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The Digital Divide in Healthcare: How Technology Affects Economic Outcomes in Different Countries?

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Abstract*—This research aims to study the impact of the digital divide on the healthcare sector, focusing on the differences between developed and developing countries in adopting health technology and its economic outcomes. The study examines the role of health technology in improving the quality of healthcare, reducing operational costs, and enhancing equity in access to various health services. The study adopts a qualitative approach by analyzing previous literature and comparing how different countries adopt health technology. The findings indicate that developed countries achieve higher success in digital transformation due to advanced infrastructure, sufficient financial resources, and supportive policies and regulations. In contrast, developing countries face financial and technical challenges that limit their ability to benefit from health innovations*.

***Keywords*—** *Digital Health, Health Technology, Health Economic, Developed and Developing Countries, Digital Divide*.

I. INTRODUCTION

The healthcare sector has witnessed transformative advancements fueled by technology, making digital solutions integral to modern health systems across the globe. Innovations such as electronic health records and telemedicine have significantly improved healthcare delivery and accessibility, while also reducing diagnostic and treatment costs (Mohammed-Nasir et al., 2023). However, these benefits have not been distributed equally, giving rise to a significant digital divide in global healthcare access and outcomes.

While developed nations have embraced digital health solutions—leading to optimized resource allocation, improved care quality, and broader access—developing countries continue to face a range of challenges. These include limited financial resources, inadequate infrastructure, and insufficient policy support (Yusif & Soar, 2014). Consequently, many developing countries struggle to fully benefit from health tech innovations.

Despite global progress, disparities persist in digital health adoption, particularly in low- and middle-income countries. Long-term economic benefits of digital health adoption highlight the need for sustainable policies to ensure equitable access and cost-effective care.

Research Problem

Although technological advancements have significantly improved healthcare delivery worldwide, the uptake has not been uniform. Developed countries have largely integrated health tech into their systems, while developing countries face numerous obstacles, including weak infrastructure, limited funding, inadequate workforce training, and unsupportive policies (Anwar & Shamim, 2011).

This research seeks to answer the following question:

- How does health technology affect healthcare economics, and how do these effects differ between developed and developing countries in terms of cost, access equity, and digital insurance transformation?

Significance of the Study

This study sheds light on the uneven adoption of health technology across countries, evaluating the factors influencing this divide. It aims to inform policymakers by balancing cost-benefit considerations and advocating for equitable healthcare access. Through comparative analysis, the study offers practical recommendations for enhancing digital health policies and strengthening innovation's role in global healthcare sustainability.

Research Objectives

- To analyze the economic impact of health technology adoption in developed and developing countries.
- To focus on three critical areas: healthcare costs, equity in service access, and digital transformation in health insurance.

II. METHODOLOGY

A qualitative research approach was adopted to assess the economic implications of digital health adoption in both developed and developing nations. The study centers on three main aspects:

1. Impact on healthcare costs
2. Role of technology in access equity
3. Digital transformation of health insurance

The research employs content analysis, comparative methods, and policy review, using secondary data from academic studies, international reports, and policy documents. As a retrospective, applied study, it not only describes the

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current situation but also offers critical analysis and actionable policy suggestions. The methodology is classified as ex-post facto, focusing on past experiences without experimental manipulation (Elimam, 2015).

Definitions of Key Terms

- Health Economics: A field of economics dealing with the efficiency, value, and behavior in the production and consumption of healthcare services, including the allocation of resources and the impact of policies on health outcomes (Johns Hopkins Bloomberg School of Public Health).
- Health Technology: Tools and systems designed to improve the delivery of safe, effective healthcare through early diagnosis, treatment, and patient monitoring (Schoville et al., 2015).
- Digital Health: Encompasses all internet-based health applications and technologies, including AI, wearables, mobile apps, and telemedicine (Mathews et al., 2019).
- Developed Countries: Nations with advanced technological infrastructure, high living standards, and diverse economies (Energy Education).
- Developing Countries: Countries with lower development indicators, limited technological integration, and lower income levels (Energy Education).

