

Sustainability in Rehabilitation Services: Long-Term Impact and Contribution to Public Health

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Introduction

Health systems today must be designed not only to provide consistent and equitable access to care, but also to ensure that healthcare delivery remains economically viable and socially responsive in the long term. Within this broader framework, rehabilitation services—encompassing physical, psychosocial, and vocational dimensions—constitute a vital pillar of sustainable health systems. They play a central role in managing chronic diseases, supporting aging populations, and promoting recovery and participation for individuals with disabilities or long-term health conditions (WHO, 2022).

Rehabilitation is not merely a curative intervention; it is preventive, restorative, and transformative. By addressing functional limitations and fostering independence, rehabilitation significantly enhances quality of life, social inclusion, and long-term health outcomes (Stucki, Rubinelli, & Bickenbach, 2019). As the global burden of chronic diseases and disability continues to rise, embedding rehabilitation as a core function of health systems has become essential. Sustainable rehabilitation practices can reduce healthcare costs, maintain workforce participation, and help mitigate health inequities over time (Kiekens et al., 2020).

For rehabilitation services to achieve these outcomes, they must be strategically planned with continuity, accessibility, and integration in mind. Sustainable models should be adapted to local resources, provide long-term benefits to individuals and communities, and contribute to wider public health goals—such as reducing hospital readmissions and alleviating systemic healthcare pressures. In this sense, sustainable rehabilitation refers not only to interventions that enable personal recovery but also to services that are inclusive, adaptable, and capable of responding to evolving population needs.

The overarching aim of this chapter is to examine the long-term contributions of rehabilitation services to public health and to explore the key principles of sustainability within this context. Drawing upon international evidence and theoretical frameworks, the chapter will critically analyze the relevance and applicability of various rehabilitation models, with a particular focus on their implementation within the Turkish healthcare

system. Core questions to be addressed include: How can rehabilitation services be made sustainable? Which models demonstrate long-term effectiveness? And what are the broader societal benefits of sustainable rehabilitation practices?

Türkiye provides a timely and relevant context for this discussion. The country is experiencing rapid demographic changes, including a graying population and a considerable burden of recent immigration, that pose challenges for social systems in general. These population shifts have led to growing demand for rehabilitation services. Not only meeting this demand but also ensuring that these services are financially viable, institutionally integrated, and socially inclusive is essential. Recent national studies have begun to address these issues through discussions of long-term care insurance, post-disaster and vocational rehabilitation, and preventive strategies in chronic disease management.

Accordingly, this chapter presents a comprehensive literature review on the sustainability and long-term impact of rehabilitation services in Türkiye. It further discusses emerging models and trends, and proposes methodological and policy-level recommendations aimed at strengthening the sustainability and resilience of rehabilitation systems for the future.

Long-Term Effects of Rehabilitation

Sustainable rehabilitation contributes to health systems not only through immediate functional recovery but also by supporting long-term survival, quality of life, and social participation. The following sections synthesize evidence across multiple domains—including stroke, cardiac, and geriatric rehabilitation—to illustrate how sustained rehabilitation practices shape individual and population-level outcomes.

Post-Stroke Rehabilitation and Mortality

Stroke remains one of the leading global causes of mortality and long-term disability. Beyond acute management, the post-stroke period often determines long-term outcomes, including survival and quality of life. Rehabilitation plays a central role during this phase, influencing both neurological recovery and mortality risk.

When rehabilitation interventions are introduced early and appropriately, they may enhance endogenous repair processes, thereby improving both functional recovery and long-term survival (Irisa & Shichita, 2025).

Clinical studies confirm that intensive rehabilitation programs initiated within the first three months post-stroke yield significant motor and cognitive gains, which in turn may influence mortality. Neural reorganization is not limited to the affected hemisphere but extends to contralateral and subcortical regions, and rehabilitation-driven neuroplasticity

can amplify this adaptive potential.

Overall, sustainable post-stroke rehabilitation should be conceptualized as a biological and systemic strategy—one that enhances survival, preserves independence, and minimizes the long-term burden on individuals and health systems.

Community-Based Rehabilitation and Quality of Life

Community-based rehabilitation (CBR) represents a sustainable, socially grounded approach that extends care beyond hospital settings. Its goal is not only to restore function but also to facilitate social participation, reduce caregiver burden, and improve life satisfaction.

