

# Cancer Care for All: Expanding Access to Life-Saving Cancer Treatment in Africa: IAEA perspective

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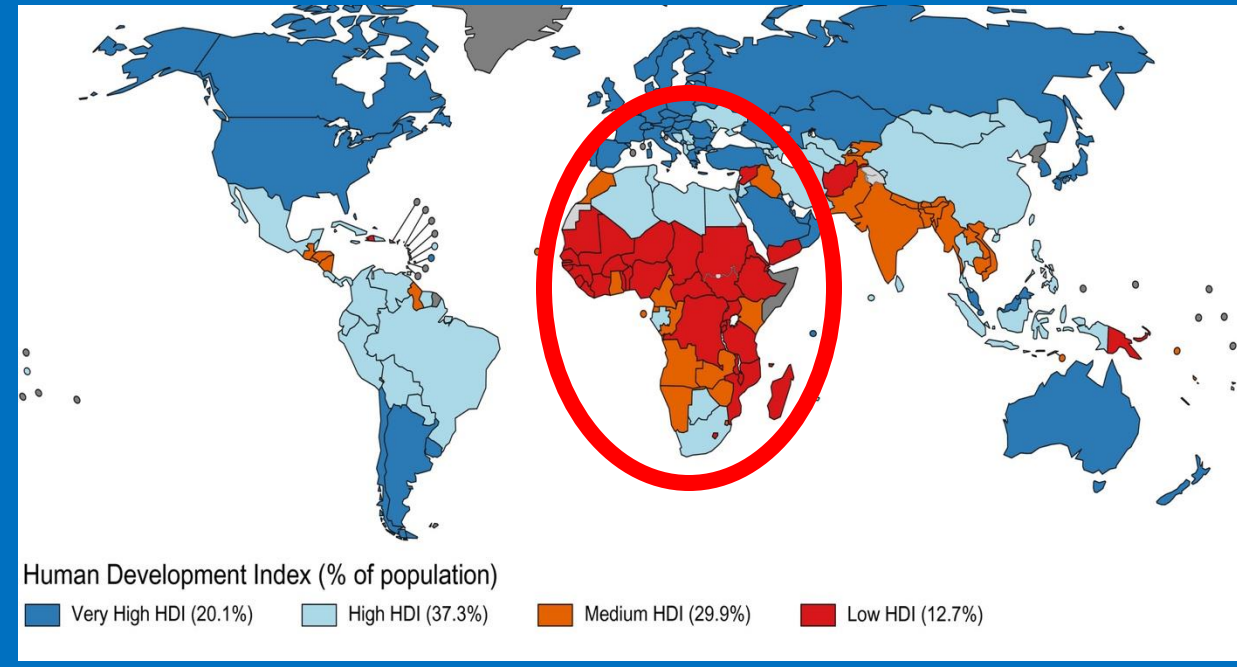
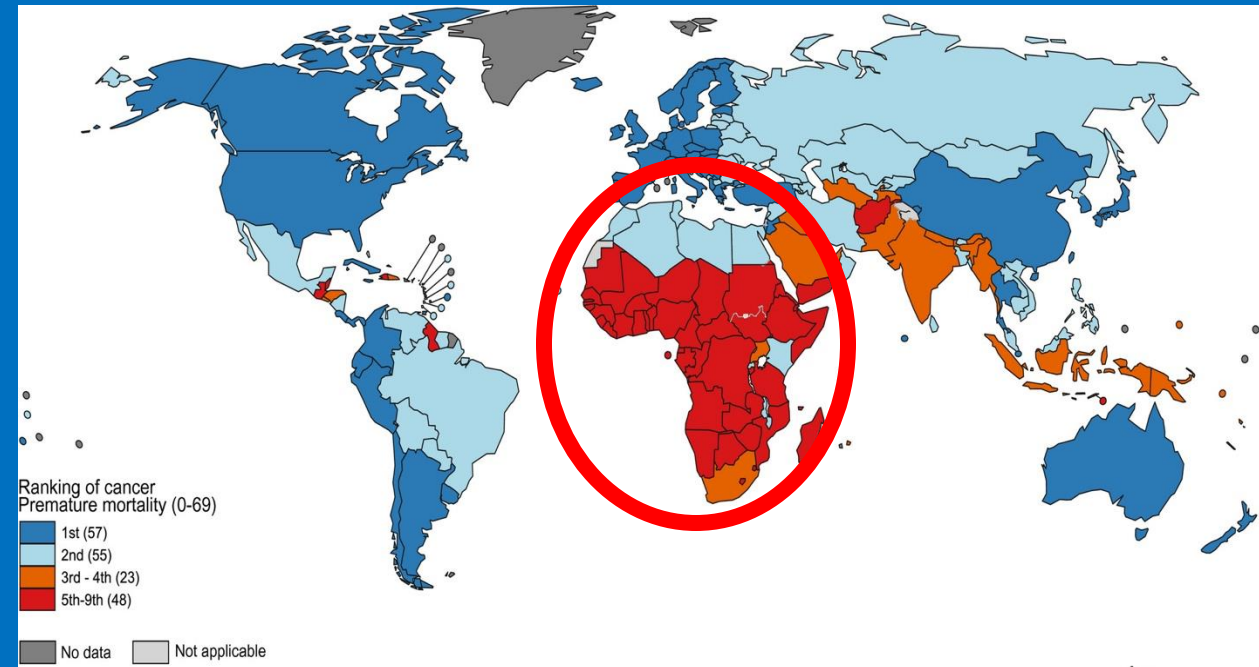
May Abdel Wahab, MD, PhD, FACR, FASTRO

*Director, Division of Human Health  
Department of Nuclear Sciences and Applications,  
International Atomic Energy Agency*

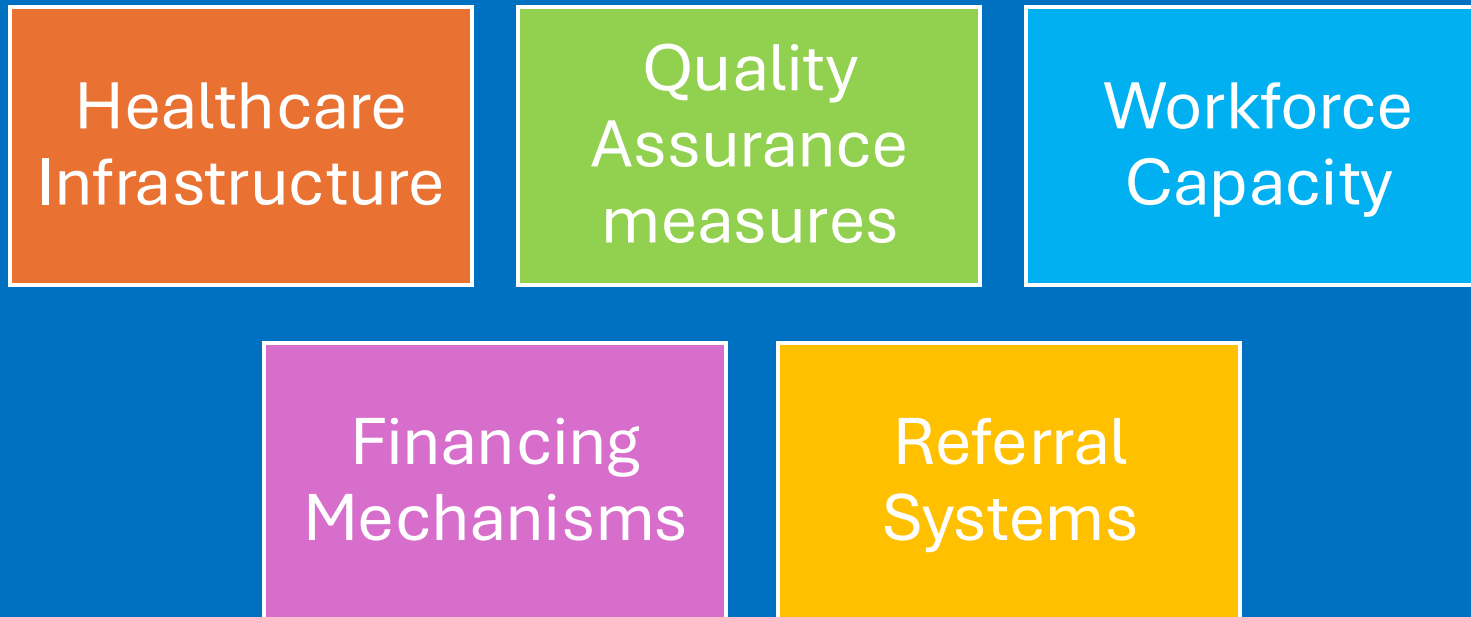
Vienna Center for Disarmament and Non-Proliferation (VCDNP) 18 March 13:00 to 14:30



