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AN INTEGRATED REVIEW ON GLOBAL ASSESSMENT OF HEALTH TECHNOLOGY IN THE HEALTHCARE SYSTEM

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ABSTRACT

Healthcare Technology Assessment plays a major role in assessing the health system, so the global assessment of HTA helps in understanding the need for transparent, fact-based decision-making in the healthcare industry to guarantee effective resource allocation and better health results. HTA will significantly impact how healthcare will be provided worldwide by evaluating the effects of health technology on society, the economy, and science. Countries differ greatly in how HTA is implemented and developed. Middle-income countries like Argentina, Brazil, and Thailand are in the intermediate stages of growth, while high-income countries like Australia, Canada, Germany, and England have well-developed HTA systems. Legal and institutional obstacles prevent HTA from being fully implemented in some nations, such as Croatia, but Hungary has a well-developed HTA procedure for pharmaceuticals. Developing countries like Sri Lanka need to allocate resources efficiently because healthcare expenses are rising. HTA can enhance decision-making and guarantee effective healthcare delivery, notwithstanding its current state of development. The global spread of HTA has emphasized its importance in health policy, emphasizing the need for context-sensitive, transparent approaches to achieve global equity and efficiency in healthcare systems. According to the findings, HTA is crucial for policymakers in helping to allocate resources, reduce inefficiencies, and ensure that technologies are adopted that are both financially viable and consistent with public health priorities. As global healthcare systems face mounting demands and budgetary constraints, HTA provides a systematic approach to integrating clinical, economic, ethical, and social factors into policy decisions, making an essential component of sustainable healthcare systems.

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INTRODUCTION

A health system is made up of individuals, organizations, assets, and activities whose primary goal is to maintain, improve, and/or promote health, according to the World Health Organization. It also acknowledges that not all nations can implement the above definition of a health system, but it specifies that, in an ideal world, a modern health system would:1

- work to enhance the health of the people it serves;
- react to the reasonable expectations of the public; and
- protect against the financial burden of an individual's illness.1

In order to address health issues and enhance quality of life, health technologies encompass pharmaceuticals, medical equipment, assistive technology, methods, and processes. These

technologies are widely utilized in healthcare institutions of all kinds, are integral to modern healthcare systems, and improve patient care. However, their utilization must be supplemented by efficient health service organization and staff training2.

A thorough, multidisciplinary analysis of health technologies and interventions that looks at both their direct and indirect effects is known as health technology assessment (HTA). Its main objective is to evaluate these technologies' worth and recommend how best to implement them in global health systems. HTA is an open, accountable approach that provides evidence-based insights to support healthcare policy decisions, assisting stakeholders and decision-makers. It acts as an essential conduit between policy and research3.

The use of Health Technology Assessments (HTA) as a means of advising and guiding innovators and strategists in the design of medical care arrangements is growing in many nations. This is a result of the realization that resources are limited and, as a result, technologies require evaluations that go beyond mere scientific viability. HTA groups use "contextual, societal, and moral issues" in an effort to "streamline accessible assets."4

Even though the bodies are somewhat identical, the review process was quite thorough, and the proof was also given appropriate weight and explanation. HTA bodies attempt to assess the potential and costs of technologies in terms of both therapy and finances, taking into account the whole effects of any technology created in light of unmet needs and innovation. It identifies the patients who will benefit, the best way to use an intervention, and where it fits within the larger scope of care.4

The US Office of Technology Assessment (OTA), which was founded in 1976 and primarily focused on efficacy and safety, produced the first report on the development of HTA. Since then, HTA has expanded throughout almost all of Europe, Australia, South America, and Asia. Many people working in HTA were inspired by the expansion to start HTA-interested societies and networks. Several well-known HTA and associated organizations are INAHTA, WHO, World Bank, PAHO, ISTAHC and HTAi, Euroscan, and Cochrane Collaboration. HTA has grown significantly over the past thirty years, and it's important to note that the Malaysian Health Technology Assessment Section (MaHTAS) was the first HTA organization to be founded in Asia.5

The need for the global assessment will help Decision-makers make better decisions by using Health Technology Assessment (HTA), a type of policy research that methodically looks at the short- and long-term effects of health technology, a group of related technologies, or issues relating to technology. Health technology is an intervention that can be utilized for rehabilitation, acute or chronic disease prevention, diagnosis, or treatment. Pharmaceuticals, equipment, techniques, and organizational structures utilized in the medical field are examples of health technologies. Prevention programs, diagnostic tests, medications, and procedures are a few examples.5

In the 1970s, policy implications surrounding computed tomography scanners sparked the beginning of health technology assessment. Since then, the field's focus has shifted significantly from reviewing medical equipment to policy related to significant public health issues, such as the management of back pain, drug and alcohol abuse, and widespread disease screening. The primary goal of health technology assessment is to integrate scientific data and analyze the social, ethical, and financial effects of health technology use and distribution.6

This review aims to examine the implementation and effectiveness of HTA in various worldwide healthcare systems. Specifically, it aims to: Identify the gaps and barriers to HTA adoption, particularly in resource-constrained situations. Examine and contrast the HTA policies of developed and developing countries. Examine the effects of HTA on healthcare outcomes and the efficiency of resource allocation.

