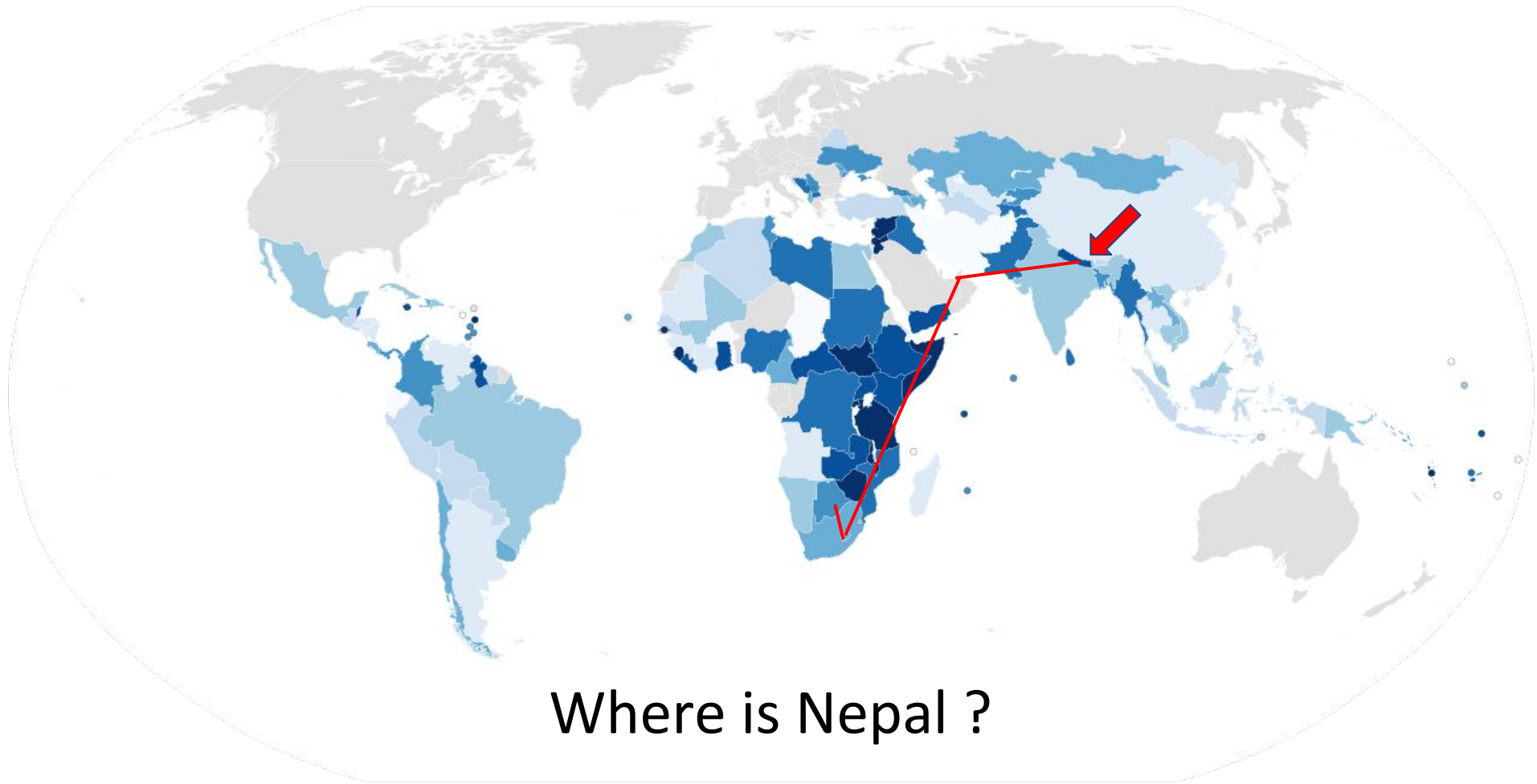


Challenges and Solutions in Radiotherapy Treatment in ODA countries

Dr. Abish Adhikari, MD
Radiation Oncologist.
Kathmandu Cancer Center,
Nepal

about.me/abish



Where is Nepal ?





