

The State of Diagnostics in Healthcare in Pakistan

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Executive Summary

This brief investigates whether artificial intelligence can close the gaps in Pakistan's healthcare diagnostics sector, and if not, what would a more immediately feasible intervention look like. It draws on two semi-structured interviews with doctors in Punjab, alongside secondary data from the World Bank, the World Health Organization, and Pakistani government sources. The evidence points to three compounding constraints: a workforce too thin to meet demand, with fewer than ten radiologists per million people; diagnostic equipment that frequently sits non-functional for years even where it exists, a pattern confirmed directly through this brief's own interviews; and chronic underinvestment, with public health spending at just 0.8 percent of GDP. Given this financing and infrastructure backdrop, this brief concludes that Pakistan is not yet positioned to integrate AI-based diagnostics at scale, unlike India, whose AI health programmes rest on years of prior investment in digital infrastructure. Instead, this brief recommends that the Ministry of National Health Services Regulation and Coordination formalize and expand public-private diagnostic partnerships, building directly on Khyber Pakhtunkhwa's 2026 pilot, as the most feasible and immediately actionable intervention available.

Introduction:

There is a growing body of global research that documents and proports the technical efficiency of AI in medical imaging, however, it does not map out how to integrate such tools and techniques within resource-constrained, decentralized healthcare systems such as Pakistan's. Investigating this issue is critical at present, given Pakistan's severe shortage of radiologists and pathologists — a shortfall that affects not only universal coverage of diagnostic services but also has staggering impacts on individual patient health outcomes. Addressing this gap would enable medical practitioners to conduct diagnoses at earlier stages of disease progression, thereby affording them ample time to study each case thoroughly and make more informed clinical decisions. This study therefore seeks to investigate the specific infrastructural and technical upgrades that are necessary to support the integration of AI-based diagnostic tools, with the ultimate goal of improving patient outcomes.

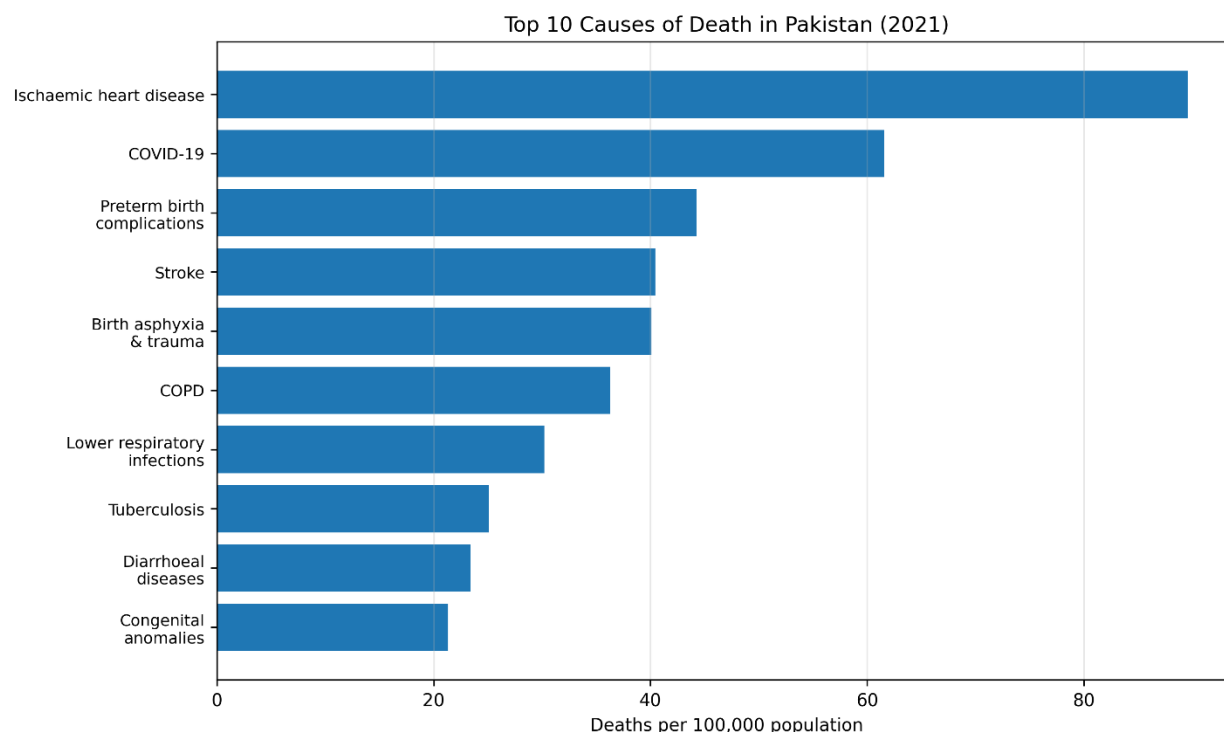
Methodology:

