Chapter 2
The Economic Impact of Digital Health Innovations on Disease Prevention: Cost–Effectiveness, ROI, and Policy Implications

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ABSTRACT

This chapter examines the economic impact of digital health innovations in disease prevention, focusing on cost-effectiveness, ROI, and policy implications. As health systems face escalating costs and a rising NCD burden, tools like mHealth, telemedicine, wearables, and AI offer scalable, cost-saving preventive solutions. Drawing on global evidence and modeling, the chapter highlights strong ROI, especially in high-risk populations and LMICs. It reviews economic evaluation metrics, showcases real-world case studies, and addresses challenges including the digital divide and policy gaps. Concluding with policy recommendations, it advocates for inclusive design, sustainable investment, and equity-driven evaluation frameworks to guide future innovation.

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1. INTRODUCTION

This chapter contributes directly to the overarching theme of Reshaping Health Promotion and Disease Prevention Through Digital Innovation by exploring how economic evaluation can inform the strategic integration of digital technologies into preventive health systems. While digital health is often discussed in clinical or technical terms, its full value for health promotion lies in demonstrating measurable economic returns that sustain and scale innovation. By linking prevention economics with digital transformation, this chapter bridges a critical gap between technology adoption, health behavior change, and evidence-based policy investment. The global surge in chronic and non-communicable diseases (NCDs) such as cardiovascular disease, diabetes, and cancer has created a profound health and economic burden across both developed and developing nations. These preventable conditions account for over 41 million deaths annually, approximately 74% of all global deaths, underscoring the urgent need for effective disease prevention strategies (Pikkarainen et al., 2024). According to WHO and OECD data, global investment in digital health for preventive care has grown from U.S. $4.2 billion in 2016 to more than U.S. $16 billion in 2024, illustrating the scale and momentum of this economic transition.

Despite significant progress in digital health innovation, global health systems remain underprepared to translate these tools into sustainable prevention strategies. The COVID-19 pandemic exposed the fragility of preventive infrastructures and revealed the fiscal strain created by reactive healthcare spending. At the same time, rapid advances in mobile health, telemedicine, and AI created a unique policy moment for re-engineering prevention around digital technologies. However, evidence guiding how to invest efficiently in these tools and how to measure their value beyond clinical outcomes remains fragmented. Addressing this knowledge gap is essential for both policymakers and practitioners seeking to realign prevention financing with 21st-century digital realities. In response to the global rise in chronic and non-communicable diseases (NCDs) such as cardiovascular disease, diabetes, and cancer, digital health innovations have emerged as transformative tools. They offer new pathways for disease prevention, population health management, and system-wide cost containment, inspiring a new wave of innovation and progress in healthcare and instilling a sense of optimism for the future (Leistner & Kowatsch, 2023). Encompassing a broad spectrum of technologies, including mHealth, telemedicine, AI, wearable sensors, and health information systems, digital health enables personalized, data-driven care that supports earlier risk detection and improved patient engagement (Han et al., 2022). These interventions have the potential to significantly reduce hospitalizations and enhance clinical outcomes, offering practical benefits and instilling a sense of optimism and hope for the future of healthcare (Islam & Maddison, 2020). These findings naturally lead into a focused examination of return-on-investment patterns, explored in the following section, which extends the analysis from cost-effectiveness to broader fiscal and social returns.

A deeper analysis of these findings reveals a consistent trend: interventions with simple, behaviorally grounded designs, such as mobile reminders or digital coaching, tend to deliver higher cost-effectiveness ratios than more technologically complex tools like AI-driven analytics or precision prevention platforms. This pattern suggests that economic value often stems from the integration of context and user adoption, rather than from technological sophistication alone. Furthermore, interventions embedded within existing care or community systems show greater scalability and sustained impact, underscoring the importance of system readiness and implementation pathways as key economic determinants.

Empirical evidence demonstrating the measurable economic impact of digital health interventions. The economic case for digital health is increasingly compelling. Studies have shown substantial returns