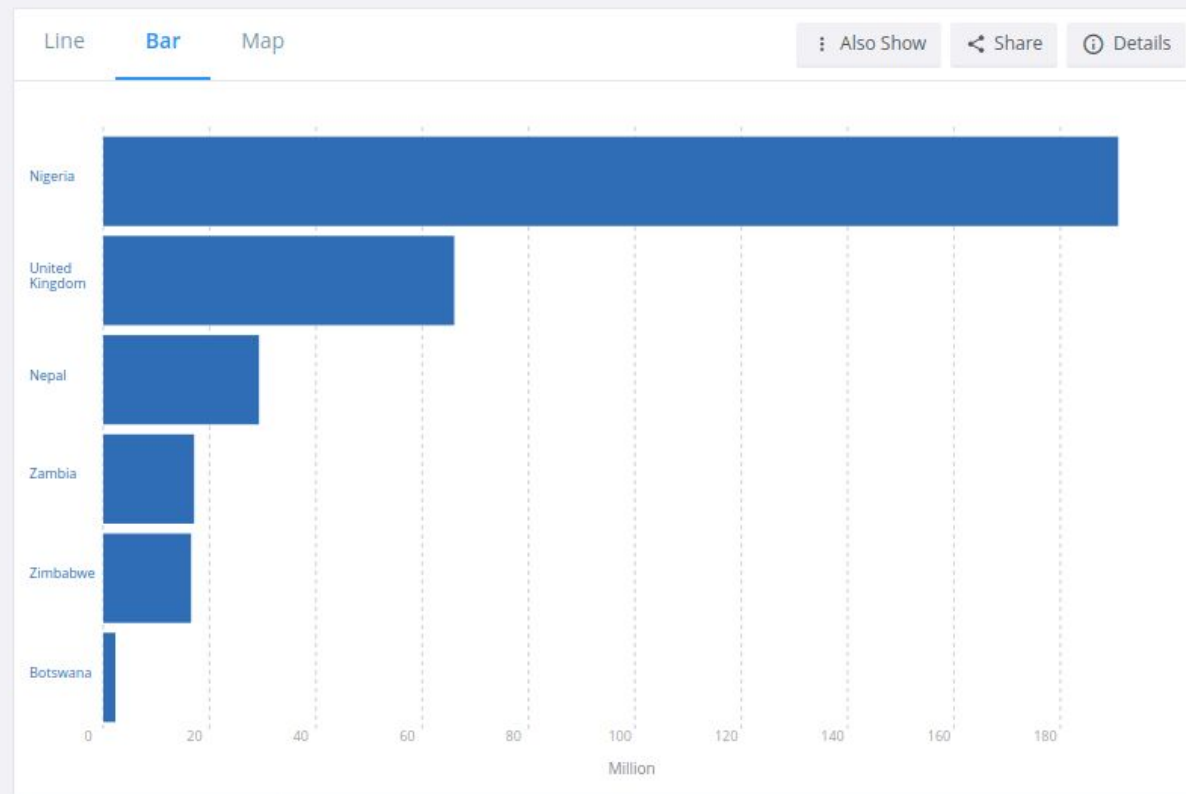
Nepal – Key Facts

- Area :147,181 km² (93rd)
- Population: 29 Million (48th)
- Eight of the world's ten tallest mountains, including **Mount Everest**.

Population, total

(1) United Nations Population Division. World Population Prospects: 2017 Revision. (2) Census reports and other statistical publications from national statistical offices, (3) Eurostat: Demographic Statistics, (4) United Nations Statistical Division. Population and Vital Statistics Reprot (various years), (5) U.S. Census Bureau: International Database, and (6) Secretariat of the Pacific Community: Statistics and Demography Programme.