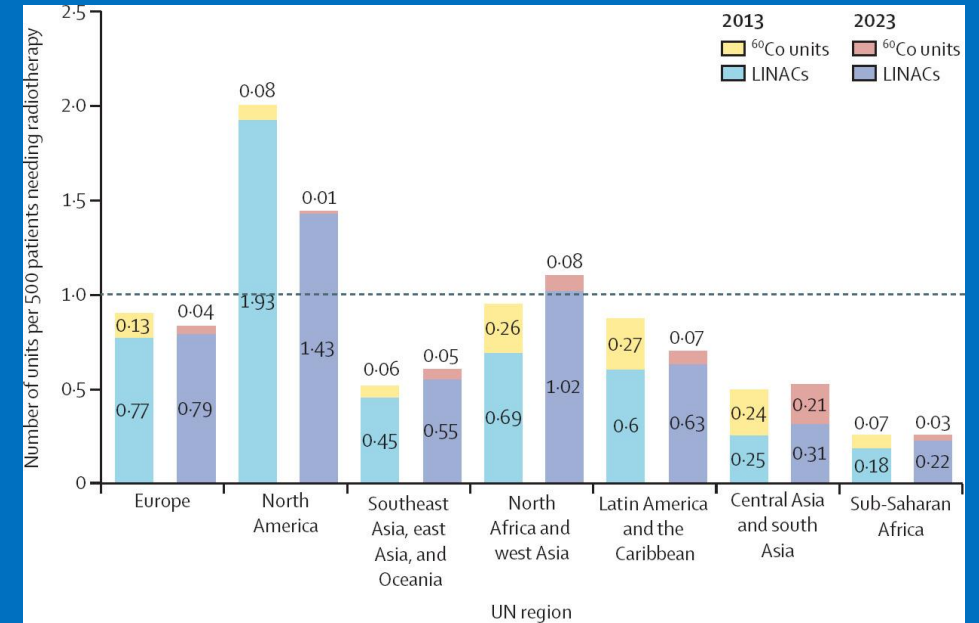
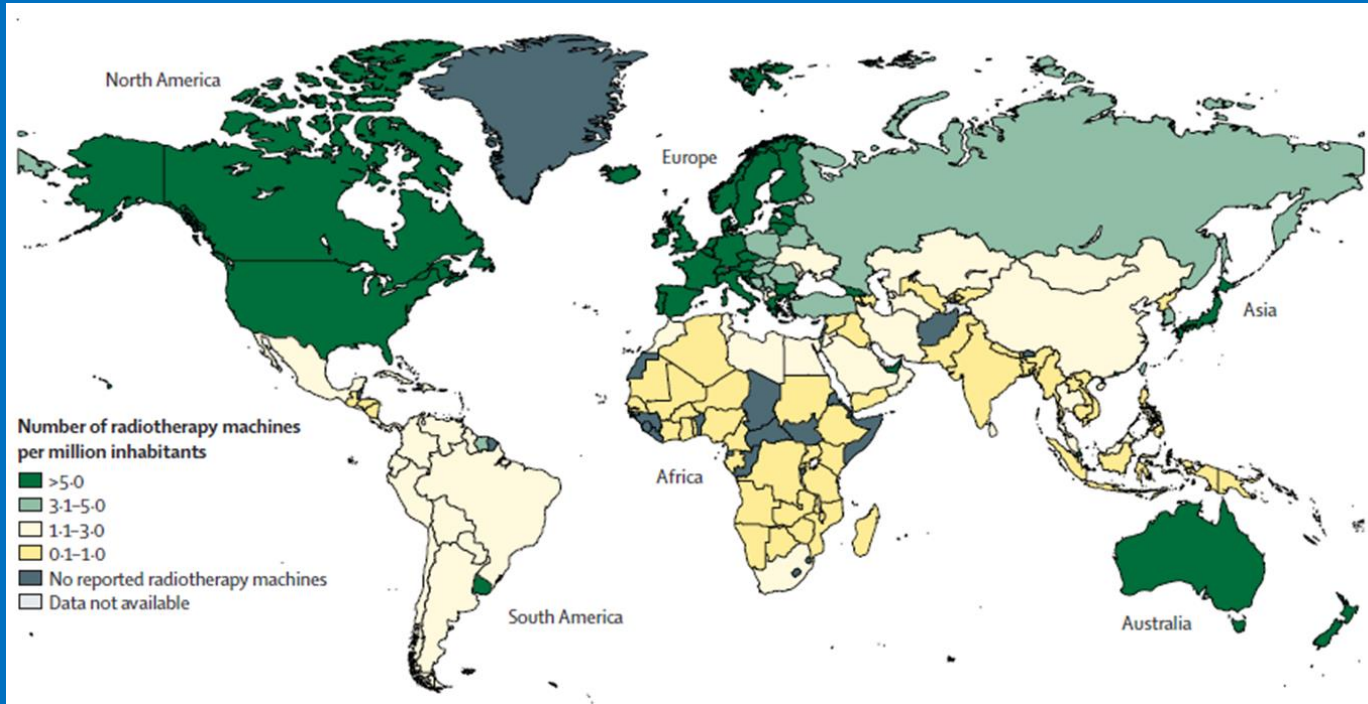
# Mortality of Cancer and HDI



# Interconnected components of the Health System



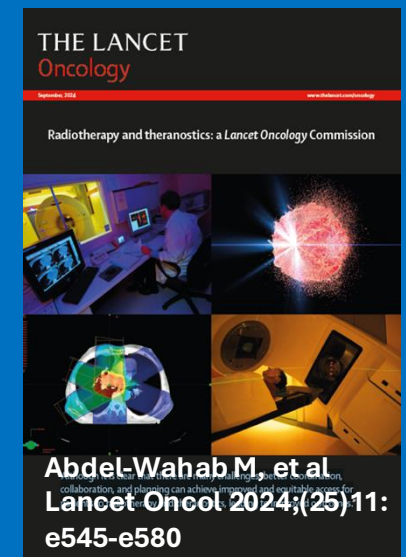
# 2024 Lancet Oncology Commission



Despite progress, equipment availability and suitably professionals continue to be challenging

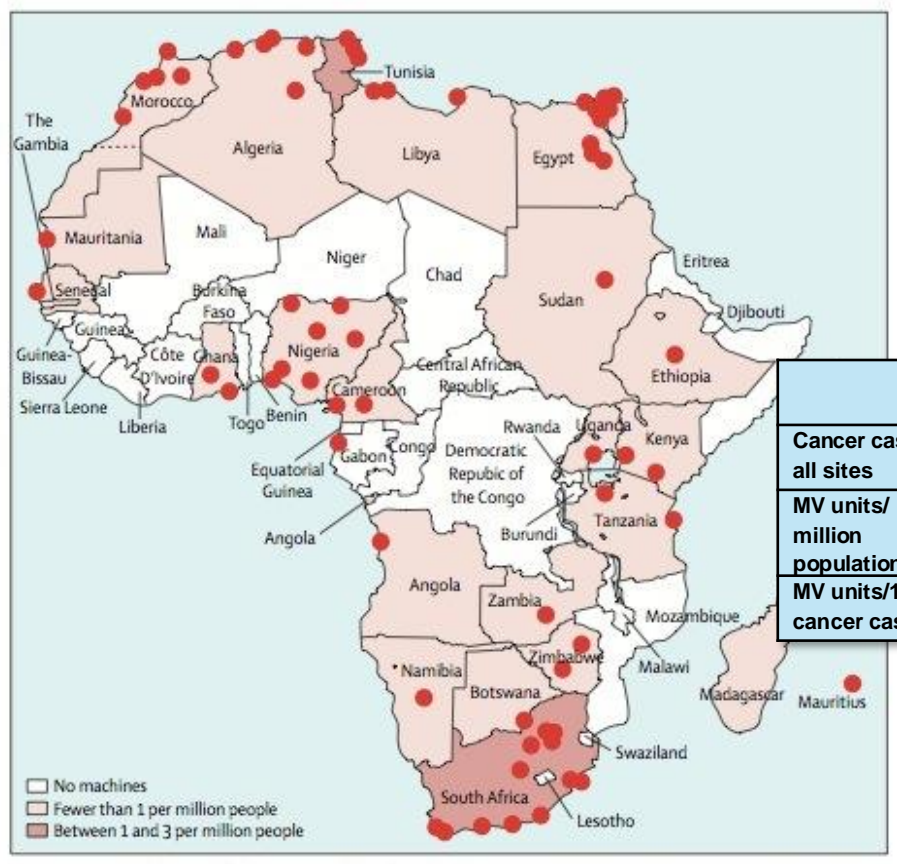
Low-income countries need 8 times the number of available machines for every 1 machine to serve 500 patients

