Radiation Oncology: A Global Perspective

Compiled by the Global Health Initiative Subcommittee (ARRO)

Please refer to the sources listed below each chart/graph/table for more information

Section IV:

Future Projections

Future Projections

- According to WHO, by 2017, cancer deaths in developing countries will exceed total mortality from the three illnesses targeted by the Millennium Development Goals (HIV/AIDS, Tuberculosis and Malaria)
- By 2030, low and middle income countries will account for an estimated 27 million new cancer cases and 17 million cancer deaths
- Annual incidence of cancer is expected to rise by 70% in developing countries in 2030 compared to 2010 rates3

Beaulieu N, Bloom D, Bloom R, Stein R. Breakaway: The global burden of cancer - challenges and opportunities. The Economist Intelligence Unit. 2009.
Boyle P, Levin B, eds. *World Cancer Report 2008.* Lyon, France: International Agency for Research on Cancer 2008.

New Cancer Cases by Income and Geographic Groups: 2020 Projections

Distribution of new cancer cases by income group and geographic region, 2020

Income group	Total population ('000s)	% of world population	Estimated new cancer cases (all sites)	% of new cases
Low Income	1,261,911	16.5	1,228,134	7.6
Lower Middle Income	4,250,681	55.6	6,615,124	40.9
Upper Middle Income	1,036,459	13.6	2,409,521	14.9
High Income	1,095,344	14.3	5,938,265	36.7
Total	**7,644,395**	**100.0**	**16,191,044**	**100.0**

Geographic group	Total population ('000s)	% of world population	Estimated new cancer cases (all sites)	% of new cases
Africa	1,268,582	16.6	1,093,608	6.8
Americas	992,762	13.0	3,616,023	22.3
Asia	4,579,687	59.9	7,784,320	48.1
Europe	721,566	9.4	3,424,466	21.2
Oceania	81,799	1.1	272,628	1.7
Total	**7,644,395**	**100.0**	**16,191,044**	**100.0**

For 2009, the sum of group estimates (income groups and geographic groups)—"Total"—is approximately 1.4% lower than the estimated number of new cancer cases for the "World" (as reported in subsequent tables). For 2020, the sum of group estimates is approximately 3.4% lower than the "World" estimate. This is because the "World" estimates include countries for which GLOBOCAN does not report separate country data. Estimates for those countries are not included in this table, nor are they used in subsequent analysis of cancer sites and costs.

Beaulieu N, Bloom D, Bloom R, Stein R. Breakaway: The global burden of cancer - challenges and opportunities. The Economist Intelligence Unit. 2009.

Global Cancer Incidence: Estimation in Year 2020 & 2030

Table 1: Estimated trends in cancer incidence[8]

	2010	2020	2030
More developed countries	5,719,728	6,583,577	7,425,611
Less developed countries	7,521,150	9,917,509	12,876,263

Samiei, Massoud.. Challenges of making radiotherapy accessible in developing countries. *Cancer Control* 2013: 85.

Possible Intervention Strategies in LMIC

Table 1. Interventions to tackle non-communicable disease risk factors: identifying 'best buys'