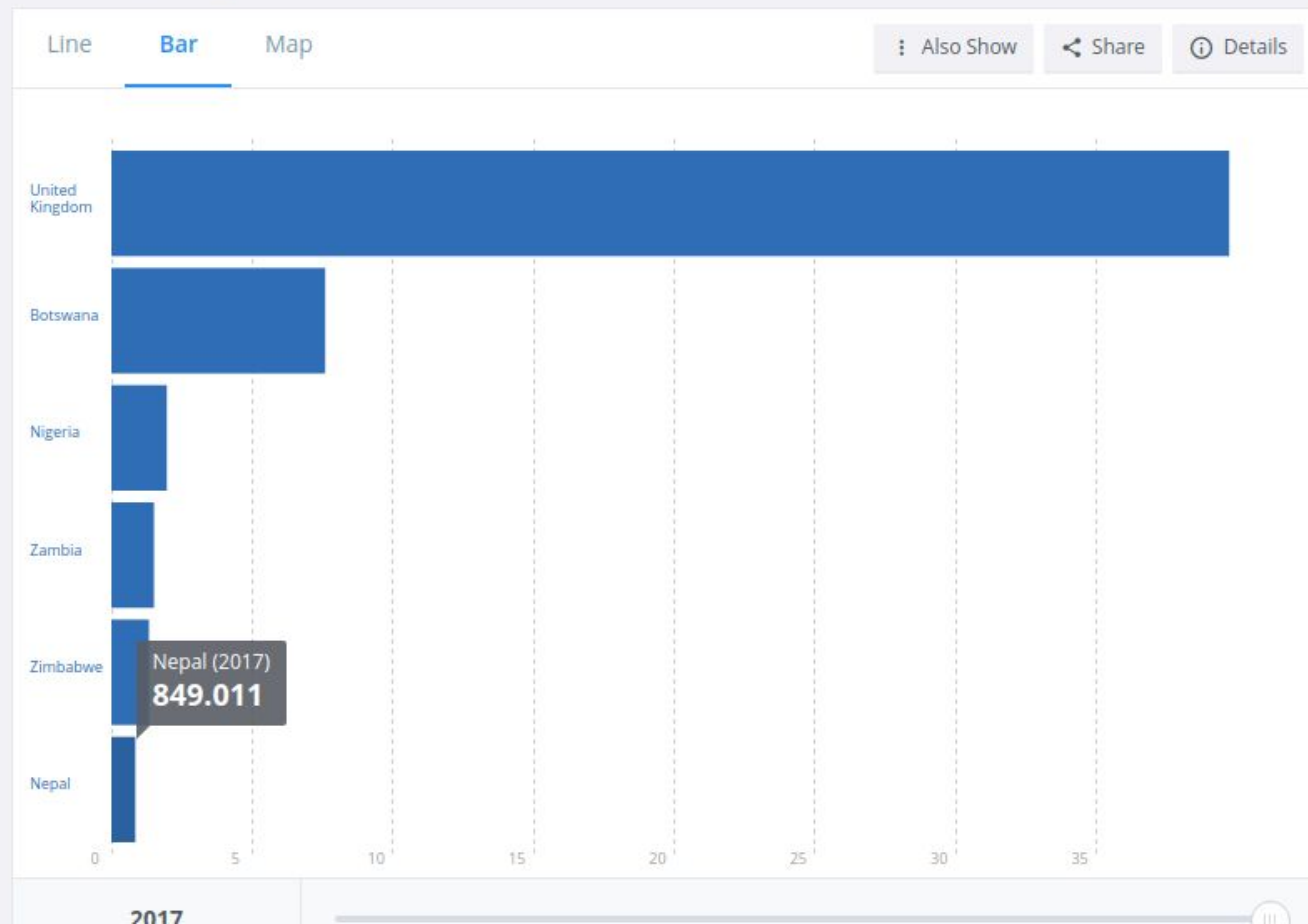
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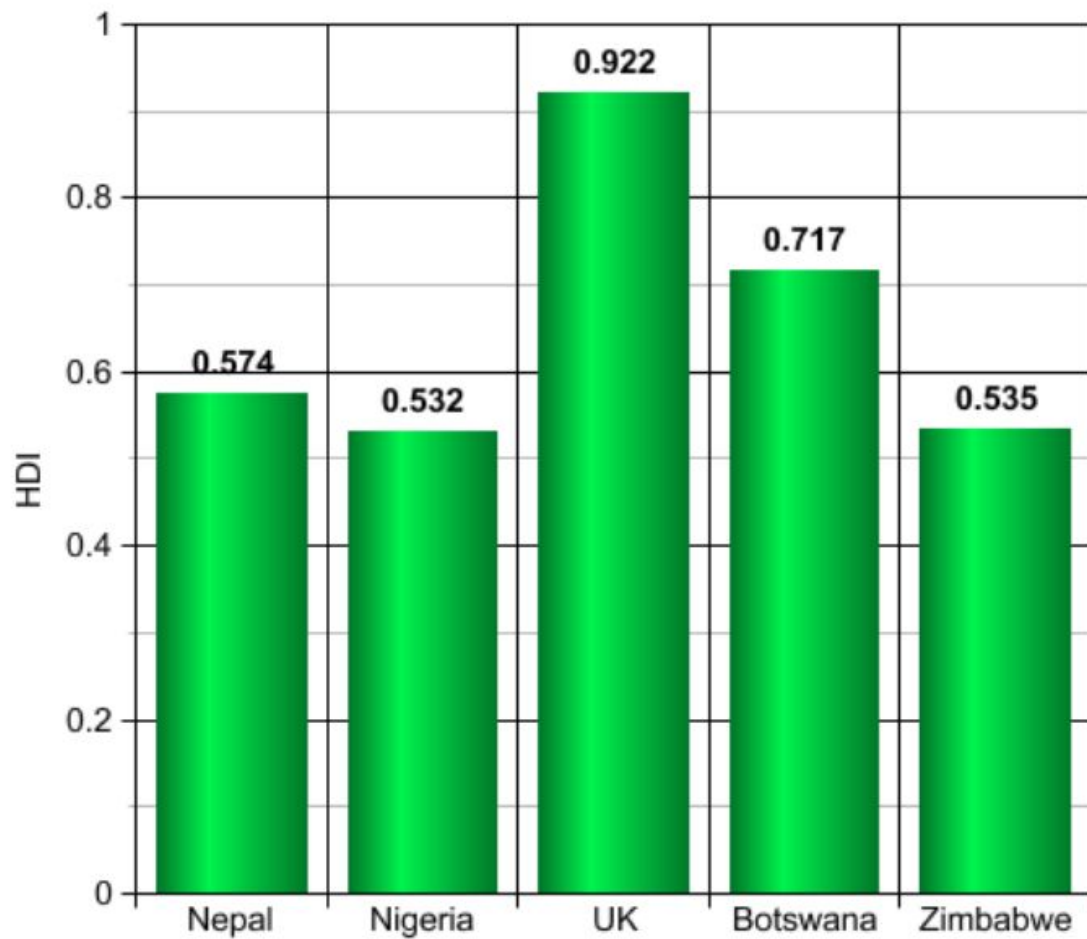
GDP per capita (current US\$)

World Bank national accounts data, and OECD National Accounts data files.

