

Protecting Children's Health through Hospital Decarbonisation

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Introduction

Despite the hope raised by the 2015 Paris Agreement, the world is now dangerously close to breaching its 1.5 °C warming limit, with record-breaking temperatures in 2023 and 2024 already fuelling deadly climatic extremes (1). Children are particularly vulnerable due to physiological, social, and demographic factors. Their higher respiratory rates, immature thermoregulation, and developing organ systems make them more sensitive to environmental hazards, while their dependence on caregivers reduces their adaptive capacity. They also face the longest lifetime exposure to climate risks. Projections suggest that a child born in 2020 will experience nearly three times more climate-related extreme events than their grandparents (1). For paediatricians, climate change is not an abstract future concern but a present and escalating health crisis.

Health impacts of climate change on children

Systematic reviews show that pregnancy and early life are among the most sensitive windows of vulnerability besides old age. Heat is a major prenatal risk factor. A meta-analysis by Reichelt et al. reports that heatwaves increase preterm birth by ~16% and stillbirth by ~46%, with each additional degree Fahrenheit (~0.56 °C) raising risks by ~5%. Low birthweight rises by ~9% during hotter periods, with babies on average 26 grammes lighter (2). Another pooled analysis by Weeda et al. found that exposure to temperature extremes was associated with an average 60% increase in preterm birth risk, although heterogeneity was high and some studies reported null findings (3).

The heightened risks do not stop at birth. From infancy onward, children are already disproportionately affected by climate-related disease. Heatwaves increase paediatric emergency visits, particularly among infants who are physiologically less able to regulate body temperature (2,3). Heat also raises all-cause mortality, with under-fives among the most heat-sensitive age groups (3). Asthma, the most common chronic paediatric disease, is consistently aggravated by exposure to air pollution, pollen, and the intensified heat that accumulates in densely built urban areas

(the so-called 'urban heat islands') (3). Each 10 µg/m³ increase in fine particulate matter ≤2.5 micrometres in diameter (PM_{2.5}) from traffic/urban sources is associated with a 2–3% rise in paediatric asthma admissions (2). During bush fires, an increase in PM_{2.5} of at least 30% is often measured. Climate change also prolongs pollen seasons and increases allergenicity through higher CO₂ concentrations, drought, and heat, compounding the burden of allergic rhinitis and asthma (2).

