefore have duties to realise the demands of justice through their personal decisions. That's not to say that some individuals might be committed to projects of social justice in their social life,³⁰ only that there is no responsibility to engage in such activities as a matter of justice.

Contrast this with utilitarianism and a principle of utility that states we ought to maximise utility. The principle of utility is generally not limited by certain kinds of relationships, by personal decisions or by institutional form.³¹ The utilitarian would not see having already paid one's fair share of tax as making a moral difference to how post-tax earnings are spent. The net is therefore cast much wider on a utilitarian view when it comes to who the agents of justice are.

The site of justice and the agents of justice are, however, separate issues because once we have determined the site of justice there is still a further question of the content and distribution of those responsibilities. On a Rawlsian view, using the difference principle to establish institutions in the basic structure that work to make the least well off as they can be leaves open exactly who should realise such institutions and how. The utilitarian, by contrast, will recognise that whilst the utility principle applies to personal choices, we might not expect that all make the same choices or do the same things when it comes to maximising utility. For example, a utilitarian might think that individuals should use their personal income and wealth to relieve global poverty. However, they might adjust who does what with their income and wealth in order to maximise overall utility when it comes to relieving global poverty.

³⁰ Hickey *et al*, *op cit*. note 28

³¹ Rawls *Political Liberalism*, *op cit*. note 27 pp.260-261

9.3.1. Division of labour and the site of justice

The debate surrounding the site of justice bears similarity to the discussion around whether institutions alone or individuals too have responsibilities to decarbonise healthcare.

In *A Theory of Justice*, Rawls limited the site of justice only to the basic structure and excluded people's day-to-day actions and decisions: "the principles of justice for institutions must not be confused with principals which apply to individuals and their actions in particular circumstances. These two kinds of principles apply to different subjects and must be discussed separately."³² For Rawls, there is a division of labour then between the moral demands on institutions and the moral demands on personal life.³³ The reason that Rawls focuses on the basic structure is because it has a profound influence over people's life chances, sets the conditions for social cooperation and has powers of coercion. However, Rawls goes on to clarify that whilst individuals have so-called 'natural duties' to establish and support just institutions,³⁴ as well as duties in their interactions with institutions or roles they might occupy within an institution, beyond this they should be left free to pursue their own ends unencumbered from the demands of egalitarian justice.³⁵

The idea of a division of labour is reflected in arguments forwarded by those who think that it should primarily fall to healthcare institutions to decarbonise healthcare. This division is made most clearly by Yoann Della Croce and Ophelia Nicole-Berva who say, "these two levels [the 'meso level' of institutions and 'micro level' of healthcare

³² Rawls *A Theory of Justice*, op cit. note 27 p.47

³³ Tan *op cit* note 29

³⁴ Rawls *op cit* note 32 p.99

³⁵ Scheffler, S. (2006). Is the Basic Structure Basic? In Christine Sydnorowich (ed.), *The Egalitarian Conscience: Essays in Honour of G. A. Cohen*. Oxford University Press.

professionals] are interdependent at multiple scales regarding practical implementations, [but] they require *different theoretical foundations and separate analyses* of how their duties toward climate protection are justified. [my emphasis]³⁶ Others, similarly, worry about overemphasising the individual level and overlooking systemic change. Gabby Samuel and colleagues write, "Focusing here on the doctor–patient dialogue as the locus of change draws attention away from structural mechanisms such as regulatory approaches, which, in a functioning regulatory system, would have the potential to bring about quicker and longer-lasting reform."³⁷ A parallel concern is raised by Sapfo Lignou and James Hart who argue that "policies should be developed to dictate when and how climate considerations limit available individual patient care enabling clinicians to focus on assessing the clinical benefits of particular interventions and ensuring compliance with these policies."³⁸

Given the complexities of decarbonising healthcare apparent from the descriptions above (table 1 especially), it is overwhelmingly preferable for institutions to take a central role in decarbonising healthcare rather than leaving it to the uncoordinated efforts of motivated clinicians and climate conscious patients. Nevertheless, the issue is over whether the business of securing climate justice in healthcare should primarily occur away from clinicians and patients. Clinicians, we might think, are better left to what they do best: making diagnosis, treating patients, preventing illness and so forth. Patients too, should be left free to make healthcare decisions by their own lights unencumbered from the worries of a net zero healthcare system. In other words, one reason to divide responsibilities in this way is to prevent them being too burdensome on individuals.

This Rawlsian framing does have limitations. It is well known that Rawls did not

³⁶ Della Croce and Nicole-Berva *op cit* note 7

³⁷ Samuel *et al* *op cit* note 7

³⁸ Lignou and Hart *op cit* note 7

include healthcare within the basic structure (Rawls includes: the political constitution, legally recognised forms of property, the organisation of the economy and the family).³⁹ Neither does Rawls explicitly exclude healthcare from the basic structure as he does with churches and universities.⁴⁰ More importantly however, Rawls argues that the principles that regulate the basic structure also apply to those who are engaged with the institution. There is no institutional division between the rules that regulate the institution from those that regulate interpersonal conduct and interactions *within* the rules of the institution. So, if there is a principle of justice that is there to regulate healthcare's fair share of the burdens of decarbonisation, on a Rawlsian view at least, there is no separation between how this principle effects institutions as a whole and how it effects action taken within institutions by individuals including professionals. Finally, Rawls thought that people have duties to uphold and establish just institutions, so if healthcare systems are unjust with regards to their GHG emissions, then this would place duties on individuals to take action. These actions, as we will see, may be far reaching going beyond the doctor-patient interaction.

