



Letter

Global data center expansion and human health: A call for empirical research

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Data centers (Fig. 1)—the backbone of the digital economy—are rapidly expanding globally to meet surging demand, yet this growth brings underappreciated risks to human health. They consumed 1.5% of global electricity in 2024 and are expected to represent nearly 10% of the electricity demand growth from 2024 to 2030 [1]. Despite efforts to curb their carbon and water footprints, the public health implications of data center expansion remain largely overlooked.

Data centers generate significant noise pollution primarily from diesel generators and Heating, Ventilation, and Air Conditioning (HVAC) systems, with internal noise levels reaching up to 96 A-weighted decibels (dBA)—well above the 85 dBA threshold considered harmful to hearing [2]. This persistent noise adversely affects data center staff, nearby communities, and local wildlife, prompting increased public concern and a push for noise mitigation strategies.

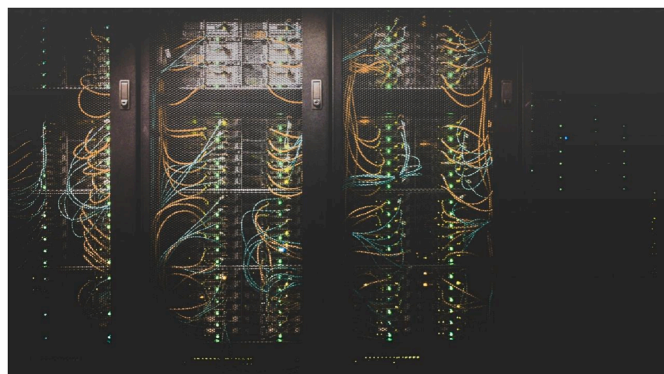


Fig. 1. A photograph of physical infrastructure essential for contemporary data management and storage in a modern data center. Photo by Taylor Vick on Unsplash (available for free use).

Air pollution is the most acute concern. Fossil-fueled power plants and diesel backup generators that power data centers emit hazardous pollutants such as nitrogen oxides and fine particulate matter, increasing rates of respiratory diseases, cardiovascular conditions, and elevating cancer risk in nearby communities. A recent model indicates that the U. S. data centers in 2030 could contribute to nearly 1300 deaths annually, resulting in a public health burden of more than \$20 billion [3].

Moreover, significant water needs for cooling, often from drinking supplies, create additional challenges. In certain areas, data centers consume up to 57% of cooling water from potable sources [4], worsening water scarcity in stressed regions. A typical hyperscale data center can use 3–7 million gallons of water per day for cooling purposes. Such consumption exacerbates local water insecurity, increasing the risk of waterborne diseases, dehydration, and poor hygiene in affected communities.

To protect communities, policymakers and industry must proactively mitigate these health risks. Key strategies include: (i) Power data centers with renewable sources and replace diesel generators with battery storage or fuel cells to eliminate exhaust emissions. (ii) Use advanced cooling technologies to reduce water use and recycle waste heat, alleviating local water scarcity and enhancing energy efficiency. (iii) Mandate public reporting of data center pollution. Greater transparency and stricter standards would hold operators accountable and encourage cleaner practices. (iv) Position new data centers away from populated or polluted areas and choose cleaner, low-density sites for energy-intensive workloads to reduce human exposure.

Empirical research is urgently needed to inform policy. Little is known about long-term health outcomes in data center host communities. Interdisciplinary studies should quantify pollution exposures (air, water, noise) and track associated health effects. Life-cycle assessments of data centers—from power generation to hardware disposal—can identify critical emission sources. Such evidence is vital to ensure that the digital revolution does not come at the expense of public health.

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In summary, the global data center boom is emerging as a public health concern. Proactive mitigation and targeted research are imperative to safeguard public health while sustaining digital innovation.

CRedit authorship contribution statement

Yu Tao: Writing – original draft, Funding acquisition, Conceptualization. **Peng Gao:** Writing – review & editing.

Declaration of competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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