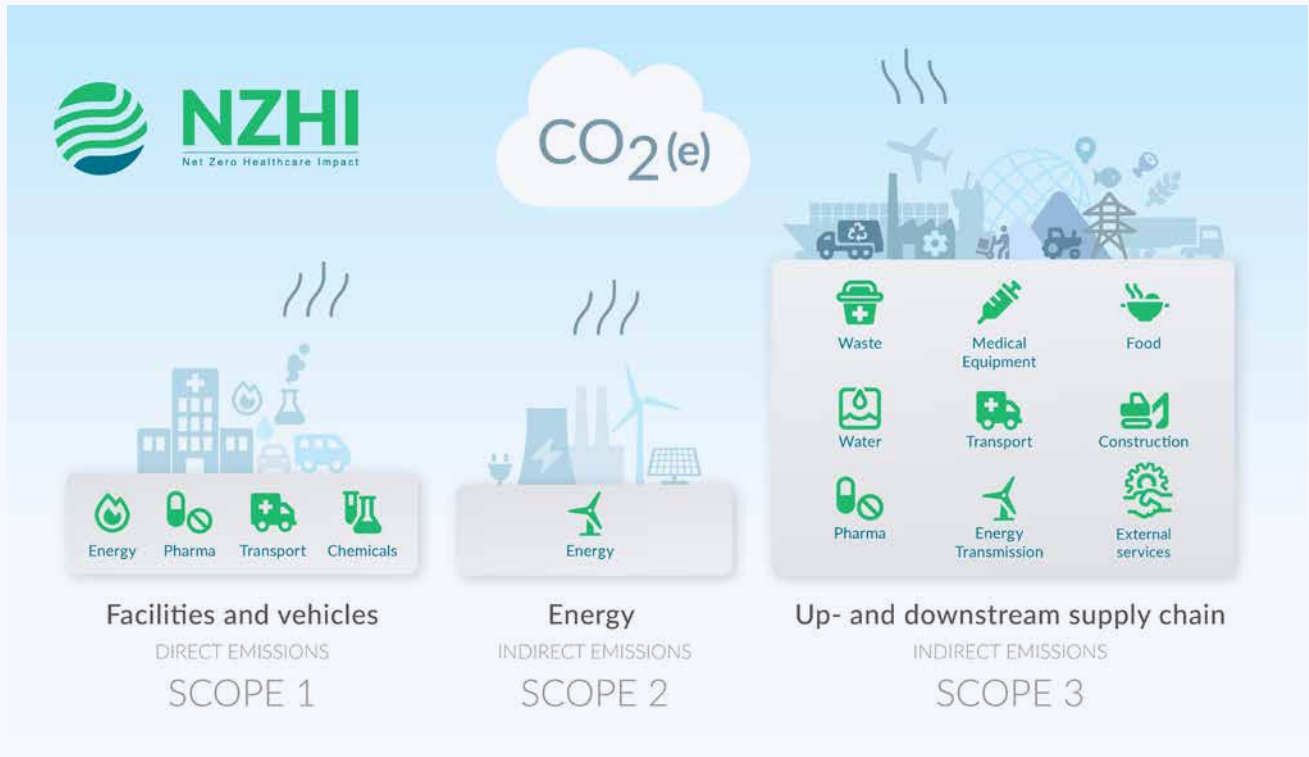
Infectious diseases are shifting under warmer and wetter conditions. Europe has documented rising incidence of vector-borne infections such as West Nile virus, while globally dengue, chikungunya, and Zika are spreading to new regions (2). Extreme events such as floods and droughts increase waterborne disease and diarrheal burden, especially where sanitation systems are weak (3). Beyond physical illness, chronic exposure to polluted air has been linked to impaired neurodevelopment, reduced academic performance, and higher risk of behavioural disorders, including ADHD (3).

These risks are not equally distributed. Children in lower socioeconomic settings are disproportionately exposed to polluted environments and have fewer resources to adapt, reinforcing existing inequities (4). The crisis is also profoundly intergenerational: today's children are projected to face two to three times more climate-related extremes than their grandparents (5).

Air pollution and greenhouse gases: two problems, one solution

Air pollution is an essential pathway linking climate change and child health. Across the EU, air pollution contributes to 239,000 premature deaths annually. In Belgium, poor air quality is responsible for around 9,000 premature deaths each year (6). Because fossil fuel combustion is the dominant source of both greenhouse gases and air pollutants, strategies to achieve net zero emissions strongly overlap with strategies to reduce air pollution. Transitioning to a net zero society would eliminate a substantial share of outdoor air pollution, yielding immediate health benefits (7). For children, this means fewer asthma attacks, improved lung development, and healthier neurocognitive outcomes. The

FIGURE 1: Healthcare sector emissions by scope according to the Green House Gas protocol and the NZHI framework (9).



concept of a “double dividend” is therefore powerful: every step taken to mitigate climate change also improves child health today.

The footprint of healthcare itself

Healthcare, while protecting health, also contributes to the crisis. Belgium’s health sector emitted 9.901 kilotons CO₂ equivalent (CO₂e) in 2022, around 5% of national consumption-based emissions. Hospitals are the most emission-intensive providers, responsible for 55% of health sector emissions. The hospital’s footprint is overwhelmingly Scope 3-dominant: 11% Scope 1, 3% Scope 2, and 86% Scope 3 (figure 1). The scope 1, 2, 3 approach relates to the Green House Gas Protocol standards: scope 1 consists of on-site combustion of greenhouse gases (such as anaesthetic gases, natural gas, ...), scope 2 of the electricity produced off-site but used in the hospital, and scope 3 includes all the carbon generated in the supply chain including production of medical goods, pharmaceuticals, food, transport, and waste treatment. Within Scope 3, purchased goods account for 63%, driven by pharmaceuticals (31%), medical equipment (14%), and food and catering (8%). For paediatrics, certain categories are directly relevant: metered-dose inhalers contribute approximately 44 kilotons CO₂e nationally (0.4% of total), a small share overall but meaningful within respiratory care decisions (8).

