



# The current state of carbon emissions in the healthcare sectors and future evolution, a narrative review

Dalia Mominkhan, Manea balharith, Ahmed Alshebli, Sara Alshareef, Abdulhemaïd Khairaldain, Najla Almutairi, Abdulaziz Abusit, Yaser Almuzaini, Fahad Alamri, Ahmed Alahmari, Mohammed K. Alabdulaali

## Background

A long-term gradual variations in temperature and weather patterns influenced by human activities is referred to as climate change. Green House Gases (GHGs) intensification, and aerosol formation. Over 98% of the world's greenhouse gas emissions in 2014 came from carbon dioxide, methane, and nitrous oxide. Over one century, carbon dioxide emissions have escalated from 3.09 to 37.12 billion metric tons in 2021

### Aim

To provide an in-depth overview of the current state of carbon emissions in the healthcare sector globally and the efforts to mitigate in the future

### Methods:

- A narrative review, using the Medline Pubmed database and Google Scholar using the keywords: 'climate change', 'Carbon Footprint' and 'Greenhouse Gases', and those relating to 'healthcare'
- Three public health experts screened the abstracts and identified the most relevant papers.

### Health Sector Implications for Climate change

- The HCS is a major contributor to the CO2 footprint despite its relatively low-carbon effusions
- The annual greenhouse gas emissions from healthcare equal those from 514 coal-fired power plants
- The health carbon footprint is a cumulative influence of intensive energy of the domestic economy, healthcare expenditure, and domestic energy system
- Hospital care (36%), physicians and clinical services (12%), and prescription drugs (10%) are reported to be the items that contribute the most to carbon emissions in healthcare services

## International Statistics & Efforts

- The global carbon footprint of healthcare has established a discernible pattern among lower middle-income (LMI), upper-middle-income (UMI), low and middle-income (LAMI), and high-income (H.I.) countries.

Top emitters >1t/cap		Major Emitters (0.5t-1t)/cap		Above average emitters (0.28t-0.50t)/cap		Lower-than-average emitters	
COU	t/cap	COU	t/cap	COU	t/cap	COU	t/cap
Australia	1.72	Austria	0.59	Bulgaria	0.37	Brazil	0.21
Canada	1.01	Belgium	0.83	Cyprus	0.34	China	0.25
Switzerland	1.02	Denmark	0.78	Greece	0.38	Hungary	0.26
USA	1.72	Germany	0.71	France	0.44	Croatia	0.19
		Finland	0.64	Czech Republic	0.35	Latvia	0.25
		Estonia	0.66	Italy	0.35	Indonesia	0.05
		Ireland	0.61	Malta	0.45	India	0.03
		Japan	0.81	Poland	0.34	Lithuania	0.17
		Korea	0.73	Spain	0.36	Mexico	0.18
		Norway	0.60	Slovenia	0.45	Romania	0.15
		Netherlands	0.79	Portugal	0.35	Slovak	0.22
		Russia	0.53	Sweden	0.46	Turkey	0.19
		Taiwan	0.52	European Union	0.49		
		Luxembourg	0.84				
		UK	0.66				

Table 1: Multistate analysis of Healthcare CO2 emission per capita (cap)

- Health care without harm (HCWH) and the Alliance of Nurses for Healthy Environments (ANHE) sought to inform, implement and influence regarding the impact of the healthcare sector on the environment.
- A program called Practice Green health aims to limit chemical and hazardous waste, eliminate mercury waste, reduce the amount of trash generated by the healthcare industry, and avoid pollution in general.

## Different perspectives to reduce CO2

- Choosing reusable versus disposable materials, circular procurement, and recycling in the operating rooms
- Implementing energy-saving strategies by turning off electrical equipment during non-operational hours
- Encouraging using Tele-medicine consultations
- Using intravenous anaesthesia in the operating rooms instead of inhalation anaesthesia.
- Ordering less imaging, employing low-impact imaging (X-ray and US) instead of MRI and CT where clinically appropriate, turning off scanners
- Empowering patients can facilitate fewer rehospitalizations and relatively fewer hospital visits
- Using alternatives such as powder-free inhalers or soft mist inhalers instead of MDI



Figure1: A novel approach of monitoring co2 emission by NHCC

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