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Singapore unveils first comprehensive study of national healthcare system emissions to strengthen climate and health action

16 September 2025 | News

New NUS-MOH study: Singapore's healthcare sector carbon emissions 18% lower than expected, a milestone in the city-state's net zero journey

In a milestone for Southeast Asia's healthcare sector, Singapore's Ministry of Health (MOH), MOH Holdings Pte Ltd (MOHH), and the Centre for Sustainable Medicine (CoSM) at the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine) have released its first-ever comprehensive national emissions report for Singapore's healthcare sector, and the first comprehensive study across Asia.

The NUS-MOH study demonstrates that Singapore's healthcare system is 18%1 more sustainable than previously estimated, with the country delivering world-class healthcare at 20% lower carbon intensity than other advanced economies.

Launched at the first WHO-NUS hosted action forum for health ministries in the region working on sustainable healthcare, this report marks an important step in supporting Singapore's national commitment to achieve net zero emissions by 2050, as outlined in Singapore Green Plan 2030. By mapping the carbon footprint of its entire healthcare system, Singapore joins a select group of countries leading the way in sustainable medicine, including the United Kingdom's National Health Service, Australia, France, Norway, and the Netherlands.

The report was launched by Mr Tan Kiat How, Senior Minister of State, Ministry of Health & Ministry of Digital Development and Information, at the inaugural Western Pacific Action Forum on Climate-Resilient and Sustainable Health Systems. Mr Tan emphasised that a whole-of-system approach to decarbonisation is essential to securing and improving the highest standards of patient care for future generations. He said, "This report marks a significant step forward in our sustainability journey. Importantly, this is also a call to action. Thus far, Singapore has been able to deliver world-class healthcare at a carbon intensity that is 20% below that of other advanced economies' healthcare systems. This is driven by several factors, such as negligible levels of refrigerant emissions despite our hot climate, and rapid reductions in anaesthetic gas emissions in recent years through the dedication of our healthcare partners."

WHO's Director for Programme Management at the Western Pacific Region, Dr Susan Mercado, underscored the significance of Singapore's leadership for the region. She said, "Sustainable healthcare is no longer a choice – it is a necessity. Singapore and the wider Western Pacific region face rising health demands, climate risks, and resource pressures. By investing in sustainable healthcare, we can strengthen resilience, lower emissions, and ensure every dollar spent delivers both better health outcomes and a healthier planet."

1 18% lower than the most recent estimate of Singapore's healthcare emissions on a 3-year rolling average basis (Romanello et al. (2024). The 2024 Report of the Lancet Countdown on Health and Climate Change: Facing Record-Breaking Threats From Delayed Action. *The Lancet*, 404(10465), 1847-1896. https://doi.org/10.1016/S0140-6736(24)01822-1)

The report draws on data from all of Singapore's healthcare system, and is the result of a year long effort by the MOH; MOHH and its subsidiaries NHG Health, National University Health System (NUHS), Singapore Health Services (SingHealth), and the Agency of Logistics and Procurement Services (ALPS); with the research led by CoSM.

Professor Nick Watts, Director of CoSM, said, "This report provides a firm analytical foundation that will allow Singapore's healthcare system to lead the world not only in high-quality care, but in the growing field of sustainable medicine. With data and contributions ranging from every hospital and every cluster through to national procurement and emergency services, the study's system-wide approach enables a whole-of-healthcare response to the health emergency of climate change."

The new study estimates the footprint of Singapore's healthcare system at **4.1 million tonnes of carbon dioxide equivalent (Mt CO?e) per year** – roughly the same as powering all 1.4 million households in Singapore for over a year. This provides crucial evidence on where the healthcare system's emissions lie, enabling healthcare leaders and professionals to target emissions where it matters most, while safeguarding and enhancing patient care.

Mapping out the emissions from Singapore's healthcare system from April 2023 to March 2024, the report identifies the following six major hotspots of emissions, and outlines healthcare decarbonisation efforts and opportunities in the respective areas:

- **Medicines and medical products (32%):** These emissions mostly arise from the manufacture, transportation, and use of medicines and medical devices, such as thermometers, bandages, medical gowns, or wheelchairs, for the core delivery of healthcare. Singapore has already achieved significant reductions in the use of desflurane (-45%) and nitrous oxide (-35%) in recent years, with some hospitals having virtually eliminated the use of desflurane and seen greater than 70% reductions in nitrous oxide use by replacing leaky manifolds with efficient canister systems.
- **Construction and maintenance of hospitals, clinics and other buildings (19%):** Building construction accounts for 12% of the footprint, driven by major projects such as Woodlands Health Campus and other hospital expansions, with maintenance of medical equipment and facility assets contributing a further 7%. The integration of sustainability into healthcare infrastructure projects positions Singapore as a leader in green hospital design, as it is already prioritising the use of low carbon materials as well as embedding lifecycle carbon assessment and energy efficient design into planning to ensure new buildings minimise emissions over their entire lifecycle, not just their construction.
- **Non-medical products and services and other capital expenditure (17%):** These include a wide range of general procurement and support services, such as laboratory equipment, laundry and cleaning services, catering, or business services. Emission reduction opportunities include prioritising local, Singapore-based suppliers, low

carbon supply chains and applying emissions criteria in procurement policies—the implementation of which can be readily supported by Singapore's highly integrated procurement frameworks.

- **Emissions from hospitals, polyclinics and other buildings (14%):** These include electricity used for lighting, cooling, and powering medical and office equipment in hospitals and clinics, water usage and the transport and incineration of general and clinical waste. As Singapore's new public hospital buildings already follow stringent energy codes and green building standards, and other existing public hospitals also undergoing upgrades, these energy savings will grow rapidly in the years ahead.
- **IT equipment and services (13%):** These include IT operations which involve the employment of energy-intensive data centres and servers to run Singapore's comprehensive and secure digital health services. Singapore's healthcare system is dedicated to improving the efficiency of its IT operations as part of its sustainability efforts through adoption of Building Construction Authority (BCA) Green Mark standards for upcoming data centres, advancement of cooling technologies, optimisation of server utilisation, and implementation of energy efficient hardware.

- **Transport emissions (5%):** This covers staff commuting, patient and visitor travel, as well as ambulance fleets, non-emergency transport in hospital vehicles, business travel, and the emissions to manufacture vehicles owned by the healthcare system. Given Singapore's dense urban population and highly efficient public transport system, transport-related emissions in healthcare are already low as a proportion of our total footprint.

The report also highlights major achievements in Singapore's various healthcare institutions in the recent years, showing that environmental stewardship and clinical excellence go hand in-hand.

- **Staff-led action and clinical innovation** from the National University Hospital (NUH) nurse-led recycling scheme (230% increase in plastic recycling) to a 90% reduction in emissions achieved by anaesthetists at Changi General Hospital (CGH) through switches to safer, cheaper, and greener anaesthetic gases.
- **A whole-of-system approach to sustainability** such as Tan Tock Seng Hospital's medication packaging recycling effort that mobilised patients, caregivers, staff, students, and local companies.

• **Leadership and recognition** including the world's first MSc in Sustainable Healthcare at NUS Medicine and NUH becoming the first hospital globally to earn Joint Commission International's Healthcare Sustainability Certification.