By examining foreign HTA protocols and assessing their impact, this research provides insights into best practices and areas for improvement. These findings are important for policymakers because they show how HTA may support sustainable healthcare systems globally and aid in budget allocation.

METHODS

This review uses a combination of literature review and case studies to analyze the implementation of HTA in various countries. The study involves desk research and structured interviews with key stakeholders from countries with well-established HTA systems, such as Canada, the UK, and Germany, as well as countries in the early stages of HTA development, such as Sri Lanka and Thailand. The data collected from these sources is used to compare HTA policies, identify challenges, and explore the impact of HTA on healthcare outcomes.

RESULTS AND DISCUSSION

Health Technology Assessment (Hta): A Global Overview

In Sri Lanka, both the public and private sectors offer healthcare services. The country's entire system of comprehensive health care is under the jurisdiction of the Ministry of Health Sri Lanka. 1989 saw the establishment of the current system. There are three recognized tiers of healthcare that make up a decentralized pyramidal structure: preventive, rehabilitative, and curative. The technical facets of health care services fall under the purview of the Director General of Health Services (DGHS) at the federal level. Being a developing nation, the majority of Sri Lanka's healthcare facilities are provided by the public sector at no cost and are paid for by taxes. In 2016, government spending on health care accounted for 3.9% of GDP, according to the National Health Accounts.5

Through a study, a SWOT analysis was conducted with the help of a literature review and expert's opinion for the implementation of HTA in Sri Lanka but HTA is not yet well-established in Sri Lanka, despite being an essential tool for prioritization. The epidemiological and demographic conditions in Sri Lanka are causing a sharp rise in healthcare costs. The attainment of UHC efficiency, and effectiveness, including cost-effectiveness, and other crucial technological requirements will be hampered by irrational resource allocation processes. But like in other nations, parts of HTA are implemented by organizations like the National Medicines Regulatory Authority (NMRA), which is in charge of determining the necessity while guaranteeing the efficacy, safety, and quality of the medications that are sold in the nation. The policy brief's list of obstacles to HTA development at the national level is true for Sri Lanka as well.5

A study conducted in European countries such as England, France, Germany, the Netherlands, and Scotland provided HTA recommendations for conditionally approved medications through June 2017. These five jurisdictions provided guidelines and practice characteristics, which were then taken out and verified. Using Fisher exact tests, the impact of price negotiations, cost-effectiveness evaluations, and non-submission, resubmission, and reassessment actions on variations in the percentage of negative recommendations and the interpretation of intercountry variations in HTA outcomes were examined.7

Cost-effectiveness evaluations were added, and as a result, the percentage of unfavourable recommendations increased significantly in Scotland and England. Following the introduction of price negotiations, the percentage of unfavourable recommendations decreased significantly in England/Wales, France, and Germany. The addition of resubmissions and no submissions may have an impact on Scottish negative HTA recommendations, according to the results, but this impact was not statistically significant. Perhaps as a result of the small sample size, no notable impacts were seen in the Netherlands.7

In this study in order to determine best practices, they created an assessment framework with 13 criteria based on the Accountability for Reasonableness framework (a deliberative appraisal process) and the INTEGRATE-HTA model (an integrative view on assessing health technology). They looked at various HTA systems in high-income (Australia, Canada, England, France, Germany, Scotland, and South Korea) and middle-income (Argentina, Brazil, and Thailand) nations. Desk research and structured interviews were done for this aim with 32 important stakeholders who were relevant and in the chosen nations.8

Following Australia, Germany, and France, the HTA systems in Canada, England, and Scotland seem to be quite well aligned with their paradigm. While Brazil and Thailand are in an intermediate stage, Argentina and South Korea are in an early stage. Interviews and desk research both showed that scoping is frequently left out of the HTA procedure. On the other hand, it is well-established to provide evidence reports for assessment. Although they are taken into account more often, indirect and unintentional consequences still need to be improved. There is a lack of defined monitoring and evaluation systems for the HTA process among nations. Lastly, it takes time to implement strong, transparent procedures, such as stakeholder consultation.8

In Central, Eastern, And South European Countries like Croatia where the legislative framework, the decision-making process, and HTA were all examined through retrospective descriptive analysis of important documents. Analysis of seven of the eight essential elements of the HTA implementation scorecard framework a tool to evaluate the present state of HTA implementation was done to examine the strategy and experience of the Agency for Quality and Accreditation in Health Care and Social Welfare with the implementation of a transparent HTA process in Croatia.9