The 2022 workforce has to expand by 60+% just to meet the cancer burden in 2050

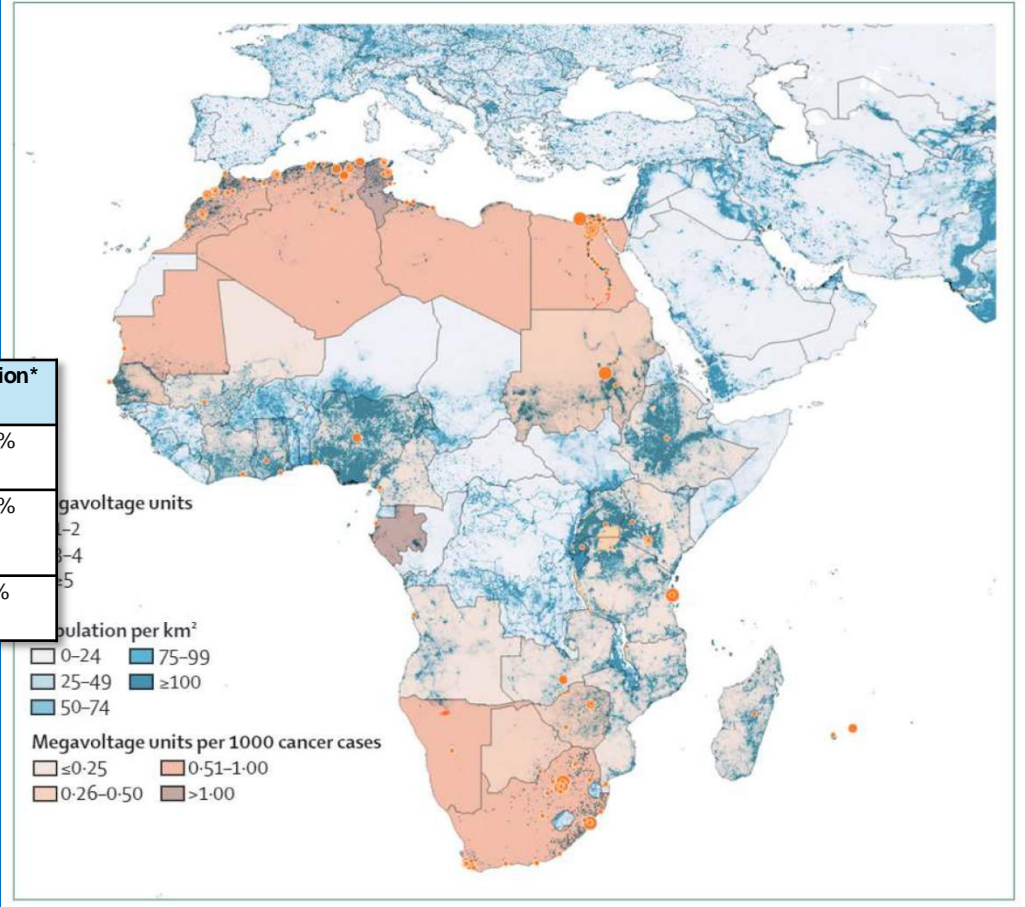




# Improvements over 10 years in Africa outpaced by cancer cases



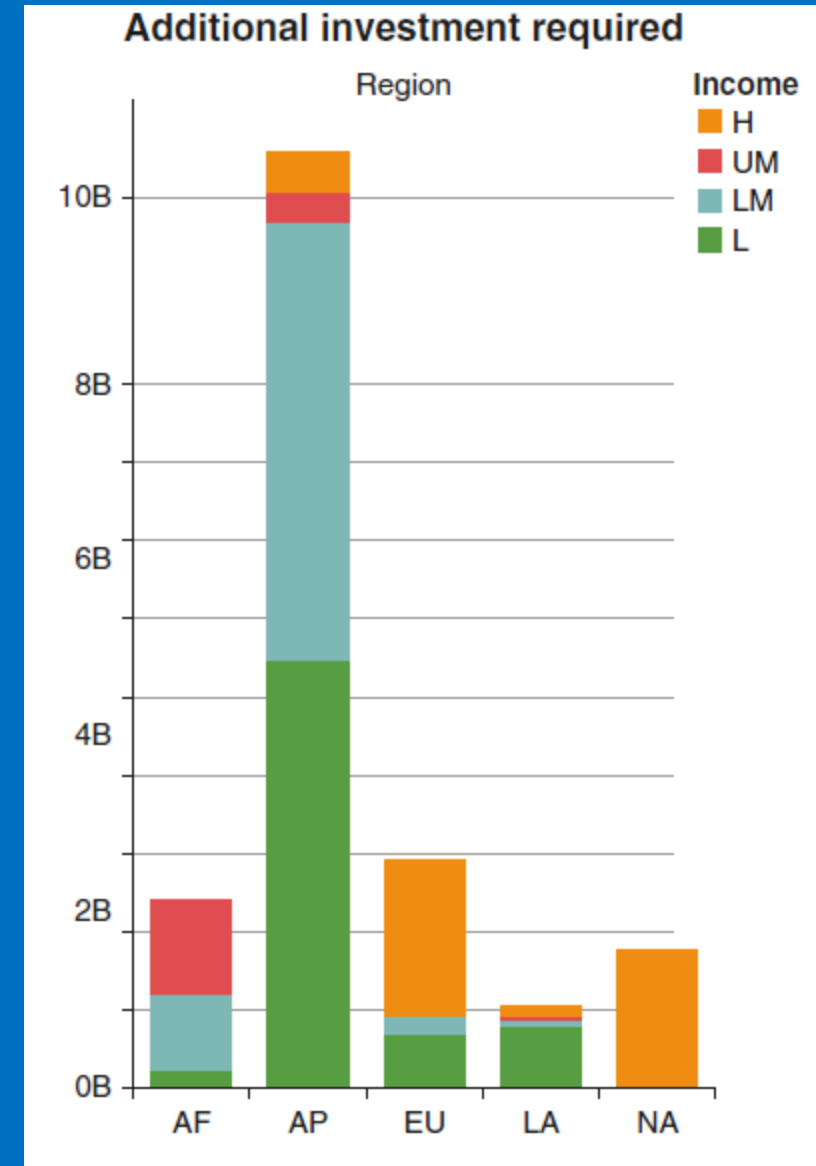
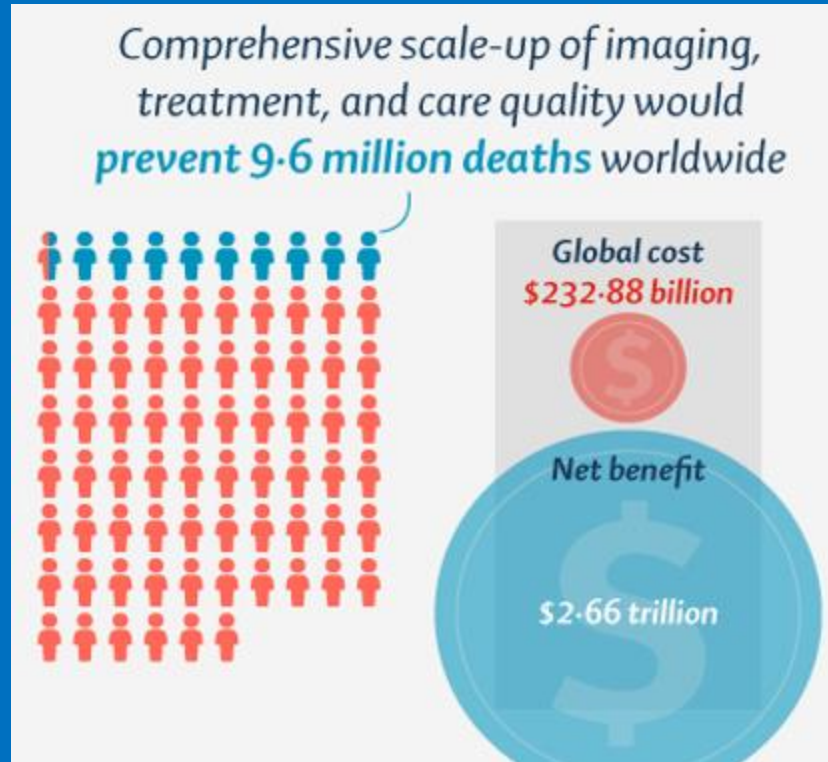
	2012	2018	2020	Variation*
<b>Cancer cases, all sites</b>	844279	1055172	1122495	+32%
<b>MV units/ million population</b>	0.26	0.28	NA	+12%
<b>MV units/1000 cancer cases</b>	0.34	0.32	0.35	+3%



Abdel-Wahab et al Lancet Oncol 2013;14:168-75

Elmore et al Lancet Oncol 2021

# Investment in Equipment and Other factors



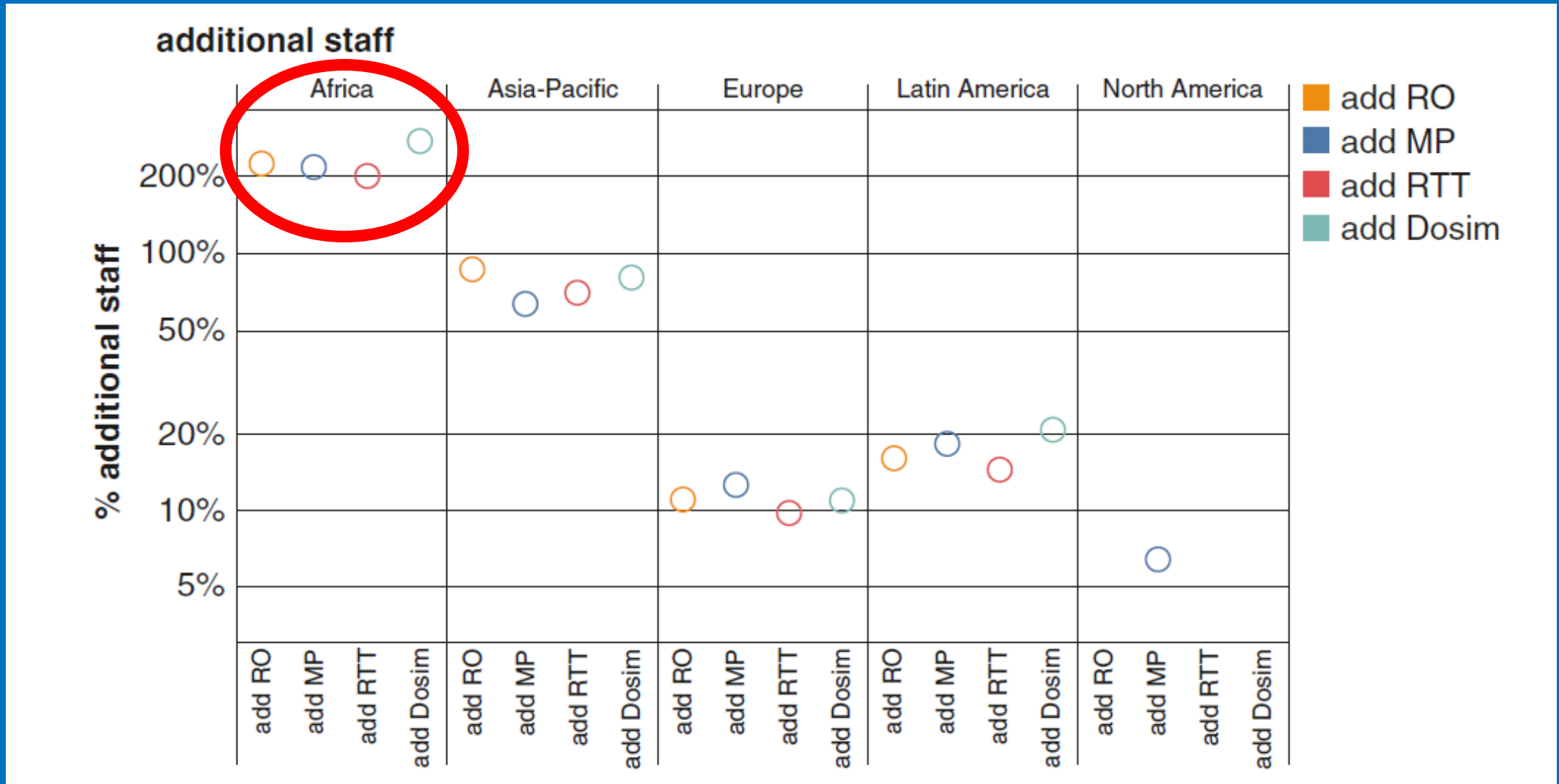
# Main challenges in 26 African countries

- Lack of Radiotherapy facilities
- Lack of Maintenance/ spare parts/ High cost of maintenance
- Limited training opportunities
- Lack of specialty recognition

Individual perspectives of the main challenges faced by radiotherapy centres.