We could reject Rawlsian institutionalism when it comes to climate justice in healthcare to maintain the institutional versus individual divide. Here, however, I embrace the Rawlsian approach to the site of justice whereby the site is healthcare institutions. Firstly, because, as Rawls suggests about the basic structure, the influence of healthcare on people's life chances is pervasive and profound. Secondly, healthcare serves as a point of cooperation and coordination that determine the division of certain health-related advantages in society. Finally, and as I explain in more detail in the next section, it is difficult to achieve climate justice in healthcare without coordination across healthcare, the health sector and beyond. It is difficult to treat the doctor-patient relationship as special and to some degree exempt from the burdens

³⁹ Rawls Political Liberalism, op cit. note 27 pp.258

⁴⁰ *Ibid* p.261

of decarbonisation whilst also achieving climate justice in healthcare. I therefore agree with these authors about taking an institutional view on the site of justice, but I do not limit how principles of justice to regulate healthcare decarbonisation in the same way. What I take from these authors arguments about the institutional view is that whatever principles of justice we adopt in healthcare decarbonisation, we need to be sensitive that they are not overly burdensome or distribute the burdens unfairly.

9.3.2. Ability to pay

Typically, three principles are used to help allocate mitigation responsibilities: a polluter pays principle, beneficiary pays principle or an ability to pay principle.⁴¹ Polluter pays allocates mitigation burdens on the basis of contribution to the problem; those who play a causal role in emissions have a remedial responsibility to tackle them. A beneficiary pays principle allocates responsibilities to those who benefit from the injustice. Ability to pay is interested in who has the greatest capacity to remedy an injustice. Here I rely on ability to pay.

Let us first discuss the polluter pays principle because this principle has much intuitive appeal in allocating responsibility.⁴² Despite its appeal, the polluter pays principle is inadequate for determining the agents of achieving climate justice in healthcare. Considering the scale of decarbonising healthcare, a contribution-based way of allocating responsibility may struggle in the face of the causal complexity.

⁴¹ See: Caney, S. (2005). Cosmopolitan Justice, Responsibility, and Global Climate Change. *Leiden Journal of International Law* 18 (4):747-775. And Page, E. A. (2008). Distributing the burdens of climate change. *Environmental Politics*, 17(4), 556-575.

⁴² I do not address whether beneficiary pays could be used to regulate healthcare decarbonisation and identify the agents of achieving climate justice in healthcare. Presumably the main beneficiaries of healthcare are patients. Neither professionals nor institutions are identified as duty-bearers by the beneficiary pays principle and so, as these are the main agents under consideration in debates, I leave aside the beneficiary pays principle. It is however worthy of further exploration as to how to conceptualise beneficiary pays in healthcare and what it would mean for ensuring that mitigation burdens are shared fairly.

Emissions that are embedded in complex healthcare systems and processes can make it tricky to single out *the* polluter. Consider the emissions from an inpatient hospital stay. Per day in a hospital bed, there are estimated to be 125kg of CO₂e.⁴³ This derives from: buildings and energy, water and waste, staff travel, medical and non-medical equipment, pharmaceuticals and chemicals, and other procurement like food. So, who is the polluter when it comes to that 125kg of CO₂e per bed-day? It seems to me that it is impossible, or at least extremely challenging, to isolate the polluter. But without an identified polluter, it is hard to say who pays.

A second concern with the polluter pays principle is that reducing the emissions of healthcare requires action from agents outside of healthcare. It is thought, for example, that to achieve net zero healthcare demand must reduce, especially for highly specialist and technologically advanced interventions. One important way to mitigate healthcare emissions is to look upstream and tackle the social determinants of health. Both individual practitioners and healthcare institutions are extremely limited in what they can do to directly affect the social determinants of health, however. Rather, governments and other state and non-state actors are needed to tackle poverty, provide adequate education, improve housing and working conditions, and so forth. Addressing the social determinants of health is clearly important and not just because of its impact on healthcare emissions. But, in looking to allocate responsibility for mitigating healthcare emissions, it is difficult to see how a principle based on contribution to a problem, like a polluter pays principle, takes us to a responsibility for governments and others to address the social determinants of health. If polluters pay, it is not clear how a government, for example, is a polluter in respect of failing to tackle the social determinants of health meaning there is a greater demand for healthcare which in turn generates healthcare emissions. An account for identifying the agents of climate justice in healthcare needs to attend to the full scope of actions necessary to

⁴³ Tennison *et al*/op cit. note 16

mitigate healthcare emissions as well as all the potential agents who can perform these.