III. Literature Review

Section One: The Impact of Technology on Healthcare Costs

Health technology is a central driver of healthcare quality improvement, yet it plays a dual role in shaping healthcare costs. In some instances, it contributes to cost reduction, while in others, it may increase expenditures. These varying impacts differ significantly between developed and developing countries, leading to a gap in both realized benefits and systemic challenges.

In developed countries, multiple studies highlight that advanced technologies—such as artificial intelligence (AI), robotic surgery, and electronic health records (EHRs)—have improved efficiency and reduced long-term operational costs. For example, Alowais et al. (2023), in *"Revolutionizing Healthcare: The Role of Artificial Intelligence in Clinical Practice,"* showed that AI enhances diagnostic accuracy and reduces costs associated with medical errors. Similarly, Malathi et al. (2024) demonstrated how IoT-enabled remote patient monitoring lowers chronic disease management costs. Olorunyomi et al. (2024) found that integrating FinOps strategies in healthcare helps cut costs by optimizing home care services and boosting financial efficiency. Juba et al. (2024) also confirmed that home care technologies reduce healthcare expenses and improve safety for elderly patients and caregivers.

However, the widespread availability of technology in high-income countries comes with its own challenges. Baker et al. (2003) observed that an overabundance of advanced medical technologies can lead to increased healthcare spending if not properly managed. Similarly, Jindal et al. (2024) emphasized the need for strategic AI integration to prevent unintended operational and maintenance cost inflation.

In developing countries—such as India, Egypt, and Nigeria—adopting digital health technologies is fraught with difficulties, primarily due to high upfront costs and weak infrastructure. Kumar (2011) concluded that both cost and infrastructure deficits hinder the full realization of health tech benefits. Despite this, there have been promising outcomes. Iqbal and Khan (2017), for example, demonstrated the effectiveness of telemedicine in reducing healthcare costs and improving access in rural areas, especially those lacking medical infrastructure and workforce.

From a data security and privacy standpoint, Paul et al. (2023) found that concerns surrounding digital transformation may lead to higher implementation costs. Conversely, Singh (2023) argued that blockchain can eventually lower data management expenses, although it requires substantial initial investment. Stoumpos et al. (2023) further stressed that successful digital transformation depends largely on the availability of reliable infrastructure.

As illustrated in Figure 1, developed nations are far more advanced in adopting technologies such as AI and EHRs, which positively impact healthcare quality and cost efficiency. On the other hand, developing countries continue to face challenges related to underdeveloped infrastructure and limited funding—factors that prevent them from fully leveraging digital health innovations.

Section Two: Technology and Equity in Access to Healthcare Services

In recent years, the healthcare sector has undergone significant transformation driven by technological advancements. These innovations have increased service accessibility and improved the quality of care. Yet, the question remains: can technology truly ensure equity in healthcare access—especially for marginalized and underserved populations?

In developed countries, numerous studies affirm the potential of digital tools in promoting health equity. For instance, Lyles et al. (2022) and the Johns Hopkins Bloomberg School of Public Health (2025) both emphasize that technology can bridge the digital health divide and foster more equitable access. Similarly, Bolarinwa (2025) highlights how artificial intelligence can significantly improve healthcare delivery, particularly in remote areas.

However, challenges persist even in high-income nations. Elevance Health (2023) acknowledges the role of mobile health apps in promoting equity but warns of limited reach among disadvantaged groups. Cleff (2023) also points out that the efficacy of mobile health interventions may be hampered by disparities in digital health literacy, especially among the elderly and low-income communities.

In developing countries, the digital divide stands as a major obstacle to achieving healthcare equity. Comprehensive digital infrastructure is essential to ensure that technology delivers its full potential in promoting equitable healthcare access. Adedinsewo et al. (2023) emphasize this need in their analysis of clinical trials and health disparities. Meanwhile, Gong et al. (2024) demonstrate how digital technologies can reduce long-term costs by improving health system efficiency

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and supporting prevention strategies—particularly in managing non-communicable diseases.

