Implementing And Scaling Ai In Low-Resourced Radiation Oncology :A System Level Analysis of LMIC Deployments

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INTRODUCTION

Radiotherapy access in LMICs is limited by workforce shortages, machine scarcity, and fragmented workflows. AI offers potential efficiency gains, but most deployments remain isolated tools rather than coordinated systems. This review synthesizes current LMIC AI deployments and assesses whether they support reliable, scalable, and safe clinical use.

OBJECTIVE

To evaluate how artificial intelligence is deployed in low- and middle-income country (LMIC) radiation oncology workflows, classify each system by integration level, and identify readiness gaps that limit safe implementation and scale-up

METHOD

- ❑ Systematic search across six databases (2000–2025) following PRISMA 2020
- ❑ 18 Studies Included
- ❑ Extracted: workflow domain, deployment model, Validation Strategy, Integration Level, Governance Considerations
- ❑ Classified each study using a 5-level integration spectrum (Levels 0–4)
- ❑ Synthesized patterns across technical, workflow, and governance readiness

RESULTS

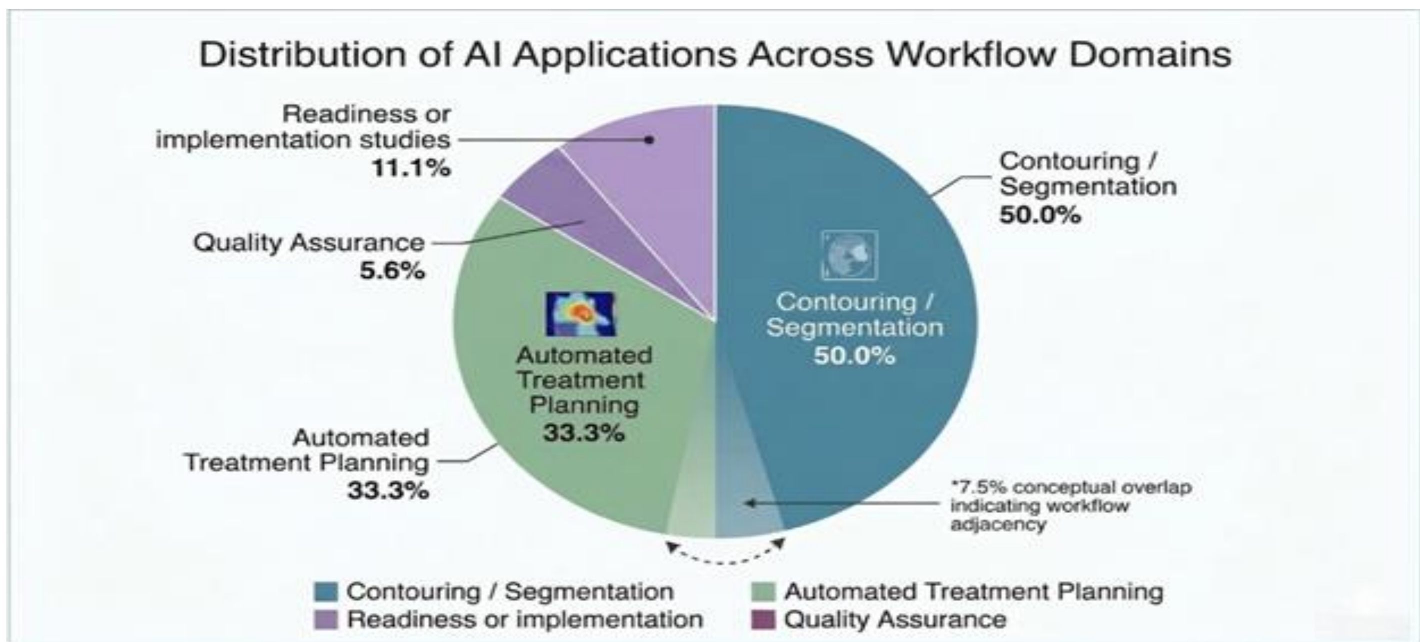

Figure 1: Distribution of AI tools Across Workflow domains

Figure 2: Geographic Distrubution of AI implementation Instances across LMIC Settings

