

From Economic and Financial Fragility to Health System Collapse: Early Warning Signals

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Abstract

Economic and financial fragility is increasingly recognized as one of the major influentials to health system instability, yet existing research has largely examined financial challenges through isolated indicators such as healthcare expenditure, budget deficits, or insurance financing. A comprehensive framework explaining how economic and financial pressures progressively accumulate and contribute to health system saturation and collapse remains limited.

This study aimed to find a comprehensive framework for understanding economic and financial fragility as a pathway to health system collapse and to identify measurable early warning indicators capable of supporting proactive risk assessment.

A qualitative study based on semi-structured interviews with experts in health policy, health economics, health financing, healthcare management, and digital health was conducted. Interview data were analyzed using thematic analysis to identify the principal dimensions of economic and financial fragility and their associated early warning signals. The identified themes were subsequently translated into measurable operational indicators and organized within a quantitative risk assessment matrix with five progressive risk levels ranging from Safe to Near to Collapse.

Five interconnected analytical levels emerged from the thematic analysis: (1) macroeconomic environment, (2) microeconomic and health market dynamics, (3) health financing system, (4) financial sustainability of healthcare providers, and (5) household financial protection. Participants consistently described economic and financial fragility as a cumulative process in which pressures originating in the broader economy progressively weaken financing mechanisms, healthcare organizations, and financial protection for households. In This study was identified early warning indicators and incorporated into an operational Economic and Financial Fragility Risk Assessment Matrix designed to support systematic monitoring of financial vulnerability before health system saturation occurs.

Economic and financial fragility should be understood as a dynamic systemic process rather than an isolated financial event. The proposed framework extends existing approaches by integrating macroeconomic conditions, financing performance, provider sustainability, and household financial protection into a unified early warning system. By translating qualitative evidence into measurable operational indicators, the framework provides policymakers and health system managers with a practical tool for identifying emerging financial risks, strengthening resilience, and implementing timely interventions before economic and financial fragility progresses to health system saturation and collapse.

Keywords: Economics ;Financial Fragility; Health System; Collapse; Early Warning

1. Introduction

Health systems are increasingly required to maintain accessible, continuous, and high-quality services while operating under persistent economic uncertainty, fiscal constraint, rising healthcare costs, demographic and epidemiological pressures, and recurrent external shocks (OECD, 2024; World Health Organization & World Bank, 2025). Economic downturns can affect health systems through multiple pathways, including declining public revenues, constrained health expenditure, austerity measures, deteriorating population health needs, and increased pressure on healthcare services (Fleming et al., 2023; Prędkiewicz et al., 2022; Sánchez-Recio et al., 2022). Experiences from countries affected by severe fiscal and economic crises further demonstrate that financial pressures can extend beyond temporary budgetary difficulties and progressively affect healthcare capacity, accessibility, workforce conditions, and the continuity of services (Diamantis et al., 2020; Massuda et al., 2018). Consequently, economic and financial vulnerability should be considered not merely as a financing concern but as a potential systemic pathway through which the capacity of a health system to sustain its essential functions can progressively deteriorate (Foroughi et al., 2025; Kurowski et al., 2019).

The relationship between the wider economy and health-system functioning begins at the macroeconomic level, where economic growth, government revenue, fiscal deficits, public debt, inflation, and available fiscal space influence the resources that governments can mobilize and sustain for health (Barroy et al., 2018; Gottret & Schieber, 2006; OECD, 2024). Economic recession and fiscal contraction can restrict the capacity to preserve public health expenditure precisely when population needs and pressures on publicly financed services may be increasing (Fleming et al., 2023; Prędkiewicz et al., 2022; Sánchez-Recio et al., 2022). High public debt and fiscal stress can further narrow policy choices by increasing competition for government resources and limiting the capacity to finance health-system investment and recurrent expenditure (Diamantis et al., 2020; Kurowski et al., 2021). The sustainability of health financing is therefore inseparable from the broader fiscal and macroeconomic environment within which revenue raising, resource allocation, and health-sector expenditure occur (Gottret & Schieber, 2006; Kurowski et al., 2019; WHO, 2016).

Macroeconomic pressure is transmitted into health systems through markets in which healthcare organizations, purchasers, suppliers, professionals, technologies, and patients interact under conditions of imperfect information and constrained resources (Bigdeli et al., 2014; Gottret & Schieber, 2006). Medicine and technology markets are particularly important because price, availability, affordability, procurement performance, and supply conditions directly influence both the cost and continuity of service delivery (Mendis et al., 2007; WHO & Health Action International, 2008). Evidence from low- and middle-income countries has demonstrated substantial variation in medicine availability and affordability, including high prices, inefficient procurement, excessive distribution mark-ups, and limited availability of essential medicines in public facilities (Mendis et al., 2007; WHO & Health Action International, 2008). These market-level pressures can therefore transform broader economic instability into rising operating costs and resource constraints within the health sector, making microeconomic and health-market dynamics an important intermediate level between macroeconomic conditions and institutional financial stress (Bigdeli et al., 2014; WHO, 2017).

The capacity of a health system to absorb these pressures depends substantially on the design and functioning of its financing arrangements, particularly revenue raising, pooling, purchasing, and provider-payment mechanisms (Gottret & Schieber, 2006; Jowett et al., 2020; WHO, 2010 a,b). Adequate financing alone does not guarantee financial resilience, because fragmentation of pools,

weak purchasing arrangements, poorly aligned provider-payment systems, and rigid public financial management can reduce the ability of available resources to generate equitable and effective services (Mathauer et al., 2017; WHO, 2016, 2019). Strategic purchasing is especially important because benefit-package design, provider incentives, payment methods, and predictable funding flows must remain aligned if promised services are to be translated into actual service delivery (Mathauer et al., 2017; WHO, 2019). Health-financing fragility can consequently emerge not only from insufficient resources but also from weaknesses in the way resources are mobilized, pooled, allocated, transferred, and converted into healthcare services (Gottret & Schieber, 2006; Jowett et al., 2020).

Financial pressure eventually becomes operationally visible at the provider level, where hospitals and other healthcare organizations must continuously balance revenues, expenditures, liquidity, debt obligations, staffing costs, procurement requirements, and capital investment while maintaining service delivery (Akinleye et al., 2019; Dubas-Jakóbczyk et al., 2025; Hu et al., 2022). Hospital financial distress is associated with combinations of weak profitability, deteriorating liquidity, indebtedness, reimbursement conditions, organizational characteristics, and market circumstances, and sufficiently severe financial deterioration can precede service contraction or closure (Enumah & Chang, 2021; Malone et al., 2025). Liquidity is particularly important because organizations may remain nominally operational while their capacity to meet short-term obligations, pay suppliers, maintain infrastructure, and respond to unexpected demand progressively deteriorates (Hu et al., 2022). Provider financial sustainability should therefore be understood not simply as an accounting outcome but as a condition that can directly influence the continuity, capacity, and potentially the quality and safety of healthcare delivery (Akinleye et al., 2019; Dubas-Jakóbczyk et al., 2021, 2025).

At the population level, accumulated financial pressure becomes visible through declining household financial protection, particularly when access to needed healthcare increasingly depends on direct out-of-pocket expenditure (WHO, 2010; WHO & World Bank, 2025). High out-of-pocket payments expose households to catastrophic health expenditure, impoverishment, and unequal access, with systematic reviews demonstrating that these risks are shaped by household socioeconomic circumstances, insurance coverage, disease burden, and health-system financing arrangements (Azzani et al., 2019; Eze et al., 2022; Mohsin et al., 2024). Financial hardship is also an incomplete measure if considered without unmet need, because households unable to afford healthcare may delay or forgo services and therefore incur little or no expenditure despite experiencing substantial barriers to access (WHO & World Bank, 2021). Evidence across different settings further indicates that greater reliance on pooled public financing is generally associated with stronger financial protection, whereas heavy reliance on out-of-pocket expenditure transfers a larger share of financial risk to households (Grima et al., 2018; Sofi & Yasmin, 2024; WHO & World Bank, 2021). Thus, household financial protection represents not an isolated endpoint but the population-level manifestation of how effectively the wider health financing system protects access under economic pressure (Kolasa & Weychert, 2024; WHO, 2024a,b; WHO & World Bank, 2025).

These relationships are especially important because health systems are composed of interdependent functions rather than independent organizational components (WHO, 2007). The WHO framework identifies service delivery, health workforce, health information systems, medical products and technologies, health financing, and leadership and governance as six interconnected building blocks, while explicitly recognizing that real health-system challenges

commonly cross the boundaries between these components and require integrated responses (WHO, 2007). Economic and financial deterioration can therefore propagate beyond the financing block by affecting procurement and medical products, workforce retention and remuneration, infrastructure and information investment, service capacity, and the governance choices through which increasingly scarce resources are allocated (Fleming et al., 2023; Kurowski et al., 2021; WHO, 2007). A system may consequently continue to report conventional measures of activity or expenditure while underlying financial buffers, operational flexibility, and capacity to respond to additional pressure are progressively being depleted (OECD, 2023, 2024).