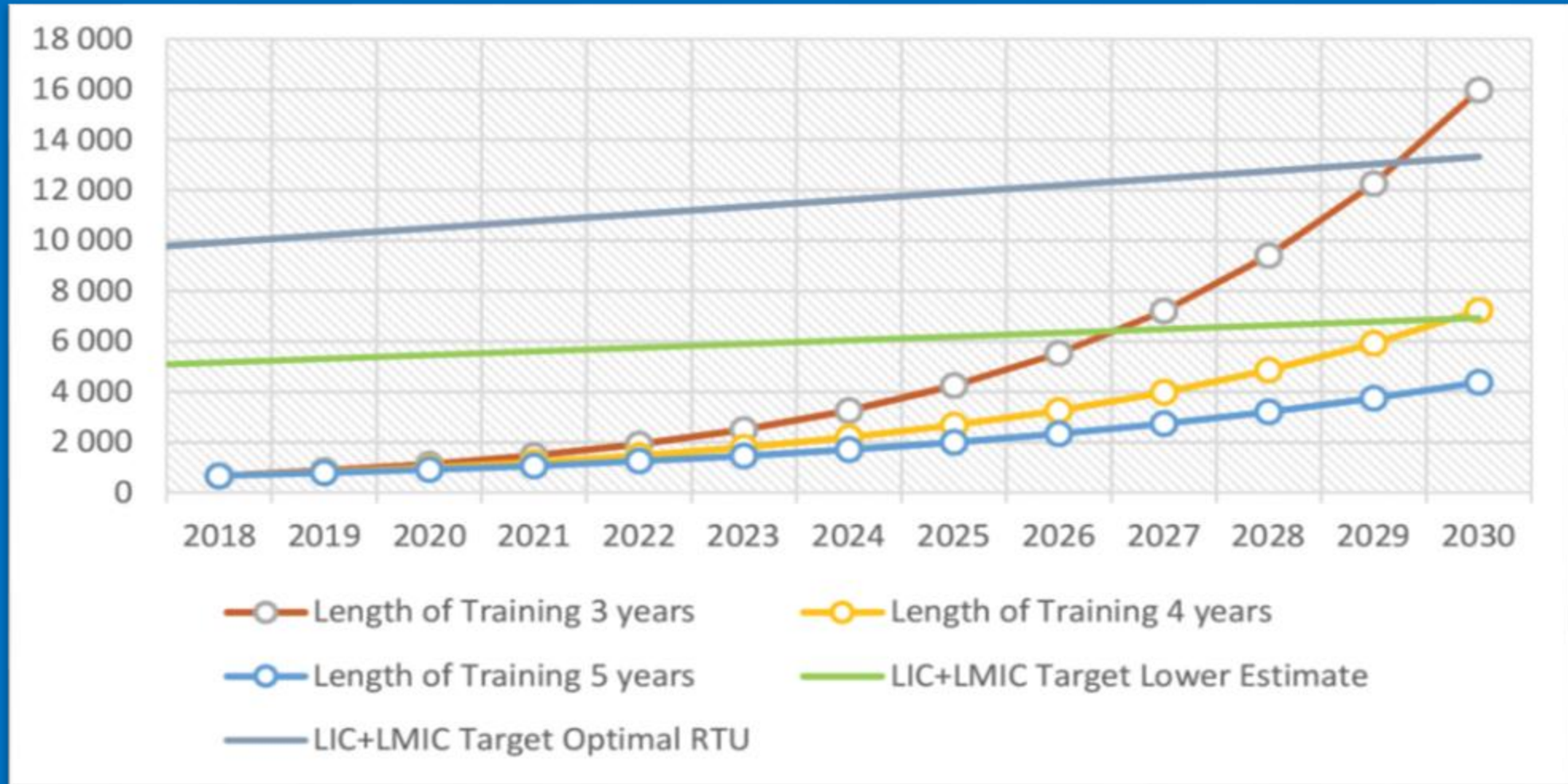
	Lack of sufficient radiotherapy treatment facilities for population	Insufficient staffing/ human resources	Lack of sufficient maintenance/ poor availability of spare parts/ frequent machine breakdown	Limited training opportunities	High cost of equipment and maintenance	Lack of recognition of specialty
Algeria	✓			✓		
Angola			✓	✓		
Botswana	✓	✓	✓			
Cameroon	✓	✓	✓	✓	✓	✓
Egypt		✓		✓	✓	
Ethiopia	✓	✓	✓	✓		✓
Ghana		✓	✓			✓
Kenya					✓	
Libya		✓		✓		
Madagascar	✓					
Mali	✓		✓			
Mauritania	✓					
Mauritius		✓		✓		
Morocco				✓	✓	✓
Mozambique	✓			✓		✓
Namibia	✓		✓		✓	
Nigeria	✓	✓	✓			
Rwanda	✓	✓				
Senegal		✓		✓		
South Africa		✓	✓			
Sudan	✓	✓	✓	✓	✓	
Tanzania	✓				✓	✓
Tunisia	✓					✓
Uganda	✓	✓				
Zambia	✓		✓			
Zimbabwe			✓		✓	

# Additional Staff needed by Region





# Effect of Length of Training on RO Supply



*The impact of different durations of training (on projected growth in the supply of radiation oncologists).*

# Areas of Support

## Division of Human Health

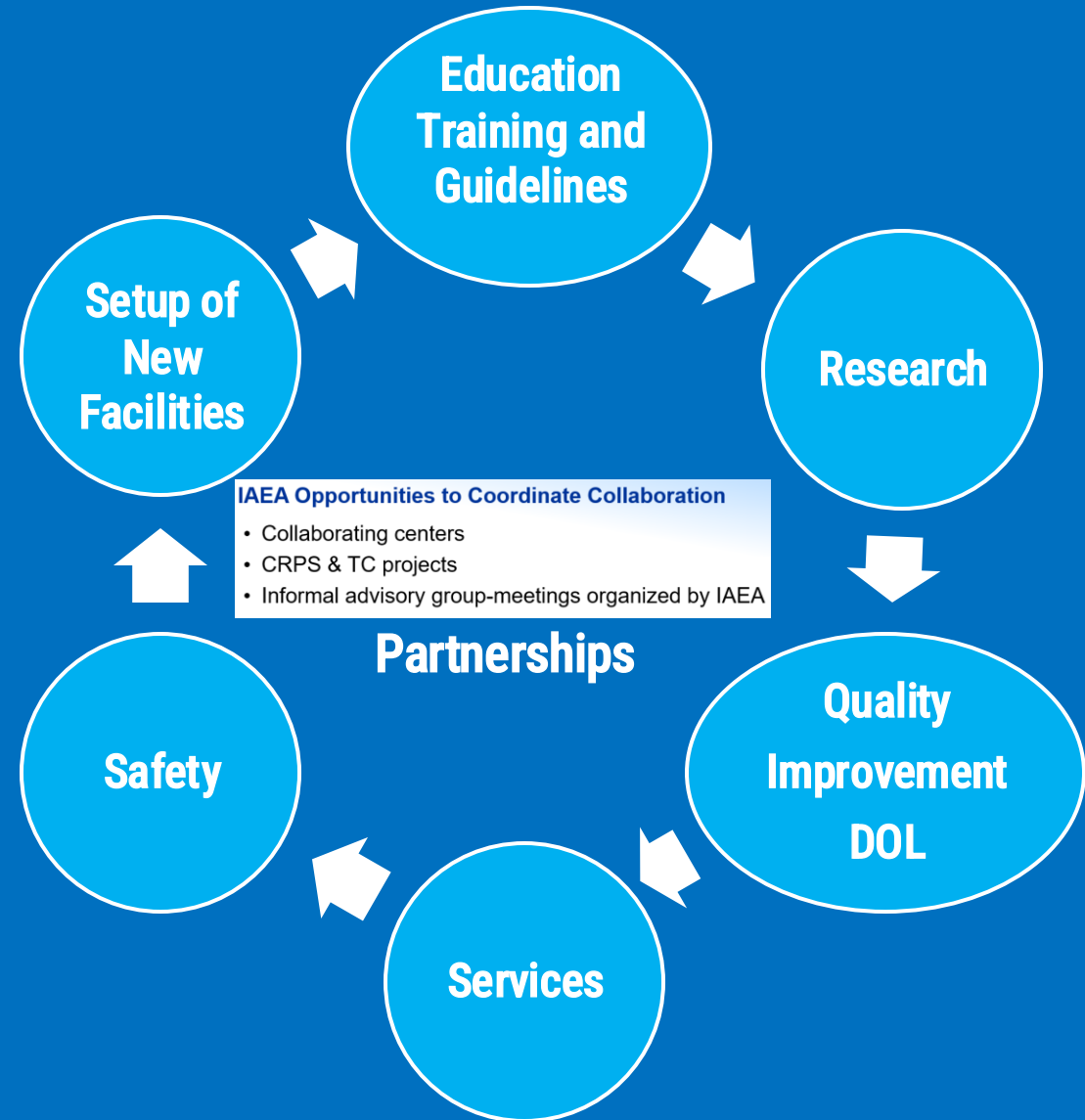
To strengthen the capabilities of MS to address the needs related to the prevention, diagnosis and treatment of health problems through the application of nuclear and related techniques

Nutritional and Health-Related Environmental Studies Section

Nuclear Medicine and Diagnostic Imaging Section

Applied Radiation Biology and Radiotherapy Section

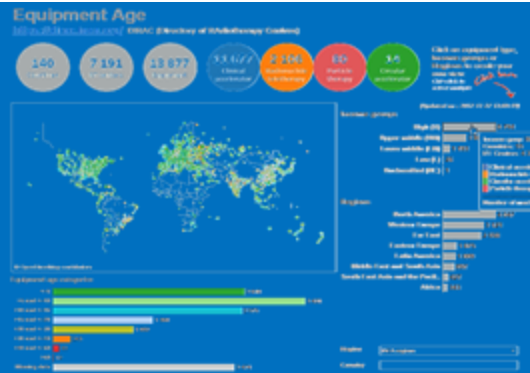
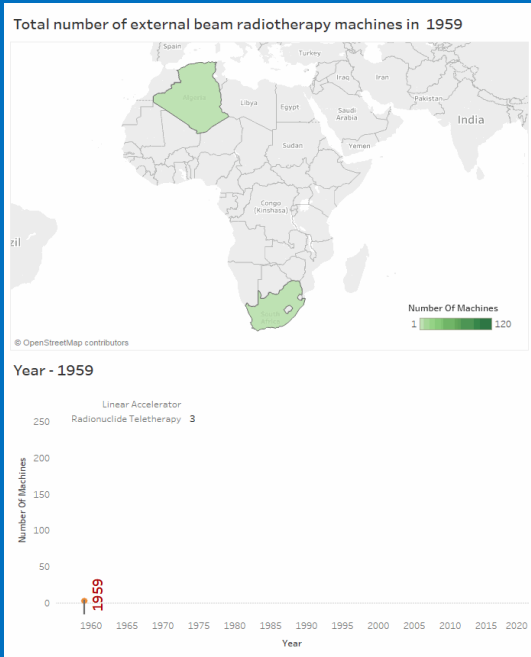
Dosimetry and Medical Radiation Physics Section



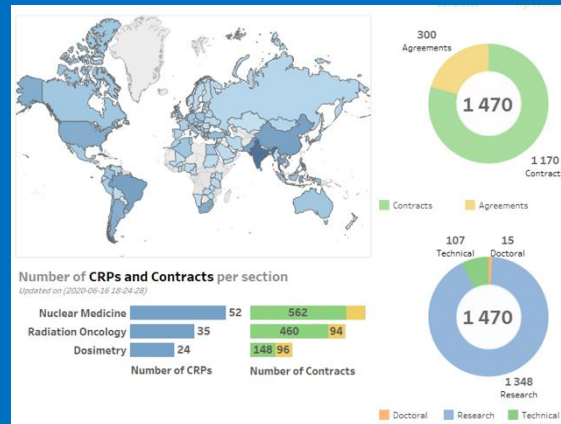
# Addressing Global Challenges

Communication

## Needs



## Research Opportunities



IAEA International Atomic Energy Agency

TOPICS SERVICES RESOURCES NEWS & EVENTS ABOUT US

### Coordinated Research Projects – Health

Topics Status Approved Programme Completed Open for proposals Search

Health Any - Any - Year - Any -

Efficacy of Spatially-Fractionated Radiation Therapy (SFRT) in palliative treatment of lung and cervical cancer patients  
Coordinated Research Project | December 2019 | CRP Code: **E33043** | 3 - Active - Ongoing

Applying Nuclear Nutrition Techniques to Improve Outcomes for Childhood Cancer in Low and Middle Income Countries  
Coordinated Research Project | March 2019 | CRP Code: **E43033** | 3 - Active - Ongoing

