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Impact of health policy reforms on telemedicine and AI integration for early cancer detection among low-income populations in South Asia: A comparative policy analysis

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Abstract

Early cancer detection remains a major challenge in low- and middle-income countries (LMICs), where late diagnoses and unequal healthcare access are widespread. While digital innovations such as telemedicine and artificial intelligence (AI) offer significant promise, their successful adoption depends on enabling policy environments. This study investigates how health policy reforms influence the integration of telemedicine and AI tools for early cancer detection in four South Asian LMICs: India, Pakistan, Bangladesh, and Nepal. Employing a qualitative comparative case study design and guided by Walt and Gilson's Policy Triangle Framework, the research analyzes national health strategies, policy documents, and global development reports from 2010 to 2023. The analysis focuses on five thematic domains: policy integration, technological readiness, institutional capacity, regulatory frameworks, and health equity. India demonstrates the most comprehensive digital health alignment through centralized governance and public-sector AI pilots, while Pakistan shows moderate progress via public-private initiatives. Bangladesh and Nepal lag behind due to fragmented systems and infrastructural deficits. Common barriers include poor regulation, limited digital literacy, and socio-economic disparities. The findings underscore the need for inclusive, equity-driven reforms and regional cooperation to scale digital health innovations sustainably across LMICs and strengthen cancer detection frameworks. *(Afr J Reprod Health 2025; 29 [8s]: 43-53).*

Keywords: Health Policy, Telemedicine; Artificial Intelligence; Cancer Detection; South Asia; LMICs

Résumé

La détection précoce du cancer reste un défi majeur dans les pays à revenu faible et intermédiaire (PRFI), où les diagnostics tardifs et l'accès inégal aux soins de santé sont répandus. Bien que les innovations numériques telles que la télémédecine et l'intelligence artificielle (IA) offrent un grand potentiel, leur adoption réussie dépend de politiques de santé favorables. Cette étude examine comment les réformes des politiques de santé influencent l'intégration de la télémédecine et des outils d'IA pour la détection précoce du cancer dans quatre PRFI d'Asie du Sud : l'Inde, le Pakistan, le Bangladesh et le Népal. En utilisant une approche comparative qualitative et le cadre théorique du triangle politique de Walt et Gilson, cette recherche analyse les stratégies nationales de santé, les documents politiques et les rapports de développement mondial de 2010 à 2023. Les résultats révèlent que l'Inde est la plus avancée, suivie du Pakistan, tandis que le Bangladesh et le Népal accusent un retard. Les principales barrières identifiées incluent la faible réglementation, le manque de compétences numériques et les inégalités sociales. L'étude recommande des réformes inclusives et équitables pour étendre durablement les innovations numériques dans les soins du cancer. *(Afr J Reprod Health 2025; 29 [8s]: 43-53).*

Mots-clés: Politique de santé; télémédecine; intelligence artificielle; détection précoce du cancer; Asie du Sud; PRFI

Introduction

Cancer is a growing global health burden, with approximately 10 million deaths recorded in 2020 alone. The majority of these deaths, nearly 70%, occur in low- and middle-income countries (LMICs), where diagnostic and treatment infrastructure remains limited and unevenly distributed.[1] Late-stage diagnosis is particularly prevalent in LMICs, contributing to poorer

prognoses, higher treatment costs, and limited access to timely care. Early detection has emerged as a critical component of cancer control strategies in this context, yet its implementation remains hindered by resource constraints, weak health systems, and insufficient public awareness.[2]

In South Asia, the situation is particularly acute. Countries such as India, Pakistan, Bangladesh, and Nepal face high rates of late-stage cancer diagnoses and escalating cancer-related mortality, compounded by demographic pressures, urban-rural disparities, and fragmented healthcare delivery systems.[3] While there has been a growing interest in leveraging digital technologies to overcome these challenges, the region continues to struggle with limited infrastructure, underdeveloped digital health governance, and stark digital divides.[4] Efforts to integrate innovative tools such as telemedicine and artificial intelligence (AI) into cancer care pathways remain sporadic and poorly institutionalized.