This concern is consistent with the progression of our broader research program on health-system saturation and collapse, which conceptualizes collapse as a progressive process rather than an exclusively sudden event and emphasizes the need to detect vulnerability before essential functions are lost (Manafi, M. 2025, 2026; Hojabri & Manafi, 2026a). Within this program, the Stability–Efficiency–Adaptability (SEA) framework provides a complementary perspective for examining whether a health system can preserve continuity and predictability, use its available resources sustainably, and retain sufficient capacity to reorganize and respond when conditions change (Gutowski et al., 2026; Hojabri & Manafi, 2026a). Comparative analysis has further suggested that vulnerability to saturation and collapse is not exclusive to a particular health-system model, because different financing and organizational arrangements create different combinations of strengths, dependencies, and potential failure pathways (Hojabri & Manafi, 2026b). Subsequent applications of this research approach to workforce deterioration and digital saturation have similarly demonstrated the value of moving beyond static performance assessment toward identification of accumulating pressures and measurable early-warning signals (Hojabri & Manafi, 2026c, 2026d). From this perspective, economic and financial fragility can be interpreted through SEA as a process that may progressively weaken Stability through unpredictable resources and financial discontinuity, Efficiency through distorted allocation and rising costs, and Adaptability through the erosion of financial buffers and the capacity to invest, reorganize, or respond to shocks (Manafi, M. 2025, 2026; Gutowski et al., 2026; Hojabri & Manafi, 2026a).

Despite substantial literature on economic crises, fiscal space, health expenditure, health financing, strategic purchasing, hospital financial performance, and household financial protection, these areas remain largely examined as separate analytical problems rather than as interconnected stages of a potential pathway toward health-system saturation and collapse (Azzani et al., 2019; Dubas-Jakóbczyk et al., 2025; Jowett et al., 2020; OECD, 2024; Prędkiewicz et al., 2022). Existing frameworks provide valuable measures of financing performance and financial protection, but a major gap remains in understanding how deterioration originating in the macroeconomic environment is transmitted through health markets and financing arrangements to providers and households, how these pressures collectively affect Stability, Efficiency, and Adaptability, and which observable signals may indicate progression toward critical system vulnerability before widespread service failure occurs (Foroughi et al., 2025; Hojabri & Manafi, 2026a; Jowett et al., 2020). Accordingly, this study aims to find an integrated early warning framework for economic and financial fragility in health systems by examining five interconnected analytical levels: Macroeconomic Environment, Microeconomic & Health Market Dynamics, Health Financing System, Provider Financial Sustainability, and Household Financial Protection identifying the mechanisms and measurable signals through which deterioration progresses across these levels, interpreting their implications through the SEA dimensions of Stability, Efficiency, and Adaptability, and mapping their effects, where relevant, to the WHO Six Health System Building Blocks in order to support earlier recognition of conditions that may precede health-system saturation and collapse (Hojabri & Manafi, 2026a; WHO, 2007).

2. Literature Review

Economic and Financial Pressure as a Source of Health-System Vulnerability

The financial capacity of a health system is inseparable from the macroeconomic and fiscal environment in which it operates. Economic growth, government revenues, public debt, inflation, fiscal deficits, and competing expenditure priorities determine not only the volume of resources potentially available for health but also the predictability and sustainability of those resources over time (Gottret & Schieber, 2006; Kurowski et al., 2019; OECD, 2024). Fiscal space for health is therefore not simply a question of increasing health budgets; it reflects the capacity of governments to mobilize and sustain additional resources without undermining broader fiscal sustainability. Equally important is the ability to translate available fiscal resources into executable health budgets and effective service delivery through functioning public financial management arrangements (Barroy et al., 2018; WHO, 2016).

Evidence from economic downturns illustrates how deterioration in the broader economy can be transmitted to health systems. Recession, declining government revenue, austerity measures, and expenditure reductions may coincide with increasing healthcare needs, creating a countercyclical pressure in which the system is required to serve more vulnerable populations with more constrained resources (Fleming et al., 2023; Prędkiewicz et al., 2022; Sánchez-Recio et al., 2022). Experiences from countries exposed to prolonged fiscal crises further indicate that reductions or constraints in public financing can affect staffing, infrastructure, availability of services, access, and health outcomes, particularly when financial pressure persists rather than occurring as a short-lived shock (Diamantis et al., 2020; Massuda et al., 2018).

The relationship is nevertheless not mechanical. Similar macroeconomic shocks can produce different health-system consequences depending on fiscal buffers, financing structures, institutional capacity, political choices, and the ability to protect health expenditure during periods of contraction (Kurowski et al., 2019, 2021; OECD, 2024). This distinction is important for early-warning analysis: deterioration in GDP growth or fiscal balance may indicate increasing exposure, but the consequences for health-system functioning depend on whether financial institutions can absorb, redistribute, or compensate for the shock. Macroeconomic indicators should therefore be interpreted as upstream signals of vulnerability rather than as direct evidence of health-system failure.

Transmission of Economic Pressure into Health-System Financing and Markets

Once macroeconomic constraints reach the health sector, their effects are mediated by the organization of revenue raising, pooling, purchasing, budgeting, and provider-payment arrangements. Health-financing systems perform several interconnected functions: collecting revenue, pooling financial risk, and purchasing services, each of which influences the capacity to maintain access, financial protection, and service delivery (Gottret & Schieber, 2006). Weakness in any of these functions can amplify economic pressure. Fragmented pools can limit redistribution; poorly designed purchasing can weaken incentives for efficient provision; and unpredictable or rigid budget execution can prevent formally allocated resources from reaching providers when needed (Mathauer et al., 2017; WHO, 2016, 2019).

The distinction between the nominal availability of funding and the operational usability of funding is particularly important. WHO evidence emphasizes that increasing resources alone does not guarantee progress if funds cannot be directed toward priority services and populations or used flexibly and efficiently (WHO, 2016). Evidence from Central, Eastern and South-Eastern European countries similarly demonstrates that rigid public-finance arrangements, delayed budget execution, limited provider autonomy, and weak links between budgeting and performance can

impair the effective use of health resources (Ruiz et al., 2019). Thus, budget execution rates, expenditure delays, accumulation of arrears, deviations between approved and executed budgets, and declining fiscal flexibility may provide warning information that is not captured by aggregate health-expenditure indicators alone.

Provider-payment mechanisms constitute another transmission channel. Fee-for-service arrangements may encourage excessive service volume and complicate cost containment, whereas inadequately calibrated fixed budgets or capitation arrangements can generate incentives to restrict supply. Case-based and diagnosis-related group payment mechanisms were introduced in many settings partly to align payment more closely with activity and improve efficiency, although their effectiveness depends on appropriate pricing, institutional capacity, monitoring, and alignment between reimbursement and the actual costs of care (Annear & Huntington, 2015). A persistent divergence between provider costs and reimbursement therefore represents more than a technical payment problem: it can progressively transfer financial pressure from purchasers to healthcare organizations.

Health markets provide an additional pathway through which economic stress affects service delivery. Medicines, medical products, technologies, energy, imported inputs, and other operational resources expose health systems to changes in prices, exchange rates, procurement conditions, and supply availability. Studies of medicine prices and availability have demonstrated substantial differences between procurement prices, retail prices, and affordability, particularly in resource-constrained settings (Mendis et al., 2007; WHO & Health Action International, 2008). Where systems are dependent on imported medicines or technologies, currency depreciation and inflation can increase the domestic cost of essential inputs even when nominal health budgets remain unchanged. Consequently, declining purchasing power, medicine-price inflation, procurement difficulties, and reduced availability of essential products can serve as intermediate signals through which macroeconomic deterioration becomes clinically and operationally visible. (Sharifi et al., 2018)

These issues demonstrate that financial vulnerability cannot be assessed solely through the amount spent on health. The structure, timing, allocation, purchasing power, and flow of resources are equally important. A system may therefore appear adequately financed according to aggregate expenditure while simultaneously experiencing budget rigidity, delayed transfers, distorted payment incentives, procurement pressure, or declining real purchasing power.

Financial Fragility at the Provider Level

Healthcare providers constitute the point at which financing constraints become operational constraints. Hospitals must continuously reconcile reimbursement and other revenues with wages, medicines, utilities, maintenance, debt obligations, capital investment, and the costs associated with changing population needs and technological requirements. Their financial condition therefore provides an important intermediate signal between health-financing arrangements and actual deterioration in service capacity.

Empirical evidence demonstrates that hospital financial performance is multidimensional and cannot be represented adequately by a single accounting measure. Profitability, liquidity, leverage, cash flow, equity, payer mix, organizational characteristics, market conditions, and reimbursement structures can all contribute to financial vulnerability (Akinleye et al., 2019; Dubas-Jakóbczyk et al., 2025; Enumah & Chang, 2021). European evidence similarly indicates substantial heterogeneity in hospital financial performance and highlights the limitations of relying predominantly on individual profitability ratios rather than composite measures capable of representing the broader financial position of providers (Dubas-Jakóbczyk et al., 2025).

The consequences of deterioration can extend well beyond accounting performance. Akinleye et al. (2019) found a positive relationship between hospital financial performance and composite measures of quality and safety, suggesting that financially stable organizations may be better positioned to sustain reliable systems and invest in quality improvement. Financial distress can also trigger organizational responses including workforce reductions, postponement of investment, elimination of services, and ultimately bankruptcy or closure (Enumah & Chang, 2021). Financial weakness at provider level can therefore become a direct mechanism through which economic fragility affects healthcare availability and continuity.

Importantly, financial distress may be detectable before organizational failure occurs. Predictive models of rural hospital distress have used financial performance, reimbursement patterns, organizational characteristics, and market variables to estimate subsequent negative cash flow, negative equity, or closure (Malone et al., 2025). Such evidence is particularly relevant to early-warning systems because it demonstrates that provider failure is not necessarily an unpredictable endpoint. Recurrent operating deficits, declining cash-flow margins, deteriorating liquidity, increasing liabilities, negative equity, worsening payer mix, and sustained reimbursement–cost gaps may represent progressive signals of declining financial resilience.

