UN renews appeal to avert disaster in flood hit Pakistan

Pakistan is on the “verge of a public health disaster” after “unprecedented climate induced floods.” As its government launched an appeal for $81m (£73m), a fivefold increase on the previous request, officials warned that the destruction of public health facilities and water systems was putting millions at higher risk of malnutrition and disease.

The floods, affecting 33 million people, were caused by heavy monsoon rains that started in mid-July. An estimated 1600 people were killed, but Tedros Adhanom Ghebreyesus, WHO director general, warned many more lives could be lost if Pakistan did not get more support. “The water has stopped rising, but the danger has not. We are on the verge of a public health disaster,” he said, adding, “Unless we tackle the existential threat of climate change, we’ll be responding to emergencies like this and worse more often.”

Malaria, cholera, dengue fever, and skin infections were now rife in Pakistan, WHO said.

Millions at risk of famine in Somalia

Somalia is on the “front line of the global climate emergency,” with an expected fifth consecutive failed rainy season putting millions of people at risk of famine and disease, the UN has warned.

At least 41% of the country’s population is expected to face acute food insecurity in December, with parts of southern and central Somalia projected to be in famine between October and December if assistance is not scaled up.

More than 80% of the country faces severe to extreme drought conditions. Consecutive seasons of poor rainfall have resulted in near total crop failures, shortages of water and pasture, and soaring food prices.

Since November 2021, when Somalia declared a drought emergency, the number of people affected has more than tripled to 7.8 million, with more than a million displaced. Russia’s invasion of Ukraine has exacerbated the situation as Somalia sourced at least 90% of its wheat from Russia and Ukraine. It has also had less humanitarian aid as donors focus on Europe.

DISPLACED. Russia’s invasion of Ukraine has exacerbated the situation as Somalia sourced at least 90% of its wheat from Russia and Ukraine. It has also had less humanitarian aid as donors focus on Europe. High levels of violent conflict are another complication.

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HOPEFUL NOT HELPLESS
How doctors are trying to combat climate crisis

With COP27 taking place next month and after a year of climate related disasters, The BMJ speaks to doctors about how the profession can respond

Climate change is the greatest threat to human health we face right now,” says Hannah Chase, an FY1 doctor working in Oxford. “I don’t think there is a more appropriate and potentially effective group of people to communicate this than health professionals, including doctors.”

However, with so much climate doom, it can be hard to find the motivation to make changes. “I think if we say it’s hopeless then we’re doomed,” says London GP Jackie Applebee. “If you look at what’s happening to the climate, the heatwaves we’ve had this year, it’s not just something that’s coming. It’s here . . . We can’t afford to do nothing.”

But where to start? Doctors from the UK, Ireland, and US share their ideas.

Join national or international initiatives

Many initiatives worldwide are working to reduce the negative impact of healthcare on the planet and in turn the effects of climate change on health.

Irish family medicine registrar Oisín Brady Bates (see right), who leads the planetary health special interest group for the European Young Family Doctors Movement, recommends getting involved in groups like the one he leads but also the Centre for Sustainable Health Care, which helps health systems reach net zero, and the Planetary Health Alliance, which does research and education and aims to integrate planetary health into policy making.

The most impactful sustainability initiatives include investing in zero emissions buildings and infrastructure Sheetal Khedkar Rao

There are also the royal colleges. Last year the Royal College of Physicians’ council approved the creation of an advisory group on sustainability and climate change, while the Royal College of General Practitioners has its Climate and Sustainability Faculty Leads Group. The Royal College of Paediatrics and Child Health has several ways to get involved in its climate related work, including through its sponsored bike rides, campaigning work, and a working group.

If you’re looking for something more active, there’s Doctors for Extinction Rebellion, in which doctors take part in “non-violent civil disobedience” to get their message across. Applebee, who chairs the doctors’ branch of the union Unite, says, “I would urge anyone to join Doctors for Extinction Rebellion. You don’t have to glue yourself to something, you can just go along and support the people who are gluing themselves.”

Work with your local community

Alongside other doctors, Applebee has been working with the Stop Silvertown Tunnel campaign, a movement led by concerned residents who oppose a new tunnel that will increase traffic in their east London area.

“It will basically bring in more cars,” says Applebee. “We coordinated a letter with more than 100
Doctors should be considering planetary health and sustainable healthcare within their day-to-day work
Hannah Chase

[mainly doctors] signing it. We held a protest, we’ve been writing to London mayor Sadiq Khan, and we have just met with the political advisers for the Greater London Authority.”

She believes that looking outside of just the medical community is important because “we can’t do it on our own.” She says, “It’ll take a big, big movement to shift government. At the end of the day, any politician, whether they’re local councillors or the central government, cares about votes, and so it’ll take masses and masses of us to push. We can’t do it on our own.”

Lobby your workplace

“Physicians can encourage their leaders to commit to climate action,” says the US internal medicine physician Sheetal Khedkar Rao, a climate and health fellow at Health Care Without Harm. “The most impactful sustainability initiatives include investing in zero emissions buildings and infrastructure, powering healthcare with 100% clean, renewable electricity, and implementing sustainable healthcare waste management.”

Some hospitals in the UK are already looking to renewable energy. Earlier this year Castle Hill Hospital, on the outskirts of Hull, announced that it was now completely powered by its own solar energy, with Hull University Teaching Hospitals NHS Trust installing 11 000 solar panels.

Alex Best, the trust’s head of capital, says, “Not only does this represent a significant contribution towards our plan to become carbon neutral by 2030, but the project is also saving us a significant amount of money on hospital energy bills: approximately £250 000 to £300 000 every month.”

Change how you practise

“I believe doctors should be considering planetary health and sustainable healthcare within their day to day work,” Chase says, “whether that’s reducing single use items, rationalising prescriptions (as medicines are the largest contributor to healthcare’s carbon footprint), or talking to patients about related topics such as reducing meat in their diet.”

Bates agrees: “In terms of practical things that GPs can think about, prescribing is a huge area, inhalers in particular. Metered dose inhalers have a carbon footprint that’s 18 times that of dry powder inhalers.”

Just do something

There’s power in just joining the conversation, says Chase. “Being engaged and working with inspiring colleagues helps me stay energised and maintain some hope rather than feeling helpless,” she says. “I think it is natural to feel like our actions won’t make a difference in the global context, but the truth is we need both a bottom-up as well as a top-down approach, and shifts in personal choices on a large scale do influence decisions at the top. “Doing something is without doubt better than doing nothing.”

Oisín Brady Bates

The family medicine registrar talks about the importance of planetary health in the medical curriculum

“Planetary health relates to how human-caused disruptions to the environment affect human health. It’s also concerned with reduced food yields, increasing urbanisation, biodiversity loss, population density, and infectious disease risk. The pandemic really was a consequence of planetary health problems. “I did some work on this with the Royal College of Surgeons in Ireland last year, surveying medical undergraduates and interviewing educators. What I found is there is huge demand for planetary health to be part of the curriculum, but there is a knowledge deficit. Students know these topics are important, but they don’t know how they’re clinically relevant. So, we have to make students and educators aware of how these topics can impact a doctor’s practice.

“It’s crucial GPs are also involved. GPs are in a unique and powerful position in that they have a great rapport with the patient cohort. They can instigate change and influence behaviours quite effectively. They’re also versed in disease prevention and catching diseases early, which is crucial in terms of planetary health.

“The NHS is responsible for 5% of the UK’s carbon footprint, and primary care makes up nearly a quarter of that. In general practice, prescriptions account for at least 65% of the carbon footprint, so GPs can have a huge impact by switching to more environmentally friendly prescriptions and being more conscious of prescription habits. They have the ability to promote positive planetary practice among patients through things like green social prescribing. Around 80% of chronic disease is preventable by tackling diet and lifestyle factors, and often these changes are good for the planet as well as good for patients.

Bates is based in Ireland and leads the European Young Family Doctors Movement’s planetary health special interest group.

Boards can instigate change and influence behaviours

Elizabeth Mahase, The BMJ

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THE NHS is responsible for 5% of the UK’s carbon footprint

Elizabeth Mahase, The BMJ

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The aftermath of Hurricane Ian that swept through Fort Myers Beach, Florida, on 28 September

A farmer among the carcasses of his livestock as drought threatens 2.8 million people in Kenya with starvation

THE BIG PICTURE

The challenge for COP27

Governments, organisations, and activists are preparing for COP27 in Egypt next month, in a year in which the world has been hit by a range of climate related disasters, from hurricanes and heatwaves to long term droughts and massive flooding. The UN states categorically that “climate change is the single biggest health threat facing humanity” that is already taking the lives of 13 million people a year. Will this year’s global summit be able to make a difference?

Alison Shepherd, The BMJ

Cite this 2022;379:o2433
A man carries his two daughters through his flooded village in Companiganj near Sylhet, Bangladesh, in May.

Tidal trenches formed by tidal washout after drought in Yancheng city, Jiangsu province, China last week.
Mobilising hope to overcome climate despair

Hope is prerequisite to achieving change

It is impossible to ignore the damage humans have inflicted on our planet. 2022 brought new record temperatures, floods, storms, wildfires, and droughts across the world. These events threaten the health of humans, wildlife, and habitats, and are wreaking permanent destruction on earth systems. The effects of climate change on human physical health are well established. They include traumatic injuries, respiratory and cardiovascular diseases, infectious diseases, and hunger, and emerge through diverse pathways. But evidence is growing that the climate crisis threatens mental health and wellbeing as well. This is exacerbated by an increase in highly visible, extreme, prolonged, and frequent climate related events.

On a global scale, and across age groups—with perhaps a heightened effect on young people—climate change increases the risk of post-traumatic stress disorder, anxiety, depression, and suicide. Climate effects that may not seem directly health related, such as crop failure, loss of livelihood, and displacement, also undermine mental wellbeing. Degradation of living and working environments, forced migration, and displacement all cause long term psychological distress.

Disadvantaged communities are more affected by the negative mental health effects of climate events.

Grassroots movements have a vital role in influencing government actions

Growing media and social media coverage of the situation, including a growing genre of “doomer” literature, promotes a sense of despair, hopelessness, and sealed fate. Government inaction adds to this loss of hope, especially when decisions they do make are detrimental to the climate. Younger people are prone to climate related negative mental health because of their increased awareness of the climate emergency and a lack of support to help manage their concerns. The climate crisis is already playing into the life decisions of young people, some of whom are opting out of higher education or choosing not to have children. In an international survey of 10000 16-25 year olds across 10 nations, 73% agreed that the future is frightening, 56% agreed that humanity is doomed, and 68% reported sadness, feeling afraid, anxious, and powerless.

In England, 57% of a sample of child and adolescent psychiatrists reported seeing children and young people who are distressed about the climate crisis and the state of the environment, and 47% of participants aged 18-34 in an American Psychological Society survey of 2017 adults in 2020 reported that the stress they feel about climate change affects their daily lives.

This distress goes by many names: eco-distress, eco-anxiety, climate anxiety, pre-traumatic stress syndrome. There is not yet a formal diagnosis, but what is clear is that these feelings are widespread and doctors will need to develop strategies to support patients who present with these symptoms.

While hope may seem quite abstract, there is longstanding evidence that it is an important tool to protect wellbeing and foster activism in the face of adversity. Hopelessness, on the other hand, is associated with withdrawal, disengagement, and a sense of passive acceptance. Evidence shows that hopeful people are happier than hopeless people. Hope doesn’t close any doors and leaves the future open to possibilities. In the context of the climate crisis, a hopeless outlook sees a foregone conclusion, whereas a hopeful one can foster change and action. As understandable as hopelessness is given the state of our world, hope offers a route to changing our future.

Hope inspires

Hope is also different from optimism. Optimism is a certainty that things will turn out well; this may lead to complacency and failure to take action to ensure a desired outcome. Hope, on the other hand, is more action focused. Hope inspires people to make plans to reach their intended target. This is valuable in a clinical context, and hope can be used as a therapeutic tool with clinical benefits.

We should take inspiration from young activists who are harnessing hope to drive positive change. There is precedent in history with the success of civil society movements advocating for change on health concerns. In the 1980s, AIDS advocacy groups were crucial in raising awareness, pushing for change, and challenging attitudes. We must remember that grassroots movements have a vital role in influencing government actions as the 2022 UN climate change conference (COP27) approaches.