Hartman-Maeir and colleagues (2007) provided early evidence on the long-term benefits of CBR among stroke survivors. In their one-year follow-up of patients discharged from the hospital, those participating in a structured home-based program showed significant gains in leisure engagement and overall life satisfaction, despite limited improvements in basic physical independence. These findings underscore that rehabilitation outcomes should be evaluated not only by physical metrics but also by psychosocial and participation-related measures.

CBR initiatives demonstrate that sustainable rehabilitation depends on integrated, community-level systems that address both medical and social dimensions. When caregivers and local networks are actively involved, such programs enhance subjective well-being, reduce institutional dependency, and promote long-term independence—aligning closely with the principles of sustainability in health systems.

Long-Term Follow-Up in Individuals with Severe Disabilities

Patients with severe post-stroke disabilities or other profound functional limitations require sustained support to maintain health, independence, and quality of life. Høyer, Opheim, Moe-Nilssen, and Strand (2023) conducted a long-term follow-up study in 60 individuals with severe post-stroke disability. Nearly 80% of participants continued to live at home 12 months after discharge, and most maintained physiotherapy involvement. Notably, 83% remained independent walkers, and the majority perceived their health as “good to excellent.”

These findings highlight several implications for sustainable rehabilitation:

- Continuity of care: Ongoing individualized therapy is crucial beyond hospital discharge.
- Community support: Home-based and community rehabilitation enable independent living even with severe disability.
- Comprehensive assessment: Long-term evaluations should incorporate both objective measures (e.g., mobility) and subjective perceptions of health.

Sustainable models must therefore extend beyond acute recovery, embedding long-term

follow-up mechanisms that adapt to evolving functional and psychosocial needs.

Long-Term Outcomes of Cardiac Rehabilitation

Cardiac rehabilitation (CR) exemplifies how structured rehabilitation programs can yield durable population-level benefits. While traditionally aimed at short-term recovery and risk management, long-term data demonstrate significant effects on mortality and healthcare utilization.

Doimo et al. (2019) evaluated five-year outcomes among patients participating in ambulatory CR compared to non-participants. The CR group exhibited substantially lower combined rates of cardiovascular hospitalization and mortality (18% vs. 30%), with a 42% reduction in overall risk (hazard ratio 0.58; 95% CI 0.43–0.77). Moreover, all-cause and cardiovascular mortality were both significantly lower among participants.

These findings reaffirm that CR contributes not only to improved survival but also to reduced hospital readmissions, underscoring its value as a sustainable component of health systems. Embedding CR within long-term care pathways thus offers both clinical and economic advantages, supporting health system resilience.

Home-Based Rehabilitation in Older Adults

As populations age, home-based rehabilitation has become increasingly vital for sustaining functional capacity and reducing institutional care dependency. Systematic reviews demonstrate that structured, individualized, and progressive programs can improve mobility, self-care, and psychosocial well-being among older adults (Alves et al., 2024; Zhao et al., 2024).

Zhao et al. (2024) analyzed 21 randomized controlled trials in older patients with hip fractures and found significant improvements in balance, mobility, and quality of life, with standardized mean differences of approximately 0.60 for activities of daily living and 0.30 for life quality. Similarly, home-based exercise interventions for community-dwelling older adults have been associated with enhanced confidence, social engagement, and reduced fear of falling (Santos et al., 2024).

Nevertheless, variability across studies—in program intensity, duration, and participant profiles—indicates that sustained success depends on personalized approaches, caregiver involvement, and continuous monitoring. In this context, home-based rehabilitation represents a scalable and sustainable strategy to meet the long-term needs of aging populations.

Home-Based Rehabilitation in the Turkish Context

Türkiye's rapidly aging population has heightened the need for accessible and sustainable

home-based rehabilitation services. However, disparities in healthcare resources and regional infrastructure continue to pose challenges. Demir Avcı and Gözüml (2018) emphasize that shortages of trained personnel, transportation barriers, and limited social security coverage constrain access, particularly in rural areas.

Although the Ministry of Health manages home-based health services—accessible through family physicians or direct application—significant challenges remain in ensuring service continuity, integration with primary care, and systematic follow-up. Recent analyses highlight that home health services in Türkiye often face limitations in multidisciplinary collaboration, communication between service levels, and long-term monitoring of patients (Sarioğlu & Emüler, 2025). Expanding sustainable home-based rehabilitation in Türkiye will therefore require strengthening the family physician network, improving referral and coordination systems, and investing in local infrastructure.