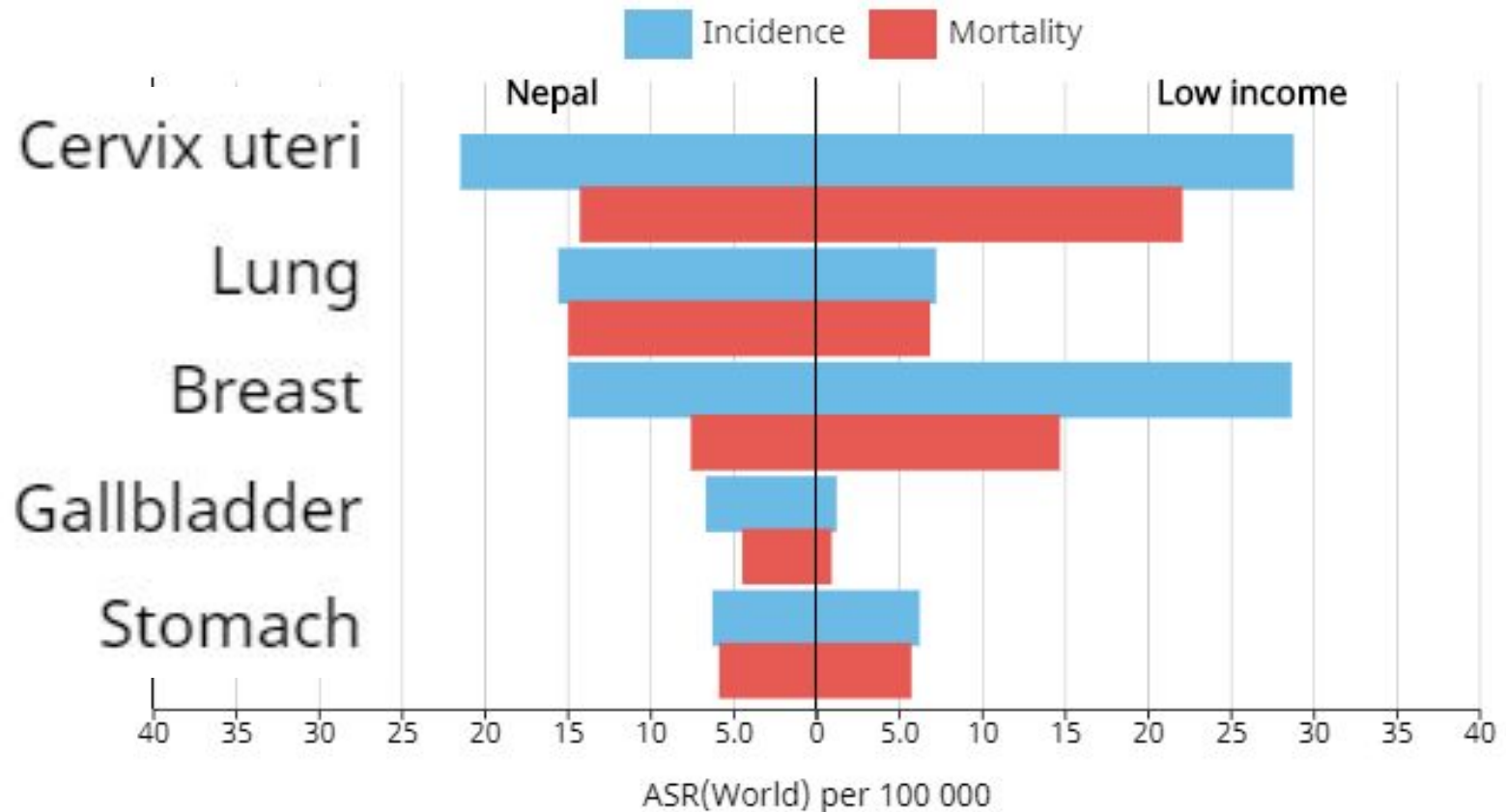
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Human Development Index

