Unlocking existing potential in developing countries through key technology

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Ingham Institute for Applied Medical Research

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IAEA Scientific Forum

Nuclear Techniques in Human Health

Prevention, Diagnosis, Treatment

Ingham Institute
Applied Medical Research

Outline

- Demand for radiotherapy
- Benefits of cancer treatment
- Costs
- Novel service delivery

Optimal RTU 2012

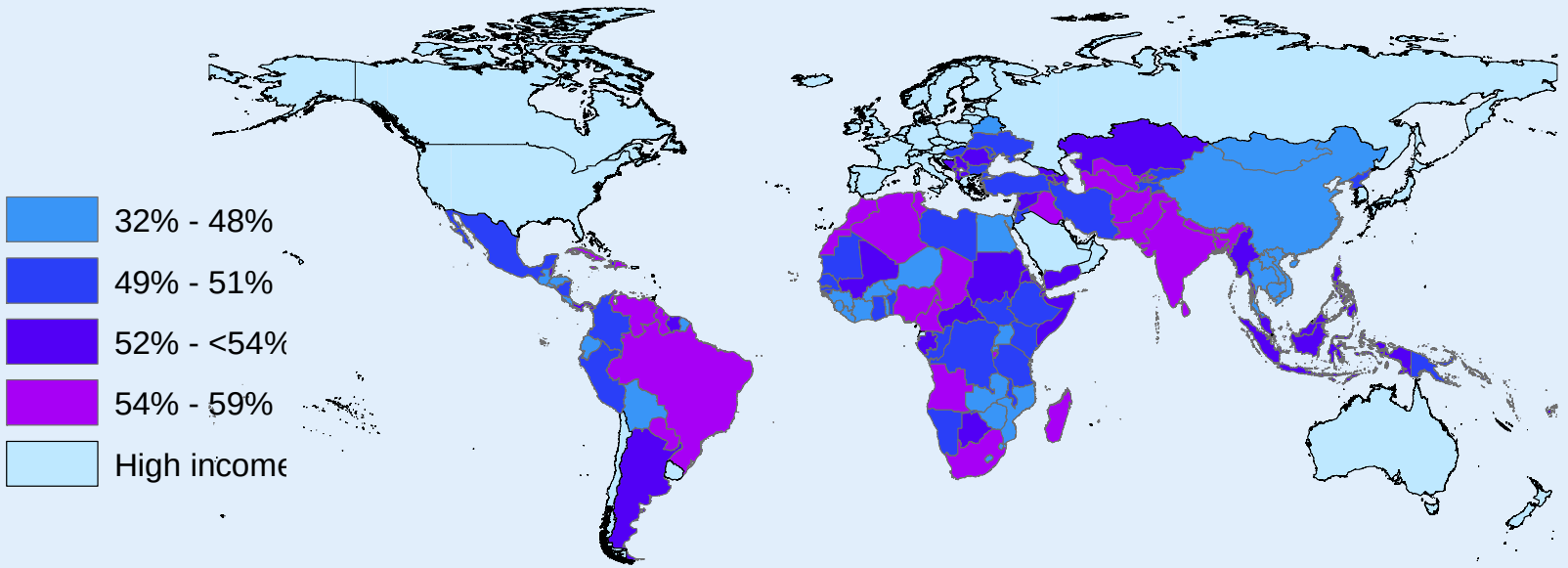
	RTU
Bladder	47%
Brain	80%
Breast	87%
Cervix	71%
Colon	4%
Gall bladder	17%
Head and Neck	74%
Kidney	15%
Leukaemia	4%
Liver	0%
Lung	77%
Lymphoma	73%
Melanoma	21%
Myeloma	45%

	RTU
Other	19%
Oesophagus	71%
Ovary	4%
Pancreas	49%
Prostate	58%
Rectum	60%
Stomach	27%
Testis	7%
Thyroid	4%
Unknown Primary	61%
Uterus	38%
Vagina	94%
Vulva	39%

Radiother Oncol. 2014 Jul;112(1):140-4 ,or tinyurl.com/pwkua34

Demand for radiotherapy

- 7 million RT cases world wide 2012
- 12 million RT cases by 2035
- 13,500 radiotherapy machines globally
- 21,800 new machines needed by 2035



