

Climate change, paediatric health and ways that digestive health professionals can engage

Rebecca Philipsborn,¹ Madhumitha Manivannan,² Todd L Sack ^{3,4}

Digestive health professionals can contribute to everyone's future by addressing the existential threats posed by climate change (CC) in our practices, our professional societies and our communities. In this commentary, we introduce the implications of CC for children and adolescents, and provide ways that all physicians, nurses, trainees and managers, whether caring for children or adults, can add CC advocacy to their professional and personal lives.

CC AND PAEDIATRIC HEALTH

Without robust, urgent action to mitigate carbon emissions and adapt to the impacts of CC that are already occurring, CC will 'define the health' of children for generations.¹ The ways that CC threatens the well-being of children have been well described, with important implications for digestive health.² Climate-driven disasters disrupt water, sanitation and hygiene infrastructure, and place children at risk for physical and psychological trauma.³ CC contributes to malnutrition through several pathways, and child undernutrition impedes lifelong developmental potential.

On the global scale, CC threatens to reverse the progress of the past century in reducing child mortality.⁴ Many of the leading causes of death and disease in children—diarrhoeal diseases, pneumonia, malnutrition, preterm birth and malaria—are climate sensitive. For example, extreme heat is associated with increased risk of preterm birth, and preterm birth complications are the largest categorical contributor to infant mortality.⁵ Extreme heat ushered in by CC can be expected to affect indirectly the incidence of conditions associated with prematurity.

Relevant for digestive health professionals, necrotising enterocolitis affects about 8% of infants born at <32 weeks, has a mortality rate up to 45% and causes significant morbidity for survivors.⁶

In 2021, UNICEF introduced The Children's Climate Risk Index to quantify climate risks and to emphasise the climate crisis as a child rights crisis.⁷ Nearly every child on earth is exposed to at least one environmental shock or stressor worsened by CC. Many children are exposed to multiple hazards that compound health risks. While all children are vulnerable to CC, risk varies even among children. At-risk paediatric populations include the very young, those with chronic illness or special needs, those who rely on caregivers with chronic conditions, those living in geographical regions facing disproportionate impacts, and those living in communities already burdened or where adaptation is less feasible.² CC and climate-related events uproot children from their homes, forcing migration and displacement from countries and communities at high risk.⁷

Beyond the physical health implications, mental health is profoundly affected by the climate crisis. In a global survey of 10 000 youth, almost 60% were very or extremely worried about CC, and 45% indicated that concerns about CC negatively affect their daily life.⁸ Given the close and bidirectional influences of gastrointestinal illness on mental health, digestive health professionals may increasingly encounter paediatric patients with concomitant psychosomatic and somatic concerns.

Health professionals have an opportunity to deliver care that is patient-centred, culturally sensitive and climate informed. **Figure 1** summarises a framework for assessing an individual patient's vulnerability to CC, emphasising examples pertinent to gastroenterology. Vulnerability is a function of the individual's risk of exposure, physiological susceptibility and adaptive capacity. Children and older individuals are more vulnerable to environmental health impacts. Children breathe closer to the ground where

pollution settles, they lack psychological maturity to recognise hazards and their behaviours may increase their exposure to the hazard.² Because they are growing and developing, they are more physiologically susceptible to hazards on exposure. Their decreased adaptive capability leaves them dependent on caregivers, communities and government to shield them. When risks are identified, medical and public health partnerships and interdisciplinary collaborations with community-based referral organisations can extend the reach of the clinician to support patient needs and climate resilience.

Nutrition emerges as a topic of broad importance to patients and health systems. While malnutrition contributes to about half of child mortality globally, diets in high-income countries contribute to chronic diseases and to unsustainable food systems. Red meat accounts for a disproportionate amount of greenhouse gas (GHG) emissions from the global food chain.⁹ Plant-based diets are capable of providing sufficient macronutrients and micronutrients, reducing long-term risks of many chronic diseases (eg, obesity, diabetes, cardiovascular diseases, some types of cancer), and are associated with dramatically lower GHG emissions.