Image-guided brachytherapy for cervix cancer: an implementation study  
Coordinated Research Project | December 2018 | CRP Code: **E33042** | 3 - Active - Ongoing

Prognostic Value of Arterial 18F-FDG PET Imaging - The PIAF Trial  
Coordinated Research Project | December 2018 | CRP Code: **E13048** | 3 - Active - Ongoing

Doctoral CRP on Advances in Radiotherapy Techniques  
Coordinated Research Project | December 2018 | CRP Code: **E24022** | 3 - Active - Ongoing

IRIS  
International  
Research  
Integration

## Education & Training

### Guidelines and Publications

IAEA Learning Management System

Home | Courses | News | Training & Applications | Services and Applications | The Africa Radiation Oncology Network (AFRONET)

### Testicular release

OPEN LMS English 17

Chapter categories:

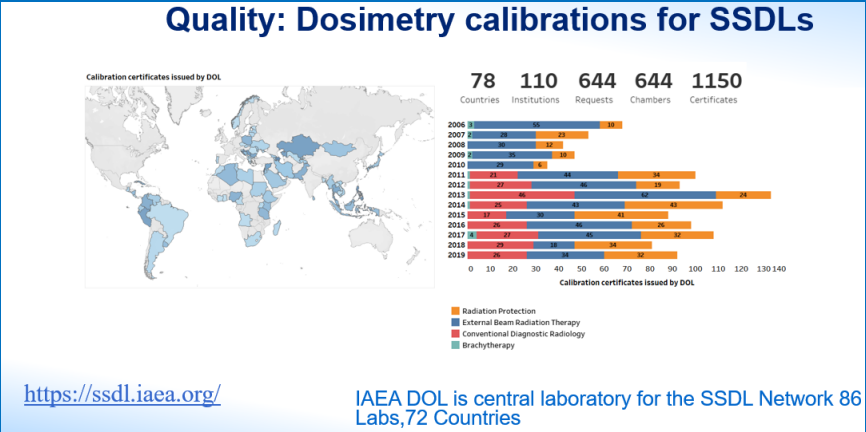
Nuclear Technology & Applications | Services and Applications | The Africa Radiation Oncology Network (AFRONET)

Country	Search	Personality	Context	Class	Time	Participants
Spain	10	70	28	13	175	13
France	10	70	28	13	175	13
Germany	10	70	28	13	175	13
Italy	10	70	28	13	175	13
United Kingdom	10	70	28	13	175	13
Canada	10	70	28	13	175	13
USA	10	70	28	13	175	13
Japan	10	70	28	13	175	13
South Korea	10	70	28	13	175	13
India	10	70	28	13	175	13
China	10	70	28	13	175	13
Brazil	10	70	28	13	175	13
Argentina	10	70	28	13	175	13
Colombia	10	70	28	13	175	13
Peru	10	70	28	13	175	13
Venezuela	10	70	28	13	175	13
Chile	10	70	28	13	175	13
Ecuador	10	70	28	13	175	13
Costa Rica	10	70	28	13	175	13
Panama	10	70	28	13	175	13
Dominican Republic	10	70	28	13	175	13
Honduras	10	70	28	13	175	13
Nicaragua	10	70	28	13	175	13
Paraguay	10	70	28	13	175	13
Uruguay	10	70	28	13	175	13
Unknown primary	10	70	28	13	175	13

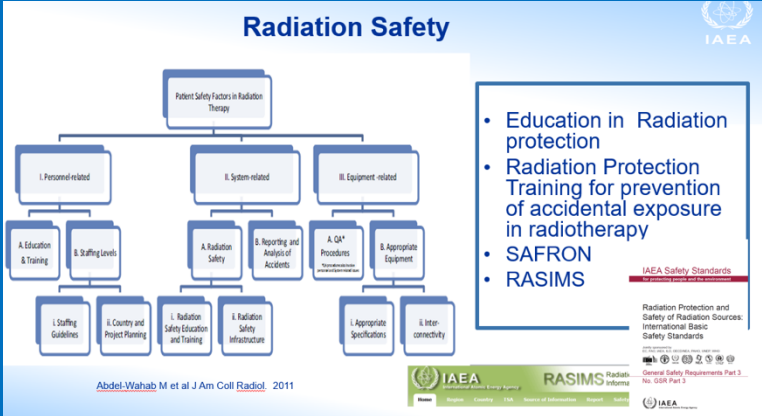
The Africa Radiation Oncology Network (AFRONET) was founded in June 2012 as an IAEA pilot initiative project for Anglophone Africa. Due to a lack of sufficient radiotherapy centres in many low income countries, limited equipment and a shortage of training opportunities for professionals, centres often have to seek in isolation area for up-to-date facilities, literature, international meetings and expert opinion. AFRONET has provided a unique opportunity for participating centres to network and discuss cases with experts from within and outside Africa. The network has benefited not only practicing professionals, but also radiation oncology residents through user and patient exposure to high quality lectures and evidence-based case discussions. Using a multi-disciplinary Virtual Tumour Board (VTB) for cancer performance review, clinical and radiotherapy outcome cases, the network has helped strengthen clinical decision-making in radiotherapy centres across Anglophone Africa.

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# Quality



# Radiation Safety



# Access

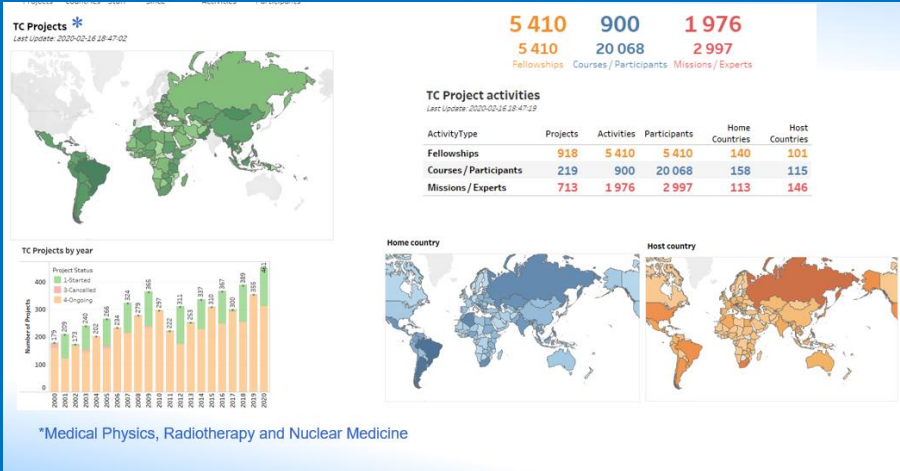
### Quality Assurance Team for Radiation Oncology

- Radiation oncologist
- Medical physicist
- RTT
- Safety specialist (local)

IAEA dosimetry travel kit used for QUATRO missions

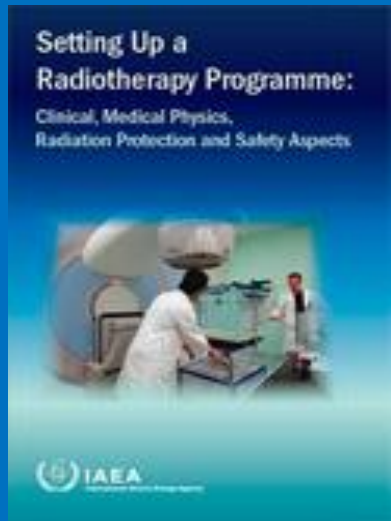
Comprehensive Audits of Radiotherapy Practices: a Tool for Quality Improvement

Quality Assurance Team for Radiation Oncology (QUATRO)





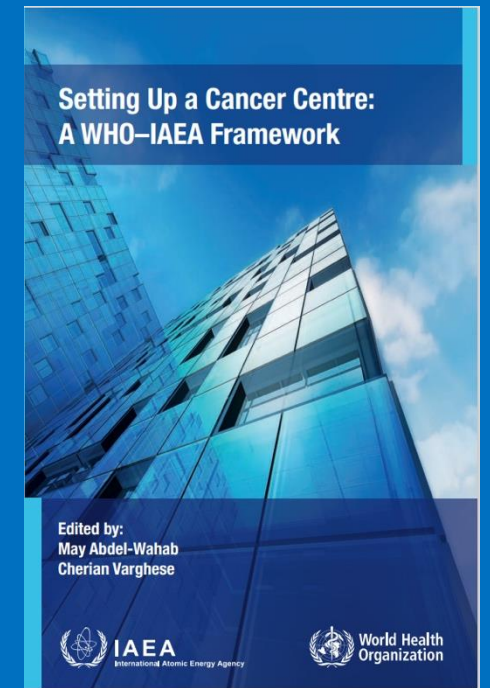
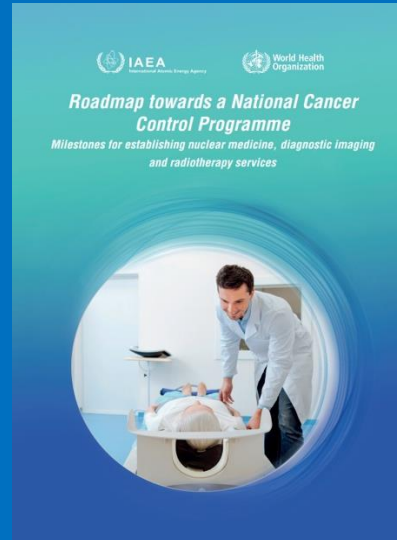
# Guidance on establishing radiotherapy departments