Recent European experience reinforces this concern. Financial pressures associated with economic stagnation, inflation, workforce costs, infrastructure requirements, and constrained reimbursement have placed hospitals under substantial strain even within historically well-resourced health systems (Rizzuti, 2025). This observation challenges the assumption that financial fragility is principally a problem of low-resource systems. Rather, vulnerability may arise wherever the growth of costs and obligations persistently exceeds the capacity of financing arrangements to adjust.

Household Financial Exposure and Loss of Financial Protection

The consequences of economic and financial fragility ultimately extend to households. Financial protection is a central objective of health financing because the need for healthcare is uncertain and potentially expensive, making direct payment at the point of use capable of exposing households to substantial financial risk (Gottret & Schieber, 2006; WHO, 2010). Prepayment and pooling are intended to redistribute this risk across populations and over time; when these mechanisms are inadequate, households absorb a greater proportion of healthcare costs directly.

Out-of-pocket expenditure is therefore a critical indicator, but its interpretation requires attention to both expenditure and access. High direct payments can produce catastrophic health expenditure and impoverishment, particularly among households with lower income, chronic illness, older members, or repeated healthcare needs (Azzani et al., 2019; Eze et al., 2022; Mohsin et al., 2024). Cross-country evidence indicates that stronger reliance on pooled public financing is generally associated with greater financial protection, whereas systems relying heavily on out-of-pocket payment expose households to greater financial risk (Grima et al., 2018; Sofi & Yasmin, 2024).

However, expenditure-based indicators can underestimate financial fragility when households respond to unaffordable care by delaying or foregoing treatment. A household that does not purchase needed healthcare may record little or no catastrophic expenditure while nevertheless experiencing severe financial barriers to access. For this reason, financial hardship should be interpreted alongside unmet need and forgone care (WHO & World Bank, 2021, 2025). Rising cost-related unmet need, declining utilization among vulnerable groups, delayed treatment, increasing household borrowing for healthcare, and increasing incidence of catastrophic expenditure can therefore represent complementary signals of deteriorating financial protection.

Household-level indicators also provide information about upstream health-system performance. Increasing OOP expenditure may reflect inadequate public financing, gaps in benefit coverage,

medicine shortages requiring private purchase, informal payments, or the transfer of costs from purchasers and providers to patients. Household financial distress should therefore not be treated solely as a social consequence occurring outside the health system; it can represent a downstream manifestation of accumulated weaknesses in financing, purchasing, provider sustainability, and service accessibility.

From Fragmented Financial Indicators to Early-Warning Signals

Taken together, the literature provides substantial evidence that economic and financial deterioration can affect health systems through multiple interconnected mechanisms. Macroeconomic contraction can constrain fiscal capacity; constrained fiscal capacity can affect health budgets and purchasing power; financing and budgeting weaknesses can disrupt resource flows; market pressures can increase input costs; provider organizations can experience declining liquidity and financial distress; and households can ultimately face higher direct payments, catastrophic expenditure, or inability to obtain needed care. Yet these mechanisms are generally studied within separate literatures.

Macroeconomic studies predominantly examine GDP, fiscal space, public expenditure, debt, or the consequences of economic crises. Health-financing research focuses on revenue raising, pooling, purchasing, budgeting, and financial protection. Provider-level research examines profitability, liquidity, debt, cash flow, financial distress, and closure, while household studies concentrate on OOP expenditure, catastrophic spending, impoverishment, and unmet need. Each literature therefore captures a different segment of a potentially connected process.

This fragmentation has implications for early-warning assessment. Many indicators conventionally treated as outcomes within one field may function as upstream warning signals for deterioration in another. Declining fiscal space, for example, may precede health-budget constraint; deteriorating budget execution may precede delayed provider payments; widening reimbursement–cost gaps may precede liquidity problems; repeated operating deficits may precede service reductions or closure; and increasing OOP expenditure or cost-related unmet need may indicate that financial pressure has already been transferred to households. The value of an early-warning approach therefore lies not simply in identifying additional indicators but in interpreting existing indicators according to their position within a dynamic process of accumulating vulnerability.

This perspective also broadens the relationship between financial fragility and health-system performance. Within the Stability–Efficiency–Adaptability (SEA) perspective, unpredictable revenues, unstable resource flows, and provider financial distress can undermine Stability; inefficient purchasing, fragmented pooling, distorted payment incentives, and rising input costs can reduce Efficiency; and depletion of reserves, fiscal buffers, liquidity, investment capacity, and household coping capacity can progressively constrain Adaptability. Financial deterioration can consequently weaken the system's ability not only to finance current activity but also to absorb shocks and reorganize when conditions change.

The implications similarly extend across the WHO Six Health System Building Blocks. Although financing constitutes one formal building block, economic and financial pressure can affect service delivery through capacity reductions; the workforce through hiring constraints, wage pressure, and staff reductions; medical products through procurement and affordability problems; information systems and infrastructure through deferred investment; and leadership and governance through increasingly difficult allocation and priority-setting decisions. Financial fragility is therefore better understood as a cross-system vulnerability than as an isolated financing problem.

The reviewed literature consequently provides a rich set of economic and financial indicators but lacks an integrated interpretation of how these signals may accumulate and propagate toward

health-system saturation or collapse. Existing evidence supports monitoring at macroeconomic, financing, provider, market, and household levels, but these indicators are rarely connected within a single early-warning architecture. This gap provides the conceptual basis for examining economic and financial fragility as a progressive and interconnected process and for determining which combinations of signals may reveal declining Stability, Efficiency, and Adaptability before widespread service failure becomes evident. Table 1 shows Synthesis of Evidence on Economic and Financial Fragility and Potential Early-Warning Signals in Health Systems.

Table 1. Synthesis of Evidence on Economic and Financial Fragility and Potential Early-Warning Signals in Health Systems

Author(s), Year	Country/Region	Study Type/Method	Economic/Financial Issue Examined	Key Findings Relevant to Health-System Fragility	Observed Health-System Consequence	Potential Early-Warning Signal(s)
WHO, 2006	Global / multi-country	Pharmaceutical indicator framework and country data synthesis	Pharmaceutical policy, access, procurement, financing, and monitoring	Pharmaceutical-system performance requires regular monitoring of access, availability, financing, procurement, regulation, and rational use; weaknesses may remain undetected without standardized indicators.	Reduced availability, affordability, quality, and appropriate use of medicines	Declining essential-medicine availability; rising medicine prices; weak procurement performance; pharmaceutical expenditure pressure; policy/monitoring gaps
Gottret & Schieber, 2006	Global	Health-financing policy synthesis / practitioner guide	Revenue collection, pooling, purchasing, financial protection, fiscal space	Health financing depends on interrelated functions of revenue collection, pooling and purchasing; weak arrangements increase inefficiency and expose households to financial risk.	Unstable financing, fragmented risk protection, inefficient purchasing, unequal access	Government health-revenue decline; fragmented pools; increasing OOP share; inadequate prepayment; purchasing inefficiency
Mendis et al., 2007	Bangladesh, Brazil, Malawi, Nepal,	Cross-country medicine price and availability survey	Essential-medicine availability, price and affordability	Essential medicines for chronic diseases were frequently unavailable in public facilities and often unaffordable	Treatment barriers, household financial burden, interrupted chronic-disease management	Declining tracer-medicine availability; rising median price ratios; increasing days'

Author(s), Year	Country/Region	Study Type/Method	Economic/Financial Issue Examined	Key Findings Relevant to Health-System Fragility	Observed Health-System Consequence	Potential Early-Warning Signal(s)
	Pakistan, Sri Lanka			relative to household income, with substantial price variation across countries and sectors.		wages needed for treatment; widening public–private price gap
WHO & Health Action International, 2008	Global	Standardized survey methodology / technical manual	Medicine prices, availability, affordability and price components	Medicine affordability is shaped not only by procurement prices but also by taxes, mark-ups, distribution costs and market structure; standardized measurement can identify emerging affordability and supply problems.	Increased procurement expenditure and reduced access to essential medicines	Medicine price ratio; availability rate; treatment affordability in days' wages; procurement-price increase; excessive mark-ups
WHO, 2010	Global	Global health-financing report	Financing for UHC, direct payments, resource mobilization, efficiency	Adequate resource mobilization, financial-risk pooling and efficient resource use are essential for UHC; direct payments create barriers to access and financial hardship.	Financial exclusion, inefficient use of resources, catastrophic spending and unmet need	Public health-expenditure stagnation; increasing OOP share; inadequate pooled financing; rising financial hardship; evidence of health-system waste