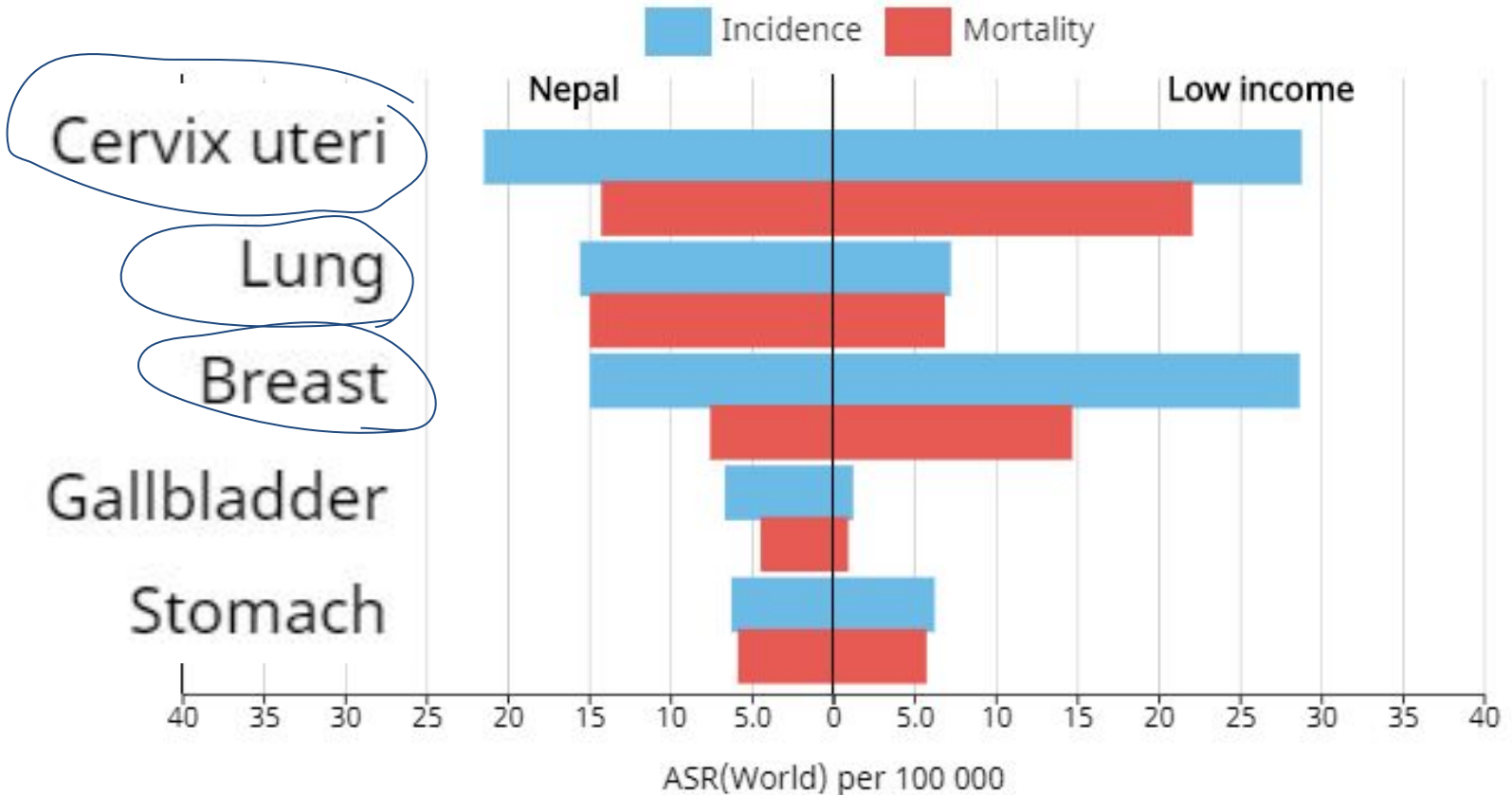


Cancer Incidence



Cancer Incidence

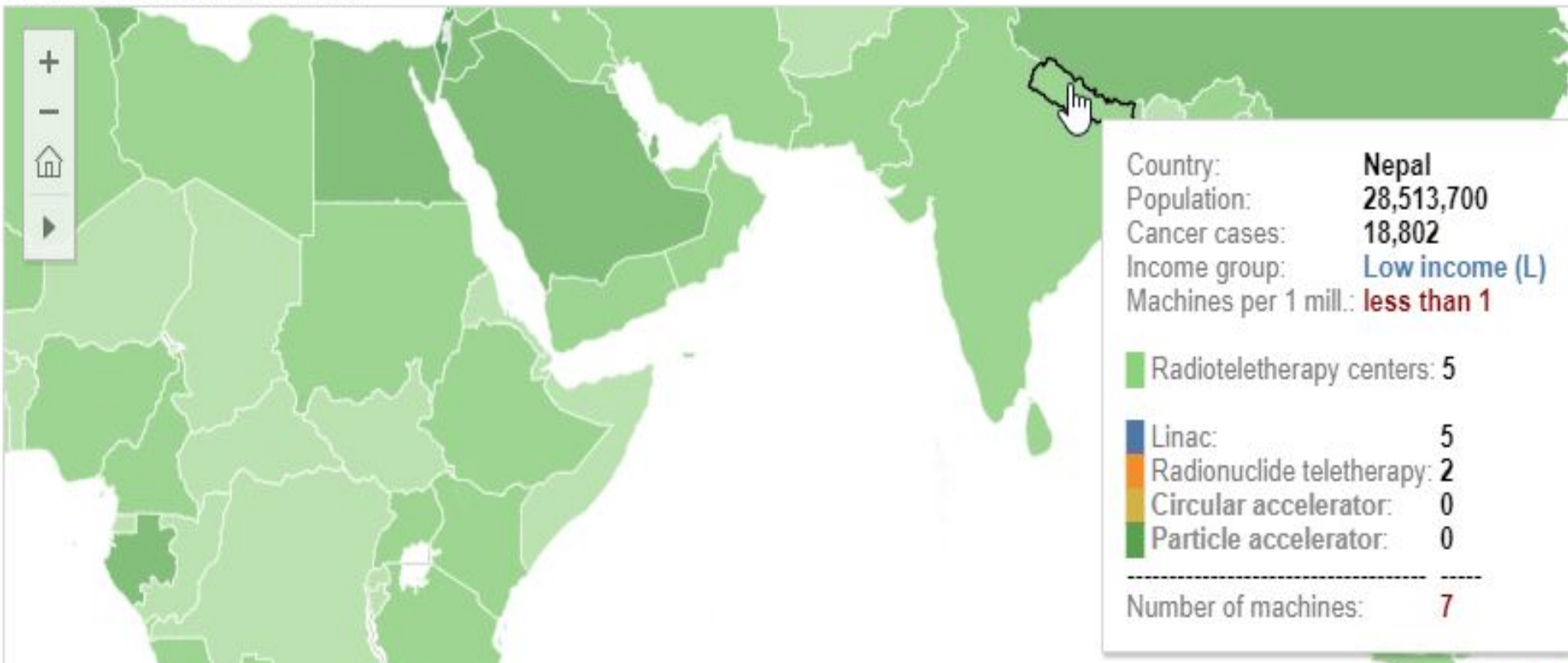
Need Radiotherapy





Number of Radiotherapy Machines Per Million People

(Updated on : 5/11/2018 2:04:58 PM)