In Croatia, HTA has not yet been fully implemented. The primary obstacles are the inadequate legal structure, scarce financial and human resources, and low stakeholder participation. The International Society for Pharmacoeconomics and Outcomes Research, EUnetHTA, and the active international collaboration and education they provide, together with the generation of national and international HTA reports, are all facilitating elements.9

In Hungary, the Department of HTA is responsible for critically evaluating HTA submissions. The Department was founded in 2004 and is currently a part of the National Institute of Pharmacy and Nutrition, which functions independently of the NHIF as a national pharmaceutical regulatory body and as a hub for scientific and research projects in Hungary.10

Reimbursement submissions for medicines (since 2004), simple medical devices (since 2007), and sophisticated medical devices (since 2010) like hospital technologies are subjected to a critical evaluation by the Department of HTA. For pharmaceuticals, which make up the bulk of the job the Department of HTA delivers, Hungary has the most intricate and sophisticated HTA process. In the past, the Department reviewed between 80 and 100 proposals per year.10

Since 2004, the usage of HTA has been mandated in Hungarian decision-making processes. The clinical efficacy, safety, and cost-effectiveness of the items must be demonstrated by the producers in order for them to be reimbursed. The Hungarian pharmacoeconomic principles should be adhered to and all studies should be customized to the Hungarian context.10

To improve their Health Technology Assessment (HTA) systems, China, India, and South Africa—three members of the BRICS and Global South examine their joint efforts in this collaborative work. To improve evidence-based decision-making in their healthcare systems, which are resource-constrained, these nations have committed to building HTA capability to convert evidence into policy. In addition to highlighting shared obstacles and supportive variables, the article examines the HTA journeys of each nation and makes recommendations for how South cooperation might enhance HTA capability for better healthcare decisions.11

South Africa, India, and China all face several important obstacles, such as little experience with HTA, Poor infrastructure for health data, growing expenditures for healthcare, shattered healthcare structures, and high non-communicable disease burden.11

In Sri Lanka when they have made great strides in disease management, as a lower-middle-income nation, it is increasingly under pressure to use its limited resources. This emphasizes how choices must be supported by facts in order to optimize the use of scarce resources while preserving efficiency and equality. In the healthcare industry, efficiency is defined as making the most of limited resources while eliminating waste, cutting expenses, and producing results that people value.5

Allocative, cost-effective, and technical efficiency are the three categories of efficiency that matter. According to welfare economics theory, resource distribution should increase the welfare of one individual without impairing the welfare of another. This is known as Pareto efficiency. Reducing inequalities in health outcomes between various social groups is the goal of equity in healthcare. Sri Lanka strives to offer effective and fair healthcare, continuously looking to enhance its system to better serve the population.5

In European countries like England, Germany, France, Netherlands, and Scotland there were differences in the effect of Practices and HTA recommendations, in England, France, and Germany, the percentage of unfavorable recommendations dropped dramatically after price negotiations were implemented. The results showed that the addition of resubmissions and no submissions would affect Scottish negative HTA recommendations, but this effect was not statistically significant.7

The HTA procedures in South Korea and Argentina are in their infancy, based on the framework they have created and implemented. Canada, Scotland, England, Australia, Germany, and France have HTA systems that are nearly identical to their model. In between are the HTA procedures in Thailand and Brazil. As such, nations that have a longer history in HTA like Argentina, Brazil, South Korea, and Thailand appear to be less in line with what we consider to be best practices than nations that have a shorter history which are Canada, England, France, Germany, Scotland, and Australia.8

As we have seen, HTA plays a major role in assessing the Pharmaceuticals, medical devices, equipment, techniques, and organizational structures but when it comes to Croatia HTA is not completely implemented and they also face challenges like insufficient legal framework, human and financial resources and also with limited stakeholder involvement.9 When it comes to Hungary they have a highly developed methodological and educational foundation for HTA. Transparency and the nation's use of science in decision-making can be further enhanced with a persistent focus on capacity building and modifications to the reimbursement process.10

The project has been carried out in seven countries Jordan, Canada, Palestine, Switzerland, Lebanon, Brazil, and Tanzania. The results of this research targeted a variety of beneficiaries, groups, and stakeholders at the local, regional, and global levels in the short- or long-term on the area of HTA, which will improve healthcare priority setting. This research has enormous direct and indirect benefits. Direct and indirect beneficiaries are the two groups of people who will profit from the study project's outcomes when it is implemented.12