Finally, hope is an act of defiance. It suggests resilience, power, and a will to change. In the face of government and corporate inaction, when many governments are acting in ways that worsen the climate crisis, maintaining hope suggests an alternative future. Hope will not solve the deep seated problems or realities that humans face. But hope, individual and collective, for young and old, is an indispensable asset in tackling the climate crisis.
Climate related migration and displacement

We must prepare health systems for rising numbers of people on the move

Involuntary displacement of people by climate hazards generates substantial challenges for human health and health systems in all countries. Over 20 million people annually are displaced by floods, extreme storms, droughts, wildfires, and other weather related hazards. Climate change has already increased the frequency, intensity, and duration of some hazards, with further increases projected in coming decades. Rising sea levels are creating additional risks for hundreds of millions of people living in low lying coastal areas and small island states.1

With further climate change, the number of people on the move is almost certain to rise. By how many will depend on future levels of gas emissions, socioeconomic development trajectories (especially in low and middle income countries), and, to a lesser extent, international policies.3 4

Most climate related migration occurs within countries.5 Not all people who experience a climate hazard move. Those that do usually remain within their home country or go to countries within the same region. Decisions to move (or stay) and where to move to are mediated by various social, economic, cultural, and other factors and are consequently linked to wider climate adaptation processes.6 7

Climate related migration is thus context specific and can range from changes in voluntary migration to sudden pulses of large scale, involuntary displacements, which can create immediate and acute challenges for health and health systems. All forms of climate related migration will present challenges in coming decades.8 9

Threats to health and health systems
Climate change is increasing deaths related to heatwaves and to changes in the distribution of certain vectorborne diseases. Over coming decades, it is expected to increase the health burdens associated with waterborne and foodborne diseases, non-communicable respiratory diseases, malnutrition, mental health conditions, and injuries from extreme events.1

The magnitude and pattern of future burdens will depend on the extent of adaptation and mitigation.10 Older adults, women, children, indigenous populations, and people with pre-existing health conditions are often disproportionately vulnerable, with socioeconomic inequalities magnifying risks for such populations.

Migrants, particularly those involuntarily displaced, are more vulnerable than resident populations because they often have lower access to healthcare, occupy substandard housing, and have limited financial means. These challenges are magnified in low and middle income countries with weak health systems, although people displaced by extreme events in high income countries also face disproportionate risks, as experienced by Louisiana communities after Hurricane Katrina.11 12

Health systems must manage the effects of extreme events on their staff and their ability to provide services, in addition to managing short term surges and increased longer term demand for care. Such increased demand has compounding effects on other services, such as postponement of treatments, with clear implications for patients. The financial effects on health systems are also expected to grow.

Planning and investment to deal with migration and displacement should make communities and health systems more climate resilient.1 More investment in disaster risk management, response, and prevention are pressing needs across all nations and communities.

Investments in communities will also be necessary, particularly those most likely to experience surges in local demand for healthcare or inflows of migrants (such as low income urban neighbourhoods that are in or near locations highly exposed to climate risks). In such areas better connections are needed between healthcare providers and migrant support services.

Access to healthcare
Governments must ensure that all migrants have comparable access to healthcare to established residents and are not excluded based on residential status or citizenship. In low income countries with weak institutions, multilateral organisations and international development agencies will need to provide investment and commitment to build resilient food, water, and sanitation systems that enhance households’ capacity to cope with climate related disruptions. People should not be obliged to migrate involuntarily in search of food, as is happening in the Horn of Africa.1

Communities that have to be moved away from high risk locations need particular attention to ensure their health and wellbeing are not compromised.13 Finally, because migrants may bring diseases and conditions not common in receiving areas—or may encounter new diseases—investments in health surveillance and early detection that consider such possibilities are important priorities.14

Climate change is amplifying the drivers of migration and displacement, negatively affecting population health and putting additional strain on health systems. Additional investment is needed now to support these vulnerable populations and communities.

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COP27: What can we expect from this year’s world climate change conference?

The BMJ explains the outcome of last year’s governmental gathering and whether this one will bring any new action for the health of the planet and its people.

What, and when, is COP27?

The 27th United Nations Climate Change Conference (COP27) will take place in Sharm el-Sheikh, Egypt, from 6 to 18 November. It will be attended by government representatives and observer organisations, such as charities, from around the world.

What happened at COP26?

In Glasgow, Scotland, between 31 October and 12 November 2021, COP26 saw 50 countries commit to creating climate resilient, low carbon, and sustainable health systems, with 14 (including the UK) setting a target of net zero emissions by 2050.

At the summit 100 countries, which together account for about 85% of the world’s forests, promised to stop deforestation by 2030, and a plan to cut methane emissions by 30% by 2030 was agreed by more than 100 countries.

However, there was frustration at the end of the summit over a watered-down climate deal. In a first for a COP, a plan to reduce coal fired power generation had been agreed, but objections from India and China led to the text being weakened from an agreement to “phase out” coal to a commitment to a “phasedown of unabated coal.” Unabated coal is a phrase used to describe the burning of coal without some form of carbon capture to reduce carbon dioxide emissions.

Writing in The BMJ after the conference, the writer and ethicist Julian Sheather said, “COP26 has made it clear that polluters still hold the whip hand, both in government and industry. But it has also made it clear that the fury of the environmentalists is growing louder by the day. Time for us all to reach for our megaphones.”

We want this COP to be about moving from pledges to implementation

Rania Al-Mashat

What is expected from COP27?

Egypt’s minister for international cooperation, Rania Al-Mashat, has said she wants COP27 to be about practicalities. “What we want this COP to be about is moving from pledges to implementation… What is it that we need to do to operationalise the pledges into implementation?” she said in the Guardian earlier this year. As part of this, one of the issues Egypt seems to want to focus on is finance, and in particular financial assistance for developing countries.

COP27 will also see the new Forests and Climate Leaders’ Partnership (FCLP) established—building on that commitment from COP26—with each country expected to commit to leading by example in at least one action area, such as ensuring that forest economies contribute to a net zero world or sustainably managing high integrity forests.

The COP26 president, Alok Sharma, former UK secretary of state for business, energy, and industrial strategy, said, “At COP26 we saw incredible ambition, with more than 140 countries committing to halt and reverse forest loss by 2030. This partnership is a critical next step to collectively deliver on this promise and help keep the goal of limiting global warming to 1.5°C alive.”

However, a big part of keeping that 1.5°C target alive relates to reducing global greenhouse gas emissions. Specifically, global emissions must halve by 2030 and reach “net zero” by 2050. Despite this, emissions are still increasing, with the UN reporting that current national climate plans are expected to see a 14% increase in emissions by 2030, when compared with 2010 levels. It is not yet clear whether COP27 could change this course.

Will the war in Ukraine and the energy crisis affect the outcomes of COP27?

Zambia’s Mwepya Shitima, the chair of the African Group of Negotiators (AGN) on climate change, told the UN that the energy crisis is likely to set back progress on the climate agenda while more countries search for alternative energy resources. He said, “But as we go back to the negotiations, our hope is that it shouldn’t affect the outcome, as the multilateral process is guided by its rules and guidelines, irrespective of the geopolitical situation, and should not make us lower our expectations.”

Will COP27 tackle “climate injustice”?

Climate injustice is a term used to describe the situation in which countries that contribute the least to the climate crisis nevertheless pay the highest price.

Africa contributes less than 4% of global emissions. President Ali Bongo Ondimba of Gabon reports that 22 million people on the continent are facing starvation and that climate change is responsible for droughts, extreme famines, and the displacement of families. African countries hope that COP27 will tackle climate injustice. During Africa climate week at the end of August the COP27 president, Sameh Shoukry, Egypt’s minister of foreign affairs, said, “Africa is obliged, with its already limited financial means and scant level of support, to spend around 2-3% of its GDP per annum to adapt to these impacts, a disproportionate responsibility that cannot be described as anything other than ‘climate injustice.’”

“We will spare no effort to assist parties in engaging in a frank, constructive, and dynamic dialogue that addresses loss and damage, including the central issue of new and additional finance dedicated thereto.”

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We want this COP to be about moving from pledges to implementation

Rania Al-Mashat
It is no secret that man made chemical emissions pose risks to human health, but nitrogen dioxide and particulate matter produced by cars are killing people every day.

While nitrogen dioxide comes from motor vehicle emissions, particulate matter is a result of vehicles, specifically tyres, and brake wear. According to the Health and Air Pollution in New Zealand (Hapinz) study, based on the latest available complete data (from 2016) and published earlier this year, nitrogen dioxide emissions have caused 2000 premature deaths, 2000 cardiovascular related hospital admissions, 6500 respiratory related hospital admissions, and an asthma prevalence of 13 200 every year. Meanwhile, particulate matter caused 1300 premature deaths, 2600 cardiovascular related hospital admissions, and 2000 respiratory illnesses. The researchers estimated that in total this has created 1.745 million restricted activity days (defined by the study as “days on which people could not do the things they might otherwise have done if air pollution had not been present”).

Samuel Cai, a lecturer in environmental epidemiology at the University of Leicester, says that though the figures might seem low compared with the UK and other European countries, they have led to a “profound finding.”

“The report says that 3300 deaths would represent about 11% of total deaths in New Zealand in 2016. That is remarkable because it means that roughly one in 10 deaths can be linked directly to air pollution.”

“Apart from that, the Hapinz study, published earlier this year, showed that in 2016 alone nitrogen dioxide emissions have caused 2000 premature deaths.”

“Also, the impacts of nitrogen dioxide appear much higher than that of particulate matter when it comes to overall mortality,” he says. “And for respiratory diseases and hospital admissions, rates are almost three times higher for nitrogen dioxide.

“Sometimes both these air pollutants are highly correlated but now there is evidence to show that nitrogen dioxide does have independent effects on mortality and on other diseases, such as respiratory disease.”

Gerda Kuschel, Hapinz lead researcher and chemical and materials’ engineer, says, “We didn’t know how bad it was. The total number number of deaths is still horrifying.

“But at least we’re now aware of what is truly going on, and I would hope to see that number reduce.”

Avoid, shift, and improve

Kuschel says that in New Zealand the framework for tackling car pollution is “avoid, shift, improve.”

“If you can avoid the trip, you do that; if you can shift to transport that is less polluting, that’s good; and if you can’t, you try and improve efficiency—such as taking a diesel bus and making it electric.”

Sandra Green, Car Free Birmingham campaigner for climate charity Possible, says, “We used to think cars only killed people if they crashed into them, but now we know that motor traffic threatens our health in many more ways.” She points to a 2019 study in Bristol which showed that a child born in 2011 could die up to six months earlier if exposed to such pollution throughout their lifetime.

Jess Berentsson-Shaw, a research associate at the Public Policy Institute at the University of Auckland and another collaborator on the Hapinz study, says it is for government to implement changes effectively and quickly.

“In New Zealand, communities are working hard to overcome these problems. In South Auckland, for example, there are a number of community initiatives to provide bikes and e-bikes, as well as the means to service them—but that isn’t going to get people out of their cars at the scale we need,” she says.

“Without people in government providing more options in terms of public transport, calmer streets, denser urban centres, and protected cycle networks—to ensure children and women, especially, can use bikes to get around and be protected—it is very hard for people on low incomes, those with multiple jobs, students, children, older people, and disabled people to travel across their own streets.”

Cai agrees. “Policy would be the most effective way to reduce air pollution exposure and protect public health.”
Policy in action

In 2019 London mayor Sadiq Khan introduced an ultra low emission zone across parts of the capital; this operates 24 hours a day, seven days a week. It restricts cars that do not meet certain emission standards from entering the designated zones.

School Streets is another initiative that operates across London. At certain times of the day it restricts cars from entering roads where schools are located, to help protect children physically and from car emissions. The UK government also wants to ban the sales of new petrol and diesel cars by 2030.

Brussels has introduced a regional mobility plan that focuses on providing efficient public transport and spaces to encourage walking and cycling, while also meeting the physical needs of local people. Actions being taken include redeveloping some roads into multimodal urban boulevards, creating pedestrian lines to link regional hubs, and developing a network of privileged cycle routes. Other plans include reducing the need for a personal car and encouraging car sharing and carpooling.

The incentives for such action are clear—with the high rates of hospital admissions and mortalities there is a great financial burden. Hapinz estimates that the cost of health impacts of man made air pollution in New Zealand alone came to a total of NZ$15.6bn.

Cai says, “We all know that air pollution is a major health hazard for most of the population. This figure considers the direct effect of air pollution on the health system, but also loss of life and reduced quality of life because of the diseases associated with air pollution, as well as loss of productivity.”

Kuschel says she went through a range of emotions when analysing the figures, “We really did not—and nor did anybody else—expect the impacts of air pollution to be this bad.

“I suppose I’ve become more hopeful—mortality and the numbers around health impacts are very high and if this doesn’t get people to start tackling vehicle emissions seriously, I don’t know what will.”

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OPINION Kent Buse and colleagues

A wellbeing economy focused on planetary health should be top of the COP27 agenda

Delegations converging in Egypt for the Conference of the Parties must set their sights on a fundamental economic reset with the health of the Earth at its core

Reaffirming pledges to net zero targets, and ambitious nationally determined contributions in efforts to reduce global heating are to be welcomed at the 27th session of the Conference of the Parties (COP27) to the United Nations Framework Convention on Climate Change.