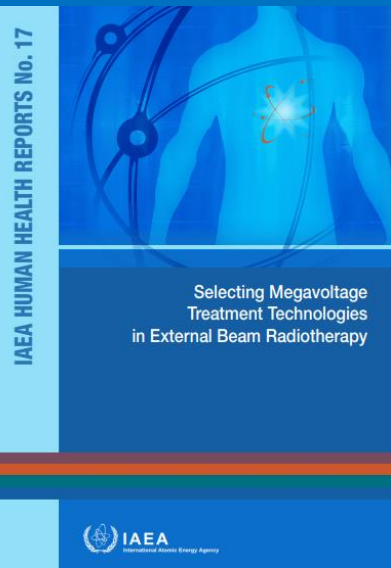
2008



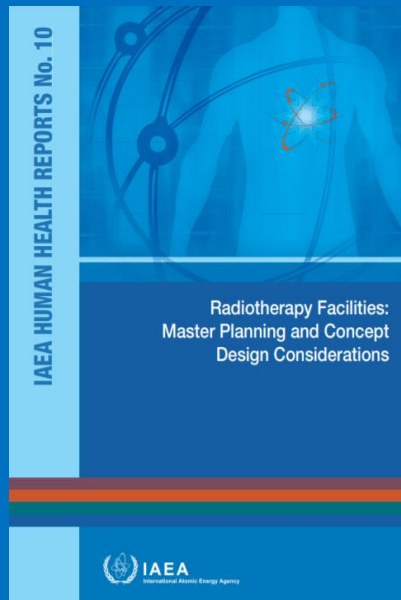
2017



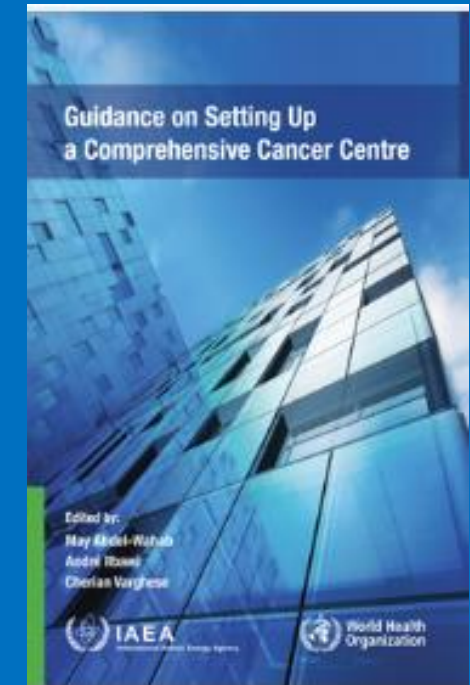
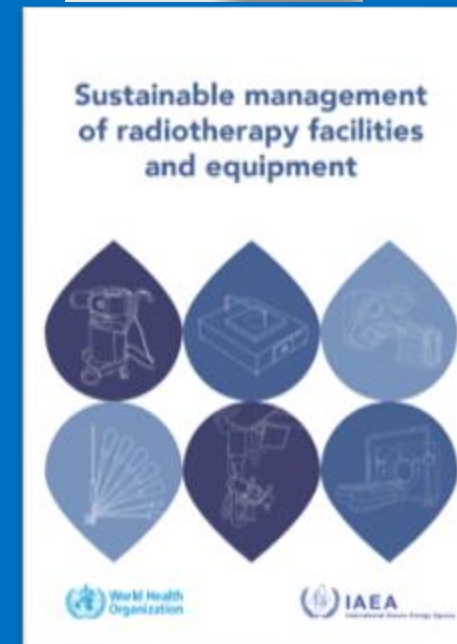
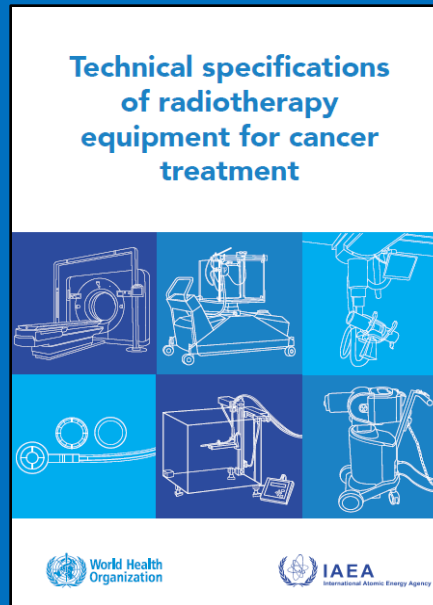
Edited by:  
May Abdel-Wahab  
Cherian Varghese



2022



2014

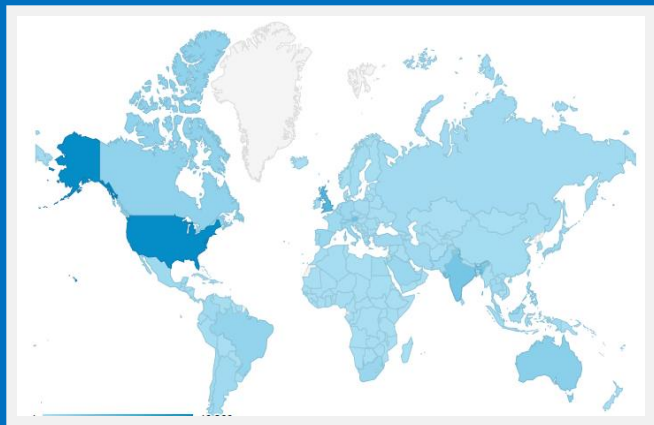


Edited by:  
May Abdel-Wahab  
Andri Itama  
Cherian Varghese





# E-Learning Resources



**Background**  
Cancer is one of the leading causes of mortality worldwide, with approximately 14 million new cases and 8 million deaths annually. Technological advances in early diagnosis, treatment, and palliative care have improved the quality of life for cancer patients. It is estimated that every year over a million new cases and half a million deaths worldwide are due to gynaecological cancers.

To ensure a fighting chance for patients diagnosed with this disease, a multidisciplinary team approach is crucial for the quality of diagnosis and treatment, involving close cooperation across the epidemiology, oncology, radiology, nuclear medicine and radiation oncology fields.

One of the major challenges faced by clinicians is to determine the most effective therapy for their patient, ensuring optimal conditions of survival and quality of life. Cancer staging is central to the modern management of cancer patients.

The purpose of the FIGO staging system is to provide uniform terminology for better communication among health professionals and to provide appropriate prognosis to the patients, which results in treatment improvement. This interactive app module cancer staging to be available and it has the potential to improve cancer management around the world.

**How to use the mobile app?**

A Web Page

**CeLP-RT**

**Breast Cancer, early**

**Treatment**

**Quality Assurance**

**General tips**

- TRS-398 – Setting up the dosimeter (Video)
  - The video provides tips on setting up your dosimeter to ensure accurate measurement results.
  - 21 min
  - Access Resource
- IMRT Patient Specific QA (Video)
  - This video provides an overview of patient specific QA for IMRT.
  - 21 min
  - Access Resource

**Essential skills**

**In-vivo dosimetry (e-Learning)**

This e-learning module provides an overview theoretical background and practical steps for In-vivo dosimetry based on air ionization chambers.

- Number of modules: 1
- Expected time to complete: 1 hour
- 21 min
- Access Resource

**Developing a Clinical Quality Assurance Program (e-Learning)**

This e-learning module provides an overview theoretical background and practical steps for calibration of photon and electron beams.

- Number of modules: 1
- Expected time to complete: 1 hour
- 21 min
- Access Resource

**Quality Assurance Program for Linear Accelerators (PDF)**

A ready to use program applicable to common 3D Conformal and IMRT linear accelerators. An optional section on QA for Teletherapy is included.

- 21 min
- Access Resource

**Quality Assurance Program for Cobalt-60 Teletherapy Units (PDF)**

A ready to use program applicable to Cobalt-60 Teletherapy Units.

- 21 min
- Access Resource

**Filter by equipment availability keywords (Alphabetical order)**

- 3D Conformal
- IGRT
- Conventional / 2D
- IMRT / In-vivo imaging
- IMRT
- Motion management
- IMRT
- Plan evaluation tool
- IGRT
- Record and verify system

## E-learning material-Medical physics

Video irradiation tutorial for participants in the IMAT/WHO Panel  
Dear Audit Service

Support the correct procedure of TLDs irradiation by Genesis

Reduction of errors in irradiation

Optimization of audit services

Video training module: IAEA Series No. 390

**Testicular relapse**

**IAEA Learning Management System**

OPEN-LMS English (en) You are not logged in. Log in

IAEA Learning Management System

Home > Courses > Nuclear Technology & Applications > Radiation and Applications > The Africa Radiation Oncology Network (AFRONET)

Course categories

Nuclear Technology & Applications / Radiation and Applications / The Africa Radiation Oncology Network (AFRONET)

Country	Basics	Particulate	Gamma	Other	Tumor Targets
Algeria	28	13	175	13	
Burkina Faso	0	0	0	0	0
Burundi	0	0	0	0	0
Cameroon	0	0	0	0	0
Central African Republic	0	0	0	0	0
Cote d'Ivoire	0	0	0	0	0
DRC	0	0	0	0	0
Egypt	0	0	0	0	0
Ethiopia	0	0	0	0	0
Ghana	0	0	0	0	0
Guinea	0	0	0	0	0
Kenya	0	0	0	0	0
Madagascar	0	0	0	0	0
Mali	0	0	0	0	0
Mozambique	0	0	0	0	0
Niger	0	0	0	0	0
Nigeria	0	0	0	0	0
Rwanda	0	0	0	0	0
Senegal	0	0	0	0	0
Tanzania	0	0	0	0	0
Togo	0	0	0	0	0
Tunisia	0	0	0	0	0
Zambia	0	0	0	0	0
Zimbabwe	0	0	0	0	0

The Africa Radiation Oncology Network (AFRONET) was launched in June 2012 as an IAEA pilot initiative project for Anglophone Africa. One to a lack of advanced radiotherapy centres in many low-income countries, isolated equipment and a shortage of training opportunities for professionals, centres often have to work in isolation and have limited access to up-to-date published literature, international meetings and expert opinion. AFRONET has provided a unique opportunity for participating centres to present and discuss cases with experts from within and outside Africa. This activity has benefited not only existing professionals, but also initiated training requests through early and periodic exposure to high quality lectures and webinars/online case discussions. Using a multi-developing Virtual Tumor Board (VTTB) where various professionals present, discuss and review challenging cancer cases, the network has helped strengthen clinical decision-making in radiotherapy centres across Anglophone Africa.

CLINNET | Copyright © 2010, IAEA, All rights reserved. Content List | Dashboard

**Applied Sciences of Oncology**  
Distance Learning Course

Version 1.0

Applied Sciences of Oncology

CURSO DE ACTUALIZACIÓN DE TECNÓLOGOS EN RADIOTERAPIA

ARCA

**Online Trainings**

- Diagnostic CT and PET/CT:** 600 professionals worldwide received training in the key competences PET/CT and CT - IAEA (NMDI-TC) and Australia (University of Sidney, ANSTO).
- DAT-OL for NM Professionals:** 39 subjects, 3 years, over 800 professionals trained worldwide.