Author(s), Year	Country/Region	Study Type/Method	Economic/Financial Issue Examined	Key Findings Relevant to Health- System Fragility	Observed Health- System Consequence	Potential Early- Warning Signal(s)
WHO, 2010	Global	Health-system indicator handbook	Access to essential medicines	A functioning system requires essential medicines to be continuously available, affordable and appropriately used; low availability and high prices are important barriers to treatment.	Stockouts, treatment interruption, reduced service readiness and household cost exposure	Tracer-medicine availability; public/private medicine prices; procurement price; treatment affordability; frequency of stockouts
Bigdeli et al., 2014	Global / LMIC focus	Systems-oriented evidence synthesis	Medicines within health systems	Medicine access reflects interactions among financing, procurement, regulation, markets, prescribing and service delivery rather than an isolated pharmaceutical problem.	Affordability problems, inefficient resource use and compromised UHC	Medicine expenditure growth; availability deterioration; procurement inefficiency; inappropriate use; increasing household medicine expenditure
Annear & Huntington , 2015	Asia-Pacific	Comparative country studies	DRG/case-based hospital payment and provider incentives	Provider-payment arrangements strongly influence service volume, efficiency and financial behaviour; FFS can promote oversupply whereas	Distorted service volume, inefficient expenditure and financial imbalance at provider level	Reimbursement–cost gap; abnormal service-volume growth/decline; case- cost divergence; payment inadequacy;

Author(s), Year	Country/Region	Study Type/Method	Economic/Financial Issue Examined	Key Findings Relevant to Health-System Fragility	Observed Health-System Consequence	Potential Early-Warning Signal(s)
				inadequate fixed budgets can produce undersupply.		provider response to payment incentives
WHO, 2016	Global	Health-financing/PFM working paper	Fiscal space, public financial management and health financing	More money does not improve health-system performance when resources cannot be allocated, executed and redirected efficiently; fiscal sustainability and PFM flexibility are essential.	Budget rigidity, inefficient allocation and inability to fund priority services	Shrinking fiscal space; budget-execution gap; expenditure rigidity; delayed fund release; increasing deviation between approved and executed budgets
World Bank, 2017	Zimbabwe	Fiscal-space country assessment	Macroeconomic conditions, government revenue, health prioritization, donor finance and efficiency	Fiscal space for health is shaped jointly by macroeconomic performance, government prioritization, external financing, new revenue sources and efficiency gains.	Restricted health expenditure and reduced ability to expand or protect essential services	GDP/revenue deterioration; declining health share of government budget; donor dependence; fiscal deficit; reduced per-capita public health spending
WHO, 2017	Global	Policy synthesis	Market forces, pharmaceutical affordability and access	Access to medicines is affected by affordability, procurement, tariffs, mark-ups, market	Medicine shortages, high household costs and unequal treatment access	Medicine stockouts; supplier withdrawal; increasing medicine prices; increasing pharmaceutical OOP;

Author(s), Year	Country/Region	Study Type/Method	Economic/Financial Issue Examined	Key Findings Relevant to Health-System Fragility	Observed Health-System Consequence	Potential Early-Warning Signal(s)
				incentives, supply chains and regulatory capacity; commercial incentives may conflict with public-health needs.		supply-chain concentration
Mathauer et al., 2017	Global	Expert/practitioner policy synthesis	Strategic purchasing, benefit design and provider payment	Strategic purchasing requires alignment among benefit design, information, governance and provider-payment systems; misalignment reduces efficiency and weakens financing performance.	Resource misallocation, inappropriate provider incentives and inefficient expenditure	Purchasing fragmentation; claims/expenditure growth disconnected from need; provider-payment misalignment; low-value spending; weak purchasing information
Massuda et al., 2018	Brazil	Policy analysis, literature review and secondary-data analysis	Economic recession, austerity and public health-system financing	Economic and political crises combined with expenditure caps threatened sustainability of SUS and risked reversing previous UHC gains, particularly where structural	Reduced system capacity, greater regional inequality and threatened service coverage	Public health-expenditure constraint; expenditure-cap pressure; declining per-capita funding; widening regional access gap; reduced service coverage

Author(s), Year	Country/Region	Study Type/Method	Economic/Financial Issue Examined	Key Findings Relevant to Health-System Fragility	Observed Health-System Consequence	Potential Early-Warning Signal(s)
				underfunding already existed.		
World Bank, 2018	Papua New Guinea	National health-financing system assessment	Health expenditure, fund flows, donor reliance and financial sustainability	Financial sustainability is constrained by weaknesses in budget execution, fund flows, payroll management and dependence on external financing.	Operational funding gaps, delayed service financing and vulnerability during donor transition	Budget–expenditure gap; delayed cash release; payroll overruns; donor share of THE; falling domestic health financing
Grima et al., 2018	Six EU Mediterranean countries	Comparative quantitative analysis	Public financing, austerity and OOP expenditure	Mediterranean systems generally had lower public health financing and higher OOP expenditure than the EU average; the financial crisis contributed to persistent public-spending reductions.	Greater household cost exposure and potential under-capacity in hospital infrastructure	Declining public health spending; increasing OOP share; reduced health spending per capita; hospital-bed undersupply
Kurowski et al., 2019	Global	World Bank policy/economic synthesis	High-performance financing for UHC and economic sustainability	Sustainable health financing requires sufficient revenues, efficient expenditure, equitable pooling and resilience to economic shocks; health	Reduced ability to maintain UHC and respond to emerging shocks	Domestic-resource mobilization gap; health-spending insufficiency; efficiency loss; weak pooling; inadequate

Author(s), Year	Country/Region	Study Type/Method	Economic/Financial Issue Examined	Key Findings Relevant to Health-System Fragility	Observed Health-System Consequence	Potential Early-Warning Signal(s)
				financing is closely connected with wider economic development.		financial preparedness
WHO, 2019	Global	Analytical governance framework	Governance of strategic purchasing	Weak governance of purchasers can undermine coordination, accountability, benefit design, provider contracting and efficient resource allocation.	Payment inefficiency, fragmented purchasing and poor alignment between resources and health needs	Weak purchaser accountability; inconsistent contracts; payment fragmentation; inadequate purchasing data; poor alignment with benefit package
Ruiz Rivadeneira et al., 2019	Central, Eastern and South-Eastern Europe	Multi-country survey	Health budgeting, expenditure governance and provider financing	Public-finance rigidities, delayed budget execution and limited provider autonomy can prevent effective use of available health resources.	Reduced flexibility of frontline providers and adverse effects on service delivery	Budget under/overspending; reporting delays; delayed execution; expenditure ceilings; frequent supplementary budgets
Akinleye et al., 2019	United States	Cross-sectional quantitative analysis of 108 acute-care hospitals	Hospital financial condition and quality/safety	Composite financial performance was positively associated with quality and safety performance;	Deterioration of financial capacity may compromise care quality and safety	Composite financial-performance score; operating margin; total margin; liquidity

Author(s), Year	Country/Region	Study Type/Method	Economic/Financial Issue Examined	Key Findings Relevant to Health- System Fragility	Observed Health- System Consequence	Potential Early- Warning Signal(s)
				financially stable hospitals appear better able to maintain reliable systems and invest in quality improvement.		deterioration; reduced capacity for quality investment
Azzani et al., 2019	Global	Systematic review	Catastrophic health expenditure and household determinants	CHE is strongly associated with low socioeconomic status, hospitalization, chronic illness, disability and older household members; poorer households are particularly vulnerable.	Financial hardship, asset depletion, debt, forgone care and impoverishment	CHE incidence; OOP-to-income ratio; healthcare borrowing; asset sales; cost-related forgone care
Jowett et al., 2020	Global	WHO health-financing assessment framework	Health-financing system performance	Health-financing performance should be assessed through multiple dimensions rather than aggregate spending alone, including revenue raising, pooling, purchasing, benefits and financial protection.	Hidden weaknesses in financing functions may undermine UHC despite apparently adequate expenditure	Revenue predictability; pooling fragmentation; purchasing performance; coverage gaps; OOP/financial hardship indicators

Author(s), Year	Country/Region	Study Type/Method	Economic/Financial Issue Examined	Key Findings Relevant to Health-System Fragility	Observed Health-System Consequence	Potential Early-Warning Signal(s)
Witter et al., 2020	Fragile and conflict-affected settings	Review of evidence	Health financing in fragility and conflict	FCAS experience disruption across revenue raising, pooling, purchasing, provider payment and financial protection; fragmented external support can intensify instability.	Service disruption, inequitable access, donor dependency and reduced financial protection	Government revenue collapse; external-finance dependence; OOP increase; disrupted provider payment; fragmented funding streams
Dong, 2020	Fragile, conflict and violence settings	World Bank policy/knowledge note	Sustainable financing in FCV situations	FCV settings commonly show very low spending, high OOP, external-funding dependence and poorly coordinated humanitarian/development financing.	Financing gaps, overstretched host systems and unstable service provision	Per-capita health spending; OOP > high share of THE; external-financing dependence; humanitarian funding gap; transition-financing gap
Diamantis et al., 2020	Greece	Retrospective study / patient survey	Government debt crisis and national health-system pressure	Debt crisis and austerity reduced public-health resources while household income also declined, shifting part of health costs toward patients and increasing	Reduced access, higher household payments and pressure on public services	Public health-expenditure cuts; increased co-payments; declining household income; greater public-hospital utilization; insurance/access problems

