

Radiotherapy Access Gaps for Bladder and Prostate Cancer in East Java, Indonesia

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Objective: Radiotherapy is a key treatment modality for bladder and prostate cancer. Travel time has been demonstrated to influence treatment utilization and consequent survival. 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.

Methods: We performed a service-planning analysis at the regency and city level across all 38 regencies and cities in East Java. Age- and sex-specific 2025 population estimates from Statistics Indonesia were combined with GLOBOCAN incidence rates to estimate annual bladder cancer cases in both sexes and prostate cancer cases in males. Modeled RTU need was estimated by applying the published radiotherapy-utilization framework for LMIC to modeled incident cases, using cancer-specific utilization proportions of 62% for bladder cancer and 66% for prostate cancer. Active radiotherapy facilities were mapped from an updated facility inventory. Travel time from each regency/city to the nearest facility was estimated by car using Google Maps and categorized as good (≤ 60 minutes), moderate (61-120), poor (121-180), or very poor (>180). Priority areas were defined as regencies or cities with high modeled demand and very poor travel-time access.

Results: The model estimated 1,445 annual bladder and 2,706 annual prostate cancer cases in 2025, corresponding to approximately 896 and 1,786 radiotherapy candidates, respectively. Total modeled RTU need was 2,681 candidates/year. Twelve active radiotherapy facilities were identified, concentrated in Surabaya (seven), Malang (three), Gresik (one), and Sidoarjo (one). Only 8 of 38 regencies and cities had good access, covering 610 candidates/year (22.7%). Most modeled candidates lived outside this zone: 2,072 candidates/year (77.3%) required more than 60 minutes of travel, and 1,683 candidates/year (62.8%) required more than 120 minutes. Jember Regency and Banyuwangi Regency were priority areas because they combined high modeled demand with very poor access.

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.