**IAEA** International Atomic Energy Agency

**Schematic Approach to Abdominal and Pelvic Lymph Nodes**

Introduction  
Measurement  
Size  
Relationship  
Menu  
Nomenclature according to vessels  
Nomenclature according to organs  
Quiz  
References  
Acknowledgments  
Help

The goal of this e-learning module is to identify and review the anatomical boundaries of abdominal and pelvic node levels

Webinars are made available at the Human Health Campus  
Free online educational resource for health professionals in radiation medicine that also offers a series of e-learning modules to enhance the learning experience. <http://humanhealth.iaea.org>

Virtual Tumor Boards

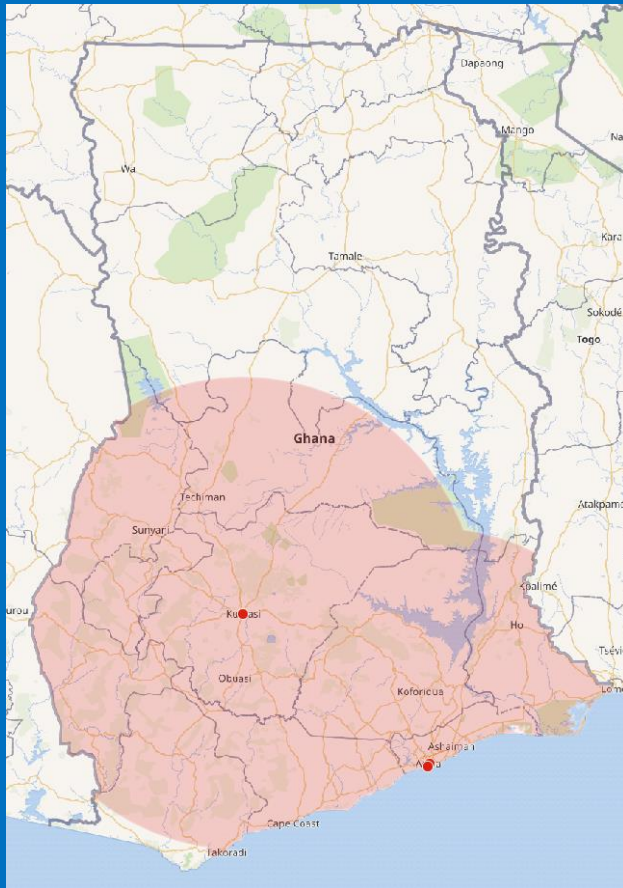
Complete curricula

Webinars and online training

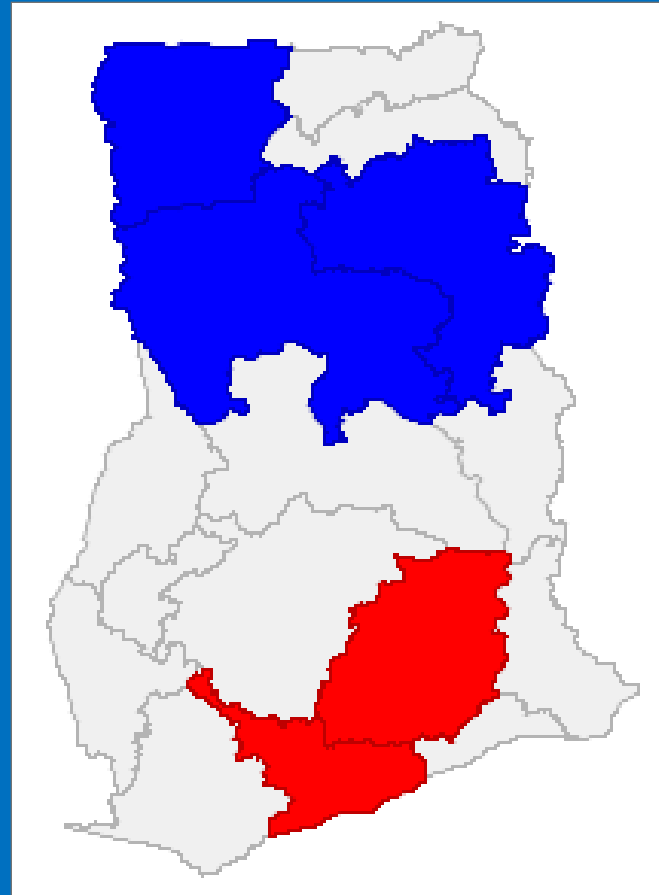
Interactive E-Learning modules

# Health Systems Research & Support of in-Country Planning

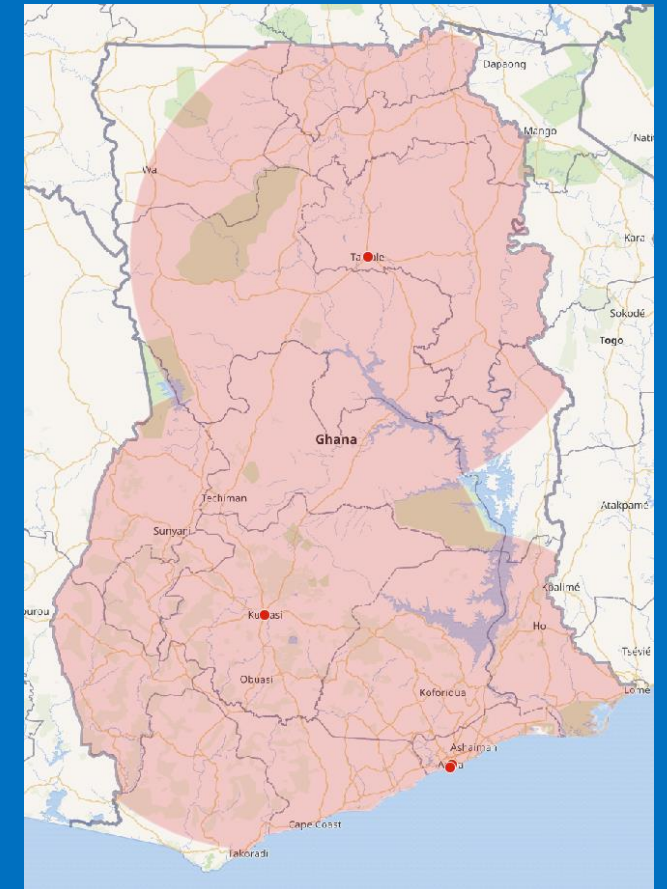
CURRENT SITUATION



SPATIAL AUTOCORRELATION MODEL



AFTER EXPANSION OF SERVICES



Analysis of inequities using quantitative methods and Geographic Information Systems

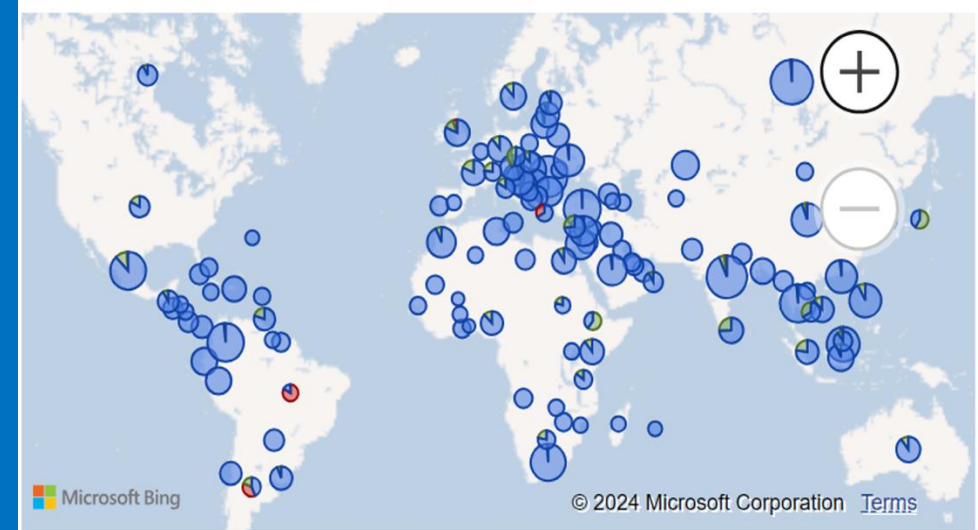


# Quality Assurance: Calibrations and Comparisons

- IAEA Dosimetry Laboratory (DOL) is the central lab of the IAEA/WHO Network of Secondary Standards Dosimetry Laboratories (SSDLs)
  - through it, the IAEA establishes a direct link between countries and the International System of Units
  - 134 ionization chambers calibrated and 269 certificates issued to labs in 39 countries in 2022/23
- IAEA/WHO postal dose audit programme –
  - 15,000+ beams checked in 2,700+ radiotherapy centres across 144 countries since 1969
- IAEA-developed independent quality audits through comprehensive reviews of practices in radiotherapy (QUATRO), nuclear medicine (QUANUM), and diagnostic radiology (QUADDRIL)
  - “train the trainer” workshops to train complete teams of radiation medicine professionals to carry out and train others in QUATRO, QUANUM, and QUAADRIL

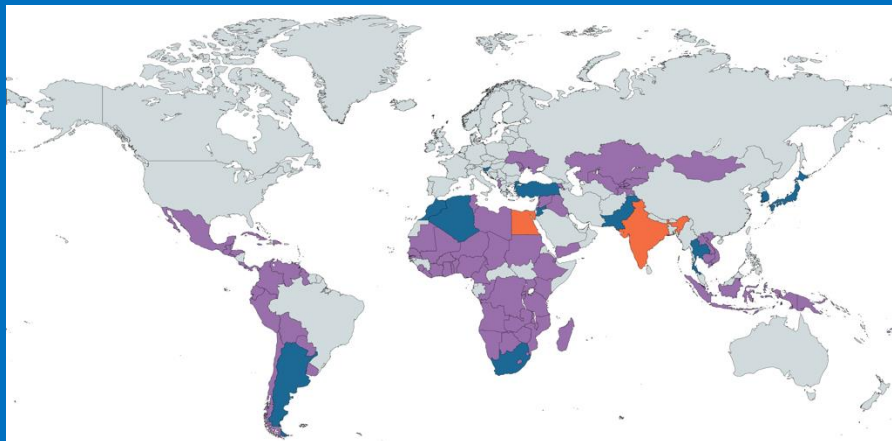


● Brachy ● Electron ● Photon



# Pillars of Rays of Hope

- Supporting access through technical assessments and economic evaluations, equipment, and capacity building (technology transfer and training)
- Sustainability through Anchor Centres – regional knowledge and capacity building hubs
- Innovation through research and development



*Visiting Panama's National Oncology Institute, January 2025*



# Examples of Progress to date

- Democratic Republic of the Congo: Training of medical professionals ongoing
- Kenya: Procurement of radiotherapy equipment completed; training ongoing
- Chad: Construction of a **radiotherapy** centre and the **training** of professionals are ongoing
- Malawi: Construction of bunkers, **procurement** of equipment and the **training** of professionals are ongoing



*Laying the foundation stone of what will be the first public radiotherapy centre in the Democratic Republic of the Congo, November 2023*

*the country's first public radiotherapy centre is expected to open at the end of the year*



# Examples of Progress to date

- **Dominican Republic**: New oncological centre being built in the southwest; procurement of radiotherapy equipment and training ongoing
- **Honduras**: Support for the procurement of radiotherapy equipment and plans for capacity building
- **Mexico**: Procurement of radiotherapy equipment in progress
- **Latin America**: 32 mammography units being procured for breast cancer screening services and diagnosis across 18 countries



