

## Systematic Review of Digital Interventions to Reduce the Carbon Footprint of Primary Care

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**Abstract :** Background: Climate change has been reported as one of the worst threats to healthcare. The healthcare sector is a significant contributor to greenhouse gas emissions with primary care being responsible for 23% of the NHS' total carbon footprint. Digital interventions, primarily focusing on telemedicine, offer a route to change. This systematic review aims to quantify and characterize the carbon footprint savings associated with the implementation of digital interventions in the setting of primary care. Methods: A systematic review of published literature was conducted according to PRISMA (Preferred Reporting Item for Systematic Reviews and Meta-Analyses) guidelines. MEDLINE, PubMed, and Scopus databases as well as Google scholar were searched using key terms relating to "carbon footprint," "environmental impact," "sustainability", "green care", "primary care,", and "general practice," using citation tracking to identify additional articles. Data was extracted and analyzed in Microsoft Excel. Results: Eight studies were identified conducted in four different countries between 2010 and 2023. Four studies used interventions to address primary care services, three studies focused on the interface between primary and specialist care, and one study addressed both. Digital interventions included the use of mobile applications, online portals, access to electronic medical records, electronic referrals, electronic prescribing, video-consultations and use of autonomous artificial intelligence. Only one study carried out a complete life cycle assessment to determine the carbon footprint of the intervention. It estimate that digital interventions reduced the carbon footprint at primary care level by 5.1 kgCO<sub>2</sub>/visit, and at the interface with specialist care by 13.4 kg CO<sub>2</sub>/visit. When assessing the relationship between travel-distance saved and savings in emissions, we identified a strong correlation, suggesting that most of the carbon footprint reduction is attributed to reduced travel. However, two studies also commented on environmental savings associated with reduced use of paper. Patient savings in the form of reduced fuel cost and reduced travel time were also identified. Conclusion: All studies identified significant reductions in carbon footprint following implementation of digital interventions. In the future, controlled, prospective studies incorporating complete life cycle assessments and accounting for double-consulting effects, use of additional resources, technical failures, quality of care and cost-effectiveness are needed to fully appreciate the sustainable benefit of these interventions

**Keywords :** carbon footprint, environmental impact, primary care, sustainable healthcare

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