The four countries selected in this study, India, Pakistan, Bangladesh, and Nepal, share common characteristics as LMICs with high cancer burdens and emerging digital health initiatives.[5] However, they also differ significantly in institutional capacity, policy readiness, and healthcare governance structures. India, for instance, has introduced centralized digital health missions and public sector AI pilots in cancer care.[6] Pakistan and Bangladesh exhibit partial progress, driven largely by NGO or private-sector-led programs. Nepal, meanwhile, lags in both digital integration and cancer-specific planning.[7] These varying trajectories offer valuable insights into how policy contexts shape the adoption and sustainability of digital health innovations.

Rather than using traditional independent and dependent variables, this study organizes its analysis around five interrelated policy domains: (1) digital health integration within cancer strategies, (2) telemedicine accessibility, (3) AI-based diagnostic initiatives, (4) institutional and workforce readiness, and (5) regulatory and equity frameworks. These domains are not treated as statistical variables but as thematic drivers influencing early cancer detection efforts through digital health. The objective of this study is to evaluate how health policy reforms across these four countries support or hinder the incorporation of telemedicine and AI tools for early cancer detection. Through a qualitative comparative policy analysis using Walt and Gilson's Policy Triangle Framework, the research identifies structural enablers, barriers, and context-specific lessons to guide the equitable and sustainable digital transformation of cancer care in LMICs.

This study examines health policy reforms (independent variable) across four South Asian LMICs—India, Pakistan, Bangladesh, and Nepal—and their influence on the integration of telemedicine and AI tools for early cancer detection (dependent variable). Rather than using traditional statistical variables, the analysis is organized around five interrelated policy domains that serve as thematic drivers: (1) digital health integration within cancer strategies, (2) telemedicine accessibility, (3) AI-based diagnostic initiatives, (4) institutional and workforce readiness, and (5) regulatory and equity frameworks. Employing a qualitative comparative policy analysis guided by Walt and Gilson's Policy Triangle Framework, the study evaluates how these policy reforms enable or hinder the adoption of digital health technologies for early cancer detection. It identifies structural enablers, barriers, and context-specific lessons to inform equitable and sustainable digital transformation of cancer care in low-income populations of South Asia.

Literature review

The use of artificial intelligence and telemedicine in early cancer detection systems among low-income populations has attracted significant academic interest. Much of the literature, however, remains fragmented either prioritizing technological potential at the expense of policy foresight, or foregrounding policy reform without regard for implementation realities.[8] This literature review synthesizes critically relevant strands to offer a holistic view of the barriers and enablers of health policy reform in the digital age.

The persistent structural inequities in early cancer detection

One of the most extensively documented issues in the literature on global health is the structural

marginalization of early cancer detection within LMIC health systems.[9] In poor nations, public health priorities have historically been oriented towards infectious disease and maternal-child health, with cancer screening and prevention assuming a secondary role. This has led to systemic neglect of oncology services at the primary care level. Over 70% of cancer deaths in LMICs are attributable to late-stage diagnosis a trend shaped by the lack of infrastructure, screening protocols, and diagnostic capacity.[10]

Even where diagnostic facilities are available, their distribution is extremely urban-biased, both due to logistic realities and policy preference for tertiary-level care.[11] Studies by point to insufficient health workforce training, fragmented referral chains, and limited investment in early detection interventions. Moreover, cancer awareness and symptom literacy are extremely low among disadvantaged and rural groups, combined with sociocultural stigmas and gendered norms that limit access to care.[12] These findings suggest that technological innovations cannot be decoupled from the broader inequities embedded in health systems a point too often ignored in techno-optimist discourses.

From potential to pitfall: The unfulfilled promise of telemedicine and AI

Digital health innovations are often portrayed as revolutionary solutions for the provision of healthcare, especially in remote or under-resourced settings.[13] Indeed, telemedicine has demonstrated strong potential in scaling consultation services, for example, in the context of crises such as the COVID-19 pandemic. Likewise, artificial intelligence has shown high accuracy in the identification of cancer biomarkers, the interpretation of imaging scans, as well as the stratification of patient risk.[14] However, the actualization of such technologies into tangible health outcomes in the context of LMICs remains highly uneven.