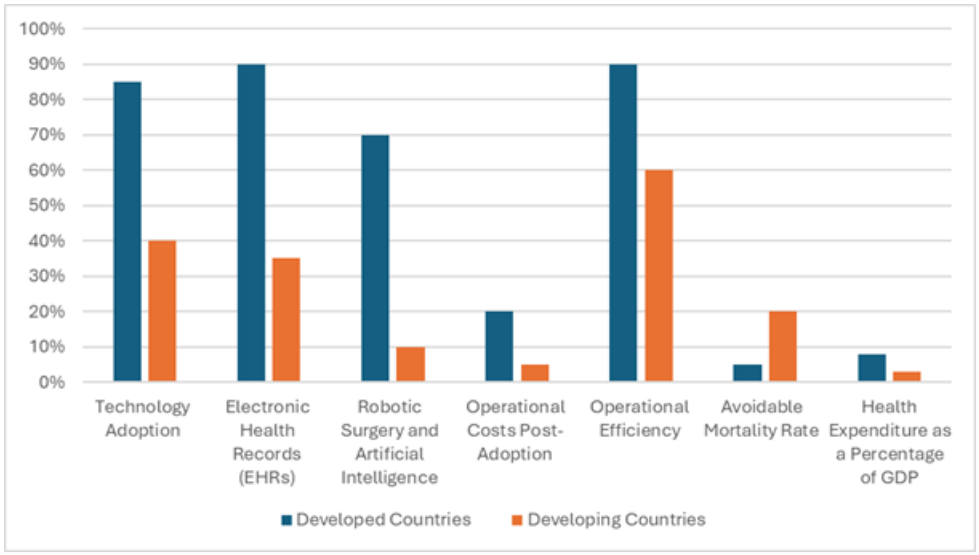

Figure 1: Health and Technology in Developed and Developing Countries
Source: Compiled by the researchers, based on data from OECD (2023), Rodriguez et al. (2025), WHO (2025), and Roza.(2025)

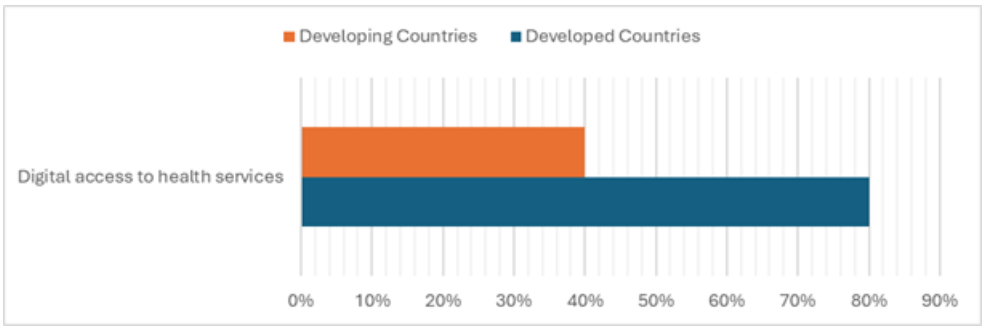

Figure 2: Health Equity and Technology in Developed and Developing Countries
Source: Prepared by the researchers, based on O'Neil et al. (2021), Lestari et al. (2024), and van et al. (2023).

Despite this promise, developing countries face substantial barriers. The high cost of implementing digital health systems—compounded by weak infrastructure and limited funding—remains a pressing challenge, especially in low- and middle-income regions. The IEEE (2023) report on *Digital Equity in Healthcare* warns that these constraints exacerbate the digital divide. Moreover, Harvard Public Health (2023) underscores how "digital redlining" reinforces health disparities, especially in rural and underserved communities.

As shown in Figure 2, technology plays a pivotal role in advancing equitable access in developed countries by extending services to remote populations. In contrast, the persistent digital divide in developing nations remains a key barrier to equitable healthcare access—particularly for vulnerable groups.

Section Three: Digital Transformation and Health Insurance

The health insurance sector is undergoing a profound digital transformation that is redefining the foundations of care delivery. While developed countries actively embrace cutting-edge technologies as part of comprehensive national strategies, developing countries continue to grapple with challenges that risk widening the digital divide in healthcare.