Synthesis and Key Principles for Sustainable Rehabilitation

Across stroke, cardiac, and geriatric contexts, evidence consistently indicates that while short- and mid-term rehabilitation gains are well established, the central challenge lies in sustaining these outcomes long-term. Translating these insights into health system design requires adopting key sustainability principles:

- Accessibility and continuity: Address geographic, financial, and systemic barriers to long-term care.
- Resource efficiency: Optimize workforce and infrastructure for cost-effective delivery.
- Community engagement: Empower patients, families, and local actors in shared rehabilitation processes.
- System integration: Embed rehabilitation within the continuum of health and social care.
- Monitoring and evaluation: Use data-driven approaches to guide service improvement.
- Technological innovation: Expand equitable access through tele-rehabilitation and digital tools.

Despite abundant evidence for short-term benefits, few studies explicitly evaluate sustainability beyond five years. There remains a pressing need for long-term, multicenter cohort research linking rehabilitation outcomes to sustainability metrics such as cost-effectiveness, workforce stability, and system resilience.

Ultimately, sustainability in rehabilitation is not only about preserving clinical gains—it is about embedding rehabilitation within the social and institutional fabric of health systems to achieve lasting population health impact.

Evidence from Türkiye: Long-Term Effects and Sustainability of Rehabilitation

While international research highlights the long-term benefits and systemic value of rehabilitation, evidence from Türkiye offers important insights into how these principles

manifest in local practice. The Turkish literature reveals progress in chronic disease management, disability inclusion, and disaster-related rehabilitation, but also underscores enduring structural and policy challenges. This section synthesizes key national studies to provide an overview of the long-term impacts and sustainability dimensions of rehabilitation within Türkiye's evolving healthcare landscape.

Chronic Disease Management and Preventive Rehabilitation

Chronic diseases are the leading cause of mortality in Turkey, accounting for nearly 70% of deaths according to Turkish Statistical Institute data (TURKSTAT, 2019). Preventive rehabilitation approaches—particularly those emphasizing physical activity—have been identified as strategic tools in reducing morbidity, mortality, and healthcare costs in this population. A national review of chronic disease prevention emphasized that structured physical activity and rehabilitation programs can significantly improve health-related quality of life among patients with conditions such as diabetes, cardiovascular disease, and COPD. These interventions not only support clinical management but may also delay disease progression and functional decline (Çalikuşu et al., 2023).

Vocational Rehabilitation and Disability Inclusion

Sustainable rehabilitation extends beyond physical recovery to encompass economic and social integration, especially for persons with disabilities. In a recent national study on vocational rehabilitation in Turkey, researchers found that successful employment outcomes for individuals with disabilities depended not only on personal rehabilitation plans but also on legal, institutional, and social support systems (Bulduk & Ocaktan, 2024). Employment was positively associated with increased life satisfaction and social participation, underlining that rehabilitation sustainability requires a cross-sectoral approach. The findings align with global data showing that work integration is a key determinant of psychosocial well-being among individuals with disabilities (OECD, 2023).

Post-COVID Rehabilitation and Long-Term Sequelae

The COVID-19 pandemic has highlighted the critical need for individualized and sustained rehabilitation services. Turkish clinical literature indicates that patients recovering from moderate-to-severe COVID-19 may experience long-term respiratory, neuromuscular, and psychological sequelae (Yavuz et al., 2023). Post-COVID rehabilitation was found to reduce re-hospitalizations and emergency department visits while improving physical function and mental health outcomes. The recommendation for customized, multidisciplinary rehabilitation—especially for individuals with post-viral fatigue or pulmonary fibrosis—aligns with international guidelines and supports sustainable recovery pathways.

Long-Term Care Infrastructure and Policy Gaps

Despite growing demand due to population aging and increased disability rates, Turkey currently lacks a formal long-term care insurance system. Kara (2025) identifies critical policy gaps in funding, legal frameworks, and public awareness that hinder the development of a sustainable long-term care model. Without adequate long-term care infrastructure, rehabilitation services—especially for the elderly and chronically ill—are at risk of becoming fragmented or inaccessible. The integration of rehabilitation into long-term care frameworks is thus essential for systemic sustainability.