A different approach to a contribution-based principle like polluter pays is to look at the various and complex tasks involved in mitigating healthcare emissions ask who can most effectively achieve those tasks? The urgency of averting dangerous climate change and healthcare's important position in reducing emissions offers one reason to allocate responsibility based on effectiveness. Since we have a broad picture of what needs to be done to achieve net zero healthcare, it also makes sense to focus on effectiveness when dividing up responsibilities. Furthermore, as I detail below, attending to the project decarbonising healthcare from the perspective of effectiveness widens the scope of the potential agents of justice from just individuals versus institutions.

Ability to pay is a forward-looking principle that assigns responsibilities to address a problem based on agents' capacity.⁴⁴ In terms of climate change, capacity is usually understood as being wealthy. But for healthcare systems, we can understand ability to pay as reflecting what agents can do to decarbonise, which is in turn shaped by their effectiveness and the costs to them in contributing to solving this problem. I do not offer a thorough defence of ability to pay as the most appropriate principle for reconciling how healthcare achieves its goals with decarbonising such that healthcare does its fair share. I undertake this task elsewhere. For my purposes, the key advantage of ability to pay is that it is sensitive to the burdens of mitigation for agents. Since I take it that the site of justice is institutional, then ability to pay regulates how healthcare systems should decarbonise and this extends to what healthcare professionals, patients and wider society should do in their interactions with healthcare

⁴⁴ Miller, David (2001). Distributing responsibilities. *Journal of Political Philosophy* 9 (4):453–471.

and in their duties to establish and uphold climate justice in healthcare.⁴⁵

As Table 1 shows, reducing healthcare emissions is a complex task that involves numerous changes to what care is provided, where it is delivered, and how it is administered. I will argue that both healthcare institutions and clinicians play essential roles in effectively achieving the transformative changes needed for a net zero healthcare system. However, their efforts alone are not enough. Since, on my view, responsibilities for achieving climate justice in healthcare should be allocated based on effectiveness, responsibilities should not only focus on directly reducing emissions but also include actions that support emissions reduction. In particular, the agents of justice should be recognised by their capacities to effectively decarbonise healthcare and so we need to look at a whole range of actions that can be taken. Furthermore, the range of agents responsible should be broadened to include more than just healthcare institutions or clinicians. To better understand who the agents of climate justice in healthcare are, and how responsibilities are allocated I distinguish between first-order and second-order responsibilities which I turn to now.

9.4. The agents of climate justice in healthcare

Distinguishing between first-order and second-order responsibilities is crucial for effectively allocating mitigation duties.⁴⁶ First-order responsibilities involve the direct

⁴⁵ Indeed, when it comes to individual duties, some authors defend a 'principle of environmental prescribing': "It is *pro tanto* wrong to choose a treatment which produces an expected amount of harm greater than any other equally clinically effective alternative unless: (1) this might undermine trust; or, (2) it significantly worsens a patient's health." (Parker et al op cit note 7 and Parker op cit note 9.) This principle may also be understood in terms of ability to pay where there is a primary focus on effectively reducing healthcare emissions but limits are placed on what burdens individuals should be expected to shoulder in order to achieve sufficient healthcare decarbonisation. A continuity between moral principles regulating climate change in the doctor patient relationship and principles of justice that govern healthcare decarbonisation, may be used to question how much daylight there is between institutional or individual levels of action. I merely note this here rather than pursue this thought further.

⁴⁶ Caney, Simon (2013). Two Kinds of Climate Justice: Avoiding Harm and Sharing Burdens. *Journal of*

obligations agents have to reduce emissions, based on their specific capabilities. These responsibilities stem from the unique powers and roles that agents hold. For example, those in leadership positions, with decision-making authority, or relevant expertise, are naturally suited to taking direct action at the level of institutions, such as installing solar panels, switching energy suppliers, or upgrading the ambulance fleet to low-emission vehicles. However, an agent's capacity to act is also shaped by the realities they face. They may, for example, have other important commitments or responsibilities which limit their ability to fully engage in emissions reduction.

On the other hand, second-order responsibilities focus on supporting and ensuring the success of first-order actions. Achieving a net-zero healthcare system depends not just on those directly reducing emissions, but also on those who facilitate, enforce, and promote these efforts. Simon Caney identifies a number of examples of second-order responsibilities, including: enforcing compliance, creating incentives, establishing norms, reducing resistance to effective climate policies, and civil disobedience.⁴⁷

As will become clear in the discussion below, first-order and second-order responsibilities cut across and extend beyond the institutional versus individual divide previously discussed. That is, different kinds of actor can take on first- and second-order responsibilities depending on who would be most effective, and sometimes the same actor can have both kinds of responsibilities in different circumstances. I take the view that an ability to pay principle should govern how healthcare systems decarbonise, but this leaves open who has what responsibilities to realise climate justice in healthcare. Since ability to pay applies to healthcare institutions and those who engage with them, first-order and second-order responsibilities are there to help divide up differential responsibilities. However, the agents of justice with abilities to

Political Philosophy 21 (4):125-149.

⁴⁷ *Ibid.* pp136-139

contribute to healthcare decarbonisation is not limited to healthcare institutions and individual professionals.

