Kirinyaga County Pioneers AI Powered Digital X-Ray to Boost TB Diagnosis

County:	**Kirinyaga**		
Sector/s:	**Health**	**Sub-sector/Theme:**	**AI-Powered Diagnostics**
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Target Audience:	**Residents of Kirinyaga, County Governments, health policymakers, TB program implementers**		
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Introduction:

Chest X-rays are vital in diagnosing a range of thoracic diseases including tuberculosis (TB), pneumonia, lung cancer, and heart failure. With the evolution of medical imaging,

traditional film-based X-rays have transitioned to digital chest X-rays (dCXR), offering faster image acquisition, better storage, and enhanced diagnostic capabilities through Artificial Intelligence (AI).

While digital X-rays are now common, challenges such as overlapping anatomical structures, image quality variability, and interpretation delays remain. AI-enhanced image analysis addresses these gaps by enabling automated, accurate, and faster diagnoses, especially crucial for resource-limited settings.

Figure 1: Kirinyaga County deploys AI-powered digital X-rays to boost TB diagnosis and train health workers in high-risk areas.

In Kirinyaga County, the deployment of AI-powered digital X-ray technology is transforming TB detection by enabling early diagnosis, increasing case detection rates, and extending diagnostic services to underserved communities through mobile outreach.

Despite national TB control efforts, Kenya continues to face a high burden of undiagnosed TB. According to the 2016 Kenya TB Prevalence Survey, nearly 50% of TB
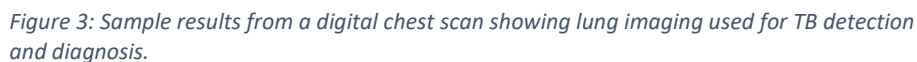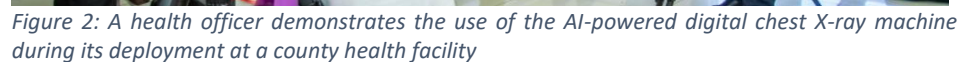
cases went undiagnosed, particularly among asymptomatic individuals and vulnerable groups such as, prison inmates, People living with HIV (PLHIV), young adults, urban dwellers, elderly (65+), health workers and marginalized and remote populations. The lack of accessible and timely diagnostic tools delayed treatment initiation, increased community transmission, and sustained TB as the leading infectious disease killer globally.

Implementation of the practice

Kirinyaga County Government established strategic partnerships with technical experts and funding organizations, including the National TB Program, LVCT Health, Fujifilm, and Qure.ai. These collaborations provided the necessary equipment, software solutions, and technical support to deploy the technology effectively across various healthcare settings.

At the core of the implementation was the deployment of both stationary and mobile dCXR units. Three major hospitals; Kerugoya, Kimbimbi, and Sagana, were equipped with fixed digital X-ray machines integrated with AI interpretation software.

Figure 2: A health officer demonstrates the use of the AI-powered digital chest X-ray machine during its deployment at a county health facility

Figure 3: Sample results from a digital chest scan showing lung imaging used for TB detection and diagnosis.

Additionally, two portable units were procured to facilitate community outreach programs and prison screenings, bringing diagnostic services closer to underserved populations.

A training program was developed to build local capacity, with 140 healthcare workers including radiographers, clinicians, and laboratory technicians receiving specialized instruction on operating the new equipment and interpreting AI-assisted results. This training emphasized the importance of maintaining quality standards while adapting to the new digital workflow.

To ensure sustainability, the County integrated the dCXR system with existing health management information systems, enabling real-time data capture and analysis. This

integration has been crucial for monitoring performance, tracking patient outcomes, and making data-driven decisions about resource allocation and program expansion.

Results of the practice

Within the first year of implementation, TB case detection rates increased by 5.3%, with 1,597 cases identified in 2024 compared to 1,516 in the previous year. This improvement is significant because it includes cases that would have likely been missed by conventional diagnostic methods.

The integration of AI interpretation has reduced waiting times for results from hours with traditional methods to under 10 minutes in most cases. This rapid turnaround has enabled quicker initiation of treatment, reducing the risk of transmission and improving patient outcomes.

The technology has also proven effective in identifying cases among high-risk groups, with notable success in prison screenings where 15 active TB cases were detected during initial rounds of testing.

Beyond the clinical benefits, the program has demonstrated significant cost efficiencies. By reducing unnecessary laboratory tests and optimizing resource use, the County has achieved approximately 30% savings in diagnostic costs.

The portability of the equipment has also decreased patient travel burdens, making screening more accessible to rural populations while maintaining high diagnostic accuracy.

Lessons learnt:

- ➢ **Technology can improve disease detection:** The use of AI in digital diagnostics enhances accuracy and enables early detection, including among asymptomatic individuals, which is critical for controlling diseases like TB.
- ➢ **Integration with existing systems is key to success**: Embedding new technologies such as dCXR into existing health infrastructure ensures smoother adoption and maximizes efficiency without disrupting existing workflows.

- ➢ **Partnerships accelerate innovation and resource mobilization:** Multi-sectoral collaboration between Counties, national programs, private companies, and donors is important in delivering high impact health solutions rapidly and effectively.
- ➢ **Decentralization and portability expand access:** Portable diagnostic units can improve health service access in hard-to-reach areas, such as prisons and rural communities.
- ➢ **Capacity building is essential for sustainability:** The success of technology-based interventions depends on having trained local personnel. Investing in continuous training and mentorship ensures proper utilization and minimizes reliance on external support.
- ➢ **Community engagement enhances uptake:** Early and consistent sensitization through Community Health Promoters (CHPs) and local media fosters trust and encourages service utilization.
- ➢ **Infrastructure readiness determines operational success:** Digital tools require stable power and connectivity. Without adequate infrastructure (e.g., backup power, internet), service delivery can be disrupted.
- ➢ **Maintenance and technical support must be localized:** Lack of in-county engineers and delayed technical support can derail otherwise successful programs. Developing local maintenance capacity ensures continuous service delivery.
- ➢ **Sustainability planning should begin early:** Relying solely on donor support is not sustainable. Counties must integrate such innovations into their budgets and plans to ensure long-term continuity and ownership.

Recommendations

- ➢ Phased implementation beginning with pilot sites allows for troubleshooting and process refinement before full-scale rollout.
- ➢ Investment in training programs ensures that local healthcare workers can operate and maintain the technology independently.
- ➢ Establishing clear protocols for quality control and human oversight of AI interpretations maintains diagnostic accuracy while leveraging technological advantages.

- Integrating the system with existing health information infrastructure facilitates monitoring and evaluation while minimizing duplicate data entry.
- Developing sustainable financing models from the outset is crucial. While initial implementation may require donor support, long-term viability depends on County budget allocations and innovative financing mechanisms that ensure ongoing equipment maintenance, staff training, and program expansion.

Further reading:

1. www.kirinyaga.go.ke
2. https://kirinyagaassembly.go.ke/
3. Kirinyaga , The Wellness City https://www.youtube.com/watch?v=MUxISYrOodU
4. Kirinyaga Mountain Cities Blueprint 2032

Photo Gallery

Figure 4: Kirinyaga County health officials receive AI-powered digital X-ray equipment to enhance TB screening and diagnosis

Figure 5: Healthcare workers, including radiographers and clinicians, undergo training on the operation and interpretation of AI-integrated digital X-ray systems.