But without reimagining markers of societal progress and tackling the root causes of global ecological disruption, these efforts will be in vain. The climate emergency provides a powerful rationale for replacing the extractive, growth fixated, exploitative economic system. So too does the increasing risk of pandemics, the biodiversity crisis, and rampant inequality within and between countries.

The agenda for the COP27 summit must not neglect or silence these connected crises.

Patterns of economic growth since the industrial revolution have caused multiple crises that need urgent redress. A continued focus on unfettered growth will only intensify the problem—making it harder to decarbonise and pushing up the costs of natural disasters emanating from ecosystem disruption and global heating.

The true value of assets is not reflected by the prevailing economic model. In particular, the use of gross domestic product (GDP) as a metric of successful governance is problematic, as it doesn’t account for the depreciation of the biosphere and the harmful impacts of economic activities, nor does it take account of insecurity, lack of social cohesion, and inequality.

Markets continue to overvalue assets such as fossil fuels by ignoring their harmful consequences on ecological systems. Equally, assets that contribute to climate crisis mitigation, such as forests and mangroves, have been undervalued and consequently depleted. Worse still, taxpayers’ money is used to subsidise the fossil fuel industry—already making extraordinary profits—by $5.9tn in 2020.

According to the International Monetary Fund, this is expected to increase to $7tn by 2025. As the Rockefeller Foundation-Lancet Commission on Planetary Health put it, “we have been mortgaging the health of future generations to realise economic and development gains in the present.”

Fundamental shift

The Intergovernmental Panel on Climate Change and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services argue for a fundamental and collective shift, especially in “moving away from a conception of economic progress based solely on GDP growth, to one of human development based on inclusive wealth and which considers the multiple values of nature for a good quality of life while not overshooting biophysical and social limits.”

Enter the wellbeing economy. It places health, social, and ecological goals as the organising
principles of economic activity and government policy, recognising human wellbeing within planetary boundaries. It adopts alternative metrics of progress that assess policy and investment against criteria concerned with the holistic wellbeing of people and planet.

As the economist Kate Raworth put it, “What we need are economies that make us thrive, whether or not they grow.” Fellow economist Katherine Trebeck, co-founder of the Wellbeing Economy Alliance, argues that “the economy is a means to an end, not an end in itself. It is an economy which regenerates nature, an economy where collaboration trumps competition, an economy where activities and what organisations do is purposeful, not simply just to make money. And which is financed by a stable, fair, and socially useful financial system that serves the real economy for the long term.”

Several governments have been experimenting with wellbeing economy approaches. New Zealand published its first Wellbeing Budget economy approaches. New Zealand experimenting with wellbeing economy for the long term.” Fellow economist Katherine Trebeck, co-founder of the Wellbeing Economy Alliance, argues that “the economy is a means to an end, not an end in itself. It is an economy which regenerates nature, an economy where collaboration trumps competition, an economy where activities and what organisations do is purposeful, not simply just to make money. And which is financed by a stable, fair, and socially useful financial system that serves the real economy for the long term.”

Several governments have been experimenting with wellbeing economy approaches. New Zealand published its first Wellbeing Budget in 2019, whereby departmental plans need to be assessed against wellbeing criteria, and Wales introduced the first Wellbeing of Future Generations Act in 2015. These countries, along with Canada, Finland, Iceland, and Scotland, have entered a Wellbeing Economy Governments partnership to collaborate on innovative policy approaches that deliver on wellbeing.

The covid-19 pandemic showed that major, rapid shifts in government policy are possible. The wellbeing economy agenda represents a more fundamental reorientation of systems. First, it questions the basis of how we think about what matters. Second, it challenges a set of dominant narrow interests that have established an economic structure and supportive political and financial institutions to sustain capital accumulation, yet which lead to climate catastrophe.

Understand and communicate

The Wellbeing Economy Alliance launched a Wellbeing Economy Policy Design Guide in 2021 that includes resources for policy makers at all levels to understand and communicate wellbeing visions, identify areas of life most important for wellbeing and how to manage trade-offs, and how to co-create, assess, and evaluate wellbeing economy policies.

We call on the public health community to mobilise society to demand that governments create the conditions for wellbeing economies

We call on the public health community to mobilise society to demand that governments create the conditions for wellbeing economies and that their delegations negotiating the text at COP27:

1 Agree urgent actions that will support holistic and longer term horizons concerning ecological disruption by recognising and reaping the co-benefits of addressing the extraction, over-consumption, and profiteering that lie behind not just the climate crisis but also the crises of ill health, inequity, and biodiversity loss.
2 Prioritise the current and future health of people and the planet by adopting Nationally Determined Contributions with a health and wellbeing lens, with a particular focus on communities at greatest risk.
3 Commit to exploring context specific, wellbeing economy approaches in all government policies, addressing the social and commercial determinants of health while respecting planetary boundaries. This may be achieved by taxes and subsidies based on the extent of regeneration, and ensuring private sector goods and services reflect both their environmental and health impacts.
4 Advance inclusive policy making to maximise health equity, by meaningfully engaging with communities experiencing marginalisation, including young people, indigenous and tribal communities, and feminist perspectives when determining priorities and solutions for climate crisis mitigation and adaptation.
5 Deliver a new generation of climate finance, given failures of high income countries to meet 2020 commitments, tendencies to report Official Development Assistance as additional climate finance, and the inadequacies of existing schemes such as the African Climate Change Fund.

The transition to a wellbeing economy calls for system change and hence will not be an easy one. However, by addressing the root causes of environmental change, there will be less need for costly downstream interventions that serve as short term fixes for a much wider problem.

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Happiness that doesn’t cost the Earth

With a limited carbon budget, we need to start asking what really makes us happy

Everyone has a basic human need for a happy and fulfilling life. For many, this is becoming increasingly difficult to achieve during a period of economic upheaval and rising energy prices. With the climate crisis looming large and internationally agreed temperature limits looking precarious, it is imperative that we rapidly reduce emissions that threaten the wellbeing of people around the world.

This presents a dilemma: at both the policy and personal scales, wellbeing has conventionally been pursued through increasing income and greater consumption of goods and services; yet—leaving aside inflationary pressures to earn more in order to stand still—higher levels of income and consumption are themselves among the strongest drivers of greenhouse gas emissions.

Fortunately, a careful unpicking of these connections shows routes to accomplishing a good quality of life at the same time as pursuing effective climate action.

Measures of subjective wellbeing and life satisfaction—happiness, by other names—do increase in general with personal income and a nation’s GDP. However, this is a more complex relation than is often assumed. For those on lower incomes, who may be struggling with the cost of living, substantial gains in life satisfaction can be had from even modest improvements in material circumstances. But higher levels of income lead to ever diminishing returns, with some research even indicating that the association between income and happiness are themselves among the strongest drivers of greenhouse gas emissions.

Many sources of happiness are not contingent on consumption behaviours

the poorest half of the world’s population. High levels of income may have questionable benefits for life satisfaction, but they have been unquestionably damaging to the planet. Given the world’s rapidly diminishing carbon budget, any further use of fossil fuels is much better directed towards lifting people out of poverty, a task that could be achieved with relatively small increases in global emissions.

Distribution of wealth

The happiness of a society does not depend solely on its overall wealth, but rather on how that wealth is used and distributed. Within Europe, nations with strong healthcare and education systems provide the best foundation for citizens’ life satisfaction. More equal societies perform better on a wide range of societal indicators including stress, anxiety, depression, and addiction; analysis of the US over a period of decades has shown that people have on average been happier during periods of relative equality in income.

The good news is that those same societal conditions that underpin people’s wellbeing—higher quality public services and health coverage, as well as greater income equality—are able to do so with relatively low levels of energy use. More unequal societies can require as much as twice the energy consumption to secure decent living standards, compared with that needed in a more egalitarian set of circumstances.

It is also worth considering which types of activities or ways of spending one’s income are most closely linked to happiness. Is it a weekend shopping trip across the Atlantic, or a walk in a nearby wood with friends?

Research from positive psychology shows that many sources of happiness—whether linked to a person’s disposition or way of life—are not contingent on consumption behaviours or much, if any, use of energy. Happiness can come from being kind to others, spending time in nature, listening to music, or even just daydreaming. In richer countries at least, it would appear there is little connection between a person’s level of energy use and how happy they are. In terms of our engagement with consumer society, a more materialistic mindset and lifestyle has been reliably shown to have a negative relation with subjective wellbeing.

A final piece of the jigsaw is the reciprocity between environmentally friendly practices and happiness. A range of studies has shown not only that sustainable lifestyles and a happy life are compatible but that each can reinforce the other. Doing things that are positive for the environment can help to meet people’s desire to live according to their values; at the same time, people who are happier in themselves may be more inclined to be good citizens. The link between green lifestyles and happiness has been observed across a range of behaviours, but appears strongest for actions that require personal effort or interactions with others. Cross national research we have carried out has found that green behaviours such as conservation volunteering and buying environmentally friendly products are associated with subjective wellbeing in countries including India, China, Brazil, and the UK—with no evidence that these effects are moderated by personal income or national wealth.

All told, some of the most valuable uses to which energy and consumption can be put are to meet people’s needs, quality of life, and personal happiness efficiently and equitably. With only so much carbon left to go around, it’s time to ask what really makes us happy, and whether that needs to cost the Earth.
There doesn’t need to be a trade-off between sustainability and the cost-of-living crisis

Planetary health, zero carbon emissions, and advancing health equity can, and must, go together

There is a siren call: use the market to save the planet. Tax carbon or use other price signals to reduce demand for energy. But there is also a problem, as President Macron of France discovered in 2018. He raised the price of petrol for environmental reasons, which led to a different type of demand. The Gilets Jaunes movement, outraged at the threat to living standards, demanded his head, figuratively. In the face of unrest, Macron backed down.

The price of energy has soared, but to say that demand has dipped does not capture the reality. People are at risk of freezing to death this winter as they can no longer afford to heat their homes. Three issues are at play here. First, distribution is crucial. Rich people may find a rise in energy bills an inconvenience. For those on low incomes—the 60% of UK households who, without intervention, face fuel poverty—the rise makes problems of poverty dramatically worse. This leads to the second problem. Energy is not like caviar or designer handbags. If the price of luxuries rises, people may consume less (or more as a form of extravagant display). But energy is fundamental to life. Consuming less home heating will lead to real suffering.

In our recent report, *Fuel Poverty, Cold Homes and Health Inequalities*, we point out that fuel poverty implies being both cold and poor. The consequences for health and health equity are potentially dire. Growing up in a cold home damages lungs and has an adverse effect on mental health and development. In adults, similarly, cold damages lungs and the cardiovascular system. The UK already has excess winter deaths.

Energy is not a luxury like caviar or designer handbags, consuming less home heating will lead to real suffering

Living in poverty damages health through lack of the basic necessities for life—food and shelter principal among them—and the struggle to make ends meet leads to increased risk of mental illness that, in turn, damages children’s health and development. Evidence shows that the greater the number of times a child is in poverty by age 14, the greater the chance of obesity, the worse performance on language tests, and the greater the likelihood of depression.

Market fundamentalism

The third issue is the lesson the pandemic should have taught us. We cannot rely on the market alone to solve issues of major importance to national health and wellbeing. Market fundamentalism ran into the buffers in March 2020. The pandemic, lockdowns, and dramatic instability in stock and bond markets led to massive government interventions. In 2020 alone, governments in rich countries issued £18tn of new debt, half of which was bought up by central banks. In the UK, a Conservative government ditched the austerity orthodoxy of the post 2010 government and declared a public spending bonanza—whatever it takes.

Faced with daunting levels of fuel poverty in the UK, the prime minister, Liz Truss, and her chancellor Kwasi Kwarteng, within three days of taking office produced an aspiration, more than a plan, to freeze energy prices, at a cost of around £150bn. This was followed by a mini-budget, which announced tax cuts for the rich, and will most likely be followed by cuts in public spending and benefits. The impact of the budget is increasing inequalities and doing little else to address rising household costs, all contributing to widening health inequalities and the cost-of-living crisis.

But the crisis should not be an alibi for dropping measures to achieve net zero. When windfall taxes were imposed on energy companies, this spring, Rishi Sunak, then chancellor, allowed rebates for more investment in fossil fuel development. Truss, when campaigning, announced her intention to remove green levies from energy bills, despite its contribution to easing the cost-of-living crisis being small.

In a report, *Sustainable Health Equity*, prepared for the Climate Change Committee, we laid out ways that sustainability, achieving net zero carbon emissions, and advancement of health equity can, and must, go together. The four domains we considered were: housing, food, work, and transport. Running through all of it was the need to reduce air pollution.

Each of these four domains is highly relevant to the cost-of-living crisis. Take housing: in 2013, the government stopped investing in home insulation. Investment in affordable housing, with good thermal properties, has to be a priority to help tackle the cost-of-living crisis and the climate crisis.