In developed nations such as the United States, Europe, and Japan, digital transformation in health insurance is a core pillar of efforts to enhance efficiency and patient experience. However, access barriers persist—especially among older populations—due to socioeconomic, geographic, and digital literacy gaps (Cabañero-Garcia et al., 2025). Technical challenges, psychological resistance, and high workloads also hinder healthcare professionals from fully adopting digital tools (Nascimento et al., 2023). Despite these hurdles, digital innovation has notably expanded patient options and improved service delivery (Stoumpos et al., 2023).

Sheikh et al. (2021) affirm that health information technology is pivotal in building national learning health systems that are both more responsive and data-driven. While time pressure may negatively impact the usability and reliability of electronic health records (EHRs), particularly among nurses (Vehko et al., 2019), other studies, such as Janssen et al. (2023), underscore the innovation potential of EHRs in improving care delivery and fostering systemic efficiency.

In developing countries, technology often represents a financial burden due to the high cost of implementation and a

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lack of robust infrastructure. Still, some progress has been made. Alamsyah et al. (2025) and Haleem et al. (2021) highlight the potential of blockchain in enhancing privacy, traceability, and transparency in public health insurance claims. Meanwhile, Yesmin et al. (2022) found that the Internet of Things (IoT) has improved direct patient care time and overall safety.

Yet significant obstacles remain. Rahman et al. (2024) point out that telemedicine requires upgrades to the physical environments of care centers to be effective. Additionally, McCool et al. (2022) argue that mobile health (mHealth) in low- and middle-income countries must strike a careful balance between rapid technological advancement and ethical considerations, such as equity and data privacy.

As illustrated in Figure 3, developed countries have successfully digitized large portions of their insurance systems—leading to improved transparency, fraud reduction, and streamlined services. In contrast, developing countries continue to face major barriers, including technical limitations and a shortage of skilled professionals. This underscores the urgent need to support digital transformation in health insurance globally to improve the sector's overall economic performance and resilience.

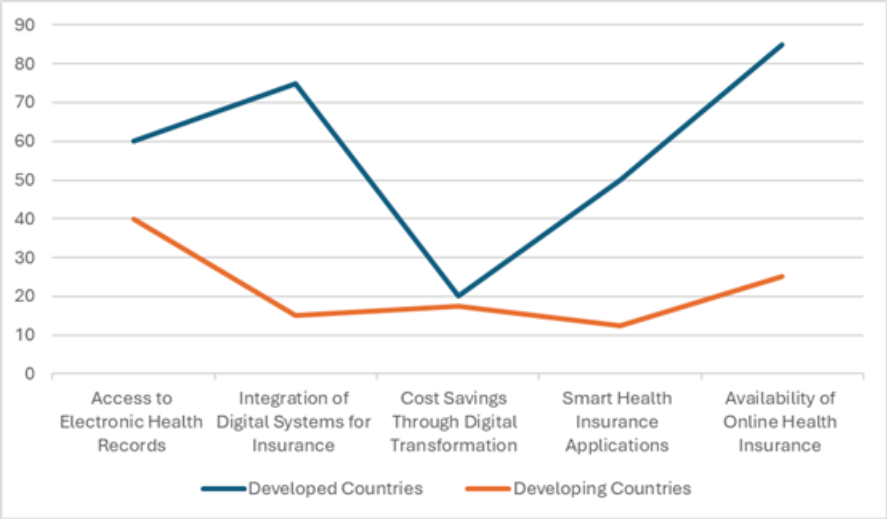

Figure 3: Digital Transformation in Health Insurance Between Developed and Developing Countries
Source: Prepared by the researchers, based on Alami et al. (2021), Health Tech Africa (n.d.), Odusanya et al. (2025), Akinleye et al. (2021), IQVIA (2021), Mehl et al. (2019), and Johns Hopkins Bloomberg School of Public Health (2025).

IV. Discussion and Findings

This study explored the impact of the digital divide on healthcare systems, focusing on disparities between developed and developing countries in adopting health technologies and the resulting economic implications. The findings confirm that digital health plays a vital role in enhancing care quality, reducing operational costs, and promoting equitable access to healthcare services. However, these benefits remain unevenly distributed due to gaps in infrastructure, funding, and policy support.

