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# Leveraging AI for Tuberculosis Diagnosis in South Africa

# Introduction

Tuberculosis (TB) remains a persistent public health challenge in South Africa, with an estimated

**280,000** cases annually      **≈ 54,000** deaths as of 2022

as per the World Health Organization (WHO) 2023 Global TB Report.

The prevalence of TB is exacerbated by several factors, including co-infection with HIV, the emergence of drug-resistant strains, poverty, inequality, limited access to healthcare, and other health factors such as malnourishment, smoking, and silicosis.



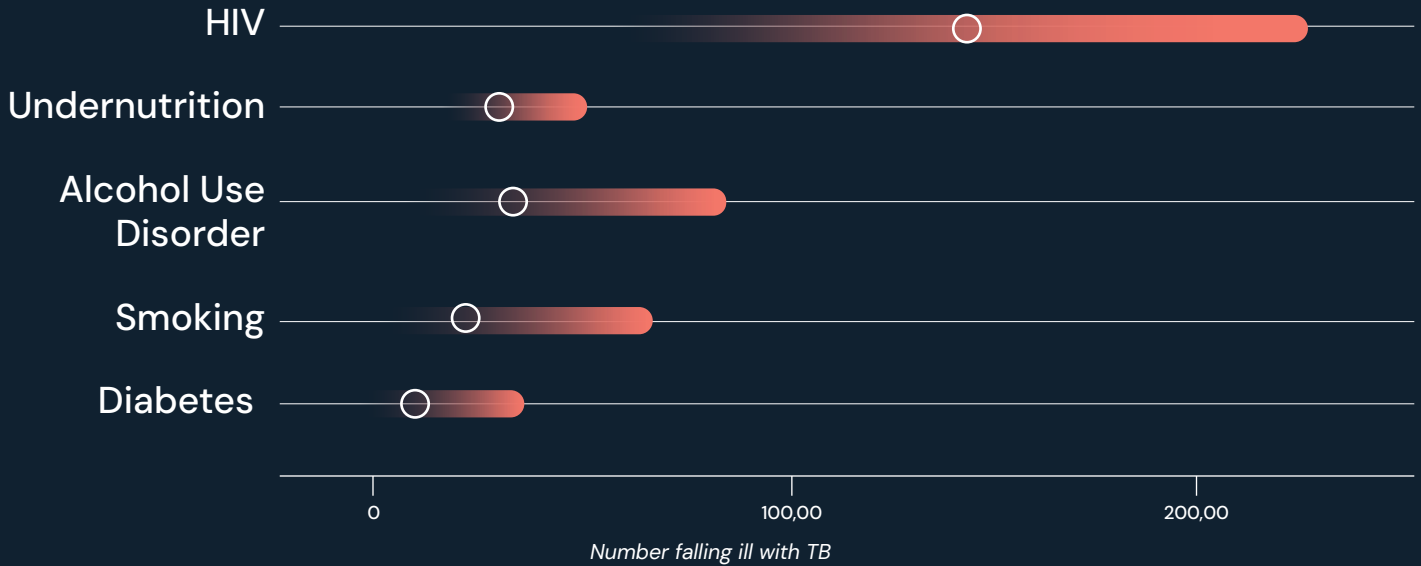
## Background

### *The TB Crisis in South Africa*

South Africa faces a significant TB burden, driven largely by the intersection of TB and HIV epidemics. According to Dr. Yogan Pillay, Director, HIV & TB Delivery, BMGF and former Deputy Director General of Health Services in South Africa, about **50%** of TB patients are co-infected with HIV, which has historically fuelled the TB crisis in the country.

Shortage of healthcare access and personnel hinders the TB diagnosis and treatment process.

## Why did people fall ill with TB in 2022?



## Challenges in TB Diagnosis and Treatment

The diagnosis and treatment of TB in South Africa are hindered by a shortage of healthcare access and personnel. Traditional methods of diagnosis, such as sputum analysis, often fail, especially in HIV-positive patients who may not exhibit typical TB symptoms.

## The Collaboration

To address these challenges, the KwaZulu-Natal Department of Health initiated a multi-partner program in collaboration with **USAID, THINK, LTE Medical Solutions, and Qure.ai**. The program aimed to enhance TB diagnosis using mobile vans equipped with AI-augmented portable X-ray machines. This initiative was deployed in 15 villages across seven provinces, with over 900,000 scans processed through the program.