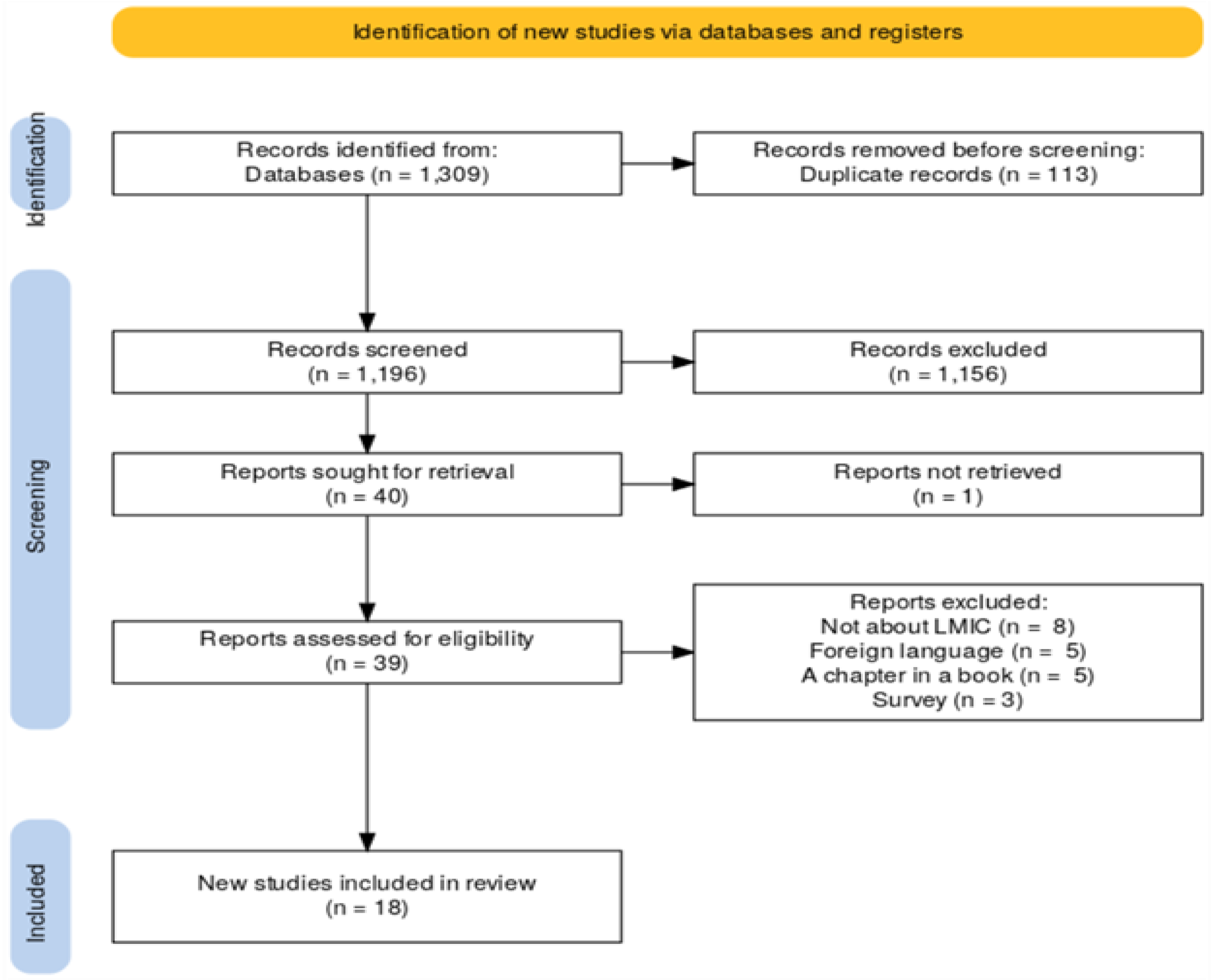

Figure 3: Prisma Flowchart

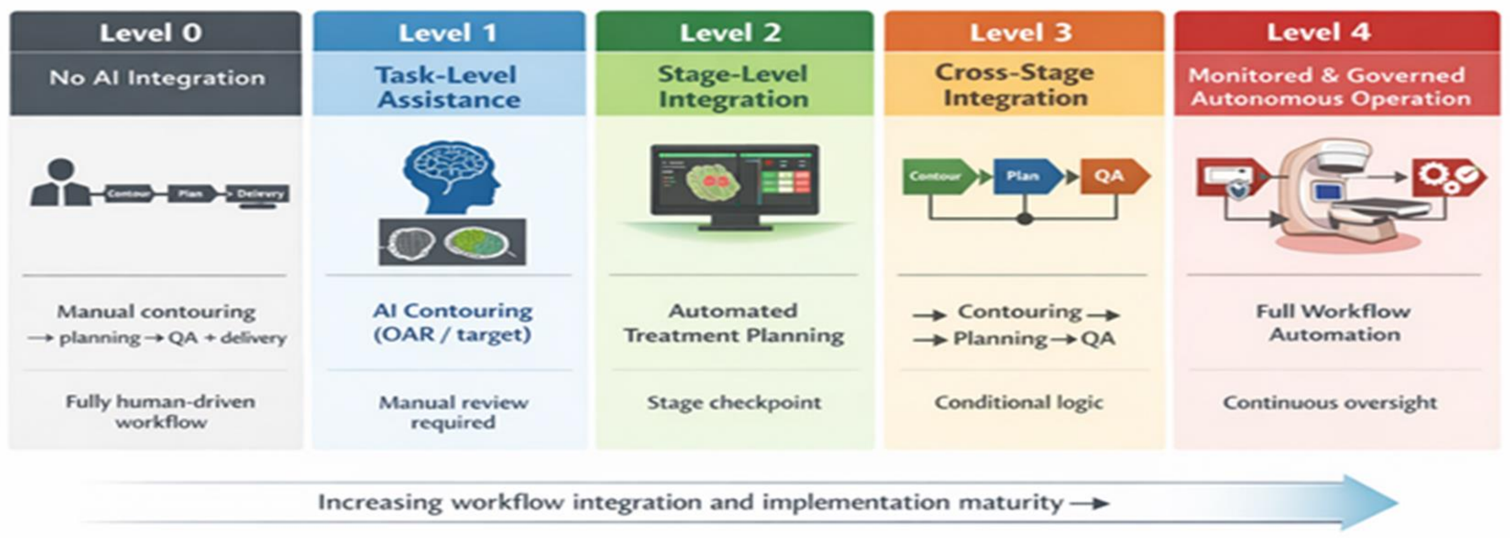

Figure 4: Intergration Spectrum in Radonc

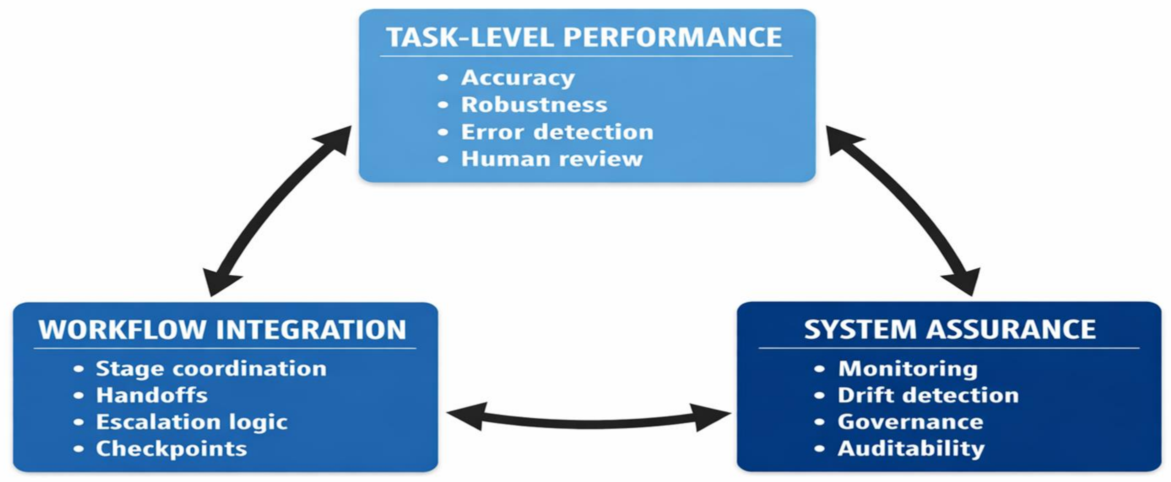

Figure 5: Coupled Constraints on AI Implementation in RadOnc

Aspect	Summary
Deployment	66.7% web/cloud-based
LMIC Validation	>61.1% used HIC datasets
Validation Design	retrospective
Post-deployment Oversight	Not reported

Table1: Percent Deployed and Validated

CONCLUSION

AI in LMIC radiation oncology remains concentrated in isolated tasks and single-stage workflows. Scalable, safe deployment requires coordinated progress in:
Task-level reliability
Workflow integration
System assurance (monitoring, governance, escalation pathways)
Without these, improvements in model accuracy alone will not translate into increased treatment capacity or safer care.

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