Author(s), Year	Country/Region	Study Type/Method	Economic/Financial Issue Examined	Key Findings Relevant to Health-System Fragility	Observed Health-System Consequence	Potential Early-Warning Signal(s)
				dependence on public hospitals.		
Kruse & Jeurissen, 2020	International / for-profit hospitals	Perspective analysis	Hospital financial sustainability during pandemic disruption	Hospitals dependent on elective activity and stable cash flow are vulnerable when demand and payment mechanisms abruptly change; organizational characteristics modify distress risk.	Revenue collapse, liquidity stress and possible provider exit	Elective-volume collapse; cash-flow reduction; revenue concentration; suspension of dividends/investment ; financial distress among high-risk providers
Crookes et al., 2020	Greece	Interrupted time-series analysis	Economic crisis and household health expenditure	The economic crisis and increased cost sharing were associated with erosion of household financial protection, with poorer households disproportionately affected.	Higher OOP burden and increasing inequality in healthcare affordability	Rising household health-spending share; increased pharmaceutical/inpatient OOP; disproportionate burden among low-income households
Kurowski et al., 2021	Global	Macrofiscal scenario and policy analysis	COVID-19 double health/economic shock and health financing	Fiscal constraints following pandemic-related borrowing threatened government health spending while household expenditure	Reduced resources for recovery and UHC, financing deficits and weakened insurance balance sheets	Declining government health spending per capita; debt-servicing pressure; SHI deficits; DAH

Author(s), Year	Country/Region	Study Type/Method	Economic/Financial Issue Examined	Key Findings Relevant to Health-System Fragility	Observed Health-System Consequence	Potential Early-Warning Signal(s)
				and development assistance were also vulnerable, creating simultaneous pressure on all major financing sources.		decline; reduced household health spending due to income loss
Enumah & Chang, 2021	United States	Retrospective longitudinal analysis, 2011–2018	Financial distress among private hospitals	A substantial proportion of hospitals experienced financial distress; payer mix, ownership and service structure influenced risk. Distress can prompt workforce cuts, service elimination, reduced investment and closure.	Reduced service availability, workforce contraction, bankruptcy and closure	Altman Z-score; inability to meet obligations; worsening payer mix; declining revenue; repeated annual distress
Dubas-Jakóbczyk et al., 2021	International	Scoping-review protocol / conceptual evidence synthesis	Hospital financial performance and quality of care	Financial stability may support technology investment, adequate staffing and quality improvement; hospital financial performance is multidimensional and should not be	Potential deterioration in quality where financial capacity weakens	Profitability decline; liquidity problems; reduced investment; wage/staffing constraints; composite financial-performance indicators

Author(s), Year	Country/Region	Study Type/Method	Economic/Financial Issue Examined	Key Findings Relevant to Health-System Fragility	Observed Health-System Consequence	Potential Early-Warning Signal(s)
				assessed with a single measure.		
Prędkiewicz et al., 2022	21 European countries	Panel-data analysis, 1995–2019	Economic slowdown, GDP, public finance and health	Economic activity and public-finance conditions influence health; crisis responses differed across financing models, with cuts, wage freezes and higher cost sharing occurring in some systems.	Reduced public financing and redistribution of costs toward providers/workers/households	GDP contraction; public debt growth; unemployment; health-budget reduction; increased co-payments
Sánchez-Recio et al., 2022	Europe	Systematic review	Economic recession and use of healthcare services	Recession and austerity were associated with increased unmet need, pharmaceutical expenditure containment, reductions in hospital beds and increased inequalities in service use.	Reduced accessibility and widening socioeconomic inequality	Unmet need; hospital-bed reduction; health-budget cuts; pharmaceutical spending contraction; reduced service utilization among vulnerable groups
Hu et al., 2022	China	Mini-review / financial-	Hospital capital liquidity during COVID-19	Liquidity is central to hospital financial health and capacity to	Risk of financial distress, inability to meet	Current ratio; cash-flow shortage; negative medical

Author(s), Year	Country/Region	Study Type/Method	Economic/Financial Issue Examined	Key Findings Relevant to Health- System Fragility	Observed Health- System Consequence	Potential Early- Warning Signal(s)
		management analysis		meet short-term obligations; pandemic- related revenue loss and expenditure increases can rapidly generate cash-flow pressure.	obligations and impaired hospital operations	surplus; declining cash reserves; inability to pay current liabilities
Eze et al., 2022	Sub-Saharan Africa	Systematic review and meta- analysis	Catastrophic health expenditure	CHE affected a substantial share of households and increased again during 2010–2020; disease- specific households faced particularly high exposure.	Debt, asset sacrifice, impoverishment and inability to finance basic needs	CHE incidence; OOP share; disease- specific CHE; increasing temporal trend in catastrophic expenditure
OECD, 2023	OECD / global policy relevance	Comparative policy analysis	Investment in health-system resilience	COVID-19 exposed underinvestment in workforce, prevention, infrastructure and supply-chain resilience even in advanced systems; additional investment is required to prepare for future shocks.	Limited surge capacity, care backlogs, supply vulnerability and reduced crisis readiness	Prevention spending; workforce vacancy; infrastructure- investment gap; supply-chain dependence; resilience-investment deficit

Author(s), Year	Country/Region	Study Type/Method	Economic/Financial Issue Examined	Key Findings Relevant to Health-System Fragility	Observed Health-System Consequence	Potential Early-Warning Signal(s)
Fleming et al., 2023	International	Realist review	Austerity and long-term health-system/workforce resilience	Austerity can create lasting legacies through rationing of staff and resources, degraded working conditions, distrust and moral distress, thereby weakening resilience to subsequent shocks.	Reduced workforce resilience, restricted care options and diminished capacity to absorb future shocks	Sustained staffing/resource rationing; wage/condition deterioration; reduced consumables; declining morale; recurrent cost-containment measures
Biel et al., 2023	OECD and economically developed countries	Comparative quantitative analysis	Crisis-related changes in financial, material and human resources	Health crises reveal structural weaknesses even in developed systems; changes in financial, human and technical resources can affect healthcare quality.	Declining quality and unequal system performance during crisis	Financial-resource contraction; workforce-resource decline; technical-capacity changes; basic-service availability deterioration
OECD, 2024	OECD countries	Comparative fiscal/policy analysis	Fiscal sustainability of health systems	Ageing, technological change and resilience requirements create rising expenditure pressures while governments operate within constrained fiscal environments;	Growing tension between expenditure needs, fiscal sustainability, quality and equity	Health-spending/GDP trajectory; expenditure growth above revenue growth; budget pressure; fiscal headroom; ageing-

Author(s), Year	Country/Region	Study Type/Method	Economic/Financial Issue Examined	Key Findings Relevant to Health-System Fragility	Observed Health-System Consequence	Potential Early-Warning Signal(s)
				robust health budgeting is required.		related spending projections
WHO, 2024	Global	Technical measurement brief	Inequalities in OOP-related financial hardship	Catastrophic and impoverishing health expenditure differs substantially by household age structure, demonstrating that aggregate financial-protection measures can conceal important vulnerability.	Disproportionate hardship among older and multigenerational households	CHE by household type; impoverishing OOP; age-disaggregated financial hardship; household expenditure concentration
WHO, 2024	Multi-country / global	Global programmatic report	Service access, emergency response and system performance	Country experiences illustrate that access and emergency response depend on sustained financing and functioning health-system capacities across multiple dimensions.	Vulnerability of service access and emergency response where system resources are insufficient	Coverage interruption; financing gaps in priority programmes; reduced emergency capacity; access deterioration
Chopra et al./World Bank, 2024	Global / multi-country	Edited comparative health-system case studies	Hospital efficiency, quality, integration and financing	Hospitals consume a major share of health resources; financing, autonomy, payment	Inefficient hospital use, fragmented service delivery and financial pressure	Hospital expenditure share; inefficient bed/resource use; provider-payment

Author(s), Year	Country/Region	Study Type/Method	Economic/Financial Issue Examined	Key Findings Relevant to Health-System Fragility	Observed Health-System Consequence	Potential Early-Warning Signal(s)
				design and integration with broader health systems strongly influence efficiency and sustainability.		misalignment; weak autonomy; avoidable hospital activity
Mohsin et al., 2024	Global	Systematic review	Socio-ecological determinants of CHE	CHE reflects individual, household, institutional and wider economic factors, while supply-side and policy determinants remain comparatively underexamined.	Unequal financial burden, impoverishment and barriers to access	CHE incidence; OOP burden; socioeconomic gradient; institutional coverage gaps; supply-side cost pressure
Kolasa & Weychert, 2024	Poland	Household-data econometric analysis	Causal relationship between CHE and poverty	Catastrophic health expenditure has a significant positive causal relationship with relative poverty, showing that OOP burden can produce direct socioeconomic deterioration even in a universal system.	Increased poverty risk and financial vulnerability, particularly among older households	CHE occurrence; poverty transition; high pharmaceutical OOP; OOP burden among elderly households
Sofi & Yasmin, 2024	India, 19 states	Panel-data analysis	OOP expenditure, economic growth	Higher economic growth was associated with lower OOP	Continued household financial burden despite nominal public spending	OOP share; GDP/GSDP deterioration;

Author(s), Year	Country/Region	Study Type/Method	Economic/Financial Issue Examined	Key Findings Relevant to Health- System Fragility	Observed Health- System Consequence	Potential Early- Warning Signal(s)
			and government health expenditure	expenditure, while higher government-health expenditure shares alone did not necessarily reduce OOP, highlighting the importance of targeting and efficiency.		ineffective public-health expenditure; insurance coverage gaps; regional OOP disparity
Bogale et al., 2024	Fragile and conflict-affected states	Review of systematic reviews	Health-system strengthening under fragility/conflict	Resource depletion, weak financing, workforce flight and governance breakdown jointly undermine health-system functions; coordinated and context-specific financing mechanisms can mitigate vulnerability.	Service cessation, reduced access, workforce depletion and dependence on external actors	Resource depletion; workforce loss; external-financing dependency; disrupted services; weak coordination across financing actors
WHO & World Bank, 2025	Global	Global monitoring report	UHC service coverage and financial hardship	Despite long-term global progress, major service and financial-protection gaps persist; forgone care and unmet need complement expenditure-based	Financial barriers to care, unmet need and unequal progress toward UHC	CHE; impoverishing OOP; unmet need; forgone care due to cost; medicine share of household OOP