This brief draws on a mixed-methods approach combining primary and secondary research. Two semi-structured interviews were conducted with doctors in Lahore, Punjab, supplemented by secondary data drawn from World Bank publications and other published literature on Pakistan's healthcare and diagnostics sector. Access constraints shaped the primary research considerably: radiologists and specialists with expertise in diagnostic machinery proved particularly difficult to reach within the research timeframe, and the pool of doctors available for interview was limited, restricting the depth of clinical perspective captured directly. Given this, findings are concentrated

in Punjab and should not be read as representative of Pakistan as a whole, particularly of rural regions, where infrastructure, staffing, and diagnostic access are likely to differ substantially. Given the dearth of primary evidence, the two interviews have been used as guides for conducting secondary research that allows any claims to be made at a national or sector-wide level.

Key Findings:

1. The role of early diagnostics in addressing leading causes of mortality in Pakistan



Source: World Health Organization¹

The majority of these diseases can easily be diagnosed but the lack of adequate and functioning diagnostic machinery in Pakistan results in what could be easily preventable deaths. For example, Ischaemic heart disease is the one of the leading killers in Pakistan (~89.5 deaths per 100,000 population), but timely diagnostic intervention can drastically increase patient survival. The adoption of existing technology such as rapid point-of-care 12-lead Electrocardiography (ECG) and high-sensitivity Troponin Assays enable doctors to diagnose a heart attack within minutes of a patient presenting with chest pain, which can potentially lead to better prognosis for many patients.²

Complications from preterm birth, birth asphyxia, claim over 105 lives per 100,000 population in Pakistan, making neonatal fatalities one of the country's most devastating health crises. During labor, continuous Cardiotocography (CTG) monitoring tracks fetal heart rate to detect intrapartum

¹ World Health Organization, 2026. <https://data.who.int/countries/586>

² Raheem, Ahmed, Salman Ahmed, Abdul Wadood Kakar, Haris Majeed, Irum Tareen, Khuzaimah Tariq, Zahid ur Rehman, and Musa Karim. "Burden of cardiovascular diseases in South Asian region from 1990 to 2019: Findings from the global burden of disease study." *Pakistan Heart Journal* 55, no. 1 (2022): 15-21.

hypoxia immediately, prompting timely emergency Caesarean sections before irreversible brain damage occurs. Pakistan currently faces one of the highest neonatal mortality rates in the world due to a collapse of peripheral diagnostic infrastructure. Rural Health Centers and Tehsil hospitals frequently lack functional ultrasound machines, CTG monitors, or trained sonographers, forcing millions of births to occur at home or under unskilled care without fetal monitoring.³ Consequently, there is an increasing preference for home births in many rural households, a trend that extends to certain urban areas as well. For women who live in cities and on the outskirts of cities, affordability, access, and quality of care are the key determinant in deciding whether to opt for a home birth or a hospital birth. This is particularly alarming given the state of training of midwives in the country. Consequently, the decision to give birth at home often results in otherwise preventable birth complications and fatalities.

2. The difference between diagnostic facilities in private vs. public medical facilities

This study benefited from the contributions of two doctors: one from the private sector and the other from the public sector. Both physicians expressed a similar perspective regarding the disparity in diagnostic capacity between Pakistan's public and private healthcare sectors. They indicated that private hospitals generally have greater access to advanced diagnostic machinery, largely because they possess greater financial resources to invest in costly medical equipment. These capital-intensive investments are often reflected in higher fees for diagnostic procedures, including MRI scans and X-rays⁴). The substantial cost of acquiring advanced diagnostic equipment presents a significant financial challenge for government hospitals. One respondent reported that an MRI machine acquired by their hospital cost approximately PKR 60–70 crore, illustrating the considerable capital required to expand diagnostic capacity within the public healthcare sector. Consequently, differences in financial capacity between public and private institutions may contribute to disparities in access to modern diagnostic technology and services.⁵

Government hospitals on the other hand, provide free or low-cost care and handle the bulk of admissions (e.g., over 6 million in Punjab public facilities in FY 2023 with greater than 90% bed occupancy in tertiary care). However, they are constrained by non-functional diagnostic equipment (e.g., limited operational MRI/CT scanners), medicine shortages, long waiting times, and inconsistent quality. Patient satisfaction with radiology services is markedly lower (~38% overall in public facilities vs. 91% in private⁶).