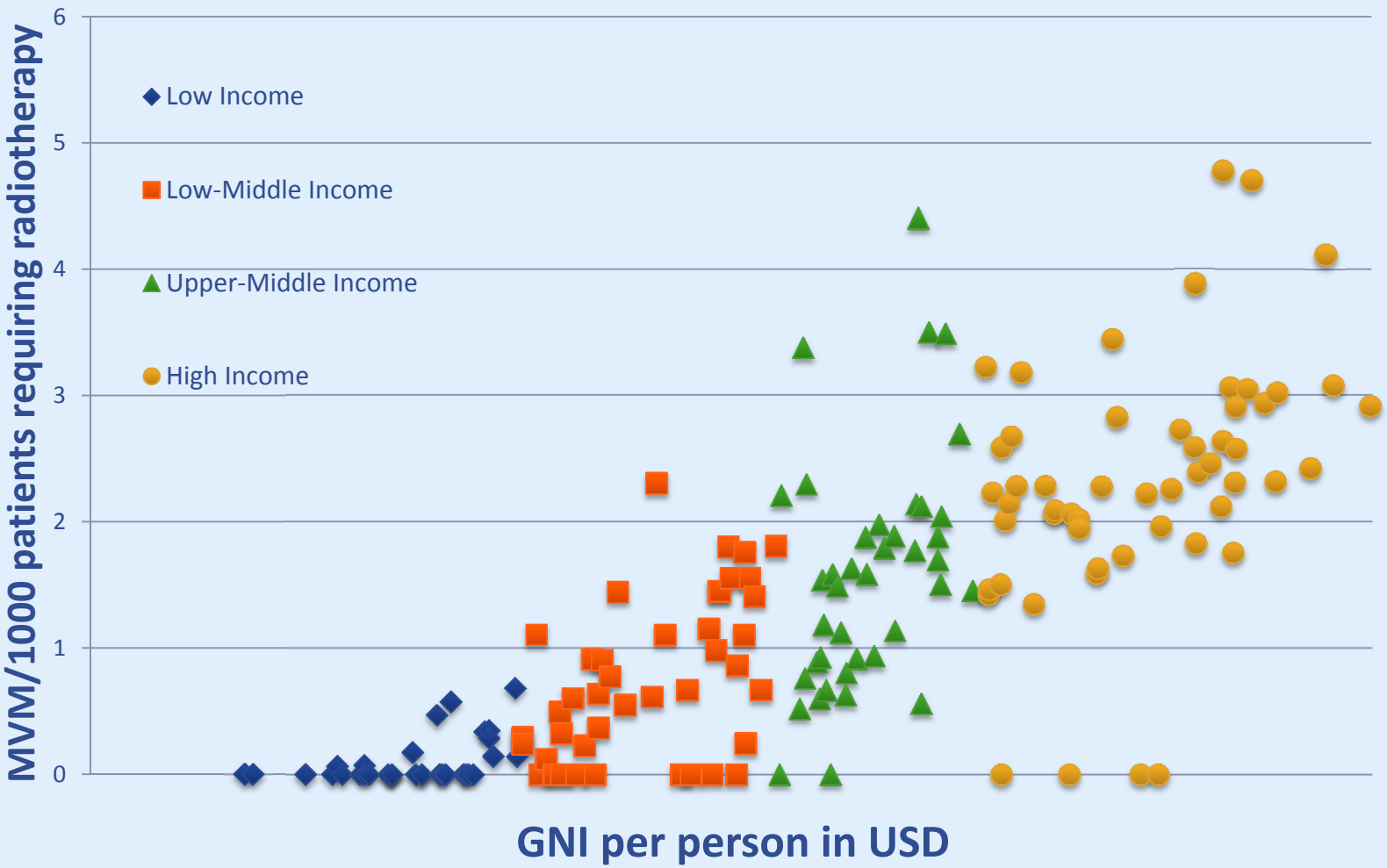
Population Benefit by Income

	Local control	Survival
HIC	10.1%	3.2%
UMIC	8.6%	3.9%
LMIC	13.4%	6.2%
LIC	13.6%	6.3%
ALL	10.4%	4.1%

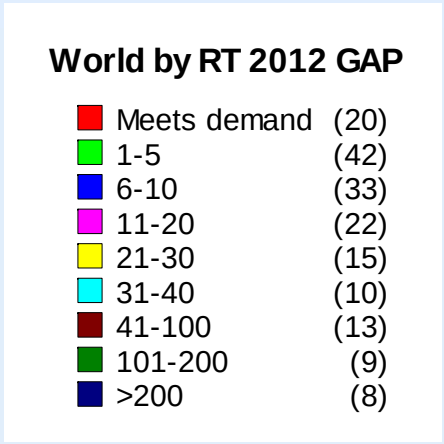
Fractions, Benefits, Costs (RT treated)