Author(s), Year	Country/Region	Study Type/Method	Economic/Financial Issue Examined	Key Findings Relevant to Health-System Fragility	Observed Health-System Consequence	Potential Early-Warning Signal(s)
				measures of financial hardship.		
Malone et al., 2025	United States, rural hospitals	Longitudinal predictive modelling	Rural-hospital financial distress	Financial performance, reimbursement, organizational characteristics and market conditions predicted future negative cash flow, negative equity and closure with good discrimination.	Progressive movement from financial weakness toward closure and loss of local access	Negative cash-flow margin; negative equity; declining profitability; reimbursement pressure; Financial Distress Index
Dubas-Jakóbczyk et al., 2025	Europe	Scoping review of 62 publications	Hospital financial performance	Hospital financial performance is heterogeneous, context-dependent and multidimensional; many studies rely excessively on single profitability measures, creating measurement blind spots.	Difficulty detecting emerging provider vulnerability and possible threats to service sustainability	Profitability; liquidity; leverage; indebtedness; composite FP indicators; recurrent deficits
Foroughi et al., 2025	Six high- and low/middle-income	Best-fit framework synthesis	Health-system resilience against economic crisis	Economic crises simultaneously reduce revenue and insurance capacity, increase costs	Financing pressure propagates to medicines, workforce, services and households	GDP/liquidity deterioration; unemployment; currency

Author(s), Year	Country/Region	Study Type/Method	Economic/Financial Issue Examined	Key Findings Relevant to Health- System Fragility	Observed Health- System Consequence	Potential Early- Warning Signal(s)
	country experiences			and OOP payments, and constrain access; responses must cross health-system building blocks.		depreciation; insurance-support decline; OOP increase; treatment avoidance
Rizzuti, 2025	Germany / Italy / Europe	Policy perspective/edito- rial	Hospital crisis, inflation and funding restrictions	Economic stagnation, inflation, reimbursement constraints, workforce costs and infrastructure pressures can create severe hospital financial distress even in mature universal systems.	Hospital deficits, closures, fewer beds, workforce pressure and declining sustainability	Hospital-deficit prevalence; reimbursement– inflation gap; bed/service closures; staffing vacancies; infrastructure- investment deficit

3. Methodology

This study employed an exploratory qualitative design using semi-structured expert interviews to investigate the role of economic and financial fragility in health system saturation and collapse. Given the complexity of economic and financial challenges affecting health systems, a qualitative approach was considered appropriate for exploring expert perspectives, identifying key drivers, understanding their interactions, and extracting early warning signals that may indicate progression toward system saturation and collapse.

The study was guided by the SEA model (Stability, Efficiency, and Adaptability), which provided the overall conceptual perspective for understanding how economic and financial pressures influence health system performance. Rather than testing predefined hypotheses, the study sought to generate an evidence-informed conceptual framework through the experiences and insights of experts working in health systems, health economics, healthcare financing, hospital management, insurance, and health policy.

Purposive sampling was used to recruit experts with substantial academic, managerial, or policy experience related to health systems, health economics, healthcare financing, health insurance, hospital financial management, and public health policy. Participants were selected to ensure a wide range of professional perspectives and practical experience in addressing economic and financial challenges within health systems.

20 Interviews continued until thematic saturation was achieved, defined as the point at which no substantially new concepts or early warning signals emerged from additional interviews. **Table 2. Shows Characteristics of Participants.**

Table 2. Characteristics of Participants

Participant Group	Area of Expertise	N
Health policymakers	Health policy and governance	4
Health economists	Health economics and financing	4
Health insurance experts	Health financing and insurance systems	3
Hospital executives and financial managers	Hospital management and finance	4
Health systems researchers	Health systems and public health	5

Data were collected through individual semi-structured interviews lasting approximately 30–60 minutes. Interviews were conducted either face-to-face or through secure online platforms according to participants' availability. With participants' consent, all interviews were audio-recorded and subsequently transcribed verbatim for analysis.

The interview guide was designed to encourage participants to discuss economic and financial challenges affecting health systems, explain how these challenges evolve into system-wide vulnerability, identify observable warning signals, and suggest measurable indicators that could support early detection of health system deterioration. Open-ended questions were accompanied by follow-up probes whenever additional clarification or practical examples were required. **Table 3. Shows Semi-Structured Interview questions.**

Table 3. Semi-Structured Interview Guide

Main Question	Purpose
What economic and financial conditions make a health system increasingly fragile?	To identify the major drivers of economic and financial fragility.
How would you categorize these economic and financial pressures? If they operate at different levels, please describe those levels and explain how they interact.	To explore experts' conceptual classification of economic and financial pressures and their interrelationships.
What observable signs indicate that economic and financial pressures are weakening the health system?	To identify early warning signals associated with increasing vulnerability.
Which signs suggest that the health system is approaching saturation or the threshold of collapse?	To identify critical warning signals preceding collapse.
Which indicators should be routinely monitored to detect economic and financial fragility at an early stage?	To identify potential indicators for an early warning system.

Interview transcripts were analyzed using thematic analysis following an inductive–deductive approach. Initially, open coding was performed to identify concepts related to economic and financial fragility, mechanisms of system vulnerability, and potential early warning signals. Similar codes were subsequently grouped into broader themes and subthemes through an iterative coding process.

Following theme development, the identified concepts were interpreted within the SEA framework to examine how the emerging themes affected the Stability, Efficiency, and Adaptability of health systems. Particular attention was given to identifying recurring warning signals, their relationships with broader themes, and their potential usefulness for the development of an early warning framework for health system saturation and collapse.

The credibility of the findings was strengthened through purposive sampling, inclusion of experts from diverse professional backgrounds, continued interviewing until thematic saturation, maintenance of an audit trail, and regular discussions among the research team throughout the coding and interpretation process.

4. Results

Thematic analysis of the expert interviews revealed that economic and financial fragility is a multidimensional phenomenon that evolves progressively rather than emerging as a consequence of a single financial crisis. Although participants described diverse economic, financial, organizational, and policy-related challenges, a consistent pattern emerged across all interviews. Participants emphasized that economic and financial pressures accumulate gradually, interact across different domains, and collectively reduce the health system's ability to maintain essential

functions during periods of stress. Rather than identifying isolated financial deficits as the principal threat, experts described an interconnected process in which disturbances originating in the broader economic environment progressively influence health financing mechanisms, healthcare organizations, and ultimately the population's ability to access healthcare services.

Participants consistently distinguished between routine financial difficulties and economic and financial fragility. Routine financial challenges were considered manageable through conventional budgeting, short-term policy adjustments, or temporary resource redistribution. In contrast, economic and financial fragility was described as a structural condition characterized by declining resilience, increasing dependence on emergency financial measures, reduced institutional flexibility, and progressive deterioration in the health system's capacity to absorb internal and external shocks. According to the participants, fragility becomes evident long before visible disruption of healthcare services occurs, making early recognition essential for preventing system saturation and collapse.

Another recurring finding concerned the cumulative nature of economic and financial pressures. Experts explained that deterioration rarely begins within healthcare organizations themselves. Instead, financial instability generally originates from broader economic disturbances that gradually influence market behavior, financing mechanisms, provider performance, and household financial security. As pressures accumulate across these domains, adaptive capacity progressively declines, resulting in increasing vulnerability of the entire health system.

Analysis of the interview transcripts further demonstrated that participants naturally organized economic and financial pressures into several interconnected domains representing different levels of influence within the health system. Although individual experts used different terminology, thematic analysis demonstrated remarkable consistency in the underlying conceptual structure. These domains formed an integrated framework describing the progression of economic and financial fragility from broad economic conditions to its direct consequences for healthcare organizations and populations. **Table 4. Shows** Thematic Framework of Economic and Financial Fragility Identified Through Experts.

Table 4. Thematic Framework of Economic and Financial Fragility Identified Through Experts

Level	Emergent Theme	Description
1	Macroeconomic Environment	National economic conditions that influence the financial capacity and resilience of the health system.
2	Microeconomic and Health Market Dynamics	Economic mechanisms governing healthcare markets, pricing, demand, supply, and allocation of resources.
3	Health Financing System	Financial arrangements responsible for mobilizing, pooling, allocating, and distributing healthcare resources.
4	Financial Sustainability of Healthcare Providers	Financial performance and operational viability of hospitals and healthcare organizations responsible for delivering services.

5	Household Financial Protection	Economic consequences experienced by individuals and households while accessing healthcare services.
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Participants described these five themes not as independent components but as successive stages within a dynamic system. According to most experts, disturbances emerging at one level gradually influence subsequent levels, producing cumulative effects throughout the health system. Macroeconomic instability was frequently identified as the initial source of pressure, affecting market performance, financing arrangements, healthcare organizations, and ultimately household financial protection. Several participants noted that the severity of health system disruption depends not only on the magnitude of pressures at each level but also on the interaction between levels and the system's ability to adapt before pressures become irreversible.

The interviews also indicated that the transition from economic and financial fragility to health system saturation is gradual rather than abrupt. Participants repeatedly emphasized that warning signals become visible during the early stages of deterioration, often several months or even years before essential health services become seriously disrupted. Consequently, systematic monitoring of these signals was considered substantially more valuable than relying exclusively on conventional financial performance indicators after organizational deterioration had already occurred.

