Millions of cancer patients live within reach of life saving radiation treatment. Millions more live nowhere near it. The research maps just how wide, and how consequential, that gap has become.

Radiotherapy is a cornerstone of modern cancer care. Around half of all people diagnosed with cancer will require it at some point during their treatment, whether with curative intent or to relieve symptoms and improve quality of life. Yet despite its central role in oncology, access to radiotherapy remains one of the world's greatest—and least visible—inequities in cancer care. [1]

"*A marked disparity in the availability of radiotherapy machines between high-income countries and low-income and middle-income countries remains a major problem.***" May Abdel-Wahab**

The divide is stark. While patients in many high-income countries routinely benefit from technologies such as stereotactic radiotherapy, adaptive treatment planning, and proton therapy, access remains severely limited across much of the world. A recent global analysis found that 36 countries have no radiotherapy services at all, most of them low- or lower-middle-income nations. For millions of patients, the challenge is not accessing the latest technology—it is accessing any radiotherapy at all.

Geography has become one of the strongest predictors of whether patients receive treatment. A 2025 geospatial analysis found that only 17% of people living in low-income countries can reach a radiotherapy center within two hours of travel, compared with more than 90% of those in high-income countries. [2] For many patients, distance translates into delayed treatment, financial hardship, or the impossible choice of abandoning care altogether.

The pattern is repeated across regions. In sub-Saharan Africa, several countries rely on only a handful of radiotherapy machines to serve tens of millions of people, while treatment costs, transport, accommodation, and long waiting lists create additional barriers. Nearly 70% of patients surveyed across nine African countries identified treatment costs as a major obstacle to receiving radiotherapy. [3] Across the Asia-Pacific region, demand is expected to rise far faster than treatment capacity, particularly in low-income countries, while Latin America and the Caribbean continue to face significant infrastructure shortages despite expanding cancer services. [4]

The inequality becomes even more striking when advanced technologies are considered. Proton therapy—one of the most sophisticated forms of radiation treatment—is available in just over one hundred centres worldwide. None currently operate in Africa. Yet inequity is not confined to resource-limited settings. Even in high-income countries, studies show that socioeconomic status, race, and geography continue to influence access to advanced radiotherapy, reminding us that equity is about more than technology alone.

The human cost of these disparities is immense. Researchers estimate that by 2050 nearly eight million patients each year could miss the radiotherapy they need because adequate services are unavailable. [5] Many of those missed treatments will translate into avoidable deaths or unnecessary suffering.

The solution, however, is not simply to buy more machines.

Radiotherapy depends on an entire ecosystem: radiation oncologists, medical physicists, radiation therapists, engineers, dosimetrists, reliable electricity, maintenance services, information technology, and sustainable financing. In many countries, shortages of trained professionals limit access even where equipment exists. Meeting projected demand will require not only expanded infrastructure but also a dramatic increase in the global workforce, with estimates suggesting the need for more than 84,000 radiation oncologists, 47,000 medical physicists, and 141,000 radiation therapists by 2050. [6]

Encouragingly, meaningful progress is possible. Hypofractionation—delivering effective treatment in fewer sessions—has already transformed care for several common cancers, including breast and prostate cancer. By reducing the number of hospital visits without compromising outcomes, it can expand treatment capacity, lower costs, and ease the burden on patients, particularly where resources are limited. Studies suggest that wider adoption could allow millions more people to receive radiotherapy using existing infrastructure. [1]

Targeted investment can make a significant difference. Experts estimate that more than 30,000 linear accelerators will be needed worldwide by 2045 to meet projected demand. Where radiotherapy machines are deployed is as important as the number of machines purchased. Recent modelling suggests that strategically locating new treatment centers in underserved regions could dramatically improve access for millions of people. International initiatives such as the IAEA's Rays of Hope programme are already helping countries strengthen infrastructure, expand workforce training, and build sustainable radiotherapy services. [1]

Ultimately, improving access will require partnerships between governments, international organizations, academic institutions, industry, and healthcare professionals. It will also require radiotherapy to be recognized as an essential component of national cancer control plans rather than an optional investment that follows drug procurement.

Cancer does not recognize borders, income levels, or political systems. Yet access to one of its most effective treatments still depends heavily on where a person lives.

The technology exists. The expertise exists. The evidence is overwhelming.

The challenge now is to ensure that every patient, regardless of where they are born, has equitable access to these lifesaving advances.

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