The EAT-Lancet Commission concluded that 'food is the single strongest lever to optimise human health and environmental sustainability on earth'.⁹ While dietary patterns globally require substantial shifts to align with the optimal planetary health diet, physicians are well positioned to advocate for this shift. Digestive health professionals can speak with patients and the public about well-planned diets that benefit individual health, public health and food security. In emphasising nutrition for disease prevention, the field will support one of the most effective ways to reduce waste in healthcare—by preventing illness and reducing the need for care in the first place.

HEALTHCARE AS A CONTRIBUTOR TO THE EFFECTS AND MITIGATION OF CC

The healthcare industry, including our work as health professionals, is responsible for 5% of the world's toxic air pollution and GHGs. Air pollution from US healthcare leads to 405 000 years of lost life annually.¹⁰ With innumerable number of hospitals, clinics and practices worldwide, there are huge opportunities to save resources and money, and reduce GHGs through wise choices. Moreover, health professionals are among the most trusted members of society. Our patients and

¹Gangarosa Department of Environmental Health, Emory University Atlanta, Atlanta, Georgia, USA

²Emory University School of Medicine, Emory University Atlanta, Atlanta, Georgia, USA

³H Wertheim College of Medicine, Florida International University, Miami, Florida, USA

⁴My Green Doctor Foundation, Jacksonville Beach, Florida, USA

Correspondence to Dr Todd L Sack, H Wertheim College of Medicine, Florida International University, Miami, FL 33199, USA; tsack8@gmail.com