Conversely, private hospitals present a stark operational contrast, operating primarily as modern, highly efficiently managed urban diagnostic hubs. These facilities maintain state-of-the-art imaging technology, robust staffing levels, and minimal wait times, resulting in markedly higher patient satisfaction rates of approximately 91%. However, this elevated standard of care comes at a steep financial premium, with private MRI scans costing between Rs. 8,000 and Rs. 25,000+. This sharp economic divide reinforces a two-tier healthcare framework where quality diagnostic

³Pregnancy Risk, Infant Surveillance, and Measurement Alliance (PRISMA) Investigators. "Pregnancy Risk, Infant Surveillance, and Measurement Alliance (PRISMA) Maternal and Newborn Health Study: protocol for a multisite, prospective, open cohort study of pregnancy and postpartum health outcomes in South Asia and sub-Saharan Africa." *BMJ open* 16, no. 1 (2026): e104512.

⁴ Dr. Ambreen Rafiq, Gynaecologist at Ijaz Hospital, Gulberg

⁵ DR Sadia Maqsood Awan, professor of pharmacology at sheikh Zayd Hospital

⁶ Attiq, S., Ali, M., Shah, M., & Nawaz, N. (2018). Real-time patient satisfaction survey in a tertiary care hospital: Patient satisfaction. *Pakistan Armed Forces Medical Journal*, 68(4). <https://pafmj.org/PAFMJ/article/view/2109>

imaging remains largely out of reach for lower-income populations, driving up out-of-pocket health expenditures and deepening healthcare inequities.⁷

3. Learning from Regional Counterparts:

India: Building upon the foundation of pilot projects, India has implemented AI systems such as qXR by Qure.ai into their national TB screening programs. This AI tool has helped reduce the workload of radiologists while also accelerating the detection of TB patients, even in rural areas where radiologists are in shortage. Furthermore, the Ayushman Bharat Digital Mission implemented health records systems within specific states of the nation, which were later expanded to other states and to the remainder of the public sector. This more gradual implementation of AI into the public health system for India is another model that Pakistan can adopt.⁸

Bangladesh: Bangladesh has slowly advanced diagnostic capabilities through focused, low-cost AI interventions supported by international partnerships. In rural facilities, AI applications for ultrasound interpretation and basic screening have improved early detection in maternal and child health. Progress involved stepwise upgrades to digital infrastructure, training community health workers, and public-private collaborations. The country has benefited from ADB-supported roadmaps that prioritize governance frameworks for data privacy and bias mitigation, alongside narrow high-impact pilots before national expansion. These efforts highlight how LMICs can build capacity incrementally without overwhelming existing systems.⁹

Nigeria: Outside of the region, countries with similar socio-economic constraints such as Nigeria, another LMIC facing similar infrastructure and specialist shortages, has made incremental progress by deploying portable imaging devices combined with AI interpretation in public health campaigns. Partnerships with technology providers enabled low-cost hardware rollout in remote and mining areas, significantly shortening diagnostic delays for high-burden diseases like TB. Emphasis on community engagement, regional data hubs, and public-private collaboration helped adapt tools to local contexts, demonstrating that targeted efforts can deliver results even with unreliable power and connectivity. This model underscores the value of starting with narrow, high-impact use cases before broader scaling which offers a practical lesson for Pakistan's public diagnostic system.¹⁰

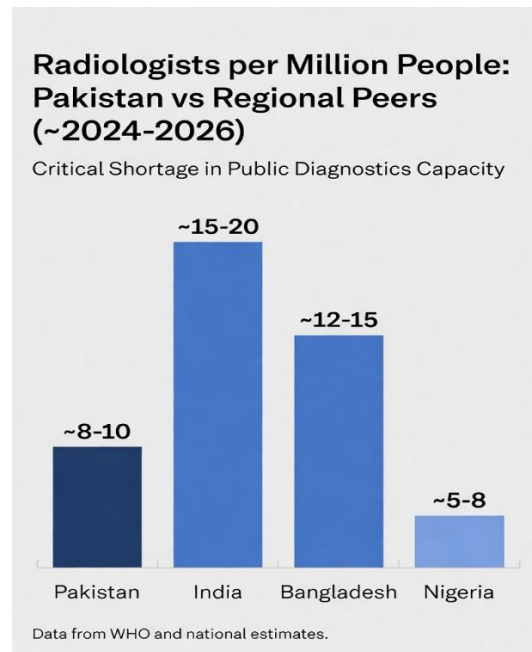
Radiology is not a preferred medical specialization in Pakistan. This is because it is considered riskier than other specializations due to exposure to radiations. Coupled with low incentive in the form of earning potential acts as a deterrent for doctors to enter into this field. Countries such as Turkey have clear growth trajectories and pay scales which reward professionals according to their