Functional Classification and Outcome Standardization

Standardized assessment tools are central to monitoring rehabilitation outcomes and ensuring quality over time. A study adapting the Cystic Fibrosis Questionnaire to the International Classification of Functioning, Disability and Health (ICF) framework emphasized that aligning national rehabilitation metrics with global standards can enhance comparability and continuity in care (Yılmaz et al., 2022). Using ICF-based tools helps evaluate not only physical improvements but also contextual factors such as environmental barriers and personal capacities—key determinants of long-term functional sustainability.

These frameworks contribute to the establishment of evidence-based rehabilitation policies and facilitate data-driven decision-making across healthcare systems. Through standardization, outcome monitoring becomes more reliable, enabling policymakers and clinicians to identify gaps, allocate resources efficiently, and improve equity in service delivery.

Disaster Response and Community Resilience

In the context of disaster response, standardized functional assessment frameworks such as the ICF can also play a pivotal role in evaluating community needs and supporting coordinated rehabilitation efforts. Applying these tools after disasters ensures that functional limitations and environmental barriers are systematically documented, allowing for tailored interventions that foster both individual recovery and social reintegration.

Turkish research demonstrates both the growing maturity of rehabilitation practices and the need for systemic integration to ensure sustainability. The following section expands the discussion by examining global models that may inform Türkiye's path toward resilient and inclusive rehabilitation systems.

Global Models and Sustainable Practices in Rehabilitation

The sustainability of rehabilitation services relies not only on their clinical and economic

effectiveness but also on their adaptability to cultural, geographic, and systemic contexts. As health systems worldwide seek to build resilience and equity, various international models demonstrate how locally responsive and culturally grounded strategies can yield lasting benefits. These experiences provide valuable insights for countries such as Türkiye, where demographic transitions and regional disparities shape rehabilitation needs.

Culturally Adapted Rehabilitation Approaches

In high-income countries such as Australia, Canada, and the United States, culturally tailored rehabilitation programs for Indigenous and minority populations have emphasized the importance of culturally safe care, local governance, and service continuity. These programs show that long-term sustainability depends not only on clinical effectiveness but also on alignment with community values, traditions, and expectations (Holliday et al., 2021).

This principle is equally relevant for Türkiye, where cultural norms—particularly in conservative or rural regions—can influence service uptake and adherence. Strategies that build community trust and engage local actors, including family networks, NGOs, and religious leaders, can enhance participation and improve outcomes. Such culturally attuned approaches are essential for ensuring that rehabilitation becomes a socially accepted and sustained component of public health.

Rural and Remote Rehabilitation Models

Experiences from rural rehabilitation systems in countries such as New Zealand highlight how contextual adaptation can overcome geographic barriers. Integrated models combining telehealth, community-based programs, and peer support networks have successfully increased accessibility and reduced inequities (Wilkinson et al., 2022).

These insights resonate with Türkiye's regional disparities, particularly in the eastern and southeastern provinces, where infrastructure and workforce limitations persist. Mobile rehabilitation units, digital follow-up platforms, and community-based services coordinated through family physicians could replicate the success of such international models in the Turkish context.

Interdisciplinary Care and System Efficiency

Multidisciplinary rehabilitation frameworks, as implemented in Sweden and Germany, illustrate how team-based collaboration enhances patient outcomes while improving overall system efficiency (Persson et al., 2024). These models integrate physiotherapists, occupational therapists, psychologists, social workers, and medical specialists into

coordinated care pathways, ensuring holistic recovery planning.

Similar approaches could strengthen Türkiye's community-level rehabilitation. Expanding interdisciplinary capacity would align with the long-term sustainability objectives identified in earlier sections on cardiac, home-based, and post-stroke rehabilitation.

Community-Based Mental Health and Psychosocial Rehabilitation

The RECOVER-E initiative, implemented across several Eastern European countries, demonstrates the sustainability and cost-effectiveness of community-based mental health rehabilitation. By reducing reliance on institutional care and fostering psychosocial recovery, the program improved both clinical and social outcomes (Wijnen et al., 2020).

These findings support a broader understanding of rehabilitation—one that extends beyond physical recovery to include mental health, social reintegration, and community participation. Integrating such models into Türkiye's mental health system could strengthen continuity of care and promote social inclusion for individuals with chronic or complex needs.