9.4.1. First-order and second-order responsibilities

The agents of justice in healthcare are those with first- and second-order responsibilities. Whilst direct interventions – like for example switching to low-emission metered-dose inhalers – are important, achieving net zero healthcare requires extensive, transformative changes and a wide variety of tasks must be performed by numerous agents. Second-order responsibilities too, are essential for an effective transition and further expand the scope of what agents must do. Two main points can be taken from this distinction: (i) decarbonising healthcare involves more than just direct emission reductions—it also includes second-order responsibilities; and (ii) these responsibilities are spread across a broader range of agents, not just institutions or clinicians. Next I discuss the specific first-order and second-order responsibilities various agents have in reducing healthcare emissions. I do not aim to defend an exhaustive list of all first-order and second-order responsibilities here as decarbonising healthcare is a complicated, large-scale process (Table 1 offers an overview).

Healthcare institutions themselves have great power to organise and coordinate the shifts in the healthcare structures, systems and processes necessary to reduce emissions. Managers, policymakers and professionals frequently have powers to effect change at an institutional level. In some instances, healthcare institutions will take decisions to directly reduce emissions. For example, the anaesthetic gas desflurane has a carbon footprint many times higher than that of comparable alternatives but can be safely decommissioned as it has no distinct advantage over rivals.⁴⁸ As a wholesale and

⁴⁸ White SM., & Shelton, CL. (2020) Abandoning inhalational anaesthesia. *Anaesthesia*;75(4):451-454.

widespread change, institutions are most effective at removing desflurane from anaesthetic practice. Expecting individual anaesthetists to switch from desflurane to alternatives is likely to lead to patchy change and so institutions are best-placed to remove desflurane.⁴⁹ A second example is shifting where healthcare is delivered to reduce GHG emissions. Institutional power will be the primary driver of providing more care in the community instead of hospitals to save emissions, not individuals. Healthcare institutions play a central role in reducing healthcare emissions but, as is clear from the tasks in Table 1, institutions cannot achieve this alone.

Action by individual clinicians is also necessary to help reduce healthcare GHG emissions. Healthcare professionals will need to alter the decisions they make and the actions they take when providing patient care to contribute to healthcare mitigation. Institutions can support, encourage and facilitate this, as I discuss below, but institutions hold limited capabilities to alter the decisions that professionals make. Clinicians act within certain contexts and whilst it is possible to structure these contexts to increase the chance that clinicians make more sustainable decisions, changing the structures in which decisions take place is different from changing those decisions themselves.

One example is reducing overtreatment and overdiagnosis, which contribute to wasteful and unnecessary care.⁵⁰ Although institutions can support clinicians by promoting sustainable models of care, providing workforce education, and fostering

doi: 10.1111/anae.14853.

⁴⁹ Parker, J., Young, P., Hodson, N., & Shelton, CL. (2023) Green nudges for sustainable anaesthetic practice: institutional support to make individual change easier. *Anaesthesia*;78(8):943-948. doi: 10.1111/anae.15991.

⁵⁰ See: Barratt, A., & McGain, F. (2021). Overdiagnosis is increasing the carbon footprint of healthcare. *BMJ*, 375, n2407–n2407. <https://doi.org/10.1136/bmj.n2407> and Johansson, M., Bero, L., Bonfill, X., *et al.* (2019). Cochrane Sustainable Healthcare: evidence for action on too much medicine. *Cochrane Database of Systematic Reviews*, 12(12), ED000143–ED000143. <https://doi.org/10.1002/14651858.ED000143>

norms around sustainability, they face limitations in directly reducing overtreatment and overdiagnosis. Decisions that lead to overtreatment and overdiagnosis are made within the clinical interaction, where professional autonomy and patient safety are paramount. Structural changes can help, but they are often shaped by the very practices they aim to influence. Decisions that contribute to low-value care can reproduce and reinforce the very systems that facilitate overtreatment and overdiagnosis. Clinicians who engage in defensive medicine and contribute to overtreatment reinforce the norms and systems that perpetuate these practices, creating a cycle that is difficult for institutions to break.

Beyond institutional and clinician action, reducing healthcare emissions also requires addressing broader factors. As I mentioned above, reducing healthcare emissions depends in part on reducing demand for healthcare. Tackling the social determinants of health is key to keeping people well in the first place. Governments and other sectors in society will need to take action to prevent poor health. Moreover, state action both nationally and internationally is required to decarbonise energy, transport and supply chains that all underpin health system emissions. Further, other actors both within and outside the health sector will be required to decarbonise the supply chain, especially casting back to the fact that scope three emissions form the majority of healthcare emissions.

The scope of agents with first-order responsibilities can be expanded even further to patients. Like clinicians, patients will sometimes have to make different decisions when it comes to their healthcare. Metered-dose inhalers provide one pertinent example where, to help healthcare reduce the emissions from inhalers, patients will have to change what inhalers they rely on and how they use them.⁵¹ Furthermore, the

⁵¹ Wilkinson, A., & Woodcock, A. (2022). The environmental impact of inhalers for asthma: A green challenge and a golden opportunity. *British Journal of Clinical Pharmacology*, 88(7), 3016–3022. <https://doi.org/10.1111/bcp.15135>

appropriate disposal of inhalers that contain greenhouse gases will also be important. Healthcare institutions and professionals can help support, educate, incentivise and enable patients, but reducing inhaler emissions fundamentally requires action from patients. Furthermore, wider action in society can help tackle the drivers of poor respiratory health like air pollution, and whilst this will help reduce the reliance on inhalers, it is unlikely to fundamentally alter some people's requirement for an inhaler.