⁷ Comparative Analysis of Patient Satisfaction Level with Radiology Services in Public and Private Hospitals of District Peshawar, Journal of Health, Wellness and Community Research, 2025, <https://doi.org/10.61919/b4th7d68>.

⁸ AI in diagnostics literature and country case studies.

¹⁰ A Perspective on AI Implementation in Medical Imaging in LMICs," European Radiology, 2025 (case studies on Nigeria/Uganda portable AI deployments).

skill and seniority level. This system of paying more as you gain experience gives doctors a clear reason to stay in the field even when overall pay in the region is limited. Unfortunately, in Pakistan there is no system that encourages people to become radiologists. The pay for radiologists in Pakistan is structured in an organized way that ensures growth and compensation for the associated occupational risks. This results in a dearth of radiologists leading to an exceedingly high patient-to-doctor ratio.



The shortage is particularly concerning because Pakistan has a population of over **240 million**, meaning a relatively small number of specialists must serve millions of patients. This results in several challenges:

- **Long waiting times** for CT scans, MRIs, X-rays, and ultrasound reporting.
- **Overburdened radiologists**, increasing the risk of fatigue and diagnostic errors.
- **Limited access in rural and underserved areas**, where many districts have few or no resident radiologists.
- **Delayed diagnosis** of critical conditions such as cancer, tuberculosis, stroke, and traumatic injuries, leading to poorer patient outcomes

Too soon for AI Integration?

Despite the potential for AI to aid the diagnostic process in Pakistan, the country's existing infrastructure prevents the widespread integration of such technology. Most public hospitals in the country lack the digital infrastructure necessary to incorporate AI into their facilities. In addition to the lack of digital infrastructure, the diagnostic hardware within many of these facilities is also non-functional, as many hospitals in Pakistan have reported that their MRI and CT scanners are broken and cannot be used for diagnostic purposes. Finally, there is also no digital records system for the country to feed into an AI system. With the lack of funds allocated to the Pakistani public health system (0.8% of GDP), AI in diagnostics for the country is likely to experience high failure rates and be unable to scale its services.

Recommendations

1. **Leverage Public-Private Partnerships to Improve Diagnostic Facilities in Pakistan:** To address the issues in the Pakistan health system regarding diagnostic technology and services, the Ministry of National Health Services, Regulations and Coordination should encourage public-private partnerships for diagnostic technology services. The structure of these partnerships would be similar to the Khyber Pakhtunkhwa province's initiative to outsource the maintenance for its MRI and CT scanners, which will be contracted to private companies starting in April 2026. Through the formation of these partnerships, the government can maintain ownership of the diagnostic facilities but allow for the private sector to provide the funding and technicians necessary to maintain the technology within these facilities. This would allow patients to have access to diagnostic technologies within public facilities.¹¹
2. **Prioritize the strengthening of digital infrastructure and hardware reliability:** If integration of AI in diagnostics is a potential end goal, the first step is to strengthen the existing digital infrastructure provisions and capabilities in Pakistan. Such a sequenced strategy which prioritizes the rectification of foundations first, before the integration of AI offers a feasible, evidence-based path drawn from regional peers like India and Bangladesh.

Conclusion

Pakistan's diagnostics gap reflects a system stretched thin on physicians, radiologists, and functioning equipment, compounded by public health spending among the lowest in the region and a regulatory environment for new technology that is still finding its footing. AI-based diagnostic tools have shown genuine promise elsewhere, including in neighboring India, but that promise rests on financing and digital infrastructure Pakistan has not yet built. The more immediate and feasible path lies in formalizing the public-private partnerships the country has already begun piloting. Until that foundation catches up with the ambition, Pakistan's diagnostics gap will be closed by better management of what already exists, not by new machines with newer names.

¹¹ Government of Pakistan, Pakistan Economic Survey 2025-26 (Ministry of Finance, 2026).