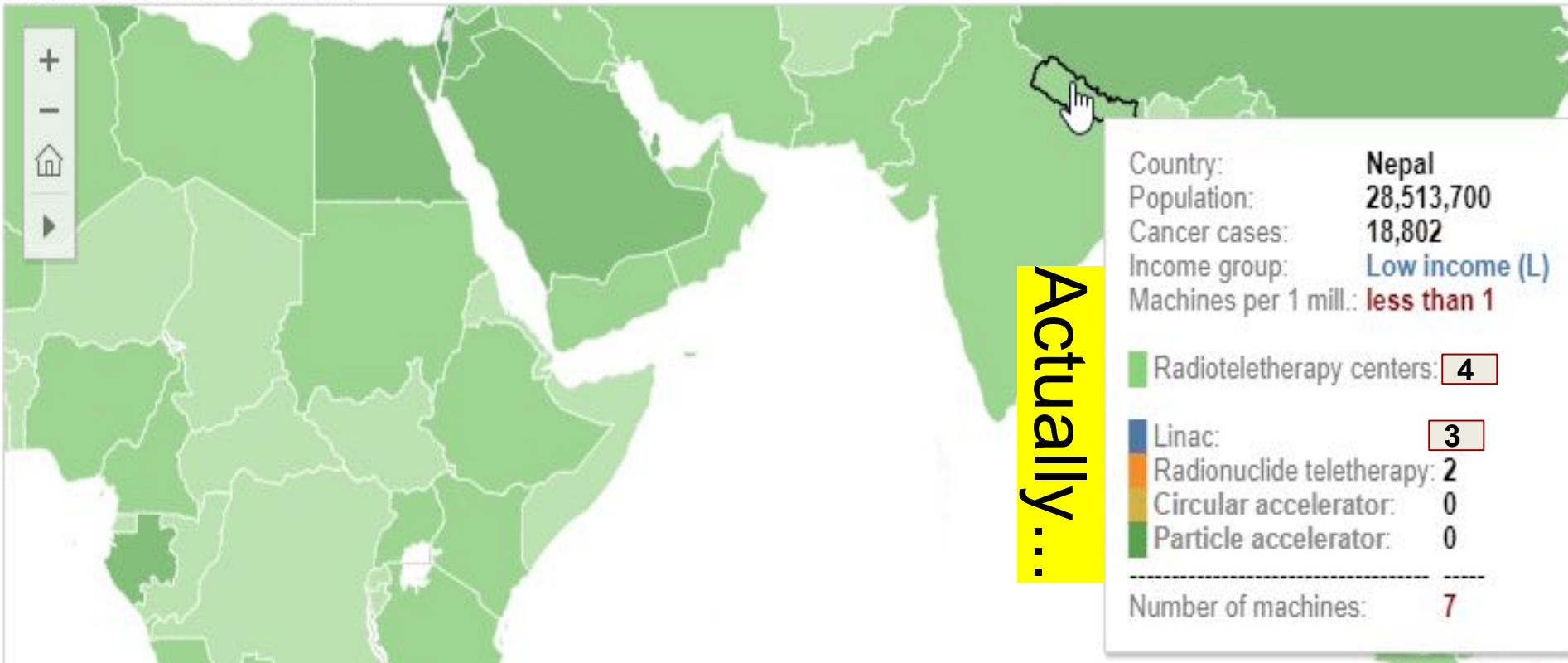
IAEA

DIRAC

Directory of
RAdiotherapy Centres

Number of Radiotherapy Machines Per Million People

(Updated on : 5/11/2018 2:04:58 PM)



Actually...

Manpower

- 70 'Oncologists'. 40 Radiation Oncologists.
- 4 Hospitals with tele-therapy services.
- ~ 30,000 new cases of cancer each year.
- Cancer prevalence per 100,000 population is 310.3

Nepal: Situation of Treatment

- Situation in 2019:
 - 30 million people
 - 5 tele-therapy machine.
- Some patients going to India/abroad for cancer treatment.
- Many patients received no treatment or sub-optimal treatment.

Linear Accelerators

1. Varian Clinac iX (2019): Government Hospital.
2. Varian Truebeam-2 (2017): Private Hospital.
3. Elekta Synergy (2016): Private Hospital.
4. Varian Clinac 600 (2001): Government Hospital
5. Varian Clinac 2300 (2001): Government Hospital
6. Seimens Linac (2002): Medical College

Linear Accelerators

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- ~~6. Siemens Linac (2004): Medical College.~~





<https://www.newsroom.co.nz/2018/07/26/167468/former-funder-of-ray-avery-speaks>

In June 2006, Morgan's foundation gave an entity associated with Avery a \$300,000 accelerator grant for radiotherapy equipment for the Bhaktapur cancer hospital in Nepal. The project went well and the **equipment was installed.**



<https://www.newsroom.co.nz/2018/07/26/167468/former-funder-of-ray-avery-speaks>

In June 2006, Morgan's foundation gave an entity associated with Avery a \$300,000 accelerator grant for radiotherapy equipment for the Bhaktapur cancer hospital in Nepal. The project went well and the **equipment was installed.**

But it never worked !

It was a previously used machine that needed parts to be replaced.

<https://www.newsroom.co.nz/2018/07/26/167468/former-funder-of-ray-avery-speaks>

By Next Year...