*Visiting hospitals in Uruguay, one of the countries that will receive mammography units, December 2023*

# IAEA Collaborating Centre - Anchor Centres (as of 31 Jan 2025)



Institute of Oncology Ljubljana (Slovenia)



Ege University Faculty of Medicine (Türkiye)

Atomic Energy Cancer Hospital, Nuclear Medicine, Oncology and Radiotherapy Institute, Islamabad (Pakistan)



Korea Institute of Radiological and Medical Sciences (Republic of Korea)

University Hospital Centre of Bab El-Oued and Pierre and Marie Curie Cancer Centre (Algeria)

Institut National d'Oncologie (Morocco)

King Hussein Cancer Center (Jordan)

The Japanese Network of Cooperation in Radiation Medicine for Rays of Hope (Japan)



Comisión Nacional de Energía Atómica (Argentina)

Steve Biko Academic Hospital – NuMeRI (South Africa)



Mahidol University Faculty of Medicine Ramathibodi Hospital (Thailand)





# Anchor Centre Hosted Capacity Building Events



Regional workshop on the status of paediatric radiotherapy services across Latin America, held at the Anchor Centre in Argentina in November 2024

Regional workshop on paediatric radiotherapy services across Europe, held at the Anchor Centre in Turkiye in April 2024



Regional training course on streamlined and emerging theranostic techniques, held at the Anchor Centre in Japan in August 2024

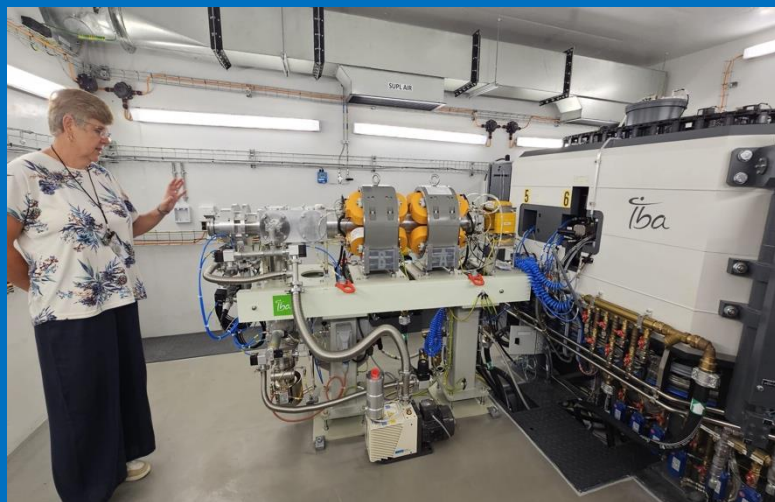




# Expert Missions

Week-long, on-site visits to identify key areas and needs where the IAEA can provide its support

Opportunity to modify and further tailor the joint workplan with each Anchor Centre



*Anchor Centre in South Africa*



*Anchor Centre in South Africa*



*Anchor Centre in Algeria*



*Anchor Centre in Morocco*



*Anchor Centre in Argentina*

# SUNRISE

- Data is pivotal for advancing cancer treatment, research and education
- Under Rays of Hope, the IAEA is developing SUNRISE: The Sustainable United Network for Radiation Medicine Innovation and Scientific Excellence
- This envisaged database will :
  - enhance cancer care for all by assessing & improving patient outcomes,
  - increasing cost-effectiveness,
  - informing decision making,
  - facilitating research,
  - optimizing healthcare systems and advancing excellence globally



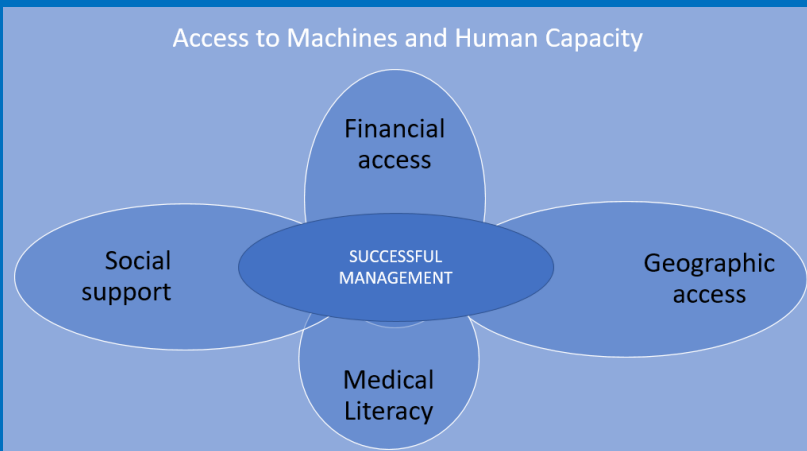


# Additional Factors and areas to be addressed

- Interim housing for traveling patients
- Increased community education to reduce late-stage diagnoses
- Use of virtual visits to avoid travel

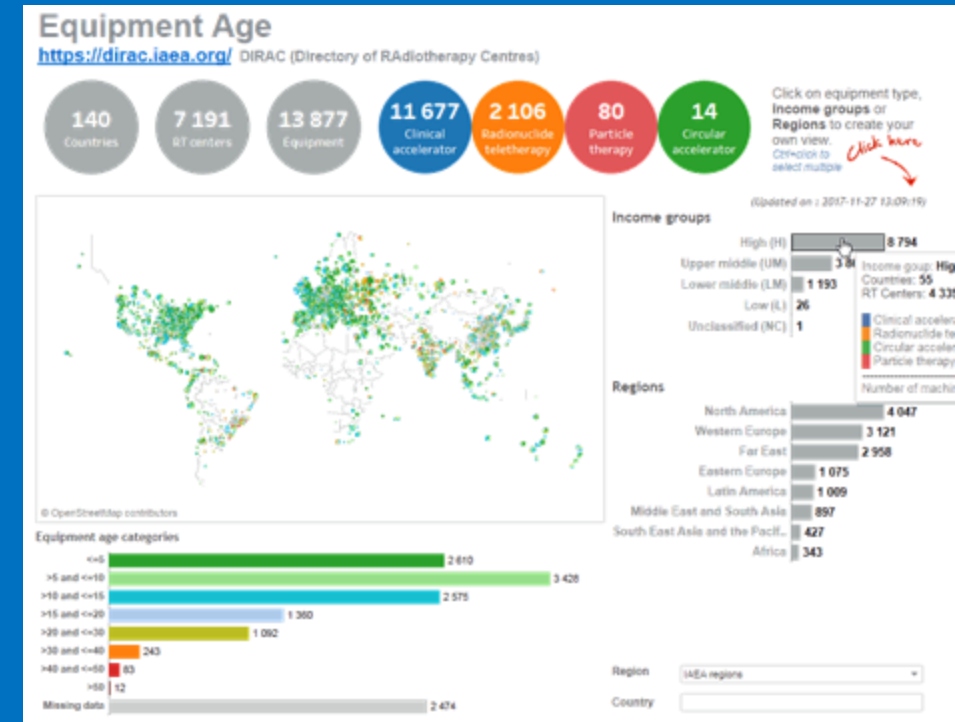
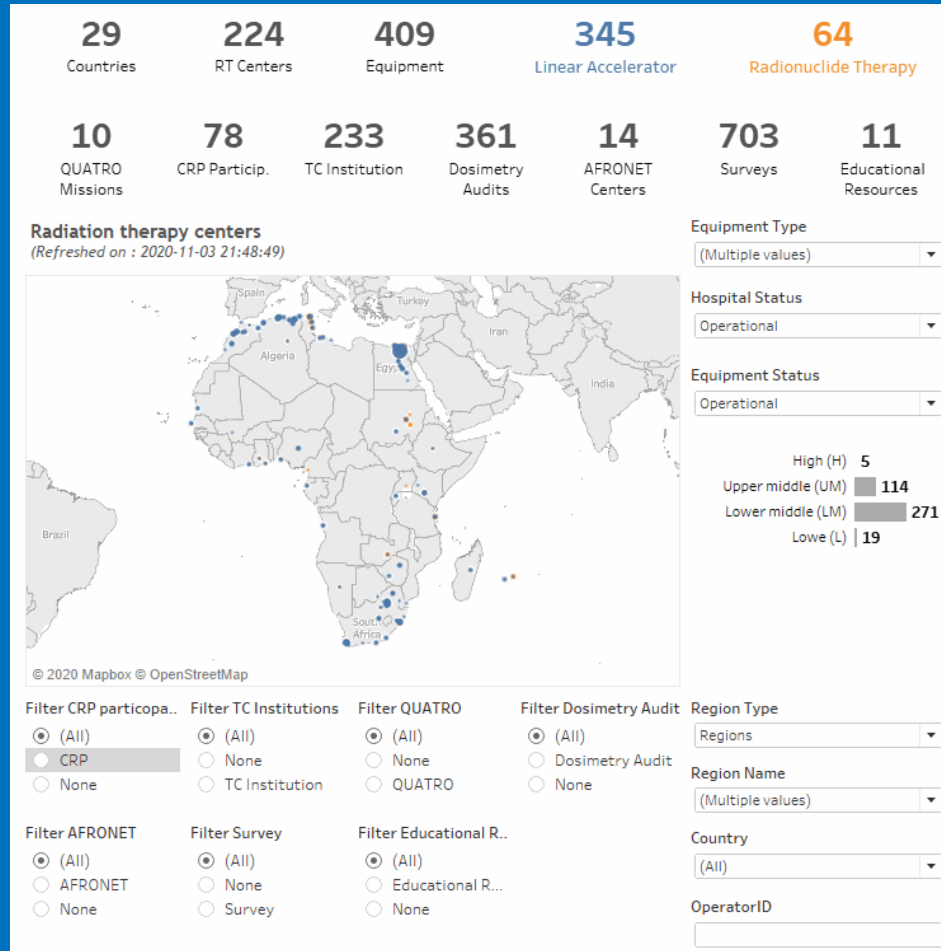
Factors Impacting Care Seeking Behaviors

Factors increasing likelihood of seeking care	Factors decreasing likelihood of seeking care
Positive awareness of cancer/family history	Lack of awareness of cancer/education
Strong Support System	Lack of health seeking behaviours at symptom onset
Protestant Affiliation	Preference for traditional or religious healers
	Fear of ostracization or stigma in community
	Fear of treatment
	Low SES
	Challenging referral system; Previous negative experience in hospitals/ healthcare; HIV +ve



# Together we can

- Education
- Training
- Planning
- Project Design
- Procurement support
- Health economics
- Bunker design
- Masters Programs
- Gender Parity





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# THANK YOU!

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<https://www.iaea.org/services/key-programmes/rays-of-hope>

<https://www.iaea.org/about/organizational-structure/department-of-nuclear-sciences-and-applications/division-of-human-health>