The thematic framework developed from the interviews therefore suggests that economic and financial fragility should be understood as a cascading process in which pressures accumulate across multiple interconnected levels. This framework provides the conceptual basis for identifying the principal fragility factors and their associated early warning signals presented in the following sections.

The second major finding concerned the specific factors contributing to economic and financial fragility within each of the five emergent levels. Participants identified a broad range of pressures, but the analysis showed that these factors could be grouped into coherent clusters according to their origin, mechanism, and point of impact within the health system.

At the macroeconomic level, participants most frequently referred to inflation, recession, exchange-rate instability, declining public revenues, fiscal deficits, public debt, unemployment, poverty, and economic sanctions. These pressures were described as external constraints that reduce the government's ability to protect health budgets, maintain purchasing power, and respond to sudden increases in healthcare demand. Inflation and currency depreciation were particularly important because they rapidly increased the cost of imported medicines, medical devices, technology, and infrastructure maintenance. Participants also noted that prolonged recession and declining government revenues may force health systems to postpone investment, reduce service expansion, or adopt short-term cost-containment measures that gradually weaken system capacity.

At the microeconomic and health-market level, participants highlighted imbalances between demand and supply, medical price inflation, supplier-induced demand, information asymmetry, weak competition, market concentration, and inefficient allocation of resources. Pharmaceutical and medical-equipment markets were repeatedly identified as highly vulnerable areas because price volatility, import dependency, limited supplier competition, and supply disruptions could rapidly increase expenditure. Participants emphasized that market inefficiencies do not necessarily appear as an immediate budgetary crisis; instead, they gradually increase the cost-of-service delivery while reducing the amount of care generated from available resources.

Within the health-financing system, the principal themes included insufficient and unpredictable public funding, deficits in insurance funds, fragmented risk pools, delayed premium contributions, delayed reimbursements, weak purchasing arrangements, and inefficient provider-payment mechanisms. Participants described recurrent deficits and delayed payments as signs that the financing system was losing its capacity to match available revenues with healthcare obligations. Fragmentation was also considered a major source of vulnerability because it weakened redistribution, increased administrative costs, and created unequal access to services across population groups.

At the provider level, experts identified rising operating costs, liquidity shortages, growing debt, delayed payments to employees and suppliers, reduced maintenance expenditure, and declining capital investment as key manifestations of fragility. Hospitals and healthcare organizations were described as the point at which accumulated economic and financial pressures become operationally visible. Participants explained that providers may initially respond by delaying procurement, postponing maintenance, reducing staff recruitment, or restricting non-urgent services. Although these measures may preserve short-term continuity, their prolonged use progressively reduces service quality, staff capacity, and organizational resilience.

At the household level, participants emphasized increasing out-of-pocket payments, catastrophic health expenditure, insurance unaffordability, delayed care, forgone treatment, treatment discontinuation, and medical impoverishment. These factors were viewed both as consequences of financial fragility and as contributors to further system deterioration. When households delay treatment because of cost, patients may later present with more advanced conditions requiring more expensive care. Participants therefore described declining household financial protection as a feedback mechanism that intensifies demand, inequality, and avoidable expenditure within the health system. **Table 5. shows** Major Economic and Financial Fragility Factors Identified Through Thematic Analysis

Table 5. Major Economic and Financial Fragility Factors Identified Through Thematic Analysis

Analytical level	Major factors identified
Macroeconomic Environment	Inflation; economic recession; exchange-rate volatility; declining government revenues; fiscal deficits; public debt; unemployment; poverty; economic sanctions; reduced fiscal space for health.
Microeconomic and Health Market Dynamics	Supply–demand imbalance; medical price inflation; supplier-induced demand; information asymmetry; market concentration; weak competition; pharmaceutical price instability; inefficient resource allocation; failure of price regulation.
Health Financing System	Insufficient or unpredictable public funding; insurance-fund deficits; fragmented financial pools; delayed premium contributions; delayed reimbursement; weak strategic purchasing; inefficient provider-payment systems; high administrative costs.
Financial Sustainability of Healthcare Providers	Rising operating costs; liquidity shortages; increasing debt; delayed salaries and supplier payments; medicine and equipment expenditure growth; postponed maintenance; reduced capital investment; contraction of non-urgent services.
Household Financial Protection	Increasing out-of-pocket expenditure; catastrophic health expenditure; insurance unaffordability; delayed or forgone care;

	treatment discontinuation; medical impoverishment; widening inequality in access.
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The analysis demonstrated that the identified factors were strongly interdependent. Participants repeatedly described how inflation and exchange-rate instability increased market prices, which then raised reimbursement requirements and provider costs. When financing organizations were unable to adjust payments in line with rising costs, hospitals accumulated debt and transferred part of the burden to patients through formal or informal charges. This process weakened household financial protection and contributed to delayed care and unequal access.

Participants also emphasized that the progression of fragility was not always linear. Pressures could move in both directions between levels. For example, increasing household inability to pay could reduce provider revenue, while provider financial difficulties could further increase patient charges or restrict services. Similarly, insurance deficits could lead to delayed hospital reimbursement, but rising hospital costs could also deepen insurance-fund deficits. These reciprocal relationships created reinforcing cycles that accelerated deterioration.

A further finding was that health systems often preserved apparent functionality during the early stages of fragility by relying on compensatory mechanisms. These included using financial reserves, delaying payments, borrowing, shifting expenditure across budget lines, reducing maintenance, or increasing household contributions. Participants warned that such measures could conceal deterioration because routine services might continue despite the progressive depletion of financial and organizational buffers. The exhaustion of these buffers was therefore viewed as a critical transition point between manageable pressure and systemic fragility.

The factors shown in Table 4 formed the basis for identifying observable early warning signals. Participants distinguished between underlying drivers, which create vulnerability, and warning signals, which indicate that vulnerability is already affecting system performance. The next stage of analysis therefore focused on the changes that could be routinely observed before widespread disruption or collapse occurred.

The third major finding focused on the identification of early warning signals that precede economic and financial deterioration of health systems. Participants consistently emphasized that health system collapse is rarely a sudden event. Instead, it is preceded by a series of measurable changes that emerge gradually across different parts of the system. Although individual indicators varied according to national context and financing arrangements, remarkable agreement existed regarding the types of signals that should alert decision-makers to increasing vulnerability.

Participants noted that early warning signals initially appear as relatively small deviations from normal system performance. If these deviations are not recognized or addressed, they progressively spread across financing mechanisms, healthcare organizations, and ultimately affect service accessibility and population health. Most experts therefore recommended that warning signals should not be interpreted individually but rather as interconnected indicators reflecting cumulative system deterioration.

At the macroeconomic level, persistent inflation, prolonged fiscal deficits, declining government expenditure on health, exchange-rate depreciation, and shrinking fiscal capacity were repeatedly identified as early indicators that the economic environment was becoming less capable of supporting health services. Experts emphasized that these indicators should be monitored continuously because they often precede visible deterioration within healthcare organizations.

Within health markets, participants highlighted sustained increases in medicine prices, shortages of essential medical products, supply-chain instability, increasing procurement costs, and widening gaps between service demand and available capacity as important warning signals. According to several experts, market instability frequently represents the first operational manifestation of broader economic pressures.

For the health financing system, delayed reimbursement of healthcare providers, recurring insurance deficits, declining financial reserves, increasing payment backlogs, and repeated budget revisions were considered the most important warning signals. Participants suggested that these indicators reflect weakening financial resilience and decreasing capacity to absorb future shocks.

At the provider level, experts consistently referred to growing hospital debt, declining liquidity, delayed salary payments, postponed maintenance, cancelled investment projects, increasing supplier debt, and progressive reductions in service availability as clear signs that financial fragility was beginning to affect operational performance. These changes were considered particularly important because they directly influence service continuity and healthcare quality.

At the household level, increasing out-of-pocket expenditure, delayed healthcare seeking, treatment discontinuation, catastrophic health expenditure, declining insurance affordability, and widening inequalities in access to healthcare were identified as the final observable manifestations of accumulated economic and financial fragility. Participants explained that when these signals become widespread, health systems may already be approaching saturation. **Table 6.** shows Early Warning Signals of Economic and Financial Fragility.

Table 6. Early Warning Signals of Economic and Financial Fragility

Analytical Level	Early Warning Signals
Macroeconomic Environment	Persistent inflation, declining fiscal space for health, exchange-rate instability, prolonged recession, decreasing public health expenditure, increasing government debt.
Microeconomic and Health Market Dynamics	Rapid growth in healthcare prices, medicine shortages, unstable pharmaceutical markets, procurement difficulties, supply-demand imbalance, increasing production costs.
Health Financing System	Delayed reimbursements, insurance fund deficits, declining reserves, increasing payment delays, repeated budget reallocations, inefficient purchasing mechanisms.
Financial Sustainability of Healthcare Providers	Increasing hospital debt, liquidity shortages, delayed salaries, supplier payment delays, reduced capital investment, postponed maintenance, declining service capacity.

Household Financial Protection	Rising out-of-pocket payments, catastrophic health expenditure, delayed care, treatment discontinuation, declining insurance affordability.
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Participants further emphasized that the predictive value of these warning signals increases considerably when indicators from multiple analytical levels occur simultaneously. A single indicator, such as temporary inflation or a short-term insurance deficit, was generally not considered sufficient to indicate imminent collapse. However, the concurrent presence of macroeconomic instability, financing constraints, deteriorating provider finances, and increasing household financial burden was viewed as evidence that the health system was entering a phase of accelerating vulnerability.