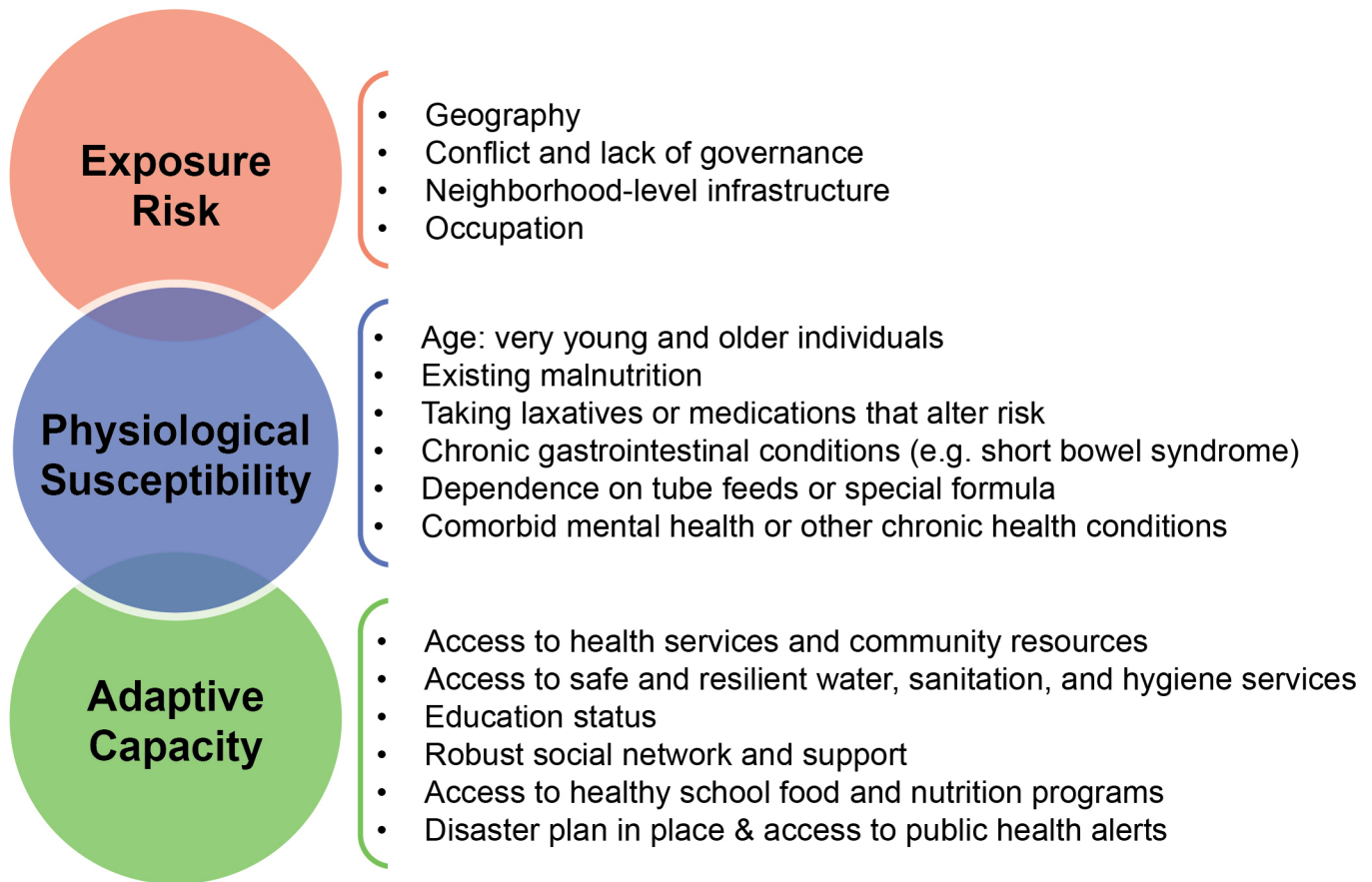


Figure 1 A framework for assessing patient risks for climate-driven exposures in gastroenterology: examples of factors that influence risk of exposure, increase physiologic susceptibility and enhance an individual's adaptive capacity.

communities take notice when we recycle, use energy and chemicals efficiently, choose electric cars or speak publicly about CC at public meetings or to health-care audiences.

Our goals as CC communicators are threefold: to raise awareness of the climate crisis; to teach patients and families how they can protect themselves from direct and indirect health threats such as heat illness, flooding, wildfires, severe storms, air pollution and infectious diseases; and to describe actions that all of us can take at our homes, workplaces and communities to address CC.

The 'co-benefits' of addressing CC—including transitioning to sustainable energy and eating diets within planetary boundaries—will improve health. Climate action will result in fewer attacks of asthma and Chronic Obstructive Pulmonary Disease (COPD), less heart disease, and less cancer attributable to pollution. It can potentially bring prosperity in the form of better paying jobs from the renewable energy industry, and economic stability with fewer climate-related disasters and population displacements. The air and water will be cleaner for all of

us to enjoy. Importantly, climate solutions implemented wisely will improve health equity and reduce environmental injustices.

ADDING CC ACTION TO OUR LIFE, PROFESSION AND PRACTICE

CC engagement begins at home and in our personal lives. Opportunities to minimise one's personal GHG footprint, conserve energy and in many cases save money, include:

- ▶ Choose a smaller house or apartment with good insulation.
- ▶ Choose the most efficient appliances, heat pump heaters and air conditioners, an induction electric stove rather than gas and low emitting diode (LED) lightbulbs.
- ▶ Adjust thermostats to 23°C (73°F) or higher in the summer; 20°C (68°F) or lower in the winter.
- ▶ Buy only electric vehicles, and use public transportation, bicycles or walk whenever possible.
- ▶ Invest in buying roof-top solar panels for our homes and businesses.

- ▶ Ask our financial planners to remove fossil fuel companies from our investment portfolios ('divestment').¹¹
- ▶ Talk about climate action with family members, colleagues, and neighbours, and 'vote climate'.