The literature is also critical of the "pilot project syndrome" where telemedicine and AI interventions are launched as short-term, donor-funded projects that are not incorporated into public health infrastructure.[15] As such, these tools often fail to scale, and their effects are localized and short-lived. Furthermore, AI performance is highly data-dependent on training datasets, yet most models are trained on data from high-income countries. This calls into question their generalizability in LMICs, where genetic, environmental, and epidemiological profiles are substantially different. Without validation and contextual adaptation, these tools risk not only performing poorly but actively causing harm to patients through biased predictions or false reassurances.

Institutional readiness and the political economy of policy reform

The viability of digital health interventions is not solely a function of technological feasibility but is also contingent upon institutional capacity and political will. Institutional readiness extends beyond physical infrastructure; it entails leadership buy-in, bureaucratic coordination, data governance structures, and inter-ministerial coordination.[16] For instance, India's comparatively successful scaling of telemedicine platforms like Sanjeevani and the National Cancer Grid is partly due to centralized policy design and integration with national insurance schemes .These programs are supported by a dedicated digital health mission and coordination with academic and private sector innovators .

In contrast, Pakistan, Bangladesh, and Nepal are faced with high fragmentation. Health system governance is often decentralized, with competing priorities across provinces, ministries, and development partners. As Walt and Gilson (1994) argue in their policy triangle model, the destiny of health policies is often decided more by power relations and institutional politics than by technical solutions per se.[17] Donor pressure sometimes leads to externally designed digital health programs that are not locally owned, undermining sustainability. Additionally, national digital health strategies—where they exist—are rarely cancer-specific, reflecting limited institutional prioritization of oncology within broader digital health reforms.[18]

Regulation, ethics, and the risk of exclusion

Even as enthusiasm for digital health technologies continues, there is increasing recognition of the ethical, legal, and social implications (ELSI) that accompany these technologies. For AI, issues of algorithmic transparency (the "black box" nature of decision-making), data privacy, and liability in case of misdiagnosis are the topic of broad debate but little regulation in most LMIC contexts. Telemedicine, as well, often operates in legal grey zones, with unclear expectations regarding licensure, malpractice, or cross-border care standards.[19]

The ethical risks extend beyond regulation into the domain of equity. The digital divide—marked by differential access to mobile devices, internet, and digital literacy—will exacerbate prevailing health inequalities if not addressed alongside technological rollout. Women, rural dwellers, and the elderly are likely to be left behind by digital health interventions due to lower levels of education, autonomy, and access to enabling infrastructure. The literature thus calls for a justice-based response to digital health, where inclusion, accountability, and transparency are addressed as core policy imperatives rather than discretionary considerations.

Toward contextualized, equity-centered policy reform

Given these challenges, an increasing number of publications demand equity-oriented, contextualized policy transformation.[20] The WHO's Global Strategy on Digital Health 2020–2025 offers a broad roadmap, but national governments must adapt these principles to their socio-political reality. Contextualization would involve the incorporation of digital health goals into existing cancer control strategies, interoperability with health information systems, and the development of fiscal frameworks subsidizing early detection services for poor populations.[21]

Moreover, cross-national learning offers untapped potential for regional innovation. As seen in India's National Cancer Grid or Pakistan's Sehat Kahani model, local successes can be replicated or scaled regionally through South-South collaboration, shared validation protocols, and regulatory harmonization.[22] Such collaboration can decrease costs, increase technology localization, and facilitate knowledge exchange. However, such possibilities must be underpinned by political will, inter-governmental agreements, and inclusive policy design. The future of digital cancer detection in LMICs, therefore, lies not in discrete technological solutions but in transformative policy ecosystems that are inclusive, ethical, and context-specific.