Plant based diet

When it comes to food, we know that a plant-based diet is better for achieving net zero and healthier than one based on meat. But there is a cost premium associated with healthy eating. It is urgent to address it.

Research suggests a four day working week would reduce the UK’s carbon footprint, but that seems like a pipe dream, at least in the public sector. With the government sanctioning wage settlements well below inflation, the idea it might pay the same wage for a four day week seems a stretch.

Transport, based on walking, cycling, and subsidised public transport, is good for the planet, has health co-benefits, and is good for equity. But it relies on the government investing in infrastructure to attract people out of their cars.

The fuel poverty crisis has to be addressed with urgency. But now is also the moment to address the longer term issues of sustainability and health equity. There need be no trade-off between them. Both will require social action in addition to whatever the market can deliver.

Michael Marmot, professor and director, UCL Institute of Health Equity, UCL

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Join the fight against fossil fuels
A socially just ecological future is possible

In September, the World Health Organization, along with hundreds of other health organisations, signed a call for a Fossil Fuel Non-Proliferation Treaty (FFNPT)—a proposed framework for a legally binding transition away from fossil fuels in line with keeping global warming below 1.5°C.

The proposed treaty calls for action in three areas: non-proliferation of any new fossil fuel projects; a fair phase out of existing production, with responsibility for the greatest work falling the most on wealthy countries; and the fast tracking of a global just transition for workers, communities, and countries.

A rapid phase out of fossil fuels is essential. The world is on track to produce more than twice as much coal, oil, and gas by 2030 than is consistent with limiting the rise in global temperature. Even if we exceed 1.5°C, we must not give up. Companies want every last drop of oil and gas, even as we hurtle towards ecological collapse. We must fight them over every drop.

The fossil fuel industry is built on harm, violence, and pollution, killing millions of people each year. In the UK, there will be record numbers of people in fuel poverty this winter and record profits for energy companies.

The forces working against us are phenomenal. Jacob Rees-Mogg, business, energy, and industrial strategy secretary, and a known climate denier, has said he wants to drill “every last drop” of North Sea oil and gas. The prime minister, Liz Truss, has pledged to “clamp down” on climate activists. The international Energy Charter Treaty is being used to block action, banks continue to finance the industry, and forces are regularly deployed across the world to protect fossil fuel “assets.”

The health community must use its large membership and public interface to encourage more organising and campaigning. Those of us based in the global North must target the expansion of oil, fracking, and gas. The UK has just announced plans for a new oil and gas licensing round. This includes the largest undeveloped oil field in the North Sea, Rosebank, which would create more CO₂ than the combined emissions of all the world’s 28 low income countries. Taking on this industry requires diverse tactics, including civil disobedience, protest, legal action, and local community organisation.

Violent colonial capture of land and resources to feed the wealth of the rich is at the core of the fossil fuel industry. Those on the frontlines of expansion face violence, criminalisation, and militarisation. Despite the violence used against indigenous people it is estimated their resistance has averted 25% of Canadian and US emissions. The health community must provide support, financial and political, to those who have been most effective at resisting fossil fuels and whose lives are most at risk.

Much like the health community’s fight against the lies of the tobacco industry, we can work to remove the social licence that holds

Climate policy and activism need to make space for disabled people

Last year at COP26, inaccessibility was briefly the subject of media attention when it was reported that Israel’s energy minister, Karine Elharrar (left) couldn’t access the conference centre in Glasgow. But lack of access for the one billion disabled people across the world doesn’t stop at the built environment: it is multifaceted and embedded in the wider climate action movement and the political and policy frameworks that govern and influence it.

Climate change disproportionately affects disabled people as it widens health and socioeconomic inequalities and threatens to destroy or damage the physical environment, which includes accessibility features such as ramps and lifts, as well as resources and equipment disabled people rely on. Moreover, 80% of disabled people live in developing countries, where the most severe effects of climate change are seen and will continue to be experienced in the years to come.

Disabled people are more likely to be killed or injured during an adverse weather event caused by the climate crisis, yet are overlooked in local and national emergency disaster planning and preparedness. Extreme climate events can worsen or cause flare-ups of existing conditions, and new infections or illnesses can arise by contamination through dirty water, animals, and insects. Climate emergencies can also restrict access to medication, including vaccines, and social care.

The loss of personal equipment (which is often expensive, customised, and not easily replaceable) is another risk specific to disabled people. During extreme climate events, accessible features of the built environment are at risk of being destroyed and not rebuilt. Disabled people who have underlying health conditions are also disproportionately affected when healthcare facilities are destroyed or damaged. Disabled people constitute some of the poorest people in the world, and climate change threatens their sources of income. All these risks are heightened when climate events cause migration, as disabled people are less likely to be included in evacuation plans and to find the support they need in shelters and temporary accommodations.

Despite this disproportionate risk, the disability community hasn’t been at the

The UK’s Net Zero strategy didn’t contain an explicit reference to disabled people

OPINION Pauline Castres
The health community must make reparations a mainstream priority

up the fossil fuel industry. We can call out its false claims, highlight its health harming practices, and support calls to exclude it from negotiations. In particular, we must reject including the industry as part of the “solution” to a problem it created.

Beyond phasing out existing supply and non-proliferation, the FFNPT calls for a just transition away from fossil fuels. This term usually refers to retraining for workers and protecting consumers from high energy prices. In a global context it puts the onus on wealthy, high emitting countries to phase out more rapidly and to give financial and technical support to low and middle income countries as they move away from fossil fuels. Rich countries and the industry have almost completely ignored this demand. To achieve global justice, our demands must go further.

Ending the expansion of fossil fuels is not enough for the communities whose water, air, and soil has been polluted, resulting in death, ill health, collapse of farming infrastructure, and poverty. Pollution, risk of spills, and other damage stay in ecosystems for decades after an oil field has closed. New research analysing the “slow violence” of pollution across 3033 environmental conflicts in the world found that “mobilising groups are reluctant to consider the closure of a polluting project a successful outcome because of the persistence of toxic pollution across time.”

Ken Henshaw, of We The People Nigeria, writes in the New Internationalist that “the definition of just transition has to include repairing the damage occasioned by oil pollution, an audit of the health of the people, and a plan to respond to the threats posed by climate change. A just transition must also provide justice for the countless victims of oil-company-inspired and state-sanctioned abuses, and reparations to the people of the Niger Delta for decades of expropriation.”

Rich countries must not be allowed to provide crumbs of “climate financing” through loans which are only likely to strengthen cycles of debt injustice. They owe reparations. A third of Pakistan is under water, despite contributing only a miniscule amount of global emissions—the case for reparations is indisputable. Rich countries owe reparations for the climate crisis and its root cause—colonialism. Those of us in the health community who are based in the global North must make climate reparations a mainstream priority.

Governments and corporations are using the same tactics as the fossil fuel industry to oppress communities in the name of a “green transition.” In many cases, it’s the same companies. Changing to an energy system based on corporate profit, endless “economic growth,” and resource colonialism cannot be the end goal.

We must demand an energy system run by and for communities, where no one’s land is stolen for the profits of shareholders. A socially just ecological future is possible, and dismantling the fossil fuel industry is an essential step towards this.

Rhiannon Osborne, medical student, University of Cambridge

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forefront of climate policy and activism. This is reflected in international climate treaties. Since being mentioned in the Cancun Agreements 12 years ago, disabled people are barely referenced in international treaties, including the Paris Agreement, where the only reference is in the preamble, and the more recent Glasgow Declaration. This trend is equally visible in decision making processes at a local level. In the UK, for example, the government’s 2021 Net Zero strategy, judged unlawful this July as it was deemed to be in breach of the Climate Change Act, didn’t contain a single explicit reference to disabled people.

Other marginalised groups such as women and indigenous people have had strong commitments in climate treaties—with specific strategic plans rolled out to acknowledge the disproportionate effects on those communities and to take steps to embed the knowledge of those communities in the climate movement. If the inclusion of women and indigenous people is far from where it should be, valuing those voices and enabling them to be heard and to lead climate conversations is the first step. The disabled community needs similar acknowledgment.

Misrepresentation often stems from a narrow, medically focused lens, through which disabled people have been portrayed as only recipients of care and not participants. The portrayal of disabled people as part of “the vulnerable”—is used profusely but rarely conveys participation, and eventually leads to exclusion. The term has been commonly used in the context of covid, for example, but did not lead to greater recognition of the voices of those shielding or those who developed long covid.

Designing and implementing scalable solutions to tackle climate change—while also empowering and engaging people, especially the most marginalised, to hold policy makers to account—will require collaboration, creativity, collective resilience, and resourcefulness. And disabled people are experts at these.

When disabled people challenge norms they create individual value beyond basic economic concepts such as productivity and market value—they create flexible and adaptable frameworks that work for everyone. These are the skills needed to adapt to a changing climate and to introduce mitigation measures. Many disabled people fought for the right to work remotely before covid-19 hit, for example.

Disabled people asking for remote working also helped other groups such as parents and carers to advocate for this right before the covid-19 pandemic started.

Disabled people are also known for creating support networks in their community. Progress towards net zero and keeping the increase in global temperature below 1.5°C is slow and patchy. Systematic change and policy action at local, national, and international levels needs us to build support networks and create systems that welcome people regardless of their perceived economic value or income.

Climate change is one of the single biggest threats to the disability community, and yet disabled people have long been ignored and forgotten in activism and policy. If we are to create a just transition to a greener economy we need to put disabled people—a diverse, resourceful, and knowledgeable group of people—at the heart of the movement. We must not simply focus on tokenistic and time limited representation, but enable sustainable leadership across all environmental platforms, networks, and policy frameworks.

Pauline Castres, public policy analyst, London

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Adolescents are prioritising human rights in the climate change agenda

Some may wonder if youth climate activism is bearing fruit; our answer is yes

Climate change is increasingly affecting the human rights to life, food, health, safe drinking water and sanitation, housing, self-determination, culture, work, and development, especially of those people already vulnerable and marginalised because of multiple factors linked to geography, gender, age, poverty, disability, and cultural or ethnic background.

Today’s adolescents and youth (aged 10-24) account for 1.8 billion people, 26% of the global population, and the larger proportion live in low and middle income countries facing extreme climate vulnerability. Almost every person under 18 is exposed to at least one climate stress, including heatwaves, cyclones, air pollution, and flooding. In addition to directly affecting their physical and mental health, climate hazards reduce young people’s access to nutrition, education, employment, healthcare services, and a safe environment.

Current and future generations of young people will continue to suffer the greatest burden of climate change, despite historically contributing the least to greenhouse gas emissions.

In response to these detrimental impacts and injustices, adolescents and youth are pioneering a human rights based approach (HRBA) to climate change. A HRBA requires designing climate policies that prioritise the needs of those most vulnerable to climate change, and translating into practice the human rights law operational principles of participation, equality and non-discrimination, accountability, and transparency.

Many young climate activists are promoting these operational principles at the international, national, and local levels. The Fridays for Future movement, the Children and Youth Constituency of the United Nations Framework Convention on Climate Change (UNFCCC), and other youth-led movements are pushing for the recognition and implementation of the human rights of vulnerable population groups to participate in climate processes, ensuring equality and non-discrimination.

Negotiation processes

Through the innovative Climate Youth Negotiator Programme, young people are also training youth representatives in national country delegations to meaningfully contribute to climate negotiation processes. In addition, youth-led civil society protests and filed litigations in national courts, such as in Australia, Canada, Colombia, Mexico, India, Pakistan, and South Korea, represent tangible mechanisms to hold governments and other stakeholders accountable.

Through climate mobilisation campaigns on social media, adolescents and youth are ensuring access to climate information within their communities. Recent achievements have reaffirmed the successes of young people’s activism, such as the UN resolutions recognising the human right to a clean, healthy, and sustainable environment and establishing a new UN Youth Office. Moreover, the UNFCCC Conference of the Parties (COP) this year has a COP27 Youth Envoy and an official Children and Youth Pavilion at COP27 for the first time, and a second edition of the Youth4Climate has been organised, reaffirming the institutional commitment towards meaningful youth engagement.

However, when looking at youth integration in climate policies, only 34% of the 103 countries with new or revised nationally determined contributions (NDCs) in 2021 were youth sensitive. Similarly, only 27% of disaster risk reduction commitments address young people. With the climate clock ticking, we urgently need to implement HRBA designed NDCs and other climate policies, to build the resilience of those most vulnerable to climate change, including adolescents and young people.

We call on governments, corporations, international institutions, and other stakeholders to listen to young people’s urgent requests for climate justice, and to co-create with young people policies on climate adaptation, mitigation, and finance that prioritise those most vulnerable to climate change, with concrete implementation mechanisms.