Open access online programmes help families to calculate their annual household GHG production and find lots of ideas that save money.¹²

To avert the looming climate crisis, every organisation that we are involved with can have an impactful role by working towards environmental sustainability and CC engagement (Table 1). This includes our community organisations such as neighbourhood associations, houses of worship, social clubs, political organisations and government agencies. The health impacts of CC need to be woven into our medical or other professional school curricula, research support, faculty and trainee development.¹³ Our enormous hospital facilities have opportunities to save energy, encourage wise transportation choices, offer environmentally sound food options, and decrease waste by adopting climate-aware purchasing, reusing, and recycling. Table 1 lists resources, stakeholders and

Table 1 Places for health professionals to engage on climate change and health^{12–19}

Places to engage	Activities and resources
At home	Energy and water use, electric cars, solar panels, appliances, safer chemicals, avoiding plastics, recycling, emergency planning
Community organisations	Sustainability committees, lectures, newsletters
Government	Climate and disaster planning, expert testimony, voter engagement
Medical schools	Curriculum change, research, faculty and trainee development
Hospitals	Practice Greenhealth, Healthcare Without Harm
Professional societies	Policies, continuing medical education, practice management tools, standards of care
Our Practices	My Green Doctor, Green Impact for Health, Greening General Practice, Green Office Toolkit, patient education

efforts that are feasible for health professionals to undertake.^{12–19}

In 2022, four of the largest US gastroenterology organisations released a joint society strategic plan on CC, which has been endorsed by 23 additional organisations that together represent most of the world’s digestive disease specialists.²⁰ This document is only a blueprint; its implementation will require digestive health professionals globally to promote the establishment of committees and working groups in medical schools, hospitals and medical practices. We need to engage with our leaders and help make the case for prioritising CC and health by formulating climate-related policies, developing best-practice management guidelines and working with industry to forge a sustainable supply chain with the lowest-possible climate and toxics impacts.

GREENING OUR PRACTICES

Outpatient healthcare—including our clinics, medical offices and outpatient endoscopy centres—is responsible for 26% of US healthcare’s air pollution and GHGs.²¹ Four open access websites offer straightforward and easy-to-use programmes for ‘greening’ practices that can save practices money and improve community health.^{16–19} The Green Impact for Health’toolkit is a service of the Royal College of General Practitioners in the UK.¹⁶ Green Impact offers more than one hundred easy projects and a practical scoring system for keeping track of your progress. Greening General Practice is a practical guide provided by the Royal New Zealand College of General Practitioners and the Green Office Toolkit is a well-designed resource from the Canadian Coalition for Green Healthcare.^{17 18}

My Green Doctor offers an environmental sustainability and CC practice management programme for outpatient healthcare. Its step-by-step approach adds only 5 min to weekly or monthly practice meetings. Twenty-nine health professional societies offer My Green Doctor as a money-saving, climate-saving membership benefit.¹⁹

CONCLUSION

CC is this century’s #1 threat to the health of children and adults, to economic security, and to social equity. Physicians and healthcare workers can emphasise the threats to health—and especially to the health of our children—in our communications with patients, colleagues and community leaders. We can all commit today to leverage our efforts and expertise as health professionals and individuals to engage on this pressing planetary health crisis and to rally climate action.

Twitter Todd L Sack @mygreendr

Contributors RP, MM and TLS jointly contributed to the initial draft of the manuscript, with edits and finalisation by all three authors. RP and TLS are joint first authors.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors. TLS is the editor and founder of My Green Doctor, a non-profit practice management resource for health professionals and managers. RP is a member of the Region 4 Pediatric Environmental Health Specialty Unit (PEHSU), with her salary funded in part by the cooperative agreement award number 1U61TS000296 from the Agency for Toxic Substances and Disease Registry (ATSDR) and by the US Environmental Protection Agency (EPA) under an interagency cooperative agreement (DW-75-95877701). Neither EPA nor ATSDR endorse the purchase of any commercial products or services mentioned in PEHSU publications.

Competing interests None declared.

Patient consent for publication Not applicable.

Provenance and peer review Not commissioned; internally peer reviewed.