# Implementation and Outcomes

## Screening and Diagnosis

Lynette Duckworth, TB Technical Lead for THINK, highlighted the program’s success during its first six months.

**6500**

Individuals  
Screened

**7%**

Identified as  
presumptive TB cases

This led to the diagnosis of 187 individuals who might have otherwise been missed, ensuring they received timely treatment.

## Advantages of AI-Enabled Screening

AI-enabled screening offers multiple advantages, including **faster turnaround times, higher accuracy, and the ability to diagnose TB in the absence of radiologists**. Sinalo Mkangelwa, a Diagnostic Radiographer for THINK, emphasized that AI systems overcome the shortage and cost of radiologists, reduce human error, and provide affordable, accurate diagnoses.



*Faster Turnaround Times*

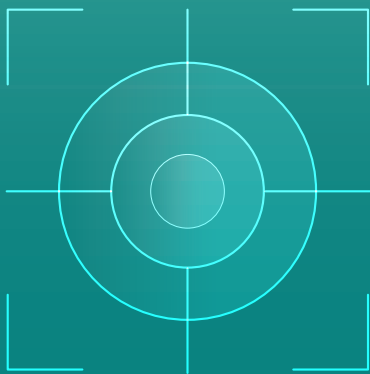
# The Technology

## *How AI Works*

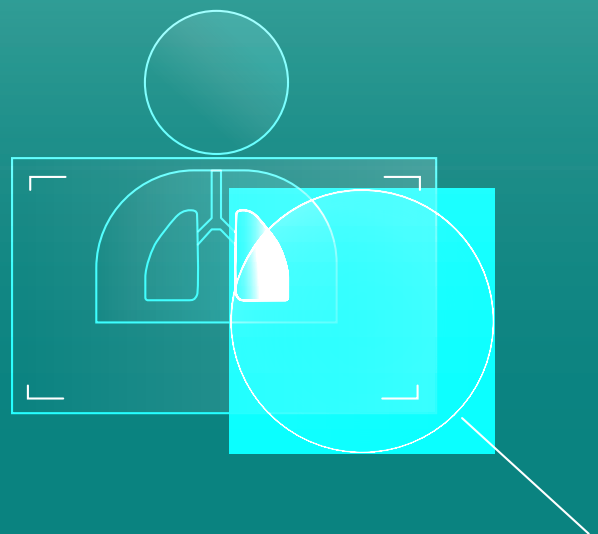
Patient scans are annotated and fed into the Qure.ai system, which generates reports indicating the likelihood of TB. These reports also highlight areas for potential cross-verification by radiologists, enhancing diagnostic accuracy.

## *Benefits of AI*

AI not only improves TB diagnosis but also aids in identifying other lung health conditions. It is particularly beneficial in rural districts and hard-to-reach areas, where access to healthcare facilities is limited.



*Higher Accuracy*



*Ability to diagnose TB in the absence of radiologists*

# Testimonials

Digital X-ray augmented by AI will significantly benefit our district and province, especially in rural areas. It helps diagnose TB in patients who are unable to produce sputum, particularly those who are HIV-positive. This technology allows for timely diagnosis and treatment initiation.



**Nkosiyakhe Hlela**

TB Supervisor, uMgungundlovu Health District

We support community outreach events to encourage TB screening. AI-assisted X-rays have identified asymptomatic patients in hotspot areas, ensuring early detection and treatment.



**Nokuphila Shoba Duma**

THINK, (USAID TB LON)

# The Future

Health officials are optimistic about scaling this AI-assisted screening program across more provinces and expanding its use to diagnose other diseases, including silicosis.

Dr. Yogan Pillay advocates for leveraging technology to routinely screen individuals at a low cost, enabling early detection and treatment of TB.



# Conclusion

The TB Collaboration Project in South Africa demonstrates the potential of AI in transforming TB diagnosis and treatment. By addressing the limitations of traditional methods and overcoming healthcare access challenges, AI technology is paving the way for more effective TB management and ultimately, better public health outcomes.



# References

- [https://worldhealthorg.shinyapps.io/tb\\_profiles/?\\_inputs\\_&entity\\_type=%22country%22&iso2=%22ZA%22&lan=%22EN%22](https://worldhealthorg.shinyapps.io/tb_profiles/?_inputs_&entity_type=%22country%22&iso2=%22ZA%22&lan=%22EN%22)
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- <https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2023>