Translating Global Lessons into the Turkish Context

While global models provide a rich evidence base, their successful application requires contextualization within Türkiye's unique healthcare, social, and demographic landscape. Several thematic priorities emerge for fostering sustainable rehabilitation nationally:

Addressing Regional Inequities

Despite substantial progress in urban centers, rural and economically disadvantaged regions still face service gaps. Strategies such as mobile rehabilitation units, community-based delivery models, and coordination through family physicians are critical for equitable access.

Overcoming Geographic and Logistical Barriers

Geographic isolation and long travel distances impede follow-up and continuity of care. Building on telehealth experiences from countries like New Zealand, Türkiye can leverage its strong digital infrastructure—particularly the *e-Nabız* and MHRS systems—to expand tele-rehabilitation coverage and remote monitoring.

Enhancing Cultural Acceptability

Cultural and gender norms may limit access, particularly for women and older adults. Culturally sensitive approaches that engage local leaders, community health workers, and NGOs can improve awareness, trust, and participation.

Strengthening Multidisciplinary Capacity

Many rehabilitation services in Türkiye remain physiotherapist-led. Integrating psychologists, social workers, dietitians, and occupational therapists into primary care teams would enhance outcomes and align with global sustainability standards.

Expanding Telehealth and Technological Integration

Although digital health infrastructure in Türkiye is advanced, standardized tele-rehabilitation protocols and outcome-tracking tools are underdeveloped. Structured frameworks for remote assessment, patient education, and continuity of care are essential to maximize efficiency and scalability.

Key Insights for Sustainable Rehabilitation Systems

Synthesizing global evidence and local realities reveals several cross-cutting principles that underpin sustainability in rehabilitation systems:

- *Accessibility and Continuity:* Overcome financial, geographic, and logistical barriers to long-term engagement.
- *Efficient Resource Utilization:* Optimize human, infrastructural, and financial inputs for cost-effective delivery.
- *Community Ownership:* Involve patients, caregivers, and local organizations in co-designing rehabilitation processes.
- *Integrated System Design:* Embed rehabilitation within broader health, social, and municipal services.
- *Data-Driven Evaluation:* Implement longitudinal tracking systems to monitor outcomes and guide policy refinement.
- *Technological Innovation:* Leverage tele-rehabilitation, wearable sensors, and virtual reality tools—while ensuring equitable access and digital inclusion.

Together, these elements provide a framework for building resilient and sustainable rehabilitation systems that not only restore function but also reinforce social cohesion and population health.

Research Gaps and Policy Directions for Sustainable Rehabilitation

Despite the growing global recognition of rehabilitation as an essential component of public health, significant research and policy gaps continue to limit its full integration and sustainability. In Türkiye, as in many countries, rehabilitation research remains fragmented, short-term in scope, and insufficiently connected to national health strategies. Addressing these gaps is essential for building resilient, equitable, and evidence-based rehabilitation systems that can meet long-term population needs.

Insufficient Longitudinal and Outcome-Based Research

One of the most persistent gaps in rehabilitation research is the lack of longitudinal data evaluating functional outcomes over time. While short-term program efficacy is often

reported, evidence on the durability of these outcomes—particularly among populations with chronic diseases or complex disabilities—remains limited (Kılınç et al., 2021). Establishing nationwide cohort studies that follow patients beyond hospital discharge is crucial. These studies should integrate clinical, social, and quality-of-life indicators to evaluate the true sustainability of rehabilitation outcomes.

Limited Integration of Rehabilitation into Broader Health Systems

Rehabilitation is still frequently treated as a supplementary or post-acute service rather than a core component of health systems. In Türkiye, health policy and research continue to emphasize curative and acute-care models, leaving rehabilitation underrepresented in chronic-disease management, elder care, and primary health-care strategies (World Health Organization [WHO], 2023; Türkiye Yaşlı Sağlığı Raporu, 2021). To support sustainable health-system performance and population functioning, it is essential to reframe rehabilitation as a continuous process that spans prevention, treatment, recovery, and social reintegration.

The global evidence base underscores that without systematic integration of rehabilitation into all levels of health care, systems will struggle to meet the rising burden of non-communicable diseases and ageing populations. According to the WHO's guide on integrating rehabilitation in health systems, governments are advised to adopt a four-phase approach comprising situation assessment, strategic planning, monitoring and evaluation, and full implementation (WHO, 2019). Furthermore, the recent meeting report of the *Rehabilitation 2030* initiative highlights that rehabilitation remains undervalued and underfunded in many health systems and calls for its recognition as a core service through universal health coverage (WHO, 2023).