Table 1. SWOT Analysis of Global HTA Implementation

STRENGTHS	**WEAKNESS**
- International organizations such as WHO and INAHTA have provided strong support.[5] - Proven capacity to improve healthcare systems' resource allocation and cost-efficiency, as demonstrated in Canada, Australia, and some European countries.[8] - Transparency and stakeholder involvement are supported by an evidence-based approach.[10]	- In low- and middle-income nations, such as South Korea and Sri Lanka, financial constraints limit HTA's potential.[5,8] - In certain countries, including Croatia, legal and regulatory restrictions prevent HTA from reaching its full potential.[9] - In underdeveloped nations, there is a lack of trained staff and institutional capacity.[5,10,12]
OPPORTUNITIES	**THREATS**
- Global adoption of HTA may increase in response to the growing need for evidence-based policy.[11] - Increasing partnerships between nations and international health organizations can aid in the development of HTA in environments with limited resources.[5] - HTA procedures can be streamlined by advancements in data collecting and	- Budgetary constraints and growing healthcare expenses could result in low funding for HTA.[5] - In developing nations, political or economic instability may cause delays or disruptions to the implementation of HTA.[8,12] - HTA development may not keep up with the rapid improvements in

health information technology.[5]	technology, which could result in inefficiencies[7]

The foundation of contemporary healthcare systems is Health Technology Assessment (HTA), which empowers policymakers to make educated, evidence-based decisions that maximize the utilization of scarce resources13. By assessing medical technology, medications, and interventions not only for their clinical efficacy but also for their economic, ethical, and social implications, HTA has demonstrated its ability to address complex healthcare concerns on a worldwide scale. This multifaceted strategy guarantees that innovations are not only economically feasible and appropriate for meeting the various needs of various populations, but also scientifically viable14.

Many countries have created extensive HTA frameworks that are used as international standards, including Canada, England, Germany, and Australia. In order to improve healthcare outcomes, decrease inefficiencies, and expedite resource allocation, these countries have developed methodical procedures for incorporating HTA into their health policy-making. For example, in countries like England and France, the percentage of unfavorable recommendations was greatly decreased by using HTA to steer pricing negotiations, resulting in more accessible and reasonably priced healthcare solutions. Their HTA systems' high degree of conformity to international best practices emphasizes how crucial openness, stakeholder participation, and flexibility are when evaluating health technology.8,15

Croatia, Sri Lanka, Argentina, and South Korea, on the other hand, have major challenges to effectively adopting HTA, including restricted legal frameworks, insufficient human and financial resources, and low levels of stakeholder involvement. For instance, despite extensive international cooperation with groups like EUnetHTA, Croatia's HTA development is hampered by a lack of resources and an inadequate regulatory framework. Similarly, despite its progress in public health, Sri Lanka finds it difficult to fully benefit from HTA because of budgetary constraints and the requirement for improved resource allocation procedures. In both situations, resolving these issues is crucial to creating a stronger HTA framework that facilitates efficient healthcare prioritization.5,8,9,16

In the future, HTA will become more and more important in determining healthcare policies, especially in nations with expanding healthcare needs and limited funding. HTA helps guarantee that innovations are adopted based on their entire worth to the healthcare system, taking into account not only clinical outcomes but also cost-effectiveness and social equality by bridging the gap between research and policy. Additionally, the worldwide experience shows that in order to support sustainable healthcare systems, ongoing capacity-building, and HTA process improvement are necessary, particularly in emerging economies.17

The global assessment of HTA concludes by demonstrating that whereas some nations have achieved notable progress, others are still developing their potential. Nonetheless, the fact that HTA is widely acknowledged as being important highlights its essential role in creating healthcare systems that are more effective, egalitarian, and efficient16. To make sure that healthcare innovations genuinely benefit populations and promote long-term health system sustainability, nations must continue to enhance their HTA frameworks while integrating scientific data with ethical, social, and economic factors.17

CONCLUSION

In conclusion, Health Technology Assessment (HTA) plays a critical role in shaping modern healthcare systems by enabling policymakers to make informed, evidence-based decisions that maximize the use of limited resources. By evaluating medical technologies, interventions, and medications not only for their clinical effectiveness but also considering their economic, ethical, and social implications, HTA ensures that healthcare innovations are scientifically viable, economically feasible, and appropriate for diverse populations. While countries like Canada, England, Germany, and Australia have established robust HTA frameworks, others such as Croatia, Sri Lanka, and Argentina face significant challenges in adopting HTA due to legal, financial, and resource constraints. Addressing these challenges is essential for improving healthcare prioritization and outcomes. As healthcare needs continue to grow globally, HTA will be crucial in promoting equitable, cost-effective,

and sustainable healthcare systems. Therefore, strengthening HTA frameworks and integrating scientific, ethical, and social considerations will be key to ensuring that healthcare innovations benefit populations and contribute to long-term health system sustainability.

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