	HIC	UMIC	LMIC	LIC	ALL
RTU (average)	49.8%	51.50%	49.24%	48.90%	49.92%
Local control	10.10%	8.60%	13.40%	13.60%	10.40%
Survival	3.20%	3.90%	6.20%	6.30%	4.10%
Average Fractions per case	18.5	18	18.5	18.6	18.4
Cost per fraction	$235.13	$85.64	$64.85	$59.84	$135.81
Fractions/ Local control	91	108	68	67	88
Fractions/OS	288	238	147	144	224
Cost/LC	$21,442	$9,231	$4,409	$4,002	$11,994
Cost/OS	$67,677	$20,356	$9,528	$8,639	$30,423

Access to radiotherapy 2012



Global deficit of RT Machines



GTFRCC Lancet commission paper

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Health

Call to improve radiotherapy access around world

26 September 2015 | Health

Millions of people globally have died unnecessarily from cancers that could have been treated by radiotherapy, according to doctors.

New figures suggest as many as nine out of 10 people in low-income countries cannot access radiotherapy treatment.

The Lancet Oncology Commission

Expanding global access to radiotherapy

Rifat Atun, David A Jaffray, Michael B Barton, Freddie Bray, Michael Baumann, Bhadrasain Vikram, Timothy P Hanna, Felicia M Knaul, Yolande Lievens, Tracey Y M Lui, Michael Milosevic, Brian O'Sullivan, Danielle L Rodin, Eduardo Rosenblatt, Jacob Van Dyk, Mei Ling Yap, Eduardo Zubizarreta, Mary Gospodarowicz

Radiotherapy is a critical and inseparable component of comprehensive cancer treatment and care. For many of the most common cancers in low-income and middle-income countries, radiotherapy is essential for effective treatment. In high-income countries, radiotherapy is used in more than half of all cases of cancer to cure localised disease, palliate symptoms, and control disease in incurable cancers. Yet, in planning and building treatment capacity for cancer, radiotherapy is frequently the last resource to be considered. Consequently, worldwide access to radiotherapy is unacceptably low. We present a new body of evidence that quantifies the worldwide coverage of radiotherapy services by country. We show the shortfall in access to radiotherapy by country and globally for 2015–35 based on current and projected need, and show substantial health and economic benefits to investing in radiotherapy. The cost of scaling up radiotherapy in the nominal model in 2015–35 is US$26·6 billion in low-income countries, $62·6 billion in lower-middle-income countries, and $94·8 billion in upper-middle-income countries, which amounts to $184·0 billion across all low-income and middle-income countries. In the efficiency model the costs were low[er]: $14·1 billion in low-income, $33·3 billion in lower-middle-income, and $49·4 billion in upper-middle-income [c]ountries—a total of $96·8 billion. Scale-up of radiotherapy capacity in 2015–35 from current levels could lead [to] saving of 26·9 million life-years in low-income and middle-income countries over the lifetime of the patients who received treatment. The economic benefits of investment in radiotherapy are very substantial. Using the nominal cost model could produce a net benefit of $278·1 billion in 2015–35 ($265·2 million in low-income countries, $38·5 billion in lower-middle-income countries, and $239·3 billion in upper-middle-income countries). Investment in the efficiency model would produce in the same period an even greater total benefit of $365·4 billion ($12·8 billion in low-income countries, $67·7 billion in lower-middle-income countries, and $284·7 billion in upper-middle-income countries). The returns, by the human-capital approach, are projected to be less with the nominal cost model, amounting to $16·9 billion in 2015–35 (–$14·9 billion in low-income

Lancet Oncol 2015; 16: 1153–86

See Comment pages 1143–52

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Atun et al., Lancet Oncology 2015

What will we need in 20 years?