I turn now to briefly consider the various ways that second-order responsibilities might be satisfied. I have pointed to healthcare institutions, governments, individual clinicians and patients as well as others outside of healthcare as agents of justice when it comes to first-order responsibilities. Ensuring compliance for each of these agents may mean that others take up second-order responsibilities. I have already touched on some second-order responsibilities, especially amongst institutions whereby creating and sustaining structures and contexts that enable individuals to reduce emissions through their practice. For example, incentives could be offered by institutions so that clinicians and patients make greener choices. Institutions are also important in creating norms that help tackle overtreatment and overdiagnosis. When it comes to supply chains, hospitals and healthcare institutions should use their relationships with suppliers as well as purchasing power to help decarbonise the supply chain and enforce environmental standards. Indeed, institutions can even have self-directed second-order responsibilities. For instance, a hospital could routinely record and publish data on scope one and two emissions allowing them to be tracked over time such that progress and performance can be easily assessed.⁵² Professionals, patients and governments too have second-order responsibilities. Healthcare professionals, for instance may need to lobby their institutions and governments, or engage in acts of civil disobedience, to ensure that healthcare emissions are being reduced. In addition, incentives, financial mechanisms and government targets are

⁵² Issa *et al* *op cit* note 22

necessary to keep healthcare institutions on track to meet net zero. Where action on the social determinants of health is lacking, institutions, professionals and the public pressure governments to address these too.

9.5. Conclusion

In this paper I have sought to clarify who the agents of justice are when it comes to decarbonising healthcare systems. By recognising the diverse tasks necessary to achieve climate justice in healthcare, I argued that responsibilities should be allocated based on effectiveness. This approach reveals the complexity of reducing healthcare emissions and underscores that the range of agents and the scope of their responsibilities are broader and more varied than often acknowledged. By distinguishing between first-order and second-order responsibilities, we gain a clearer understanding of the distribution of obligations. This also highlights that focusing solely on the direct mitigation responsibilities of healthcare professionals or institutions is insufficient for achieving meaningful progress.

Part III

Chapter 10

10. Conclusion

10.1. Review of the thesis

In this final chapter, and final part of the thesis, I reiterate and draw together the arguments made. The goal is to explain how the research questions have been addressed and to elaborate on the common threads running through all five papers included in this work. After the arguments contained in the papers are laid out alongside their original contributions to the literature, the limitations of the arguments are considered as are avenues for future research. I end with some final reflections.

The overarching concern of this thesis is healthcare's fair share of the burdens (and benefits) of adopting policies to address their GHG emissions. The specific question addressed by the thesis is: How should we determine what a fair share of the benefits and burdens of climate change mitigation for complex, modern healthcare systems like the NHS should be? In turn, I raised three further sub-questions:

1. The exceptionalism question: should healthcare be treated differently when it comes to climate change mitigation?
2. The sustainability question: how can healthcare's valuable role in social justice be reconciled with the burdens of addressing climate change?
3. The question of duty-bearers: who is responsible for ensuring that healthcare does its fair share of climate change mitigation?

To determine healthcare's fair share of the burdens of climate change mitigation, this thesis defends an ability to pay principle, understood as a sufficientarian concept where healthcare emissions above and below a threshold of enough are treated differently. This approach is sensitive to healthcare's primary goal of protecting and promoting health and integrates this role with mitigation. However, healthcare is not special and thereby exempt from mitigating emissions. I now review the principal arguments laid out in this thesis to show how the primary research question and sub-questions have been addressed.

10.2. Review of the principal arguments

To begin with the research questions were contextualised and the key problems facing healthcare were explained in light of their GHG emissions. Part I also laid out the method used in the thesis.

Humanity faces the stark realities of global warming as well as huge challenges in addressing climate change. Healthcare is an organisation that is increasingly recognised as having a substantial carbon footprint and duties to address climate change. To get a solid idea of the unique issues facing healthcare the concept of 'healthcare's Red Queen problem' was introduced. This explained how healthcare is in a particularly unstable position, 'running to stand still'. Healthcare's Red Queen problem leads to the question of how healthcare reconciles reducing its emissions with meeting its goals. However, since reducing emissions tends to be burdensome there was a question of healthcare's fair share of such burdens. These are questions of justice and so in the introduction I also explained how 'justice' was going to be understood throughout the thesis. The goal of this project was to formulate principles of justice to guide healthcare decarbonisation fairly.

Chapter two set out the approach taken in the thesis to construct principles of

justice for healthcare mitigation. Initially I considered 'the circumstances of justice' to get a better sense of the preconditions in which questions of justice arise. These circumstances were discussed in light of healthcare's predicament regarding its greenhouse gas emissions. Following this, different philosophical approaches were considered, and the chapter explained a methodological approach that worked from 'the inside out'. 'Interpretive constructivism' was adopted to construct principles of justice in order to govern organisations like healthcare. I drew on the 'practice-dependent' framework which involves reconstructing the 'best interpretation' of the institutions, organisations and practices within a given domain to develop principles of justice for governing them. For an interpretation to qualify as the 'best,' it was argued that principles must be normatively justifiable.