Triple benefits

Investing in young people and prioritising their resilience to climate change will yield triple benefits: today, into adulthood, and for the next generation. Failure to invest in young people’s well-being will undermine the progress in all of society towards climate resilience.

Young people worldwide will continue to mobilise at COP and through other initiatives, such as the Fridays for Future movement and the Global Forum for Adolescents, to demand a HRBA to addressing climate change. For a just future, countries must move from pledges to implementation for the world’s adolescents and young people.

Giulia Gasparri, founding committee member
Ommia El Omrani, founding committee member, GCHA Youth Climate and Health Network
David Imbago-Jácome, chair of the Adolescents and Youth Constituency
William Yeung, medical intern, Partnership for Maternal, Newborn and Child Health
Heeta Lakhani, founder and director, ClimAct Foundation

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Transport and health on the path to a net zero carbon world

James Woodcock and colleagues argue that cutting the gas emissions of transport requires a shift from the private car, however it’s powered

The dissonance between the palpable climate emergency and political inaction to meaningfully reduce carbon emissions around the world can be paralysing. Transport is a leading contributor to greenhouse gas emissions, comprising approximately 21% of total annual CO₂ emissions, with emissions largely flat since 1990 in the UK. Transport mode, associated infrastructures, technologies, and land use also affect health through multiple pathways. Physical activity—such as walking or cycling, including from and to public transport—reduces the risk of premature all cause mortality by around 30%. By contrast, road traffic injuries are now the eighth leading cause of death in the world, with 1.35 million deaths and 50 million injuries a year. Air pollution is an established risk factor for non-communicable disease, with nearly 400 000 deaths a year from small particulate matter (PM₂.₅) and ozone attributed to exhaust emissions.

The rationale for changing how people travel is thus two pronged: harms to the climate of inaction on transportation will continue to accrue if we do not act, and driving less and walking and cycling more would also substantially benefit population health. Focusing on the health benefits of climate action should be highly motivating. Despite this, greenhouse gas emissions from transport remain stubbornly high, with increased vehicle ownership, larger vehicles, and greater distances travelled across the world cancelling out improvements in vehicle efficiency and technology. Technological fixes that do not fundamentally change power, behaviour, and culture around transportation will not achieve sufficient reductions quickly enough nor realise the potential population health gains. Instead, we argue that a more holistic approach is needed.

Transport is an important determinant of health

Because they can be incorporated into everyday schedules, walking and cycling are the best opportunities to be physically active throughout life. Walking is the most common type of physical activity. All physical activity matters for health: the greatest population health benefits would result from increased physical activity in the least active populations, but there is no clear upper limit. More exercise is better, both in terms of volume and intensity (brisk walking or cycling). Consistent findings from cohort studies of self-reported physical activity support an association between physical activity and reduction in multiple disease endpoints, including ischaemic heart disease, stroke, dementia, depression, and several cancers. For example, a dose-response meta-analysis with 165 million person years evaluating different volumes of physical activity found that nearly 19% of premature deaths could have been prevented if the cohort population had achieved five hours a week of moderate to vigorous physical activity. The association between physical activity and health outcomes is increasingly supported by evidence from objectively measured exposures.

By contrast, there is no known “safe” limit for exposure to air pollution, which increases the risk of premature death and disease across the cardiovascular, circulatory, endocrine, immune, reproductive, respiratory, musculoskeletal, and nervous systems. In a pooled analysis of eight cohorts with 325 367 adults followed up for an average of 19.5 years across six European countries, a 5 μg/m³ increase in PM₂.₅ was associated with a 13% increase in natural deaths (95%CI 10.6% to 15.5%). Associations tended to be steeper at lower concentrations and remained significantly positive at pollution levels well below current regulatory standards.

There is also a growing evidence base of the harms of transport related noise (controlled for air pollution) on multiple aspects of human health. Often seen as just a source of annoyance, noise not only disturbs sleep and learning but also increases risks of cardiovascular disease and mortality, diabetes, hypertension, obesity, and adverse nervous system effects. For example, in a population based cohort study of nearly 2 million adults living in Denmark evaluating the relation between residential noise ( > 65 dB v <45dB) and risk of dementia found a relative risk of 1.16 (95% CI 1.11 to 1.22). The burden of noise caused by transportation is substantial, with one health impact study finding it larger than that of air pollution in Warsaw. Another health impact study, in Lausanne, showed that traffic speed reduction would benefit health more through noise reduction than traffic crashes.

Traffic injuries result in 1.35 million deaths each year and are the leading cause of death among people aged between 5 and 29 years.

KEY MESSAGES

- Transport is a major source of greenhouse gas emissions and an important determinant of population health
- A rapid transition to electric vehicles is needed but will not on its own solve transport related health problems or achieve zero greenhouse gas emissions fast enough
- A holistic approach to reducing greenhouse gas emissions caused by transportation is required
- Cycling and the “15 minute city” might be part of this solution but require attention to reducing inequalities, particularly around housing
- There is an urgent need to imagine a future where the car, as a privately owned, one-size-fits-all mobility solution does not exist
Transport: A Better, Greener Britain

of state for transport) argues in the foreword to accessibility, alternative modes of transportation, and alternative existing cars, rather than taking the opportunity to rethink incentivisation of and push for electric cars to directly replace transportation or urban infrastructure. This is exemplified by the car dependency rather than more fundamental changes to solutions that maintain business as usual and that reinforce governments and corporations have focused on purported decarbonisation and will benefit population health. But electrification on its own will not solve transport’s health problems or enable us to reduce the dependency on automobiles for daily movement. Previous attempts to lower greenhouse gases through narrow fixes have failed. Most notably, a policy evaluation estimated that between 1990 and 2010 Europe increased the diesel fleet by around 47 million, without implementing wider infrastructural change. This did not reduce global warming when accounting for black carbon emissions, exacerbated local pollution, and slowed consideration and development of sustainable alternatives.

Unlike the dash for diesel, electrification is a necessary part of carbonisation and will benefit population health. But electrification on its own will not solve transport’s health problems or enable us to reach net zero carbon quickly enough. Electric vehicles reduce exhaust related greenhouse gas emissions, but net reductions vary according to what powers the electricity grid and is small for countries reliant on coal (such as India and Australia).

Nor do electric vehicles solve problems of low density development with high greenhouse gas emissions from construction and operation. Motor vehicles are already getting substantially larger and heavier, and electric vehicles add to this further, as longer range batteries weigh more. Greater weight increases non-exhaust emissions (tyre, surface and brake wear, and resuspension of dust) and road traffic danger due to their greater weight compared with a fossil fuel powered car. Life cycle assessment of electric vehicles in China found no reduction in PM$_{2.5}$ or SO$_2$ emissions. They reduce noise at lower speeds (from the engine), but road surface noise can be worse at higher speeds owing to the greater weight.

Electric vehicles alone are not the answer

Cycling, including electric bicycles (e-bikes), has huge potential to reduce the dependency on automobiles for daily movement. The proportion of all trips taken by bicycle varies from >1% of trips to around 30% in Amsterdam and Osaka. No single mode of transportation will be accessible, available, and acceptable for everyone, but cycling can be highly inclusive with the right infrastructure and array of cycles. Electric-assist bikes require pedalling to achieve maximum speeds of 15-25 mph and can extend the distance people are willing to travel by bicycle (for a work commute, for example), making hilly areas more accessible, while helping to maintain an active lifestyle. E-bikes can be prohibitively expensive, and governments should subsidise and incentivise them, unlike the regressive UK Cycle to Work scheme. The manufacture of e-bikes has a greater environmental cost than for conventional bikes but is far less resource intensive than for electric cars.

Cycling and walking are important alternatives

Cycling, including electric bicycles (e-bikes), has huge potential to reduce the dependency on automobiles for daily movement. The proportion of all trips taken by bicycle varies from >1% of trips to around 30% in Amsterdam and Osaka. No single mode of transportation will be accessible, available, and acceptable for everyone, but cycling can be highly inclusive with the right infrastructure and array of cycles. Electric-assist bikes require pedalling to achieve maximum speeds of 15-25 mph and can extend the distance people are willing to travel by bicycle (for a work commute, for example), making hilly areas more accessible, while helping to maintain an active lifestyle. E-bikes can be prohibitively expensive, and governments should subsidise and incentivise them, unlike the regressive UK Cycle to Work scheme. The manufacture of e-bikes has a greater environmental cost than for conventional bikes but is far less resource intensive than for electric cars.

Efforts to promote and incentivise cycling need to include supporting infrastructure: pleasant, safe, and direct routes to all destinations. These routes require a combination of protected bike lanes, as recognised in the latest Department for Transport guidance, and separation at the network level—eg bicycle boulevards and low traffic neighbourhoods. All space reallocation policies provide a simultaneous push and pull: incentivising active travel while discouraging motor vehicle use, but this is stronger for low traffic neighbourhoods that deliberately aim to reduce traffic volumes and speeds.

Many cyclists and pedestrians experience a conflict between the physical activity benefits of walking and cycling and the exposure harms of air pollution and road injuries. At a population level, however, fewer cars reduce pollution and road traffic danger if speeds do not increase. The countries with the lowest per capita burden from road traffic injuries are Singapore, where car use is highly constrained and public transport dominates, Norway, and Switzerland, which both have relatively high proportions of walking and cycling. If the US had the same fatality rate as Norway it would have 35 000 fewer deaths a year (a more than 80% reduction). Reducing traffic danger and all sources of air pollution...
increases the benefits from walking and cycling, while benefiting everyone else too.

However, investing in cycling alone is not sufficient to tackle the climate emergency. Cycling can be combined with high rates of intercity driving, as in the Netherlands, but if trips are replaced like-for-like, cycling can only directly replace a relatively small vehicle distance (around 11% with e-bikes in the UK).

In practice, people who walk or cycle will often choose nearer destinations, reducing total travel distance. But this would mean that workplaces, shops, and entertainment need to be available within a short distance of where people live. Thus, a complementary idea to improve infrastructure for cycling and walking is the 15 or 20 minute city, in which most activities should be accessible within a 15-20 minute walk or cycle ride. This idea is being supported by the C40 network of cities. These cities require medium to high population density, diversity in land use (such as intermingled housing, retail, and employment spaces), proximity of services, and well designed attractive neighbourhoods. There may be elements of 15-20 minute “cities” outside of cities themselves, where an accessible combination of housing and services co-exist. Still, in the context of high inequalities in wealth and income, creating attractive neighbourhoods or improving transport connectivity are long term and expensive projects that many urban areas may not be able to afford.

In the UK, the housing stock per capita is higher than ever, so achieving a healthy, equitable, and net zero carbon transport system requires producing more a equitable system of housing provision.

**A complementary idea to improving infrastructure for cycling and walking is the 15 or 20 minute city**

“push” away from the car. Economists typically propose pricing to influence behaviour, as exemplified in Singapore combining an auction for the right to own a car (with prices two to three times the purchase price) and congestion charging. With the transition to electric vehicles, traditional petrol and diesel based taxes will no longer be applicable, so some form of road user charging (eg, charge per mile) will be essential. Price based mechanisms cannot achieve an equitable reduction in car use with existing income and wealth inequalities since higher pricing promotes a car owning elite (the reality in many countries) and creates government dependency on the resulting revenue, making further change more difficult.

The potential for innovation away from car dependency—in addition to incentivising cycling and walking in a 15-20 minute city—can be seen in the proliferation of micromobility (such as electric scooters). Many of these vehicles are marketed as an alternative to walking. Existing rental business models risk high turnover and waste. But the right regulatory framework could support small, light, low power, speed limited electric vehicles, ideally incorporating personal energy expenditure during their use. Shared, more powerful electric vehicles or public transport could complement such a framework and be used for longer journeys.

**Conclusions**

The principles of net zero carbon and healthier transport are known to achieve sufficient population density; reduce travel distances with mixed land use and truly affordable housing; design attractive, safe, and climate resilient environments for walking and cycling; replace fossil fuel vehicles with electric smaller vehicles; and progressively restrict car ownership and use. To achieve net zero carbon transport, these actions must be rolled out rapidly and at scale, providing widespread and just benefits.

Cities should extend car-free and low emission zones, ahead of national phasing out. Space reallocation to pedestrians and cyclists, through infrastructure and low cost, low traffic neighbourhoods, provides a simultaneous push and pull: incentivising active travel while discouraging motor vehicle use. Subsidies and scrappage schemes should support moving away from private vehicle ownership and incentivise and facilitate e-bikes, season tickets, and carsharing, not just to buy a car sized electric vehicle.

Importantly, most housing and transport infrastructure that will be in use in 2050 has already been built, and new construction comes with considerable embedded emissions. If we depend on existing infrastructure and land use in any given place, different medium term visions can be conceived to reduce transport related emissions and mitigate possible harms to health, aiming to strike a balance between walking, cycling, e-bikes, public transport, new forms of mobility, car sharing, and electric vehicles, without a narrow focus on any of these options on their own. New development should not just provide for public transport, walking, and cycling, but should be car-free. Ambitious car-free actions should be enacted, with use allocated based on need.