Methods

This study employs a qualitative, comparative case study design grounded in secondary document analysis to examine how health policy reforms shape the adoption of telemedicine and AI tools for early cancer detection in low-income populations. The qualitative approach is well-suited for unpacking policy complexity in naturalistic settings, where the effectiveness of reforms is influenced by institutional configurations, policy legacies, and stakeholder dynamics rather than quantifiable inputs or outcomes.[23]

Country selection rationale

The four countries, India, Pakistan, Bangladesh, and Nepal, were selected based on purposive sampling. Each belongs to the World Bank's low- or lower-middle-income category, shares a high burden of late-stage cancer diagnosis, and exhibits variable engagement with digital health initiatives. While these countries share comparable socioeconomic constraints, their divergent policy frameworks and institutional readiness offer a valuable basis for cross-case comparison and transferable policy insights.

Analytical framework

The research is anchored in Walt and Gilson's Policy Triangle Framework, which dissects health policy through the lenses of context, content, actors, and process. These dimensions help interpret how policy environments influence the implementation of digital technologies in cancer care, particularly across five thematic policy domains:

1. Policy Integration (Inclusion of digital tools in cancer strategies)
2. Telemedicine Accessibility
3. AI Diagnostic Application
4. Institutional and Workforce Readiness
5. Regulatory and Equity Frameworks

These domains are not treated as independent or dependent variables but rather as thematic categories through which policy action and inaction are assessed.

Data sources and time frame

Data was gathered from 2010 to 2023 from peer-reviewed journals, official policy documents, and international development sources, including:
National digital health strategies and cancer control plans
Reports from ministries of health in each country
Technical documents from BRAC, Shaukat Khanum Hospital, and Sehat Kahani
The sources were analyzed using thematic coding and content analysis, focusing on patterns across the five domains. NVivo software was used to support coding reliability and generate mind maps that visualize recurring policy trends and bottlenecks as shown in Table 1.
The following table presents a comparative matrix summarizing each country's readiness across six

Table 1: Summary table of indicators and sources

Thematic Domain	Example Indicators/Questions	Key Sources
Policy Integration	Is digital cancer care included in national strategies?	National health strategies, WHO reports
Telemedicine Accessibility	Number and scope of telemedicine programs	Ministry portals, NGO reports, peer-reviewed papers
AI Diagnostics	Pilot projects or the integration of AI in screening	Hospital data, AI guidelines, NITI Aayog docs
Institutional Readiness	Workforce training, digital infrastructure coverage	WHO, national planning documents
Regulatory & Equity	Legal frameworks, affordability, and inclusion policies	Legal texts, gender/equity strategies

Table 2: Comparative matrix of country readiness for digital cancer detection policy reform

Country	Cancer-Specific Digital Policy	Telemedicine Integration	AI in Early Detection	Institutional Readiness	Equity & Access Focus	Regulatory Framework
India	Strong (NCG, Digital Health Mission)	High (eSanjeevani, Ayushman Bharat)	Advanced pilots in public hospitals	Robust (National Cancer Grid, NITI Aayog)	Moderate (digital divide persists)	Partial (AI/telehealth standards evolving)
Pakistan	Moderate (Digital Health Strategy 2022)	Moderate (Sehat Kahani, provincial pilots)	Emerging (Shaukat Khanum AI tools)	Fragmented (decentralized health governance)	Weak (rural and gender gaps)	Weak (no formal AI regulation)
Bangladesh	Weak (cancer not prioritized digitally)	Moderate (BRAC and NGO-led platforms)	Minimal (no policy-linked pilots)	Low (infrastructure & workforce shortages)	Weak (high out-of-pocket costs)	Absent (no legal framework)
Nepal	Very Weak (absent in digital health plans)	Low (basic district telehealth units)	Absent (no known integration)	Very Low (resource-strained system)	Weak (geographic exclusion)	Absent (no national digital policy)

domains: cancer-specific digital health policy, telemedicine integration, use of AI for diagnostics, institutional infrastructure, inclusion strategies with an emphasis on equity, and regulatory frameworks. The matrix was created through content analysis of official policy documents, peer-reviewed literature, and technical reports by international health agencies, such as the WHO and the World Bank. These areas reflect both the supply-side potential for the adoption of technology as well as the policy context that enables or discourages digital health innovation as shown in Table 2.