© Author(s) (or their employer(s)) 2023. No commercial re-use. See rights and permissions. Published by BMJ.



To cite Philipsborn R, Manivannan M, Sack TL. *Gut* Epub ahead of print: [please include Day Month Year]. doi:10.1136/gutjnl-2023-331166

Received 26 September 2023
Accepted 28 September 2023

Gut 2023;**0**:1–3.
doi:10.1136/gutjnl-2023-331166

ORCID iD

Todd L Sack <http://orcid.org/0000-0003-1919-6536>

REFERENCES

- Watts N, Amann M, Arnell N, *et al*. The 2019 report of the Lancet Countdown on health and climate change: Ensuring that the health of a child born today is not defined by a changing climate. *Lancet* 2019;394:1836–78.
- Ahdoot S, Pacheco SE. Council on Environmental Health. Global climate change and children’s health. *Pediatrics* 2015;136.
- United Nations Children’s Fund. *Unless We Act Now: The Impact of Climate Change on Children*. New York, NY, 2015.
- Philipsborn RP, Chan K. Climate change and global child health. *Pediatrics* 2018;141:e20173774.
- Bekkar B, Pacheco S, Basu R, *et al*. Association of air pollution and heat exposure with preterm birth, low birth weight, and stillbirth in the US: A systematic review [published correction appears in *JAMA Netw Open*. 2020 Jul 1;3(7):e2014510]. *JAMA Netw Open* 2020;3:e208243.
- Zozaya C, García González I, Avila-Alvarez A, *et al*. Incidence, treatment, and outcome trends of necrotizing enterocolitis in preterm infants: A multicenter cohort study. *Front Pediatr* 2020;8:188.
- United Nations Children’s Fund (UNICEF). The Climate Crisis is a Child Rights Crisis: Introducing the Children’s Climate Risk Index. 2021.
- Hickman C, Marks E, Pihkala P, *et al*. Climate anxiety in children and young people and their beliefs about government responses to climate change: a global survey. *Lancet Planet Health* 2021;5:e863–73.
- Willett W, Rockström J, Loken B, *et al*. Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems. *The Lancet* 2019;393:447–92.
- Singh H, Eckelman M, Berwick DM, *et al*. Mandatory reporting of emissions to achieve net-zero health care. *N Engl J Med* 2022;387:2469–76.
- American Medical Association. AMA to protect human health from the effects of climate change by ending its investments in fossil fuel companies (divestment). 2017. Available: <https://policysearch.ama-assn.org/policyfinder/detail/divestment?uri=%2FAMADoc%2FHOD.xml-H-135.921.xml>
- US EPA. Household Carbon Footprint Calculator. Available: <https://www.epa.gov/ghgemissions/household-carbon-footprint-calculator/>
- Columbia University Irving Medical Center. Global Consortium on Climate Change and Health Education. Available: <https://www.publichealth.columbia.edu/research/programs/global-consortium-climate-health-education/>
- Practice Greenhealth. Sustainability solutions for health care. Available: <https://practicegreenhealth.org>
- Healthcare Without Harm. Leading the global movement for environmentally responsible health care. Available: <https://noharm.org>
- Royal College of General Practitioners. Green Impact for Health. Available: <https://greenimpact.nus.org.uk/green-impact-for-health/>
- Royal New Zealand College of General Practitioners. Greening General Practice. Available: <https://www.rnzcgp.org.nz/resources/sustainability/greening-general-practice/>
- Green Office Toolkit. Available: <https://greenhealthcare.ca/clinics/green-office-toolkit/>
- My Green Doctor. Available: <https://www.MyGreenDoctor.org>
- Pohl H, de Latour R, Reuben A, *et al*. GI multisociety strategic plan on environmental sustainability. *Gastroenterology* 2022;163:1695–701.
- Sack T. Green offices are healthier. 2020. Available: <https://mygreendocor.org/green-offices-are-healthier-new-analysis/>