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Health professionals are increasingly learning how climate change is harming their patients’ health and, unsurprisingly, most respondents to a 2020 multinational survey felt a responsibility to educate the public and policy makers. Many also reported, however, that they were not discussing the health risks of climate change because it is too politically controversial, peers would not be supportive, or it may be professionally risky.

There is growing evidence that such concerns are unsupported by data about actual social divisions. For example, in the US there is far more public appetite—and more bipartisan consensus—for climate solutions than popular narratives of entrenched polarisation suggest. This has direct implications for health advocacy. When people misperceive social and cultural norms, including falsely believing that others are hostile or dismissive to climate action, yet the public vastly support action, their political beliefs. In addition, many communities of colour are far less politically polarised around climate change, even in hyperpolarised nations like the US.

State-level climate action offers a striking illustration: while the Democratic party is most often associated with advancing climate action, nearly a third of state-level carbon mitigation bills in the past five years were passed by Republican controlled governments. The reality is that most Americans support climate action, yet the public vastly underestimates the degree of popular support that exists. People want a clean, healthy, and safe future. They support policies that simultaneously improve human health and livelihoods, and they want fair policies implemented by trusted institutions—and for polluters to pay.

**Political ideology**

Political beliefs are a weaker predictor of climate change engagement than we might think. In most nations “left” or “right” political ideology is a weak predictor of support for climate taxes or laws—and more consensus often exists for climate action across values and belief systems than we might think.

Even people who endorse “self-interested” values—such as seeking wealth and personal ambition—are only slightly less supportive of climate action than the average person. In the US, what people believe their friends, family, and other trusted sources think about climate change (social consensus beliefs) is a stronger predictor of their attitudes than their political beliefs. In addition, many communities of culture (perceptions, ideas, and practices with shared meaning) shapes how people understand climate change, including narratives about how others view societal problems, as well as our collective ability to solve them. In mainstream US culture, climate change is often cast as a global problem, a narrative that undermines individual agency. But for many, everyday understanding of climate change is shaped in relation to locally salient matters, like food and water security, and political participation. Overly simplistic or mistaken beliefs, such as “Americans lack political consensus” or “people are too selfish to support climate action,” can undermine our collective sense of agency. Lack of agency permeates everyday understandings of climate change in major economically developing nations, including Brazil, China, and South Africa, and hyperpolarised political rhetoric and legislative gridlock may fuel a similar sentiment in the US.

One of the unique strengths of medicine is its focus on developing a mechanistic understanding of the processes—including social and cultural forces—that contribute to health or disease. Tackling the root causes of climate change (such as fossil fuel combustion) and the societal forces that exacerbate their impacts (such as structural racism) requires societal transformation. The mistaken belief that others lack sufficient interest or capacity for action poses a formidable barrier to mobilisation, and undermines our sense of collective agency. Once the health community recognises that cultural barriers are minimal, it is uniquely positioned to spark and shape climate action to protect human health.

Health professionals can contribute to collective action by building on the consensus, particularly when they adopt approaches to communication that are informed by social and behavioural sciences. Harnessing the power of health professionals’ communications to influence social consensus narratives, and advocating for local health protective actions, are important ways that health professionals can bolster the public’s sense of agency and urgency. Local climate change and health impacts are, arguably, the best framing for personalising and humanising climate change and catalysing behaviour change. Yet fewer than 4% of US cities—and only 40% of states—provide original, location relevant content about climate and health on their websites, so opportunities for more impactful communication abound.

As medicine continues to accelerate its engagement, it is optimally poised to combat false climate polarisation narratives. Discussing the health impacts of climate change is a critical approach for furthering medicine’s mission—to improve health and accelerate equity.

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Adam R Pearson, associate professor of psychology Pomona College, California

Renee N Salas, assistant professor of emergency medicine, Harvard Medical School, Boston

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**OPINION Camilla Kingdon**

**Children have a right to clean air, and we must fight for it to become a reality**

Air pollution is complex—but the WHO air quality targets are clear, writes Camilla Kingdon

Legally binding targets based on WHO guidelines would reduce the number of deaths from air pollution in the UK. This was the clear conclusion from the coroner following the death of nine-year-old Ella Adoo-Kissi-Debrah in 2013 following an asthma attack. Ella was the first person in the UK to have air pollution listed as a cause of death.

As paediatricians we are committed to learning from this tragic example—no other child in the UK should be allowed to suffer in the way that Ella did.

In the UK, air pollution is the largest environmental risk to public health. Children are especially vulnerable to air pollution, which can lead to asthma in childhood, and lifelong health issues. Exposure to air pollutants during pregnancy and early childhood can have harmful and irreversible effects on the development of the lungs and other organs, with potential long term health effects such as COPD well into adulthood.

Children breathe faster, so they inhale more airborne toxins in proportion to their weight, than adults exposed to the same amount of air pollution. Their organs and immune systems are still developing—therefore toxin-induced damage is far more likely to have an impact.

**Unborn babies**

Polluted air is also known to impact the health of children even before they are born, correlating strongly with miscarriages, premature births, low birth weight, and brain development. It is extremely concerning to see new research published this month showing the impact of toxic air pollution particles on the lungs, livers, and brains of unborn babies—confirming the direct harm caused to the fetus by dirty air.

The WHO global guideline limits aim to achieve the lowest concentrations of pollutants possible, recognising that there is no safe level of air pollution. For children in particular, there is no “safe limit.” As paediatricians, we see the impact of poor air quality on our patients every day. Clinically there is no escaping this harsh truth—the UK has one of the highest prevalences of asthma in Europe and tragically unacceptably high rates of emergency admission and death in childhood.

We also see the broader impact of air pollution on children’s lives—whether from missed schooling or in combination with other social determinants of health like poor housing. Climate change and air pollution are likely to be significant drivers of poverty and of widening health inequalities. The environment in which we live is a key determinant of our health. We know that more deprived communities in the UK are typically exposed to higher levels of air pollution, and pregnancy outcomes related to air pollution are worse among low socioeconomic and ethnic minority groups. Emergency admissions for asthma are strongly associated with deprivation and poverty, and asthma outcomes are worse for children and young people living in the most deprived areas.

The UN Human Rights Council declared at COP26 last October that a healthy environment is a basic human right. However, globally, more than 90% of children are exposed to ambient fine particulate matter (PM2.5) levels above WHO’s global air quality guidelines. The close relationship between air pollution and poverty is why this is a social justice and child rights issue and the reason why paediatricians and all healthcare professionals who work with children are so galvanised to raise awareness about this.

**Solutions within our grasp**

Time is not on our side and yet we are confident that we can tackle this globally—just as nations came together to fight the effects of the pandemic. In the UK we have solutions within our grasp.

The UK government must be more ambitious in its legally binding targets for fine particulate matter. Evidence clearly shows that a PM2.5 target of 10 μg per cubic metre can be met by 2030 if current and proposed policies are fully implemented. The same research highlighted clear economic and health benefits of meeting this target, including children across the UK suffering an average of 388 000 fewer days of asthma symptoms a year.

Stronger air quality targets are key to safeguard the health of current and future generations. Children have a right to clean air, and we must fight for it to become a reality.

__Camilla Kingdon, president, Royal College of Paediatrics and Child Health, London__

Cite this as: *BMJ* 2022;379:o2425  ▶ FEATURE, p 97
Environmental impact of anaesthesia

Uses and alternatives for inhaled anaesthetics

All commonly used inhalational anaesthetic agents are greenhouse gases that contribute to the climate crisis. Their use is very embedded in clinical practice, but there are alternatives such as total intravenous anaesthesia and regional techniques. These usually have substantially lower climate impacts, despite the greater use of disposables such as syringes. This graphic offers a comparison of some of the most commonly used agents.

<table>
<thead>
<tr>
<th>Inhaled general anaesthesia</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Isoflurane</strong></td>
<td>Drug levels can be easily monitored by measuring the partial pressure of agents at end-expiration</td>
<td>Increased risk of post-operative nausea and vomiting. Volatile agents can provoke malignant hyperthermia in susceptible patients</td>
</tr>
<tr>
<td><strong>Desflurane</strong></td>
<td>High potency</td>
<td>Low potency</td>
</tr>
<tr>
<td><strong>Sevoflurane</strong></td>
<td>Inexpensive</td>
<td>Expensive</td>
</tr>
<tr>
<td><strong>Nitrous Oxide</strong></td>
<td>Slow onset and offset</td>
<td>Very rapid onset and offset</td>
</tr>
<tr>
<td></td>
<td>Airway irritant</td>
<td>Airway irritant</td>
</tr>
<tr>
<td></td>
<td>1.0 kg CO₂e per hour*</td>
<td>25.8 kg CO₂e per hour*</td>
</tr>
<tr>
<td>Exert most of their greenhouse gas effects within the first decade following release</td>
<td>10.9 kg CO₂e per hour*</td>
<td></td>
</tr>
</tbody>
</table>

Intravenous general anaesthesia

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propofol</td>
<td>Generally, intravenous anaesthesia has a lower carbon footprint than any inhalational equivalent</td>
</tr>
<tr>
<td>Remifentanil</td>
<td>Potential for ecological contamination from plastics and waste medications</td>
</tr>
<tr>
<td>Used for maintenance</td>
<td>Used for induction</td>
</tr>
<tr>
<td>Used for induction</td>
<td>Adjunct for maintenance</td>
</tr>
<tr>
<td>Used for sedation</td>
<td>Adjunct for induction</td>
</tr>
<tr>
<td>Smooth onset and offset</td>
<td>Potent analgesic</td>
</tr>
<tr>
<td>Suppresses airway reflexes</td>
<td>Rapid onset and offset</td>
</tr>
<tr>
<td>Requires specialised infusion equipment for maintenance</td>
<td>Respiratory depressant</td>
</tr>
<tr>
<td>Can have toxic effects on aquatic life</td>
<td></td>
</tr>
</tbody>
</table>

Regional techniques

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerve blocks, epidural and spinal anaesthesia</td>
<td>Minimise the use of medications</td>
</tr>
<tr>
<td>Can provide complete analgesia</td>
<td>Some techniques generate a lot of plastic waste</td>
</tr>
<tr>
<td>Surgery can be performed awake</td>
<td></td>
</tr>
</tbody>
</table>

Labour analgesia

Limited information is available, but opioid analgesics and epidurals have lower carbon footprints than nitrous oxide in most circumstances.

* CO₂e = Carbon dioxide equivalent
† Assuming 130g CO₂ emitted per mile, equivalent to a modern small family car in the UK
Towards net zero healthcare: anaesthesia

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A 30 year old woman attends the obstetric anaesthetic clinic at 36 weeks’ gestation. This is her first pregnancy. The baby was in the breech position, and, after an unsuccessful attempt to turn the baby, she has been offered the option of planning for a vaginal delivery or a caesarean section. The anaesthetist discusses the anaesthetic and analgesic options for both and reassures the patient that all options appropriate to the mode of delivery are safe. Her priority is a safe delivery but she recently read online that both anaesthetic agents and “gas and air” contribute to global warming. Concern about the world in which her child will grow prompts her to ask which is the “greenest” option.

Providing anaesthesia for approximately 310 million surgical procedures worldwide every year,1 and contributing to peri-operative medicine, critical care, and pain management, generates emissions of greenhouse gases (GHGs) and vast amounts of waste. 

In this paper, we suggest ways that anaesthesia teams can mitigate their environmental footprints while integrating their primary aim of providing safe, high quality patient care.

WHAT YOU NEED TO KNOW

- Sevoflurane and isoflurane have smaller atmospheric impacts than desflurane and nitrous oxide
- Intravenous anaesthetic agents have minimal atmospheric impacts, but drug waste and urinary excretion of drugs and metabolites causes pollution in soil and ground water
- Nitrous oxide is a common cause of medication waste and greenhouse gas emissions due to leaks in supply systems, over-ordering, and unused gas in cylinders returned to suppliers being vented to the atmosphere

What is the evidence?

Life cycle assessments of the “carbon footprints” of anaesthetic equipment, medications, and procedures,2 3 global endorsement of sustainable anaesthesia practice,4 and expanding literature on the atmospheric effects of inhalational anaesthetics5 8 show the problem; however, strong evidence for specific solutions is relatively sparse and novel compared with other aspects of healthcare.4 10

What is the problem?

Inhalational anaesthetics are greenhouse gases17

Anaesthetic gases have markedly different global warming potentials (GWP), eg, those of sevoflurane and isoflurane are far lower than those of desflurane.