Results

Data analysis

The findings of this study are presented through a comparative analysis of health policy reforms across four South Asian LMICs: India, Pakistan, Bangladesh, and Nepal. The results are structured around five thematic domains, derived from the Walt and Gilson Policy Triangle Framework and informed by document analysis. Each domain illustrates how health policy factors contribute to or hinder the adoption of telemedicine and AI tools for early cancer detection.

Theme 1: Policy integration and strategic commitment

Sub-theme 1.1: Digital health strategies and cancer-specific alignment

Digital health policies are increasingly national priorities in the four nations, with variable cancer-specific alignment. India stands out with a strong digital health strategy that includes explicit mention of early detection in national cancer programs. Both the National Cancer Grid and Ayushman Bharat Digital Mission enable the incorporation of telemedicine into oncology care pathways. In Pakistan, the Digital Health Strategy (2022) and Bangladesh's e-health policies mention telemedicine in general terms without disease-specific priority. Nepal has yet to incorporate digital oncology into health policy, reflecting an urgent gap in strategic planning.

Sub-theme 1.2: Incorporating AI in national health systems

Only India has begun formally integrating AI-enabled diagnostics in government-backed pilots namely for breast and cervical cancer. Pakistan shows promising signs through institutional efforts like Shaukat Khanum's AI image analysis but without the backing of national policy structures. Bangladesh and Nepal have minimal or no AI integration, highlighting a technology-policy gap in their cancer detection efforts.

Table 3 illustrates how digital health priorities intersect with cancer policy across four South Asian LMICs. India demonstrates a strong and deliberate alignment through its National Cancer Grid and Ayushman Bharat Digital Mission, both of which include provisions for digital oncology and early detection of breast and cervical cancer. Pakistan shows partial integration; while its national digital strategy is in place, there is no cancer-specific digital planning, and early detection is addressed only through isolated institutional pilots. Bangladesh and Nepal lack any formal inclusion of cancer or early detection within their digital health frameworks, reflecting an urgent need for strategic alignment. The findings suggest that without policy-level integration, digital tools for early cancer detection remain peripheral to national health systems, limiting their long-term impact and scalability.

Theme 2: Institutional capacity and implementation infrastructure

Sub-theme 2.1: Health system readiness and interoperability

India has the benefit of centralized health governance and institutional coordination that can facilitate standardization, interoperability, and rapid pilot scaling. Its National Digital Health Mission also allows for integrated records and cross-institutional platforms. Pakistan and Bangladesh, on the other hand, face governance fragmentation with disconnected provincial and NGO-led projects. Nepal has a basic infrastructure deficit with unreliable power, internet (Patton, 2015), and limited diagnostic labs, making

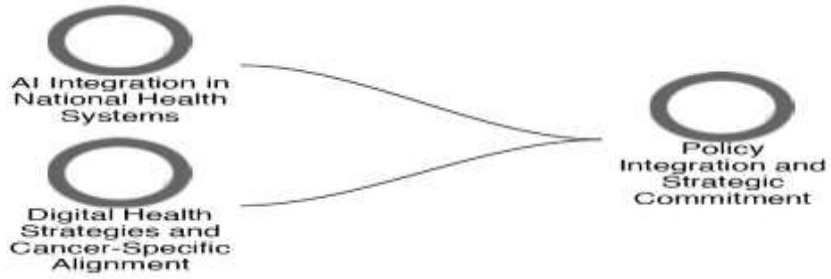

Figure 1: NVIVO Mapping theme 1

Table 3: Integration of digital health strategies with Cancer-Specific early detection policies in South Asian LMICs

Country	Cancer-Specific Digital Strategy	Mention of Early Detection	Strategic Alignment
India	✓ NCG, ABDM	✓ Breast/cervical focus	✓ Strong
Pakistan	⚠ General Digital Strategy	⚠ Institutional pilots	⚠ Moderate
Bangladesh	✗ None	✗ None	✗ Absent
Nepal	✗None	✗ None	✗ Absent