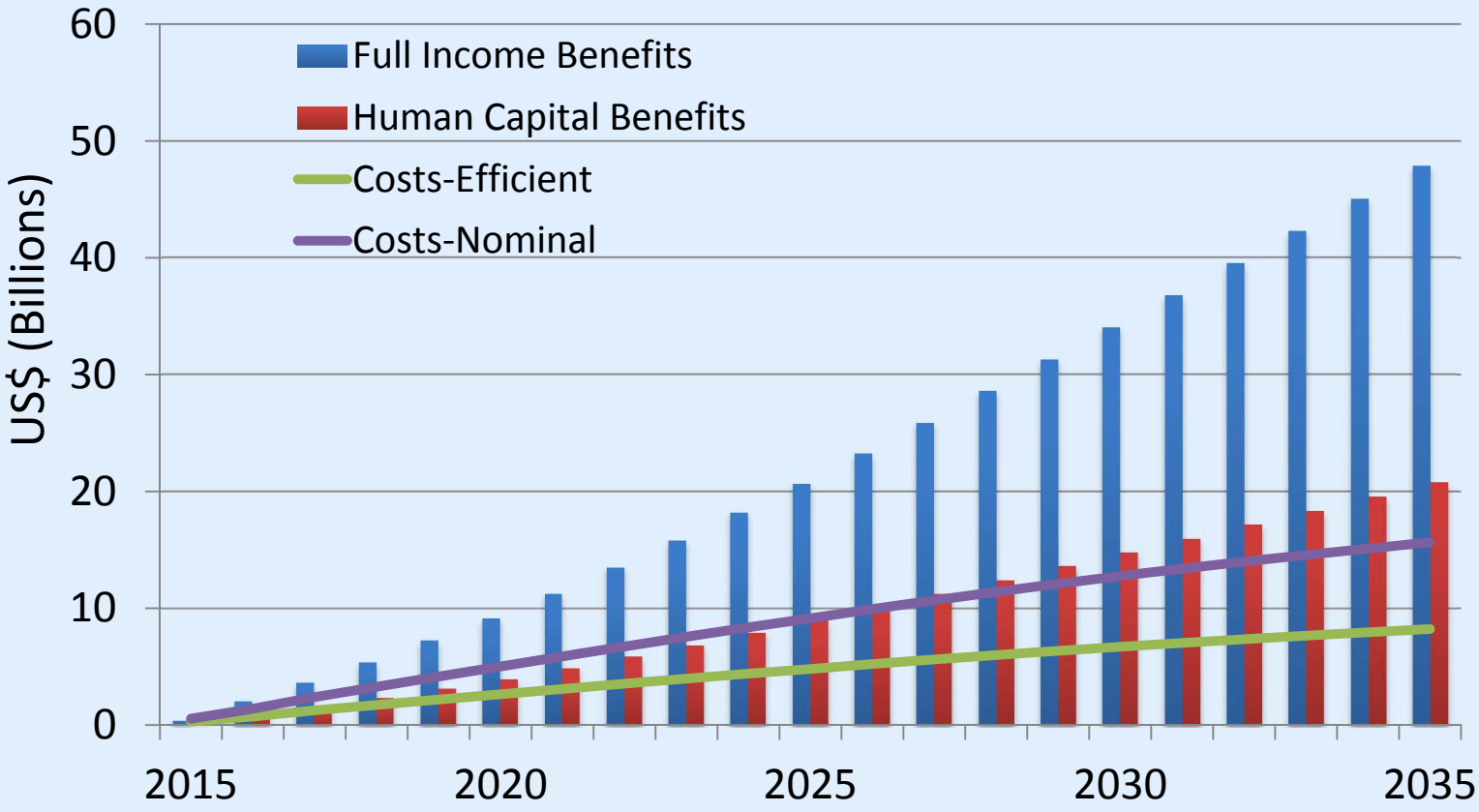
2035	High-income countries	Upper-middle-income countries	Lower-middle-income countries	Low-income counties
Fractions	76 424 000	77 014 000	40 974 000	13 268 000
Radiotherapy departments	4600	3700	2000	600
Megavoltage machines	9200	7400	3900	1300
CT scanners	4600	3700	2000	600
Radiation oncologists to be trained	15 500	16 800	9900	3300
Medical physicists to be trained	17 200	12 500	7200	2400
Radiation technologists to be trained	51 900	45 300	24 900	8100

Atun et al., Lancet Oncology 2015

uicc global cancer control

GTFRCC | UICC PRESIDENT'S PORTFOLIO GLOBAL TASK FORCE ON RADIOTHERAPY FOR CANCER CONTROL

Investing in radiotherapy brings clinical and economic benefits



Atun et al., Lancet Oncology 2015

Thinking differently

- Finance innovations
- Scope of services
- Training networks
- Quality Assurance
- Single machine departments
- Treatment networks
- Small countries
- Technology

Clin Oncol (R Coll Radiol). 2017 Feb;29(2):69-71.