Having set out the methodological approach, the next chapter of the thesis provided a detailed background on the relevant scientific and philosophical debates. In the first half of the chapter, an empirical background covered climate change, healthcare emissions and how climate change affects health. This descriptive element was important to orientate the normative arguments that followed. However, it was also necessary to recap the relevant philosophical literature. Political philosophers have devoted much energy to debating various approaches to how to determine a fair share of the benefits and burdens of addressing climate change. Remedial principles like a polluter pays principle (PPP), and beneficiary pays were discussed. Furthermore, distributive principles like egalitarianism and sufficientarianism were also considered. Finally, some philosophers reject the idea that addressing climate change is about distributing distinct burdens but rather is a problem of 'structural injustice'. The overarching issue with debates amongst philosophers about climate change is that they overlook healthcare and the distinct issues that decarbonising healthcare raises. Within the bioethics literature there has been limited engagement amongst philosophers regarding healthcare's fair share of addressing climate change.

The final chapter in part I is chapter four. This gave an overview of the structure of the main body of the thesis. I laid out the key arguments from each of the five papers that make up the main argument of the thesis and explained that, while each paper was written for its own independent purpose, and therefore stands as an individual piece of work, the papers coalesce to form a collective and cohesive narrative.

The main argument is best understood as progressing in three stages. In the first stage, papers one and two lay down the foundational ideas, concepts and arguments that are central to the thesis. This part focuses on sustainability, the idea of exceptionalism as well as setting aside a polluter pays principle (PPP). Stage two develops and defends the idea of ability to pay as a principle grounded in sufficientarian justice I argue this is particularly well-suited to addressing healthcare emissions because, healthcare's fair share relies on demarcating permissible from impermissible emissions. The third and final stage of the argument examines the practical consequences of utilising an ability to pay principle to allocate responsibilities to decarbonise healthcare.

A key issue in determining when healthcare has done its fair share to address climate change is whether, and to what extent, principles of justice should account for healthcare's socially valuable goals. This is the issue of healthcare exceptionalism which I addressed in paper one. This paper centred around the idea that healthcare is special and deserves to be treated differently in allocating responsibilities to tackle GHG emissions. The crux of this is whether to integrate climatic considerations into how healthcare systems achieve their goals or whether these issues should be treated separately. I argued that they should be integrated, and to do this I defend an ability to pay principle. This paper therefore further builds on the foundational issues of how to think about the problem facing healthcare and the various ways of approaching this. But more importantly the paper introduces an ability to pay principle as a useful way to answer the questions raised by the thesis.

Before going on to further defend an ability to pay principle and clarify its nature, in paper two I argue against a PPP. This completes the first stage of the argument. It is critical to address a PPP head on since it is such a common and intuitive response to determining healthcare's fair share of the burdens of mitigation. The paper presents two limitations to applying the PPP to healthcare's mitigation responsibilities. First, the PPP relies on causation to identify a polluter and determine who pays. On one account of causation however, it is difficult to identify 'healthcare' as a polluter. An alternative causal account can find healthcare as a polluter but fails to require that healthcare pays. Second, the PPP allocates costs in proportion to emissions, meaning that disadvantaged groups, who often have greater healthcare needs and therefore emissions, would bear a larger share of mitigation costs. I argue this is unfair. Paper three concludes that while healthcare is liable to engage with mitigation, a different approach is needed to assign responsibility fairly.

The second stage of the argument further clarifies and defends an ability to pay principle from a sufficientarian perspective. Sufficientarianism is concerned with ensuring that people have enough, as a matter of justice, and uses thresholds to do so. This makes it particularly appealing for integrating the benefits of healthcare with ensuring that healthcare does its fair share of mitigation.

The third paper was published in a special issue on healthcare resource allocation and environmental sustainability in *Bioethics*. This paper directly builds on paper one in two ways, one major and one minor. The minor development is that this paper also relies on integrationism but does not argue for this methodology instead providing a worked example. The major aspect is that the paper argues that sufficientarianism is particularly well suited to delineating a fair share of mitigation burdens for healthcare.

Sufficientarians adopt two theses, and it is through theses that it is argued that we

can better clarify the ways in which healthcare has an ability to pay. The positive thesis states that, from the perspective of justice, it is especially morally important that individuals reach a threshold of enough. When it comes to the second thesis, sufficientarians adopt either the negative thesis or the shift thesis. The negative thesis states that above a threshold of enough, inequalities are irrelevant from the perspective of justice. Those who advocate a weaker standard above the threshold of enough rely on the shift thesis, for this states that different distributive criteria apply above a threshold of enough as opposed to below.