System level initiatives, such as the Greener NHS plan, aim to reduce the use of desflurane and nitrous oxide (N2O), which have the highest carbon dioxide equivalent (CO2e) at clinically relevant doses (infographic).11 The CO2e of less clinically potent anaesthetic agents (eg, desflurane and N2O) is magnified because more is needed to achieve the same clinical effect (table 1, bmj.com).10

The ongoing release of anaesthetic agents at a rate that exceeds their atmospheric breakdown means that atmospheric concentrations are rising. Although GWP100 (ie, GWP over 100 years) is the most often quoted value, the 100 year time horizon does not reflect the dynamic (and worsening) situation. All inhaled agents (except N2O) exert most of their greenhouse gas effects within the first decade following release, so shorter time horizons may be more appropriate when assessing climate impacts.11

Waste intensive practice

Most supplied N2O is wasted, either because of leaks in the cylinder manifold or pipes, or because cylinders are returned to the supplier part full.16 17 Returned cylinders cannot currently be “topped up,” so surplus gas is vented to the atmosphere.

Anaesthesia practice also generates landfill, microplastics, and noxious pollutants associated with equipment disposal, packaging, single use items, and clinical waste.2 Equipment for monitoring and for vascular access, airway devices (eg, tracheal tubes), and numerous medications in pre-operative, operative, peri-operative, and postoperative care all involve multiple single use items, which may account for the greatest proportion of the total environmental impacts.22 Sustainable alternatives to plastics and sterile packaging are currently lacking.

Medication can cause ecological contamination, either from wastage or drug/metabolite excretion by the patient. Propofol can have toxic effects on aquatic life, and although only 0.3% is excreted unchanged in urine, measurable quantities are present in drinking water and the tissues of fish.11 This likely reflects the vast number of anaesthetic procedures per year, and also implies that not all surplus propofol is disposed of responsibly. Wastewater treatment works are not designed to remove drugs from effluent. Indeed, glucuronidated propofol metabolites can undergo deglucuronidation in water treatment facilities, thereby increasing the downstream concentration of free propofol.24
Abandoning the routine use of desflurane and N₂O can reduce climate impacts without affecting patient outcomes. Since direct emission of GHGs is avoided, the carbon footprint and atmospheric pollution of total intravenous anaesthesia (TIVA) is substantially lower than any inhalational anaesthetic, despite the increased use of disposable items such as syringes and syringe pumps. However, the ecological and aquatic toxicity of intravenous agents and their metabolites is a concern. Adoption of TIVA in institutions where it is not already widely used requires training and equipment procurement, which can be prohibitively expensive. Regional anaesthesia may have a lower carbon footprint than general anaesthesia as it minimises medication and use of airway equipment. However, consider each component of regional anaesthesia technique separately, as, depending on the carbon intensity of electricity production, the carbon footprint of the neuraxial (ie, spinal or epidural) anaesthesia can be similar to that of low flow sevoflurane general anaesthesia, owing to the carbon footprints of sterile equipment reprocessing and supplemental oxygen administered intra-operatively. Anecdotally, wide variation exists in practices for regional anaesthesia. For example, performing spinal anaesthesia with a full “surgical scrub” is considered standard practice in the UK, but this is not typical in the US. Intra-operatively, N₂O can be substituted for alternatives such as remifentanil or regional anaesthesia. However, for labour analgesia this may require a marked change in practice (for example,
the need for intravenous access and continuous fetal monitoring). In maternity services where \( \text{N}_2\text{O} \) is already an established anaesthetic technique it is likely to have a role for some time to come.

**Take an integrated approach**

Systemic changes, such as optimising drug formulaeies and equipment, and creating cultures that value sustainability, would have notable effects— for example, removing desflurane from drug formulaeies. However, explanation, behavioural suggestions, and making the “greener” option easier, may be easier to instigate. In one author’s institution, explaining desflurane’s GWP, together with moving desflurane vapourisers from the anaesthetic machines to a nearby cupboard (thereby requiring practitioners to make an active decision to use them), led to a noticeable reduction in desflurane use.

Collaborative work with hospitals’ quality improvement teams, equipment manufacturers (including designing greener alternatives to plastics and sterile packing), and colleagues in other institutions is also needed. It is difficult to justify advising a patient to decide about anaesthesia and analgesia based on sustainability alone. However, more sustainable options (ie, regional anaesthesia, TIVA) may have concurrent patient benefits, and if the patient desires a spinal anaesthetic, an open discussion on minimising sedation and oxygen requirement may be beneficial.

**Make shared decisions**

It is difficult to justify advising a patient to decide about anaesthesia and analgesia based on sustainability alone. However, more sustainable options (ie, regional anaesthesia, TIVA) may have concurrent patient benefits, and if the patient desires a spinal anaesthetic, an open discussion on minimising sedation and oxygen requirement may be beneficial.

Peri-operative care is daunting and extraordinary from many patients’ perspectives. It may be more reasonable to discuss environmental anaesthesia impacts in shared decision making for scheduled minor surgery than for emergency or major procedures.

**Case discussion**

Childbirth is often unpredictable. The lowest carbon option would be to have an uncomplicated vaginal delivery without pharmacological analgesia. But labour analgesia needs to be universally available, and uncomplicated childbirth cannot be guaranteed. A prolonged labour using \( \text{N}_2\text{O} \) for analgesia followed by an emergency caesarean section would generate the largest carbon footprint.

If the patient opted to plan for a vaginal delivery, analgesia with remifentanil or an epidural would have a lower carbon footprint than \( \text{N}_2\text{O} \), unless the labour is very short (ie, less than half an hour), in which case the high GWP of \( \text{N}_2\text{O} \) may theoretically be offset by avoiding the use of disposable items, intravenous access, and monitoring. If remifentanil or epidural analgesia were used, the patient would need to be cared for in a consultant led unit, but this may not align with their wishes. Furthermore, remifentanil and epidural analgesia carry additional risks and may not be suitable for all patients. Intramuscular opioids (eg, diamorphine, pethidine) involve little single-use equipment and do not mandate continuous monitoring, so are likely to have the lowest environmental impact, but are of limited efficacy.

The “anaesthesia” component of a caesarean section would likely have a lower carbon footprint than using \( \text{N}_2\text{O} \) for (prolonged) labour analgesia, but considering the full procedure, operative delivery is likely to have a greater environmental impact than an uncomplicated vaginal delivery owing to the surgical equipment, operating theatre resources (including energy), and longer hospital stay required. Home births may use fewer resources than hospital births, but they are generally restricted to those at lower risk of complications. As this patient has a known breech presentation, a home birth would not be advisable, and any environmental comparison would not be appropriate in terms of patient safety and healthcare quality.
Reducing the health impacts of ambient air pollution

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Case 1—A man in his late 50s with a history of chronic stable angina, arterial hypertension, and a family history of cardiovascular disease presents with acute onset chest pain and is diagnosed with NSTEMI myocardial infarction. He lives in an industrialised city with annual particulate matter ($PM_{2.5}$) levels higher than 50 μg/m$^3$, which spiked to 90 μg/m$^3$ in the days before his myocardial infarction.

Case 2—A 9 year old girl with constant cough that interferes with her sleep visits the GP with her mother. Her symptoms have caused tiredness and school absences. The family recently moved to a large city where annual $PM_{2.5}$ is 85 μg/m$^3$, from a region with annual $PM_{2.5}$ of 20 μg/m$^3$. The cough began after the move. She has no known allergy or previous similar complaint. Examination reveals a mildly inflamed throat and mild wheezing.

WHAT YOU NEED TO KNOW

- Inhaling polluted ambient air has many health effects, including childhood onset of asthma, and onset and progression of atherosclerosis
- Vulnerable people can consider using well fitted N95 face masks, avoiding outdoor exercise on days when the air quality is poor, and using indoor HEPA air filters
- Consider establishing air quality monitoring and warning systems for use by clinicians and in hospitals

Annually, 8.7 million global deaths are thought to be caused by inhalation of particulate matter released into the air from combustion of fossil fuels

Ambient air pollution is the fifth highest risk factor for death (after hypertension, smoking, high fasting glucose, and high total cholesterol), according to the Health Effects Institute.\(^1\)

Annually, 8.7 million global deaths are thought to be caused by inhalation of particulate matter released into the air from combustion of fossil fuels.\(^2\) In Europe, particulate matter and ozone account for almost 800,000 excess deaths annually.\(^3\) Additionally, an exposure-response study has estimated that particulate air pollution has contributed to approximately 15% (95% confidence interval, 7% to 33%) of covid-19 deaths worldwide.\(^4\)

Evidence on how ambient air pollution affects health is abundant; however, much less is available on protecting health from this impact. The recommendations in this paper are based on the available evidence; national, international, and society guidelines; and the authors’ expertise and experience.

What causes ambient air pollution?

Fossil fuel emissions (eg, from gas, coal, and oil) contribute most to ambient (outdoor) air pollution but other contributors include vehicle emissions and burning of solid fuels in stoves or open fires (dung cakes, dry shrubs, or wood) for outdoor and indoor cooking and heating (table 1, bmj.com).

How does ambient air pollution affect health? (table 2)

Inhaled PM$_{2.5}$ (particulate matter that is 2.5 μm) and ultrafine PM (0.1 μm) cause oxidative injury and acute inflammation in the respiratory tract. Simultaneously, PM$_{10}$ transmigrates across the alveolar-capillary membrane, leading to extensive damage characterised by widespread oxidative stress, inflammation, endothelial cell dysfunction, and coagulation activation, ultimately initiating the atherosclerotic process in nearly every organ system.\(^13,14\)

Mortality is the most severe impact, but adverse health and health system burden affect far greater numbers of vulnerable individuals (fig 1).
the BMJ | 15 October 2022

How air pollution affects the body, according to evidence published between 2012 and 2022

<table>
<thead>
<tr>
<th>Affected system/physiology</th>
<th>Effects</th>
<th>Examples of supportive evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fetal and maternal health</td>
<td>Decreased pulmonary function, increased risk of respiratory infections, acute exacerbations of asthma, COPD, and lung cancer, and increased admissions to hospital and respiratory mortality. Early childhood exposure causally linked to childhood asthma onset</td>
<td>A meta-analysis of 41 studies from three continents that examined children’s exposure to traffic-related air pollution and risk of asthma development, childhood exposure to PM₂.₅, PM₁₀, black carbon, and NO₂, were statistically significantly associated with asthma onset.</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>Causally implicated in onset and exacerbation of existing heart disease, and increased risk of coronary artery disease (CAD), stroke, heart failure, and arrhythmia. Acute PM₂.₅ exposure increases risk of admission to hospital and death from heart failure, as well as out-of-hospital cardiac arrest. Acute and chronic exposure to PM₁₀ might also increase cerebrovascular risk but systematic assessment is needed.</td>
<td>The ESCAPE study found that even very small increases in PM₁₀ (5 μg/m³) increased risk of coronary events by 13% among a large European cohort.</td>
</tr>
<tr>
<td>Mental and cognitive health</td>
<td>Depression in adolescence, suicidality, anxiety, dementia, and impaired cognitive development—potentially owing to systemic or brain-based oxidative stress and inflammation or impaired cytokine signalling Also linked to poor school attendance, low test scores, and reduced labour productivity.</td>
<td>Among 15 628 rural and 12 650 urban adult residents enrolled in the China Family Panel Studies, a one-standard deviation increase in PM₁₀ concentrations (18.04 μg/m³) increased the probability of having severe mental illness by 6.67%.</td>
</tr>
<tr>
<td>Covid-19 response</td>
<td>Long-term exposure causing impaired immunity, respiratory tract damage, oxidative stress, and reduced viral clearance has been linked with a higher likelihood of mortality from covid-19.</td>
<td>A literature review of evidence correlating covid-19 infection and air pollution exposure suggests air pollution causes upregulation of the ACE-2 receptor (responsible for SARS-CoV-2 intra-cellular uptake).</td>
</tr>
</tbody>
</table>

How do you assess whether ambient air pollution has contributed to a patient’s symptoms?

Currently, no laboratory-based test is available to determine the levels of air pollution to which patients have been exposed, and there is no definitive way to attribute air pollution as a causative factor to symptoms. In the future, however, immune biomarkers may be a tool to monitor pollutant exposure and the therapeutic effects of modifications to air quality exposure.

To assess potential for a causal relationship, consider whether symptoms are known to be associated with ambient air pollution and whether the relationship appears appropriate—this is best ascertained by a good environment history, focused on potential exposures to ambient air pollution at home, work, school, or other areas where large amounts of time are spent.

How can risk be modified?

Preventing or limiting exposure is the mainstay of risk modification, for example, refraining from strenuous outdoor exercise during days when air quality is poor, staying indoors in spaces with high efficiency particulate air (HEPA) filtration systems (which reduce exposure to particulate pollution), reducing sources of concomitant indoor air pollution (such as biomass burning), and avoiding busy streets and travel during peak transit hours.