1. Health Technology and Healthcare Costs

The results indicate a dual impact of health technology on healthcare costs. On the one hand, digital innovations have significantly reduced operational expenses in countries such as the U.S., Germany, and the U.K. by improving diagnostic accuracy and reducing costs associated with medical errors (Malathi et al., 2024; Alowais et al., 2023). Technologies like AI and IoT have proven effective in optimizing financial management and minimizing hospital expenditures through remote patient monitoring (Olorunyomi et al., 2024).

On the other hand, if not properly managed, these technologies may increase costs. Baker et al. (2003) found that unregulated access to advanced medical technologies could escalate overall spending. Similarly, Jindal et al. (2024) warn that unchecked reliance on AI may inflate maintenance and operating costs, challenging institutions to maintain financial efficiency.

In contrast, developing countries such as India, Egypt, and Nigeria still face significant barriers to fully leveraging health technology, particularly in terms of financing and infrastructure. While telemedicine has reduced rural healthcare expenses by up to 30%, concerns around privacy and cybersecurity continue to drive up implementation costs (Kumar, 2011; Khan, 2017; Paul et al., 2023).

The World Health Organization (WHO, 2018) highlights that poor-quality care—especially in low-income countries—leads to increased treatment costs and inefficiencies. Thus, digital infrastructure investment is essential for improving service quality and achieving universal health coverage.

2. Technology and Equity in Healthcare Access

In developed countries, digital tools such as telemedicine and AI have contributed to improved health equity by making care more affordable and accessible in rural and remote areas (Bolarinwa, 2025; Lyles et al., 2022). However, in developing nations, the high costs of adopting digital tools, combined with infrastructure deficits, continue to limit these benefits (Gong et al., 2024).

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IEEE (2023) and Harvard Public Health (2023) assert that expanding digital infrastructure can foster healthcare innovation and improve service reach, particularly for low-income communities. According to the WHO (2024), global progress toward universal health coverage is still uneven, with underserved regions in developing nations facing significant barriers to access. The COVID-19 pandemic underscored the role of technology in sustaining care delivery and emphasized the need for long-term investment in digital health systems.

3. Digital Transformation and Health Insurance

The findings show that digital transformation in health insurance has significantly improved efficiency and fraud prevention in developed countries, thanks to technologies like blockchain and AI (Alamsyah et al., 2025; Haleem et al., 2021). Countries such as Germany and Japan have successfully digitized their health insurance systems, increasing transparency and simplifying claims processing.

However, in developing countries, digital insurance initiatives remain limited due to infrastructure and workforce challenges (Rahman et al., 2024). Nascimento et al. (2023) report that these nations struggle with both technological readiness and implementation barriers.

The OECD (2024) notes that digital health insurance adoption leads to substantial efficiency gains, including reduced fraud and improved patient satisfaction. Nonetheless, the absence of strong regulatory frameworks in many developing countries hinders the success of such transformations, highlighting the need for government and legislative support.

V. Conclusion and Recommendations

The study concludes that digital health technologies hold significant potential to improve economic outcomes in healthcare. However, their impact is unevenly distributed due to a persistent digital divide between developed and developing nations. While advanced economies benefit from strong infrastructure and supportive policies, resource limitations continue to challenge progress in less developed regions.

To address these disparities, the study recommends:

1. Investing in digital infrastructure by improving internet connectivity and telecommunications systems in developing countries.
2. Expanding digital healthcare platforms, including electronic health records and telemedicine services.
3. Strengthening supportive policies and legislation to encourage digital adoption and provide incentives for private sector investment.
4. Developing regulatory frameworks that ensure data security and patient privacy.
5. Bridging the funding gap through international partnerships and financial support from global health organizations.
6. Providing training and capacity-building programs for healthcare workers to enhance digital literacy and system use.
7. Raising public awareness about the role of digital health in improving care quality.
8. Promoting international collaboration and knowledge transfer to share best practices and innovation models.
9. Supporting joint research initiatives aimed at tailoring digital health solutions to the specific needs of developing countries.
10. Ensuring equitable access to digital health technologies, particularly for low-income and rural populations.

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