In the context of Türkiye, recent assessments of elderly health emphasize significant gaps in rehabilitation coverage and service provision. The TUSEB report highlights that most older adults lack access to comprehensive, continuous rehabilitation services, and current programs are often fragmented across hospitals, primary care, and social support systems (Türkiye Yaşlı Sağlığı Raporu, 2021). Embedding rehabilitation within governance mechanisms, health information systems, resource-allocation models, and primary-health-care services is crucial to elevate its status from a marginal service to an integral system element. Only then can health-system resilience, functional outcomes, and equity of access be reliably improved.

Underdeveloped Community-Based and Digital Models

Although technological capacity has expanded—particularly following the COVID-19 pandemic—systematic research on community-based, home-based, and tele-rehabilitation models remains limited. Studies evaluating cost-effectiveness, patient

satisfaction, and clinical outcomes in digital environments are still scarce in Türkiye (Topbaş et al., 2023). Scaling up pilot programs and embedding digital rehabilitation protocols into national service delivery could significantly enhance access, particularly in rural and underserved regions.

Fragmented Data Infrastructure and Lack of Standardization

A sustainable rehabilitation ecosystem depends on robust data systems and standardized outcome measures. Currently, the absence of unified data collection frameworks and inconsistent application of international standards such as the *International Classification of Functioning, Disability and Health (ICF)* impede benchmarking and quality improvement (Stucki & Bickenbach, 2019). In Türkiye, limited pilot implementations of ICF exist, but they remain fragmented. Establishing a centralized national rehabilitation registry under the Ministry of Health could facilitate evidence-based decision-making and cross-institutional comparability.

Policy Priorities for a Sustainable Rehabilitation Future

In response to the identified structural and research gaps, a coherent framework of policy interventions is suggested:

Establish a Long-Term Care Insurance Scheme

Türkiye currently lacks a formal mechanism to finance long-term rehabilitation needs. A dedicated long-term care insurance scheme—integrated with existing health and social services—would provide sustainable funding for elderly, disabled, and chronically ill populations (Kara, 2025).

Diversify Rehabilitation Delivery Models

Expanding beyond hospital-based care toward hybrid models that combine home-based, community-based, and tele-rehabilitation services can enhance accessibility and reduce inequalities (Tschanper et al., 2021).

Standardize Assessment and Outcome Measures

Nationwide implementation of validated frameworks such as the International Classification of Functioning, Disability and Health (ICF) can substantially enhance data interoperability and support longitudinal monitoring of rehabilitation outcomes. Recent studies emphasize that integrating ICF-based metrics into national health information systems facilitates not only consistent data collection but also outcome comparability across institutions and regions (Kostanjsek et al., 2021; Prodingner & Tennant, 2023).

Establishing a centralized digital platform for rehabilitation outcome reporting would further

promote transparency, accountability, and quality assurance within healthcare delivery. Such platforms, when aligned with international data standards, enable continuous evaluation of functional outcomes and guide evidence-informed policy decisions (World Health Organization, 2023).

Integrate Rehabilitation into Public Health and Social Strategies

Rehabilitation should be systematically embedded within national chronic disease, aging, and disaster management policies. Cross-sectoral collaboration among the Ministry of Health, municipalities, NGOs, and academic institutions can ensure continuity of care and promote public participation (WHO, 2023; Altındağ et al., 2022).

Invest in Workforce Training and Capacity Building

Expanding and diversifying the rehabilitation workforce is critical for long-term sustainability. Educational reforms should emphasize interdisciplinary and community-based training, while incentives should support deployment of professionals in underserved regions (OECD, 2023).

Summary and Future Directions

Bridging the gap between research and practice is essential for achieving sustainable rehabilitation in Türkiye. Strengthening longitudinal evidence, integrating rehabilitation into national health priorities, and developing standardized data systems will provide the foundation for more equitable and efficient care. Policymakers must view rehabilitation not as a supplementary service, but as a strategic investment in public health and social well-being. Future research should therefore adopt interdisciplinary, system-wide perspectives that align clinical outcomes with social and economic sustainability goals.

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