Radiotherapy in cancer control in low- and middle-income countries
XRT in LMI countries

- What is LMI?
- Cancer in LMI
- Need for XRT
- Cost and cost-effectiveness
- Current state of XRT in LMI countries
- Case studies
  - Breast
  - Cervix
  - Lung
## LMI countries

<table>
<thead>
<tr>
<th>Income</th>
<th>Gross National Income per person per year (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>765</td>
</tr>
<tr>
<td>Middle</td>
<td>766 – 9,385</td>
</tr>
<tr>
<td>High</td>
<td>9,386</td>
</tr>
</tbody>
</table>
Cancer in LMI countries

- 10 million new cases by 2010
- >50% of all cancers occur in LMI
- 70% by 2020
New cases of cancer

Globocan 2002
Radiotherapy Utilisation

- 52% of all cancer patients need radiotherapy at least once
- 86% curative or adjuvant
- 20-25% may need >1 treatment episode
- RTU likely to be higher
  - More advanced stage
  - Less surgical expertise
The need for radiotherapy

N. Taylor, IAEA 2005
Cancer cases needing XRT

Cancer cases needing XRT

Russia
Iceland
Canada
Uzbekistan
United States
United Kingdom
United Arab Emirates
Ukraine
Turkey
Tunisia
Tajikistan
Syria
Spain
Slovenia
Slovakia
Serbia
Saudi Arabia
Romania
Qatar
Portugal
Poland
Pakistan
Morocco
Mongolia
Moldova
Mexico
Malta
Macedonia
Lithuania
Libya
Lebanon
Latvia
Kyrgyzstan
Kuwait
Korea Rep.
Korea DPR
Kazakhstan
Jordan
Japan
Ireland
Iraq
India
Hungary
Greece
Germany
Georgia
Estonia
Egypt
Czech Republic
Cyprus
Cuba
Croatia
China
Bulgaria
Bosnia and Herzegovina
Belarus
Bangladesh
Azerbaijan
Armenia
Algeria
Albania
Afghanistan
Zimbabwe
Zambia
Vietnam
Venezuela
Uganda
Thailand
Tanzania
Sudan
Sri Lanka
Singapore
Sierra Leone
Senegal
Philippines
Peru
Panama
Nigeria
Niger
Nicaragua
Myanmar
Mali
Malaysia
Malawi
Madagascar
Liberia
Kenya
Jamaica
Indonesia
Honduras
Haiti
Guatemala
Ghana
Gabon
Ethiopia
Eritrea
El Salvador
Ecuador
Dominican Republic
Democratic Republic of the Congo
Cote D'Ivoire
Costa Rica
Cape Verde
Cameroon
Burkina Faso
Brazil
Bolivia
Benin
Angola

N. Taylor, IAEA 2005
### Cost

<table>
<thead>
<tr>
<th>Item</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building</td>
<td>3%</td>
</tr>
<tr>
<td>Equipment</td>
<td>30%</td>
</tr>
<tr>
<td>Staff</td>
<td>50%</td>
</tr>
<tr>
<td>Materials</td>
<td>4%</td>
</tr>
<tr>
<td>Overheads</td>
<td>13%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Cobalt</th>
<th>Linac</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Machine</strong></td>
<td>$480,000</td>
<td>$1,800,000</td>
</tr>
<tr>
<td><strong>Maintenance</strong></td>
<td>$1270 to $35,680</td>
<td>$3000 to $91,740</td>
</tr>
<tr>
<td><strong>Cost per treatment</strong></td>
<td>$4.87</td>
<td>$11</td>
</tr>
</tbody>
</table>

Current status of XRT

- 24/72 countries with > 1 million people had no XRT
- Average GNI/cap US$300
Cervix

- >80% new cases & deaths in LMI
- 50-60% of new cases die of cervix cancer
- 91-99% need XRT
Strategies to improve access

- Planning
- Investment
- Linkages
- Access to information
- Education about cancer
- Safety
Planning

- No “one size fits all” plan
  - casemix
  - capabilities
Investment

- Equipment
- Staff
- Maintenance
- Source replacement
Linkages

- Many isolated departments
- Training
- CPD
- South – South
- Exchanges
  - Protocols
  - Staff
Access to information

- Journals
  - Cost
  - Language
  - On-line access

- Meetings
Education about cancer

- Medical students
- Radiation oncology staff
  - Regional training centres
- Distance learning courses
Safety

- Inter-centre dosimetry
- Maintenance
- Common protocols
- Source security
Conclusions

- Cancer is a major problem in LMI
- Radiotherapy is essential and viable
- Cobalt is preferred
- Planning
- Investment
- Linkages
- Information
- Education
- Safety
- PACT