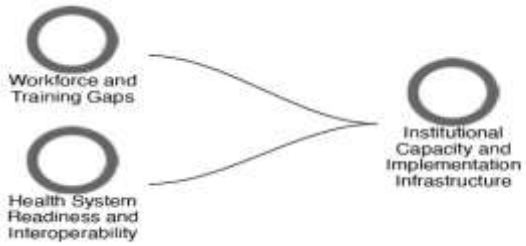

Figure 2. NVIVO Mapping theme 2

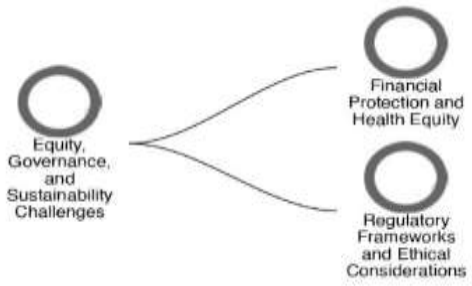

Figure 3: Nvivo Mind Mapping Theme 3

implementation of digital tools especially challenging.

Sub-theme 2.2: Gaps in workforce and training

A common bottleneck across all countries is the absence of digitally skilled health workers (Scott Kruse, 2018). India's digital capacity-building efforts are expanding under programs like eSanjeevani, but uptake is low in rural areas. Pakistan, Bangladesh, and Nepal have limitations in AI-specific or telehealth training, particularly for nurses, radiologists, and community health workers. This workforce unreadiness undermines even the most ambitious digital health plans ans shown in Table 4

Theme 3: Equity, governance, and sustainability challenges

Sub-theme 3.1: Regulatory frameworks and ethical considerations

All four countries lag in AI and telemedicine regulation. India has suggested guidelines for digital health, but gaps remain in liability, validation, and certification of AI tools.

Table 4: Comparative overview of digital healthsystem readiness in selected south asian countries

Country	Centralized Coordination	Telehealth Scaling	Infrastructure Gaps
India	✓✓ Yes (NDHM, NCG)	✓✓ Nationwide	⚠ Limited rural
Pakistan	⚠ Partial (provincial)	⚠ NGO-led pilots	⚠ Medium
Bangladesh	✗ No centralized system	⚠ BRAC initiatives	⚠ Weak connectivity
Nepal	✗ Very weak	⚠ Pilot stage	✗ Severe gaps

Table 5: Comparative overview of egulatory and ethical frameworks for telemedicine and AI in cancer care

Country	Telemedicine Regulation	AI-specific Guidelines	Data Protection Measures
India	⚠ Partial	⚠ Drafted (NITI Aayog)	⚠ Emerging
Pakistan	⚠ Basic	✗ Absent	✗ Absent
Bangladesh	⚠ Informal	✗ Absent	✗ Absent
Nepal	✗ None	✗ None	✗ None

