

Background & Objective

Radiotherapy is a key treatment modality for bladder and prostate cancer. In East Java, Indonesia, a province covering 48,055.90 km² with a projected 2025 population of 42.09 million, we estimated model-based radiotherapy utilization (RTU) need and access gaps at the regency and city level for service planning.

Method

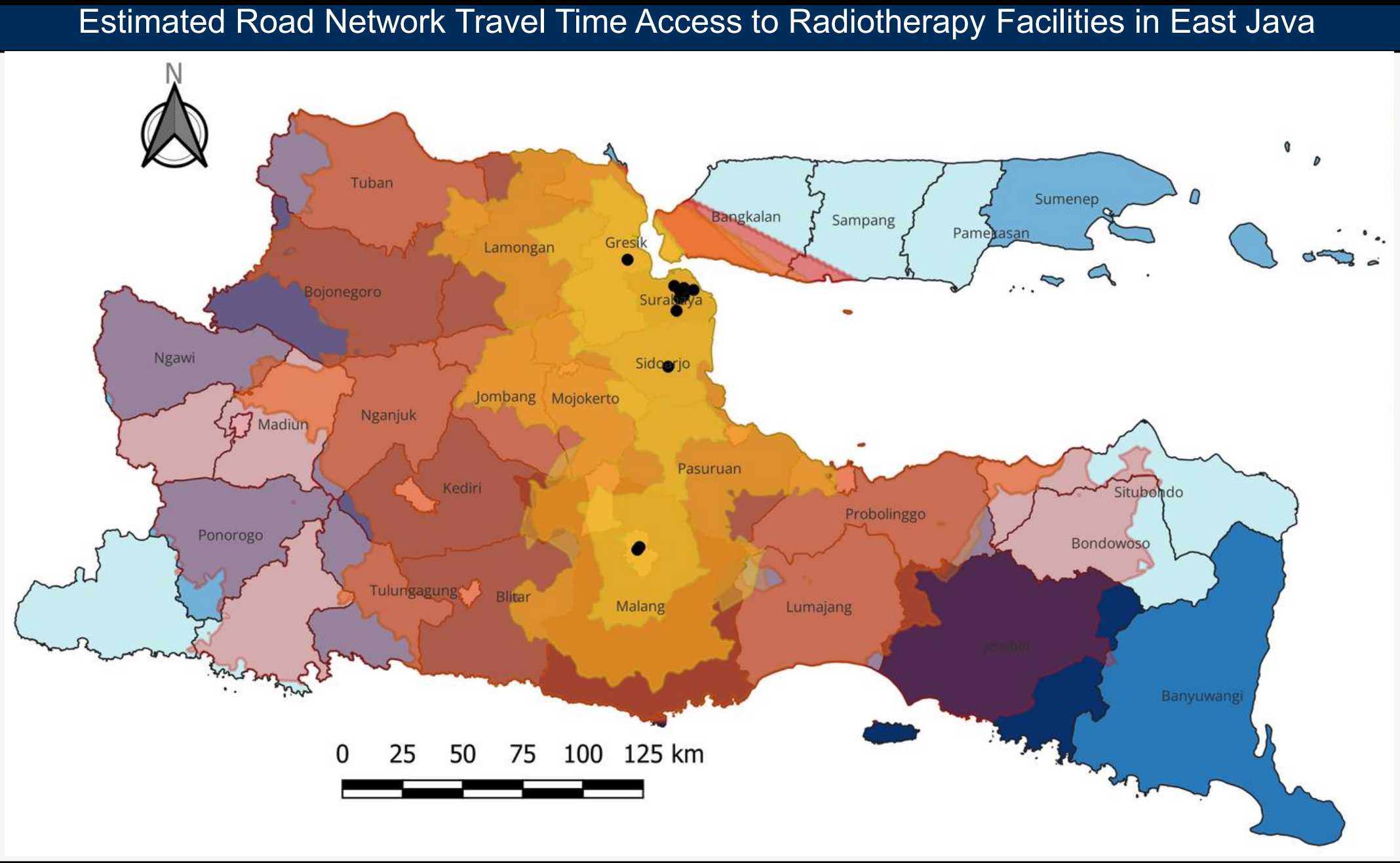
Population: Age- and sex-specific 2025 population estimates from Statistics Indonesia.

Incidence: GLOBOCAN 2022 incidence rates applied to estimate incident bladder (both sexes) and prostate (males) cancer cases.

RTU Need: Modeled using Yap et al. (2016) framework with utilization proportions of 62% (bladder) and 66% (prostate).

Facilities: Active radiotherapy facilities mapped from an updated inventory (May 2025).

Access: Road-network travel time modeled in QGIS using OpenStreetMap road data and QNEAT3. Iso-area polygons generated for 60-, 120-, and 180-minute thresholds and clipped to East Java boundary.



Legend

- Radiotherapy Facilities
- ≤60 minutes (Good access)
- 61–120 minutes (Moderate)
- 121–180 minutes (Poor)
- >180 minutes (Very poor)

Estimated RT Candidates (by Regency/City, per year)

- 8 - 17
- 17 - 60
- 60 - 82
- 82 - 120
- 120 - 177

Conclusion

Bladder and prostate cancer generate substantial model-estimated radiotherapy need in East Java, but services remain geographically concentrated. High-demand regencies and cities with poor travel access should be prioritized for referral-network strengthening and feasibility assessment of additional radiation oncology services.

Results				
	Modeled Incidence	1,445 Bladder	2,706 Prostate	Σ Total Modeled RTU Need 2,682 Candidates/Year
	Modeled Radiotherapy Candidate	896 Bladder	1,786 Prostate	

12

Active radiotherapy facilities
Surabaya (7), Malang (3),
Gresik (1), Sidoarjo (1)

848

candidates/year
(31.6%)
within ≤60 minutes
Good access

1,834

candidates/year
(68.4%)
beyond 60 minutes
Moderate-to-very-poor access

1,069

candidates/year
(39.9%)
beyond 120 minutes
Very poor access

Priority areas
with high demand
and very poor access
(>180 minutes)
Jember Regency and
Banyuwangi Regency

- Policy Implication / Recommendation**
- Future service expansion:** Eastern East Java should be considered for feasibility assessment of additional radiotherapy services to reduce travel-time barriers.
 - Patient support:** Transportation and temporary accommodation support should be considered for patients living beyond 120 minutes from existing facilities.
 - Regional planning:** Radiotherapy capacity planning should integrate cancer burden, population distribution, and road-network travel-time access to improve equitable cancer care.