Here is a rough sketch of how an ideal of sufficiency can guide healthcare decarbonisation fairly. A threshold of enough that is of fundamental importance from the perspective of justice can be set, that basic needs are met, that people have enough health, sufficient well-being, some set of capabilities and so forth. The next question is then whether GHG emissions are necessary to secure a threshold of enough. Where GHG emissions are necessary, then we can treat these emissions differently to other GHG emissions. In other words, we can demarcate a sphere of permissible emissions through a sufficientarian method and for any GHG emissions outside this sphere we can say that healthcare has the capacity to mitigate. This approach has the distinct advantage of both being sensitive to the morally valuable goals of healthcare (i.e. it is integrationist) but ensures that healthcare is not 'off the hook' so to speak, in terms of reducing emissions.

Paper three leaves open a number of questions that are taken up in paper four to tighten up a sufficientarian approach to conceptualising ability to pay for healthcare. Sufficientarians face a number of questions regarding their approach: what is the appropriate metric? How do you set the threshold? What is the value of the threshold? How should we distribute above the threshold? How should we distribute below the threshold? These questions are pertinent for my account. Sufficientarians and their critics have debated each of these questions extensively. In paper four I decided to

address these issues indirectly by pitting my sufficientarian approach against an ideal of prevention. Since prevention is frequently thought to be central to decarbonising healthcare and yet seems to involve benefits above a threshold of enough, thinking about whether it is possible to reconcile these approaches helps to answer the questions mentioned.

The idea of a *secure* capability to be healthy is foundational as the metric in my sufficientarian understanding of GHG emissions distribution. This used to set a threshold of enough such that it is not sufficient that people have enough health, they must be able to rely on this. This then allows the argument to be developed such that some prevention emissions are necessary to secure the threshold. Hence prevention emissions can be reconciled with the idea of subsistence emissions. I then go on to discuss how emissions should be distributed above and below the threshold with those below the threshold receiving weighted, but not lexical, priority over above threshold benefits.

The final stage of the argument is contained in paper five. This paper asks who are the agents of justice when it comes to decarbonising healthcare? This paper is important to understand the practical implications of ability to pay as well as clarifying how mitigation burdens are allocated. The thesis largely focuses on the organisational level of healthcare arguing for principles of justice that govern how healthcare organisations like the NHS are structured as well as their policies and practices. Individual conduct is, however, free from the constraints of principles of justice at this level. It is important to clarify, however, how various tasks associated with decarbonising healthcare are distributed within an organisation. This is especially significant as an emerging debate in the literature is whether healthcare decarbonisation should occur at the meso rather than micro level, and in particular spare the doctor-patient relationships from the intrusions of a green agenda. It is important to address these arguments and this paper does so by illuminating the site

of justice as well as the agents of justice by demonstrating how ability to pay distributes responsibilities.

In paper five I provide an overview of how various scholars propose to achieve a net zero healthcare system. I divide these into various tasks. From there I go on to argue that to be effective in decarbonising healthcare, tasks must be allocated across a range of actors. First-order responsibilities to directly decarbonise healthcare are distinguished from second-order responsibilities to support, facilitate and ensure that others fulfil their first-order responsibilities. This framework widens the actors with responsibilities from a narrow healthcare organisation versus individual clinician dichotomy, as well as providing more depth in the various tasks that can be utilised to effectively decarbonise healthcare.

10.3. Limitations and future research

It is hoped that a wide-ranging analysis of healthcare's responsibilities to reduce its GHG emissions has been presented. However, any enquiry must draw lines around its scope and exclude some considerations. Six limitations of the arguments presented are considered here. These limitations surround (1) the target and scope of the arguments; (2) climate change adaptation; (3) non-compliance with mitigation responsibilities; (4) climate activism amongst healthcare professionals; (5) exclusion of a beneficiary pays; and, (6) a broader integration of health and climate justice. In addition, a sketch of how these issues lead to further research questions is provided.

A major limitation of the thesis concerns the target and scope of the arguments. While the focus has been on the English NHS, many of the issues addressed are relevant for other healthcare systems and organisations. It is important to examine how far the arguments developed here can or should be extended beyond the specific context of the NHS. In addition, the thesis started from practical normative questions

around what healthcare organisations should do to reduce their emissions. This framing necessarily narrows the scope of inquiry, and it is important to think about how adjacent areas like public health ethics and environmental ethics enrich the analysis and expand its theoretical reach.

Perhaps the most significant limitation arises from the challenge of transforming individually conceptualised and prepared manuscripts into a unified thesis. In doing so, a conceptual ambiguity around the nature of healthcare and the difference between institutions and organisations has been introduced. Whilst the thesis maintains a coherent overarching argument, greater attention to these conceptual foundations would have strengthened both the clarity of the project's scope and the practical implications of its conclusions. This is a valuable lesson for future philosophical work; that not only is conceptual clarity critical for internal coherence, but for ensuring the applicability and robustness of normative claims.

Two limitations are left in the wake of healthcare's Red Queen problem: adaptation and non-compliance. Healthcare's Red Queen problem highlights how healthcare's emissions serve to undermine their own goals. This leaves healthcare systems unstable over the longer term. Primarily, this thesis was concerned with how mitigation policies can help resolve healthcare's Red Queen problem. Mitigation, however, is unlikely to be sufficient to fully address this. Healthcare systems must also adapt to a changing climate to continue to provide care. Furthermore, healthcare alone cannot sever the link between climate change and threats to human health. Since other actors are necessary to help healthcare to achieve its goals over the longer term, it is important to understand what, if anything, healthcare systems can and should do to deal with non-compliance amongst other polluters.

