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## Global gap in access to Radiotherapy

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The lack of access in radiotherapy (RT), is experienced across the world. While some high income countries struggle to meet the needs of their population [1,2], it is in lower income countries that the problem is most acute [3]. The Global Task Force on Radiotherapy for Cancer Control (GTFRCC) was formed to conduct a detailed analysis of the current state and the future needs until 2035. It evaluated the desirable utilization of RT, its impact in terms of years lives saved, and estimated economic return on RT investment [4]. The data produced can be used to engage actors outside cancer such as policy makers, public health and healthy system experts. We review the techniques and methodologies used in this study.

The first step was to determine the current demand for radiotherapy and to project those estimates to 2035. An epidemiological evidence based method was used to estimate the optimal RT utilization rate (RTU). The average RTU for all cancers was ~50%. The RTU was then applied to top 10 cancers ranked in accordance to incidence that represent 75% of all cancers around the world [5]. Projecting the cancer incidence to 2035 and estimating the average number of fractions per RT course, the total number of fractions was estimated to be 204 million.

The demand data was next stratified in accordance to the World Bank's Gross National Income (GNI) categories; low-income, lower-middle-income, upper-middle-income, and high-income countries. DIRAC equipment data, validated by HERO data, was used to determine the current RT capacity. This result and the demand estimates were entered into a modified activity based calculator, to determine the additional RT resources required satisfy the need within the different GNI strata. Applying a nominal operating model that consists of a two MV machine department running a 12 hour day, the total global number of departments, machines, CT scanners, radiation oncologists, medical physicists, and radiation therapists was found to be 10900, 21800, 10900, 45500, 39300, and 130200 respectively. More than half of these resources would be needed in upper-middle, lower-middle, and low-income countries. A sensitivity analysis was performed to demonstrate the effect of longer operating hours, automation in radiotherapy planning and quality control testing.

The Lancet report demonstrates that the global demand for radiotherapy is expected to increase significantly over the next 20 years, with the sharpest increases expected in countries that are currently ill equipped to handle the pending cancer crisis. The techniques described here can be used as tools to help guide country specific cancer control planning and investigate the most suitable technologies and operating models to be implemented at the state level.

### References:

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### Country

Canada

## **Institution**

Techna Institute, University Health Network; Toronto Canada

**Primary authors:** JAFFRAY, David (University Health Network); GOSPODAROWICZ, Mary (Princess Margaret Cancer Centre); LUI, Tracey (Techna Institute, University Health Network)

**Presenter:** LUI, Tracey (Techna Institute, University Health Network)

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