Risk factor (DALYs, in millions; % global burden)[a]	Interventions / actions (* core set of 'best buys', Others are 'good buys')	Avoidable burden *(DALYs averted, millions)*	Cost-effectiveness [b] *(US$ per DALY prevented) [Very = < GDP per person; Quite = < 3xGDP per person Less = >3xGDP per person]*	Implementation cost *(US$ per capita) [Very low = < US$0.50 Quite low = < US$ 1 Higher = > US$ 1]*	Feasibility *(health system constraints)*
Tobacco use (> 50m DALYs; 3.7% global burden)	Protect people from tobacco smoke * Warn about the dangers of tobacco * Enforce bans on tobacco advertising * Raise taxes on tobacco *	Combined effect: 25-30 m DALYs averted (> 50% tobacco burden)	Very cost-effective	Very low cost	Highly feasible; strong framework (FCTC)
	Offer counselling to smokers		Quite cost-effective	Quite low cost	Feasible (primary care)
Harmful use of alcohol (> 50m DALYs; 4.5% global burden)	Restrict access to retailed alcohol * Enforce bans on alcohol advertising * Raise taxes on alcohol *	Combined effect: 5-10 m DALYs averted (10-20% alcohol burden)	Very cost-effective	Very low cost	Highly feasible
	Enforce drink-driving laws (breath-testing) Offer brief advice for hazardous drinking		Quite cost-effective	Quite low cost	Intersectoral action Feasible (primary care)
Unhealthy diet (15-30m DALYs; 1-2% global burden)[c]	Reduce salt intake * Replace trans-fat with polyunsaturated fat * Promote public awareness about diet * +	Effect of salt reduction: 5 m DALYs averted Other interventions: Not yet assessed globally	Very cost-effective	Very low cost	Highly feasible
	Restrict marketing of food and beverages to children Replace saturated fat with unsaturated fat Manage food taxes and subsidies Offer counselling in primary care Provide health education in worksites Promote healthy eating in schools		Very cost-effective (more studies needed)	Very low cost	Highly feasible
			Quite cost-effective	Higher cost	Feasible (primary care)
			Less cost-effective	Quite low cost	Highly feasible
Physical inactivity (> 30m DALYs; 2.1% global burden)	Promote physical activity (mass media) * +	Not yet assessed globally	Very cost-effective	Very low cost	Highly feasible
	Promote physical activity (communities) Support active transport strategies Offer counselling in primary care Promote physical activity in worksites Promote physical activity in schools		Not assessed globally	Not assessed globally	Intersectoral action
			Quite cost-effective	Higher cost	Feasible (primary care)
			Less cost-effective		Highly feasible
Infection	Prevent liver cancer via hepatitis B vaccination *	Not yet assessed globally	Very cost-effective	Very low cost	Feasible (primary care)

WHO Global Status Report on Noncommunicable Diseases (NCD) 2010. Available at: http://www.who.int/nmh/publications/ncd_report_full_en.pdf

IAEA'S EFFORT TO BUILD RADIOTHERAPY SERVICES IN DEVELOPING COUNTRIES

TABLE 4. DEVELOPING A RADIOTHERAPY STRATEGY APPLYING THE WHO STEPWISE FRAMEWORK

Component	Core With available resources	Expanded With a projected increase	Desirable When more resources are available
Short term 0–5 years	Streamline referral patterns Increase machine efficiency Increase staff training and capabilities Install information technology to monitor deficiencies Stimulate cooperation and sub-specialization	Increase the number of machines Increase staff numbers Increase training of staff National audit of radiotherapy by an embedded IT system Invest in specific specialist services Invest in health delivery research	Create new networks of interlinked radiotherapy centres Develop international links for training and audit Increase access to precision based radiotherapy Develop distributed network of hub and spoke radiotherapy centres Participate in collaborative clinical trials
Medium term 5–10 years	Increase access to radiotherapy nationally Overcome geographic access barriers Reduce need for radical surgery in breast cancer Increase access for palliative pain control	Create distributed network of interlinked radiotherapy centres Ensure that complex planning is available for all radical plans by remote planning services Dramatically increase the RUR	Develop tools for precision RT for all radical treatments Develop R&D centres to optimize care Stimulate local clinical trials
Long term 10–15 years	Increased reduction in radical surgery Increase the RUR Increase geographical distribution	Modernize the equipment stock Develop sophisticated IT and audit Convert cobalt to linear accelerators (linacs)	International training for all key staff Optimize radiotherapy planning systems Develop a long term linac replacement strategy

IAEA Human Health Series No. 14. Planning National Radiotherapy Services: A Practical Tool

These numbers are insufficient and pose a great threat to the well being of those living in developing countries. The ARRO Global Health Initiative hopes to increase awareness of these disparities and opportunities to advance cancer care worldwide.