In the introductory chapter adaptation was defined as the process of adjusting social, economic and political systems to reduce the actual, or anticipated, threats of

climate change. Adaptation is one of three broad burdens that actors can take in addressing climate change, the other two being mitigation and compensation. Since adaptation is also likely to be burdensome for healthcare systems, just like mitigation, adaptation raises questions of distributive justice. One key question discussed by political philosophers is whether a fair share of the burdens of adaptation fall under the same principles of justice as mitigation, or whether other principles are required. In the literature, this debate takes place under a distinction between atomism and holism.¹ Atomism states that each burden of addressing climate change requires its own principle of justice. Holism treats both mitigation and adaptation burdens under one principle. As I only focused on mitigation, this issue is unresolved. However, it is important to consider whether, in the particular case of healthcare, atomism or holism is most appropriate.

Paper five suggested that a wide range of agents have diverse responsibilities to help decarbonise healthcare. This goes some way in helping to reduce the health impacts of climate change. However, these arguments assumed that these agents would comply with their duties. But, as we know, adequate action on GHG emissions frequently falls far short. Where non-compliance with climatic duties amongst non-healthcare actors threatens health, there is a question of how healthcare should respond. One concern raised by a peer reviewer for paper one on healthcare exceptionalism was that healthcare systems would end up doing *more* than their fair share to address climate change in part because of compliance issues amongst other powerful actors. If properly resolving healthcare's Red Queen problem relies on coordination beyond healthcare, then a narrow focus on healthcare is a limitation worthy of further philosophical discussion. There is then the business of how healthcare integrates into wider societal action on climate change.

¹ Caney, S. (2018). Climate Change', in Serena Olsaretti (ed.), *The Oxford Handbook of Distributive Justice* (pp. 664-688), Oxford Handbooks, OUP,

Building on this last issue of non-compliance, there is also a point about climate activism, protest and civil disobedience amongst health professionals. In the face of widespread non-compliance with climatic duties from powerful actors, many healthcare professionals see themselves as having “promotional duties” to bring about societal change to help address environmental health threats.² A comprehensive review of the ethical questions that arise in the connection between health, healthcare and climate change would address these issues. In chapter five I extended arguments to individuals as they interact with institutions and mentioned duties to establish just institutions. However, the analysis was lacking in specific details for how this relates to climate activism. Furthermore, since doctors are actively engaged in such issues and are falling foul both of the law and their professional regulator, philosophical analysis of this issue is particularly timely.³

The PPP and ability to pay received particular focus in this thesis. However, the beneficiary pays principle is frequently deployed in debates around climatic responsibilities.⁴ A complete picture would therefore consider the merits of the beneficiary pays principle for ensuring that healthcare does its fair share to address climatic change. I, however, only mentioned the beneficiary pays principle briefly in paper three’s discussion.

Integrationism is a key theme in this thesis, but I have been fairly narrow in integrating climate considerations and the goals of healthcare. Healthcare is facing a varied list of challenges: rising costs, aging populations, burned out staff, post-COVID

² On the idea of “promotional duties”, see Cripps, E. (2013). *Climate Change and the Moral Agent: Individual Duties in an Interdependent World*. Oxford University Press, pp.140–66.

³ See, for example, BBC News. (January 2025). GP suspended after climate protests loses appeal. Retrieved from: <https://www.bbc.co.uk/news/articles/cm216ej98nro>

⁴ Page, E. (2012) Give it up for climate change: A defence of the beneficiary pays principle. *International Theory* 4(2): 300–330. Page, E. (2008) Distributing the burdens of climate change. *Environmental Politics* 17(4): 556–575.

recovery, increasing complexity of individual's healthcare needs, rising inequalities including health inequalities, increased litigation, shifting expectations of healthcare, to name a few. In the day-to-day work of policymakers, managers and clinicians these features may weigh more heavily than thinking about decarbonising healthcare. Where clinicians are concerned with just getting through the day, managers are worried about overseeing budgets, and patients just want to be seen and have their needs appropriately addressed, decarbonising healthcare may be at best seen as a luxury consideration and at worst an inconvenience. How then can healthcare systems integrate these broad and varied concerns with achieving their goals and climate justice? Moreover, given the central concern of health justice, we might think about how societies achieve health justice alongside climate justice by integrating the broad range of factors that contribute to health not just healthcare.

10.4. Final reflections

Working at the intersection of health, healthcare, climate change and distributive justice is an exciting and interesting place to be. I am immensely fortunate to have had the opportunity to work at the cutting edge of this emerging area in bioethics and political philosophy. The goal of this thesis is to think about what principles of justice can help healthcare systems respond to their contribution to climate change fairly. I have focused on the NHS and sought to integrate healthcare's goals, traditionally understood, with the importance of healthcare doing its fair share to address climate change. As such I have tried to construct principles that are sensitive to the morally valuable role of healthcare whilst also providing a foundation for potentially radically transformative change towards environmentally sustainable healthcare systems. My hope is that my ideas provide sufficiently general normative guidance and have some practical import.

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