- A medical college in eastern part has ordered a Varian Truebeam to start running in 2020.
- A government hospital in the central region will have a new Varian Clinac iX running in 2020.

In a few Years...

- An MD radOnc training university replaced it's Co-60 with Tomo. Ready by 2022. □
- A government hospital in Western region has been trying to get a Linac & a Cobalt 60.

—



L: Linac / C: Cobalt

Green: Active / Yellow: Procurement in Process

Nuclear Imaging

- Two PET-CTs privately owned.
- FDG brought from India / 2-3 half lives.
- Bone Scans
- Cyclotron has been discussed since years but doesn't seem to arrive anytime soon!

Problems !

Problems: Investment

- Why invest on Linear Accelerators when you have so many things to invest on ?
- When do I get the returns ?
- Supply & Demand of the service.
- Customers ? Enough of them ?

Problems: Human Resource

- Trained Radiation Oncologists ? - 30
- Well Trained Radiation Oncologists ?
- Radiotherapy Therapists ? - 30
- Trained Therapists ? - 6

Problems: Human Resource

- Radiation Physicists ? - 10
- With a degree ? -3
- Engineers ? None !
- 'Technicians' handle most issues.

Problems: Others !

- Taxes
- Electricity
- Security
- Government Support

Problems: Others

- Taxes
- Electricity
- Security
- Government Support

PRIORITIES

What can be done ?

- An easy on pocket machine.
- That doesn't break down as often.
- Spare parts easily/economically available.
- Hospital & manufacturer's co-investment.

Human Resource

- Biomed Engineers Training ?
- Electronic Engineers Training ?
- Technician Training ?
- Medical Physicists vs Trained physics Msc ?



The Airbus - Boeing Duopoly !
90+ % of planes built by them !



Similar to the Varian /Elekta Duopoly !



Varian FQ1 earnings up 192%

Jan. 23, 2019 4:31 PM • SA Editor Douglas W. House

- [Varian \(NYSE:VAR\) fiscal Q1 results](#) (\$M):
Revenues: 741.0 (+9.2%).
- Net income: 103.2 (+191.9%); non-GAAP net income: 97.3(-1.1%); EPS: 1.12 (+191.8%); non-GAAP EPS: 1.06 (flat); cash flow ops: 140.9 (-21.3%).
- **Fiscal 2019 guidance:** Revenue: \$3.06B - 3.15B; non-GAAP EPS: \$4.60 - 4.75; cash flow ops: \$460M - 510M.

Do we have a place for the ATR ?



What could sell ? Where ?

- Small markets.
- Developing countries
- Instant support !
- Instant Deliveries ?
- Global vs Local ?

My Experience

Kathmandu Cancer Center



Private Hospital started in 2006.

Battery & UPS



Power Generator & Fuel Tank



BUNKER MAZE



Elekta synergy.
600+ patients/ year

--- Patient Pays:----

3DCRT: 1000 USD.

IMRT: 1500 USD.

VMAT: 2000 USD.



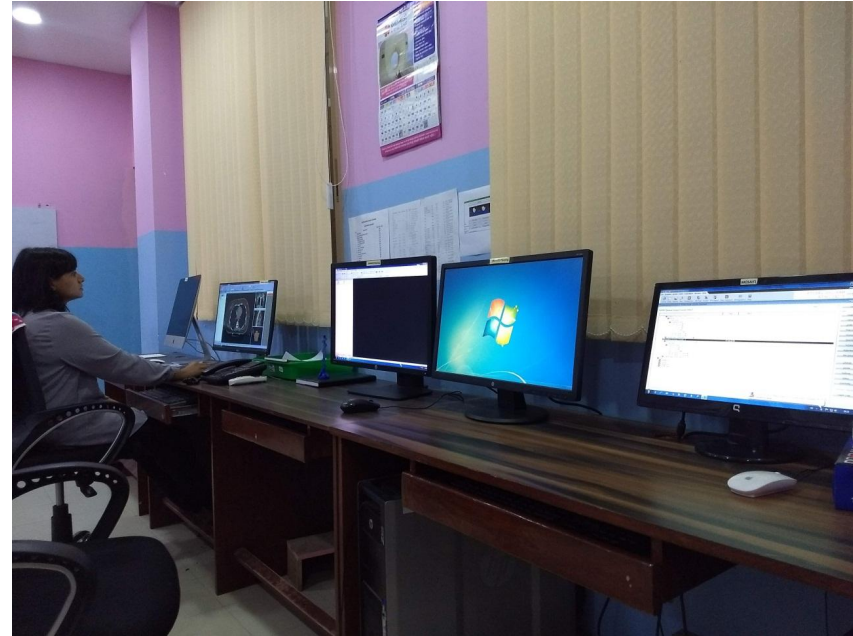
Cheap does not mean ugly.

- Self-designed
- 100\$ skylight.
- 50 times cheaper



Treatment Planning Systems

- Monaco - 2 consoles
- MIM software (donated by Radiating Hope/MIM)
- ----Lacks----
- Conebeam CT
- Personal Dosimetry
- Record keeping System



TSET (Total Skin Electron Therapy)



TSET Treatment in cutaneous lymphoma using custom-made frame.