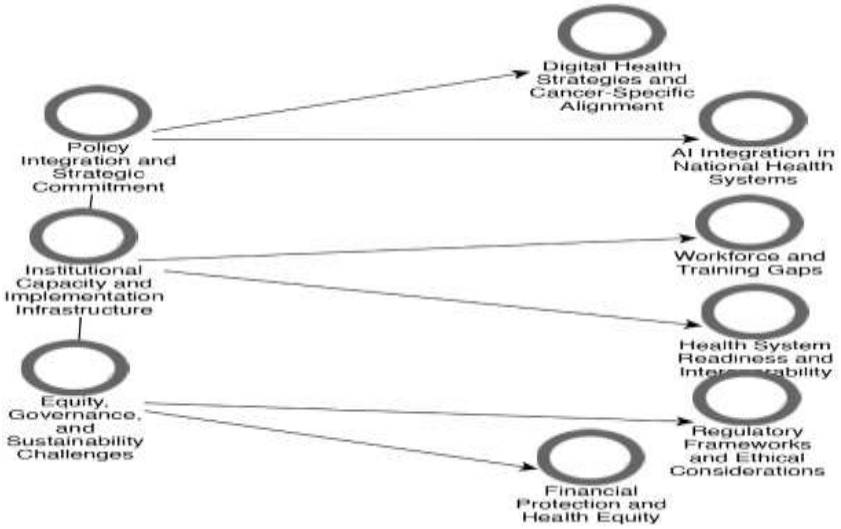

Figure 4: Overall research mind maps

Table 6: Synthesis of thematic patterns

Domain	India	Pakistan	Bangladesh	Nepal
Cancer-specific policy	✓	⚠	X	X
Telemedicine scaling	✓	⚠	⚠	⚠
AI diagnostic pilots	✓	⚠	X	X
Institutional readiness	⚠	⚠	⚠	X
Regulatory frameworks	⚠	X	X	X
Equity/inclusion focus	⚠	X	X	X

✓= Advanced | ⚠ = Emerging | ✗ = Absent

Pakistan and Bangladesh have rudimentary telemedicine policies but no binding regulation on AI use in diagnostics. Nepal has no formal regulatory framework, undermining patient safety, data privacy, and accountability. Ethical risks of algorithmic bias and data misuse (Morley, 2020) are mostly unconsidered in national plans.

Sub-theme 3.2: Financial protection and health equity

Despite immense potential for universal service provision, financial and digital divides continue. India's public insurance covers some digital services but not diagnostic innovations. In Pakistan and Bangladesh, most of the services are out-of-pocket or NGO-driven, which limits access for the poor. Nepal, having a very limited fiscal space, cannot subsidize digital diagnostics yet. No country has yet incorporated AI-assisted screening under universal health coverage schemes, which reflects a missed opportunity to universalize access.

Table 5 provides a snapshot of the regulatory landscape surrounding digital cancer detection tools in the studied countries. India is the most advanced, with partial telemedicine regulation, a draft AI strategy under, and emerging data protection norms, though enforcement remains inconsistent. Pakistan and Bangladesh have minimal legal infrastructure, relying on basic or informal guidelines without formal accountability mechanisms or AI-specific rules. Nepal exhibits the most significant regulatory gap, with no national telemedicine laws or digital health governance frameworks in place. Across all countries, the absence of dedicated legal protections for AI-assisted diagnostics and patient data represents a critical bottleneck to scaling digital cancer care equitably and safely. Figure 4

The findings of this study reinforce the assertion that while telemedicine and AI hold transformative potential for early cancer detection, their equitable and sustainable integration in low-income contexts is fundamentally dependent on policy reform. The comparative case analysis of India, Pakistan, Bangladesh, and Nepal reveals a layered narrative one that combines opportunity, fragmentation, and inertia. Table 6

The thematic synthesis table highlights a clear hierarchy of digital health policy readiness across four South Asian LMICs. India demonstrates the strongest overall performance, with established cancer-specific policies, scaled telemedicine infrastructure, and active AI diagnostic pilots—though it still has room to improve in regulatory and equity dimensions. Pakistan shows emerging efforts in most domains, particularly in telemedicine and institutional pilots, but lacks a cohesive regulatory framework and equitable access strategies. Bangladesh and Nepal lag significantly, with no formal cancer-related digital strategies, no AI pilots, and very weak regulatory or inclusion mechanisms. While telemedicine has some limited reach in all countries, the broader digital integration necessary for early cancer detection remains fragmented and inequitable, especially outside India.

Discussion

This study set out to examine how health policy reforms influence the integration of telemedicine and artificial intelligence (AI) tools for early cancer detection in four South Asian LMICs: India, Pakistan, Bangladesh, and Nepal. Using a qualitative comparative policy analysis framework grounded in thematic coding and document review, we evaluated five thematic domains: policy integration, telemedicine access, AI diagnostic adoption, institutional readiness, and regulatory equity. The analysis found that India leads in strategic alignment and public-sector AI experimentation, while Pakistan demonstrates moderate institutional innovation without national policy coherence. Bangladesh and Nepal lag behind significantly due to underinvestment, fragmented governance, and a lack of cancer-specific digital policy.