However, individual level interventions have varying degrees of effectiveness for reducing exposure and/or risk, and research on their effectiveness has been limited (table 3).

Suggestions for preventing or limiting exposure

- Ensure patients are aware of their underlying vulnerabilities (eg, comorbidities, age, pregnancy status), especially those with pulmonary and cardiovascular risk factors and diseases, and incorporate education on air pollution into their yearly health checks.
- Use air quality alerts (fig 2, bmj.com) to advise avoidant behaviour in potentially vulnerable patients.
- Arrange close follow-up and stabilisation of underlying chronic disease during periods of poor air quality. 

All countries are affected, irrespective of income or resource. If WHO recommendations on ambient air pollution limit were met, an estimated 80% of deaths related to air pollution could be avoided.

- Co-create an “action plan” for those with respiratory conditions always to carry rescue inhalers (although note that no reliable evidence supports the use of inhalers preventively in settings where exposure to air pollution is increased).
- Consider temporary use of tightly fitted certified respirators (eg, N95 face masks) that can reduce exposure to particulate matter when properly worn in high exposure situations. However, weigh this against the possibility of creating a false sense of security which may result in increased levels of exposure, and the fact that respirator use may escalate false sense of security which may result in increased levels of exposure, and the fact that respirator use may escalate false sense of security which may result in increased levels of exposure, and the fact that respirator use may escalate false sense of security which may result in increased levels of exposure, and the fact that respirator use may escalate false sense of security which may result in increased levels of exposure, and the fact that respirator use may escalate false sense of security which may result in increased levels of exposure, and the fact that respirator use may escalate false sense of security which may result in increased levels of exposure, and the fact that respirator use may escalate false sense of security which may result in increased levels of exposure, and the fact that respirator use may escalate false sense of security which may result in increased levels of exposure, and the fact that respirator use may escalate false sense of security which may result in increased levels of exposure, and the fact that respirator use may escalate false sense of security which may result in increased levels of exposure, and the fact that respirator use may escalate false sense of security which may result in increased levels of exposure, and the fact that respirator use may escalate false sense of security which may result in increased levels of exposure, and the fact that respirator use may escalate false sense of security which may result in increased levels of exposure, and the fact that respirator use may escalate false sense of security which may result in increased levels of exposure, and the fact that respirator use may escalate false sense of security which may result in increased levels of exposure, and the fact that respirator use may escalate false sense of security which may result in increased levels of exposure, and the fact that respirator use may escalate false sense of security which may result in increased levels of exposure, and the fact that respirator use may escalate false sense of security which may result in increased levels of exposure, and the fact that respirator use may escalate false sense of security which may result in increased levels of exposure.

What levels are considered safe?

World Health Organization (WHO) data suggest that more than 90% of people who live where ambient air pollution is at harmful levels. All countries are affected, irrespective of income or resource, with the highest levels in China, India, and South East Asia. If WHO recommendations on ambient air pollution limits (table 4, bmj.com) were met, an estimated 80% of deaths related to air pollution could be avoided. However, currently, no global consensus exists on safe exposure levels. Authorities typically convert concentrations of major air pollutants into categories, with increasing concentrations associated with more severe degrees of health risk. Many countries publish composite air quality indices to communicate levels of health risk (fig 2, table 2), where alerts (also available on apps) are generated based on composite scores for a variety of criteria assessing which pollutants correspond to unsafe human exposure.
What are the inequities in exposure and health outcomes?

Racial/ethnic, socioeconomic, and geographic disparities in exposure are well documented, even within a single city or neighbourhood. This might be driven by economic injustice, systemic racism, and/or the potentially higher susceptibility of conditions such as diabetes, heart disease, and lung disease among certain ethnic groups.

For example, consistent PM$_{2.5}$ exposure inequity (from all major emission categories) has been suggested in people of ethnic minority across most states, urban and rural areas, and income levels in the US, and the risk of dying early from exposure to particulate matter pollution is shown to be higher in US communities with larger black populations, lower home values, and lower median income. Similarly, a recent study analysing air pollution exposure in India showed higher PM$_{2.5}$ concentration in districts with higher percentages of Scheduled Castes, young children, and households without toilets.

In the US (and likely elsewhere) structural racism can lead to segregation in housing market dynamics, environmental racism in zoning regulations for the industry and transportation sectors, and systemic neglect of upholding environmental justice principles.

**Competing interests**: None declared.

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### Table 3 | Interventions to minimise patients’ health risks from ambient air pollution exposure

<table>
<thead>
<tr>
<th>Category</th>
<th>Intervention</th>
<th>Recommended by</th>
<th>GRADE criteria$^{a,b}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health status</td>
<td>Assess and screen for vulnerability and educate on steps to minimise health risks from exposure to air pollution</td>
<td>American Thoracic Society$^{63}$ European Society of Cardiology (ESC) Prevention Guidelines$^{39}$</td>
<td>Low$^{32}$</td>
</tr>
<tr>
<td>Physical</td>
<td>Recommend a well fitted, certified respirator (eg, N95) for use in high exposure areas</td>
<td>No consensus recommendations on use, however some experts recommend this temporary use based on studies showing blood pressure reduction and biomarker improvements$^{66}$</td>
<td>Moderate$^{3,42}$</td>
</tr>
<tr>
<td></td>
<td>Advise optimisation and maintenance of vehicle filtration/ventilation and, when driving in high air pollution conditions, close windows and only circulate internal air</td>
<td>US Environmental Protection Agency (EPA)</td>
<td>Moderate$^{54,55}$</td>
</tr>
<tr>
<td>Behavioural</td>
<td>Advise avoiding busy streets and roads on poor air quality days</td>
<td>British Lung Foundation$^{77}$ American Lung Association$^{11}$</td>
<td>Low$^{72}$</td>
</tr>
<tr>
<td></td>
<td>Advise reducing or avoiding strenuous outdoor activity during days with poor air quality (without jeopardising efforts to get regular exercise)</td>
<td>British Lung Foundation$^{11}$ American Lung Association$^{11}$ American Thoracic Society$^{43}$</td>
<td>Moderate$^{5,42}$</td>
</tr>
<tr>
<td></td>
<td>Advise avoiding travel during peak transit hours</td>
<td>British Lung Foundation$^{11}$</td>
<td>Low$^{72}$</td>
</tr>
<tr>
<td></td>
<td>Advise performing outdoor activities during cooler parts of day to limit exposure to ozone</td>
<td>US EPA$^{47}$</td>
<td>Low$^{73}$</td>
</tr>
<tr>
<td></td>
<td>Advise staying indoors when outdoor air quality is poor</td>
<td>US EPA$^{47}$</td>
<td>Low$^{74,76}$</td>
</tr>
<tr>
<td></td>
<td>Advise avoiding combustion of all types of biomass within living spaces to improve indoor air quality; identify and provide details of relevant government schemes, if financial support needed</td>
<td>American Lung Association$^{11}$ World Health Organization$^{59}$</td>
<td>High$^{77,78}$</td>
</tr>
<tr>
<td></td>
<td>Encourage patients with high cardiovascular risk to avoid long term exposure in areas with high air pollution</td>
<td>ESC Prevention Guidelines$^{11}$</td>
<td>Very low$^{71}$</td>
</tr>
<tr>
<td>Technological</td>
<td>Advise using air quality alerts to limit exposure to harmful levels</td>
<td>US EPA$^{47}$ American Lung Association$^{11}$</td>
<td>Low$^{75,77}$</td>
</tr>
<tr>
<td></td>
<td>Advise staying indoors with sealing of the building/room and with HEPA filtration systems in place</td>
<td>US EPA$^{47}$</td>
<td>Moderate$^{7,77,78}$</td>
</tr>
<tr>
<td>Pharmacological</td>
<td>Create “action plans” for vulnerable patients</td>
<td>British Lung Foundation$^{77}$</td>
<td>Moderate$^{77}$</td>
</tr>
<tr>
<td></td>
<td>Encourage those with respiratory disease always to carry rescue inhalers</td>
<td>British Lung Foundation$^{77}$</td>
<td>Low$^{77}$</td>
</tr>
<tr>
<td></td>
<td>Consider increased use of preventive inhaled medications in anticipation of exposure to poor air quality, as appropriate, and with careful consideration of risks and benefits</td>
<td>Some experts</td>
<td>Low$^{77,78}$</td>
</tr>
<tr>
<td></td>
<td>Actively manage conditions which increase vulnerability</td>
<td>Some experts</td>
<td>Very low$^{77}$</td>
</tr>
<tr>
<td></td>
<td>Consider use of oral antioxidants</td>
<td>Some experts</td>
<td>Very low$^{77}$</td>
</tr>
</tbody>
</table>

$^{a}$GRADE (grading of recommendations, assessment, development and evaluations) is a transparent framework for developing and presenting summaries of evidence and provides a systematic approach for making clinical practice recommendations. (Very low=the true effect is probably markedly different from the estimated effect, low=the true effect might be markedly different from the estimated effect, moderate=the authors believe that the true effect is probably close to the estimated effect, high=the authors have a lot of confidence that the true effect is similar to the estimated effect)

### HOW PATIENTS WERE INVOLVED IN THE CREATION OF THIS ARTICLE

The cases of two patients who suffered health consequences from air pollution were used to gain insight into their experiences. An additional patient perspective was derived from a personal conversation with Rosamund Kissi-Debrah, whose daughter’s death in the UK from severe asthma was officially attributed to air pollution. In addition, we undertook two patient interviews in the US to understand better the impacts and opportunities for intervention. The author team thanks the patients and their families for their contribution to this work to raise awareness of the health impacts of air pollution.

Two external patient reviewers stressed the importance of indoor air pollution; however, covering this was deemed beyond the scope of this article. In response to their other comments, we put more emphasis on the practical messages and less on statistics; included more references about inequalities and exposure; and reshaped the clinical approach of this article.

### EDUCATION INTO PRACTICE

- How can you advocate for local and national policy that seeks to improve air quality and health?
- Which ambient air pollution impacts will you communicate to vulnerable patients?

15 October 2022 [the bmj]
How can I make the NHS greener?

Adele Waters hears what doctors can do to make their specialties more sustainable and environmentally friendly.

“We have a unique opportunity and obligation”

Eleanor Damm, co-chair of the environmental sustainability workgroup, Intensive Care Society UK

“The detrimental effects of CO₂ emissions are visible all over the world. As well as taking personal steps, we need to think about what the NHS can do too. “The NHS long term plan has many targets to reduce its carbon footprint. One area is the carbon emissions from anaesthetic gases which are responsible for 3% of the NHS carbon footprint. The aim is to reduce this by 40% through shifting away from desflurane use, effective capture, destruction or reuse of volatiles, and reducing the atmospheric release from leftover nitrous oxide canisters. “Desflurane is one of the most potent greenhouse gases, producing 886 kg of CO₂ per 240 ml bottle and costs £63. Comparatively, sevoflurane produces 49 kg of CO₂ per 250 ml bottle and costs £49. “Working with Rachel Grant, an anaesthetic core trainee year 3, I introduced a project to cut our department’s carbon footprint by reducing desflurane use and encouraging low flow anaesthesia and total intravenous anaesthesia. We removed desflurane from the anaesthetic machines making it available only on request. Over the year our desflurane usage dropped to 0%, saving around £9063 and 439 670 kg of CO₂. “We learnt that behaviour can be changed by removing the causative agent. Feedback revealed that anaesthetists were only using desflurane because it was available. “We would encourage all anaesthetic departments to do the same and to look into the recapturing of nitrous oxide gas within obstetric and emergency departments.”

“We cut our carbon footprint by reducing desflurane use”

Arun Tohani, anaesthetic specialty trainee year 5, London

“My first piece of advice is to think about everything you do from a patient and environmental point of view. We do so many things automatically—because guidelines say so, because it’s the cheapest option, or because that’s the way it’s always been done. “Often there’s an option that’s not only better for the planet, but also better for the patient. Does this patient need an antihypertensive today, or would they benefit from a healthier diet and physical activity, for example? “Second, talk about tackling climate change. Talking gets people thinking and that sends ripples. If you consider how many people we have contact with every day, you realise the great potential we have to make a real difference. “Last year I gave a presentation on the NHS Green Plan for the practice and after that things snowballed. Staff (from the cleaner to the practice manager) came to me with environmentally friendly ideas. We’ve now got a ‘green team’ to drive initiatives. “We’ve reduced our general waste by two thirds by recycling as much as we can and composting our food waste. We’ve become an ‘active practice,’ with several members of staff now cycling, walking, or car sharing. “We’ve re-written our asthma protocols with a focus on greener inhaler prescribing and paper is a last resort, with information being sent by email or text where possible. “To summarise—think about it, talk about it, and watch the seed you’ve planted grow.”

“Think and talk about the environment at work”

Amanda Woodgate, GP and co-chair of East Midlands Greener Practice, Coventry and Warwickshire

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