Hospital-level data illustrate this picture. The Flemish hospital group *Maria Middelaere* VZW with 707 accredited beds measured 35.288,3 tons CO₂e in 2024 across all scopes. More than 90% of emissions were Scope 3, with medical goods and pharmaceuticals together responsible for over half. Transport contributed 14%, food 10%, energy 9% (with green electricity already in place), construction 4%, waste 2%, and water less than 1% (own data (9)).

When nothing changes, the Belgian health-sector emissions will rise by over 60% by 2050, to around 16.000 kilotons CO₂e. A

modelled package of 16 interventions business-as-usual, reducing emissions to 4.300 kilotons CO₂e in 2050, about 44% of today’s level. Supplier decarbonisation standards are the single largest lever, responsible for ~43% of modelled reductions. Other high-yield actions include optimising and substituting pharmaceuticals (e.g. switching to clinically appropriate low-carbon inhalers), extending equipment lifetimes, shifting from single-use to multi-use instruments and garments, and reducing food waste. Futureproofing of existing hospital buildings and attention for sustainability in newly constructed hospitals is essential. This includes electrification, insulation, renewable power production and purchasing (10).

What this means for Belgian hospitals and paediatricians

Belgium’s National Environmental Health Action Plan (NEHAP) explicitly identifies climate change as a key determinant of health (8). Decarbonisation aligns directly with paediatric health protection. Reducing high-GWP (global warming potential) inhalational anaesthetics and optimising inhaler choices cuts emissions without compromising care. Cleaner energy and sustainable procurement reduce the co-burden of air pollution, while resilient food systems support nutrition. NEHAP calls for monitoring environmental exposures, reducing vulnerabilities, and integrating climate-health risks into prevention strategies (10).

Hospitals hold powerful levers: formulary stewardship for high-impact medicines, sustainable anaesthetic gas choice and capture, prioritisation of reusable over disposable items where safe, sustainable supplier criteria, plant-based menus, mobility policies promoting active travel and telehealth, and full energy decarbonisation. Individual clinicians, especially paediatricians, can lead by example, avoiding unnecessary pressured metered-dose inhalers, supporting rational prescribing, and advocating for sustainable practice within their institutions.

Net Zero Healthcare Impact (NZHI) is a Belgian start-up founded by emergency physician dr. De Tavernier, dedicated to driving the healthcare sector towards net zero carbon emissions and sustainability. The company has developed an evidence-based methodology to measure hospital emissions across all scopes, including the often-overlooked supply chain (Figure 1). By quantifying the footprint 10 core domains (pharmaceuticals, medical goods, waste, chemicals, transport, food, energy, mobility, water, construction, and external services), NZHI provides hospitals with precise data to identify high-impact areas and reduction opportunities. This approach allows hospitals to integrate climate performance into procurement, clinical decisions, and strategic planning, while ensuring that patient care remains uncompromised. NZHI also supports hospitals in meeting emerging European sustainability reporting requirements, providing benchmarks and pathways for compliance. By combining data analysis with practical solutions, NZHI empowers hospitals and clinicians to take ownership of their environmental impact, ensuring that the protection of human health is fully aligned with the protection of planetary health. These sustainability efforts are in practice often significant cost savings by reducing the use of single use goods, reducing energy costs and improving overall efficiency and performance of a hospital by

stimulating a lean and resilient approach within the 10 domains. The NHS recently identified sustainability as the number one way to save healthcare related costs today (11).

Conclusion

Climate change undermines child health through multiple pathways. At the same time, hospitals remain a significant source of emissions, yet many opportunities to reduce their footprint are achievable and compatible with high-quality care. For paediatricians, this reality brings both responsibility and opportunity. As trusted advocates for children, they are uniquely positioned to make the health impacts of climate change visible to families, institutions, and policymakers. Recognising climate action as child health protection reframes sustainability as central to paediatrics. By embedding sustainable choices into daily medical practice, paediatricians can help protect children from today's illnesses and tomorrow's risks. By sharing their practices and advocating for sustainability within their hospitals, they can lead by example and encourage colleagues across disciplines. In doing so, paediatricians help safeguard future generations.

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