These findings reinforce prior research showing that the success of digital health interventions is not determined by technology alone but rather by institutional capacity, policy integration, and regulatory support. India's relatively advanced progress can be attributed to centralized digital health missions, such as the Ayushman Bharat Digital Mission and National Cancer Grid, which have facilitated the structured deployment of eSanjeevani and cancer AI pilots.[24]In contrast, Pakistan's progress stems largely from NGO and hospital-led programs like Sehat Kahani and Shaukat Khanum, highlighting the potential of bottom-up innovation in fragmented systems. These dynamics echo Walt and Gilson’s (1994) Policy Triangle, which emphasizes that policy outcomes are shaped by actors, processes, and political context as much as by policy content.

One of the more surprising findings is the disconnect between digital health strategies and cancer care across all four countries. While India shows early signs of integration, the absence of explicit cancer-oriented digital frameworks in Pakistan, Bangladesh, and Nepal limits the potential impact of AI and telemedicine on early detection. Additionally, despite international enthusiasm for digital transformation, ethical and equity concerns remain under-addressed. As the literature warns, deploying AI in LMICs without local validation risks algorithmic bias and diagnostic errors.

Similarly, telemedicine often operates in legal grey zones, with unclear guidance on licensure and malpractice. These issues are compounded by deep digital divides—women, rural communities, and older adults remain underserved due to structural inequalities in access and digital literacy.

Policy implications emerging from this study are clear. First, cancer-specific integration must become a priority in national digital health strategies. Generic telemedicine or AI plans are insufficient to address the nuanced needs of oncology. Second, regulatory frameworks must evolve to include AI transparency, cross-border licensing, and malpractice protections to ensure safe use in diagnostics. Third, national governments should adopt inclusive equity frameworks that proactively address access barriers across gender, geography, and income. Finally, cross-national cooperation—including pooled procurement, shared validation, and regional standards—can drive down costs and build locally adapted solutions. Without these systemic policy reforms, the promise of digital health in transforming cancer care will remain unrealized for the populations that need it most.

Conclusion

This study explored how health policy reforms in four South Asian LMICs—India, Pakistan, Bangladesh, and Nepal affect the integration of telemedicine and artificial intelligence (AI) tools for early cancer detection. Using a qualitative comparative case study design and thematic analysis of policy documents and secondary literature, the research provided insight into how structural and regulatory contexts shape the digital transformation of cancer care systems in resource-constrained settings. The findings highlighted that India leads in terms of strategic policy alignment, national-scale implementation, and AI experimentation within public cancer programs. Pakistan demonstrated localized progress driven by institutional innovation and public-private partnerships, while Bangladesh and Nepal struggled with infrastructural weaknesses, fragmented policy environments, and an absence of cancer-specific digital planning.

Although the promise of telemedicine and AI for early cancer detection is well-recognized, this study confirms that their successful deployment in LMICs is contingent on broader policy reforms—especially in regulatory clarity, workforce capacity, and digital inclusion. The analysis revealed critical gaps in equity frameworks, AI regulation, and financial protection that, if unaddressed, risk exacerbating healthcare inequalities. At the same time, the study draws attention to promising models of localized innovation and regional cooperation, which could be leveraged for cost-effective scaling and standardization.

Like all secondary qualitative research, this study is subject to certain limitations. The analysis relies on publicly available documents and published literature, which may not fully capture the informal or emerging policy initiatives within each country. Additionally, the absence of direct stakeholder interviews limits insight into behind-the-scenes policymaking and implementation bottlenecks.

Future research should expand on this foundation by empirically assessing the real-world impacts of telemedicine and AI tools on cancer outcomes, especially in rural and disadvantaged populations. Comparative evaluations of implementation effectiveness, patient satisfaction, and diagnostic accuracy would provide essential evidence for policy refinement. Moreover, cost-effectiveness studies could guide national health financing strategies. Political economy analyses exploring institutional interests, resistance, and stakeholder dynamics would further contextualize the feasibility of digital health reform. Lastly, there is

considerable scope for investigating regional integration models, such as cross-border AI validation, pooled procurement, and harmonized regulatory frameworks, which may be particularly vital for LMICs with limited resources and shared healthcare challenges.

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