Total Body Irradiation (TBI)

Nepal | May 11, 2018

The Himalayan

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Successful bone-marrow transplant through radiation for the first time in Nepal

Published: January 02, 2018 4:24 pm On: Health

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नेपालमा पहिलो पटक टोटल बडी इरेडियसन

नेपालमा पहिलो पटक पुरै शरिरको रेडियोथेरापी गरिएको छ । प्राविधिक भाषामा टोटल बडी इरेडियसन टिबीआई भनिने यो विधि प...

NAGARIKNEWS.COM



Deep Inspiration Breath Hold



How we setup vDIBH?

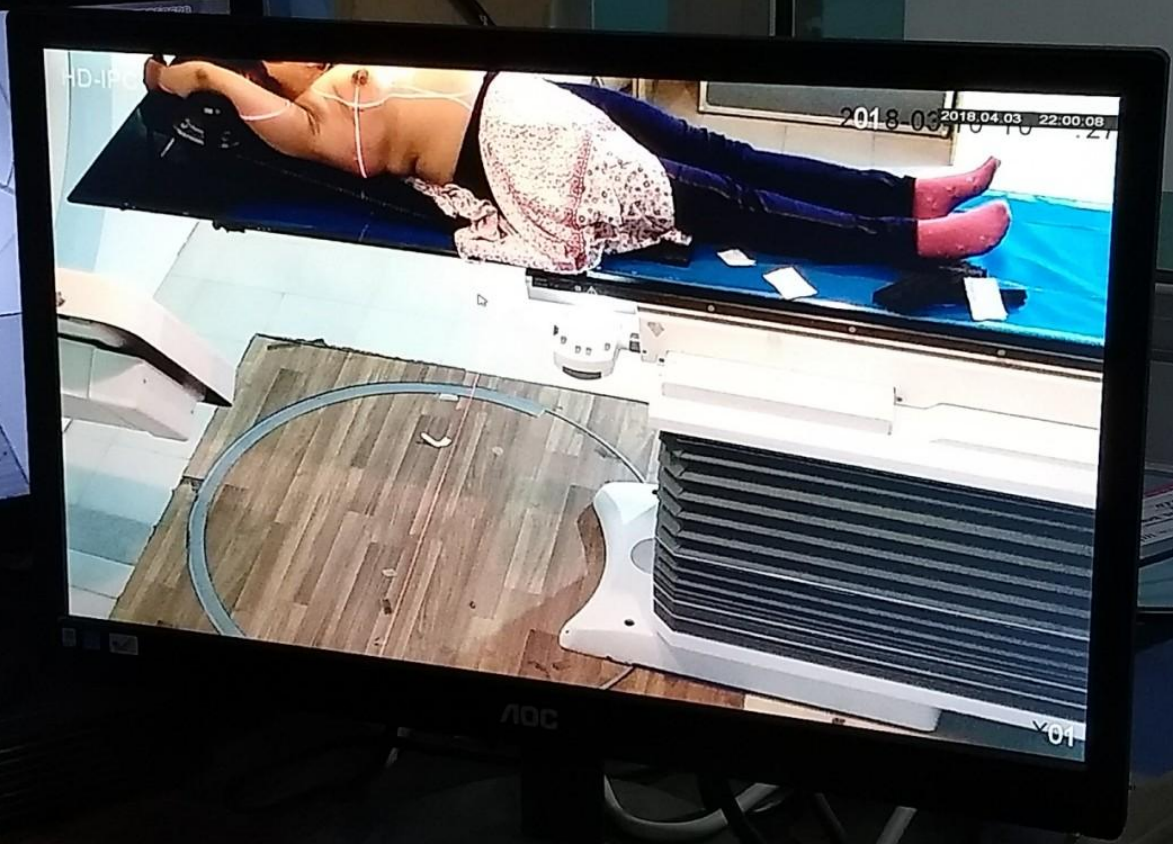
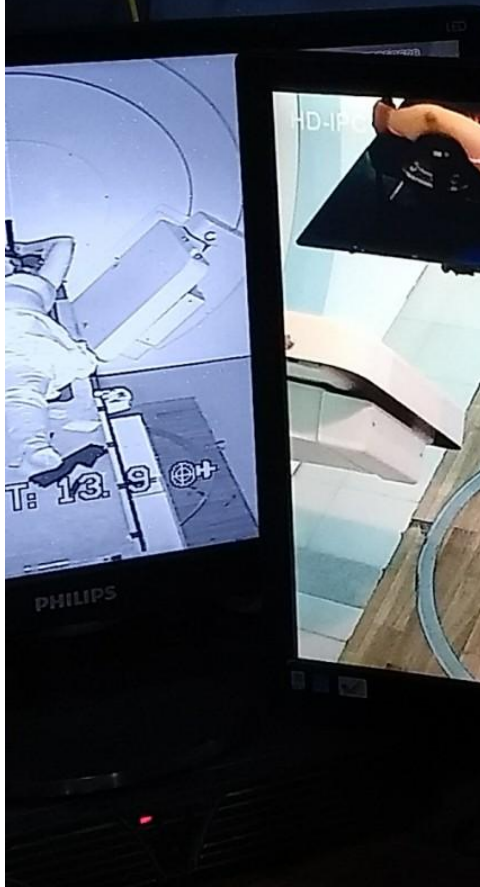


**HD-CCTV &
Display
Console**



Wednesday - 7,8

Thursday - 9,0





visit **Nepal** 
2020 Lifetime Experiences