Another important finding concerned the temporal progression of warning signals. Participants distinguished three successive stages of deterioration. The first stage was characterized by early signals, including economic instability, increasing inflation, and declining fiscal capacity, which primarily affect the external environment surrounding the health system. The second stage involved intermediate signals, such as insurance deficits, reimbursement delays, liquidity shortages, and increasing provider costs, reflecting the spread of financial pressures within the health sector itself. Finally, critical signals emerged when providers reduced services, households delayed or abandoned treatment, and essential healthcare functions became increasingly difficult to sustain. According to participants, the transition from intermediate to critical signals represents the period during which the probability of health system saturation increases substantially.

Across all interviews, participants stressed that effective monitoring requires an integrated perspective rather than isolated financial assessment. Monitoring only hospital debt, insurance deficits, or government expenditure was considered insufficient because each indicator reflects only one part of a much larger process. Instead, participants proposed continuous surveillance of complementary indicators across economic, financing, provider, and household domains to identify patterns of accumulating fragility before irreversible disruption occurs.

Finally, thematic analysis demonstrated that the identified warning signals were closely associated with the three dimensions of the SEA model. Participants consistently described declining Stability through increasing financial uncertainty and reduced predictability of funding, declining Efficiency through growing resource wastage, rising operational costs, and ineffective allocation of financial resources, and declining Adaptability through diminishing institutional capacity to respond to economic shocks, reorganize financing arrangements, or protect essential health services during crises. Collectively, these findings indicate that economic and financial fragility is not solely a fiscal phenomenon but a systemic process that progressively undermines the Stability, Efficiency, and Adaptability of health systems, thereby increasing the likelihood of saturation and eventual collapse.

The early warning signals identified through the thematic analysis were subsequently translated into measurable operational indicators to facilitate practical risk assessment. For each indicator, five progressive risk categories were defined, ranging from **Safe** to **Near to Collapse**, providing a

standardized framework for evaluating the severity of economic and financial fragility. The proposed thresholds are intended to support routine monitoring by health system managers and policymakers, enabling timely identification of deteriorating conditions before they progress to health system saturation and collapse. **Table 7. Shows Risk Assessment Thresholds for the Early Warning Signals Identified.**

Table 7. Risk Assessment Thresholds for the Early Warning Signals Identified

Level and early warning signal	Operational indicator	Safe	Low Risk	Moderate Risk	High Risk	Near to Collapse
Level 1. Macroeconomic Environment						
Persistent inflation	Annual consumer price inflation rate	<5%	5–<10%	10–<20%	20–<40%	≥40%
Declining fiscal space for health	Real annual change in public health expenditure per capita	Increase ≥3%	Increase 0–<3%	Decline >0–5%	Decline >5–10%	Decline >10% for two consecutive years or inability to finance essential programmes
Exchange-rate instability	Annual depreciation of national currency against the principal currency used for medical imports	<5%	5–<10%	10–<20%	20–<40%	≥40% or inability to finance essential imports
Prolonged recession	Real GDP growth and duration of economic contraction	Growth ≥2%	Growth 0–<2%	Contraction >0–2% for one year	Contraction >2% or contraction for two consecutive years	Contraction ≥5% or contraction for three consecutive years
Decreasing public health expenditure	Percentage change in the health share of total government expenditure compared with the three-year baseline	Stable or increased	Decline <5%	Decline 5–<10%	Decline 10–20%	Decline >20% or interruption of essential health programmes
Increasing government debt	Increase in public debt-to-GDP ratio compared with the three-year baseline	<5 percentage	5–<10 percentage	10–<20 percentage	20–30 percentage	>30 percentage combined with debt distress or major

						restriction of health expenditure
Level 2. Microeconomic and Health Market Dynamics						
Rapid growth in healthcare prices	Healthcare price inflation minus general consumer inflation	≤0 percentage	>0–3 percentage	>3–7 percentage	>7–15 percentage	>15 percentage
Medicine shortages	Percentage availability of tracer ¹ essential medicines	≥90%	85–<90%	80–<85%	60–<80%	<60% or prolonged shortage of life-saving medicines
Unstable pharmaceutical markets	Percentage of tracer medicines experiencing a price increase above 20% or major supply disruption within one year	<5%	5–<10%	10–<20%	20–40%	>40%
Procurement difficulties	Percentage of essential procurement processes that fail, are substantially delayed, or require emergency purchasing	<5%	5–<10%	10–<20%	20–35%	>35% or repeated inability to procure essential products
Supply–demand imbalance	Percentage of estimated demand for essential services that cannot be met	<5%	5–<10%	10–<20%	20–35%	>35% or widespread unavailability of essential services
Increasing production costs	Annual provider input-cost growth minus annual growth in	≤2 percentage	>2–5 percentage	>5–10 percentage	>10–20 percentage	>20 percentage

¹ **Tracer medicines** refer to a predefined set of medicines used as sentinel indicators for monitoring the availability and stability of the pharmaceutical supply system. For operational purposes, the tracer medicine list should include four categories: **(1) over-the-counter (OTC) medicines, (2) essential/general medicines, (3) specialized medicines, and (4) medicines for chronic, rare, and high-cost diseases.** Each category should be assessed independently, while the overall tracer medicine indicator should be calculated by aggregating the results across the four categories according to national pharmaceutical priorities.

	reimbursement rates or provider budgets					
Level 3. Health Financing System						
Reimbursements	Average number of days between validation of provider claims and payment	≤30 days	31–60 days	61–90 days	91–180 days	>180 days or suspension of reimbursements
Health Insurance-fund Deficits²	Annual financing deficit of health insurance schemes as a percentage of annual health insurance revenue.	Balance or surplus	Deficit <3%	Deficit 3–<7%	Deficit 7–15%	Deficit >15%, technical insolvency, or inability to pay contracted providers
financial reserves	Months of expected claims or expenditure covered by available reserves	≥6 months	4–<6 months	2–<4 months	1–<2 months	<1 month or exhausted reserves
payment delays	Value of overdue payments as a percentage of total annual payment obligations	<5%	5–<10%	10–<20%	20–35%	>35% or widespread payment default
Repeated budget reallocations	Percentage of the approved annual health budget transferred through unplanned or emergency reallocations	<5%	5–<10%	10–<20%	20–30%	>30% or repeated diversion from essential services

² For public or social health insurance systems, the indicator refers to the annual deficit of health insurance funds. For private or commercial insurers, it refers to the annual underwriting deficit (claims and administrative expenditures exceeding health insurance premium revenue). In mixed systems, both sectors should be assessed separately.

Inefficient purchasing mechanisms³	Percentage of health expenditure classified as avoidable, duplicative, non-priority, or unsupported by service need	<5%	5–<10%	10–<20%	20–30%	>30% or failure to purchase essential services
Level 4. Financial Sustainability of Healthcare Providers						
Hospital debt	Total hospital debt as a percentage of annual operating revenue	<20%	20–<40%	40–<60%	60–100%	>100% or inability to meet current obligations
Liquidity shortages	Days of cash available to cover routine operating expenditure ⁴	≥90 days	60–<90 days	30–<60 days	15–<30 days	<15 days or inability to finance daily operations
Delayed salaries	Average delay in payment of staff salaries	No delay	≤15 days	16–30 days	31–60 days	>60 days or repeated non-payment
Supplier-payment delays	Average number of days beyond the contractual payment date	≤30 days	31–60 days	61–90 days	91–180 days	>180 days, suspension of deliveries, or cash-only supply conditions
Capital investment	Real annual reduction in capital investment compared with the three-year baseline	No decline or increase	Decline >0–5%	Decline >5–15%	Decline >15–30%	Decline >30% or cancellation of all essential capital projects

³ This indicator refers to the proportion of total annual expenditure by health financing agencies (e.g., public health insurance funds, social insurance schemes, national purchasers, or private health insurers) that is identified as potentially avoidable, duplicative, low-value, or inconsistent with documented population health needs, approved benefit packages, or evidence-based clinical guidelines. The indicator should be calculated as the percentage of such expenditure relative to the total annual health purchasing expenditure of the financing agency. Expenditures should be identified through claims review, procurement audits, clinical audits, health technology assessment (HTA), or other nationally approved utilization review methods.

⁴ Days of cash available refers to the number of days a healthcare provider can continue routine operations using only its immediately available cash and cash equivalents, assuming no additional revenue is received. It is calculated by dividing unrestricted cash and cash equivalents by the average daily operating expenditure. This indicator reflects the provider's short-term liquidity and financial resilience.

Postponed maintenance	Value of overdue maintenance as a percentage of total estimated annual maintenance requirements	<5%	5–<15%	15–<30%	30–50%	>50% or failure of critical equipment and infrastructure
Declining service capacity	Percentage reduction in available beds, operating hours, diagnostic capacity, procedures, or essential service volume compared with baseline	<3%	3–<7%	7–<15%	15–30%	>30% or interruption of essential services
Level 5. Household Financial Protection						
Out-of-pocket payments	Out-of-pocket expenditure as a percentage of current health expenditure	≤15%	>15–20%	>20–30%	>30–40%	>40%
Catastrophic health expenditure	Percentage of the population spending more than 10% of total household expenditure or income on health	<2%	2–<5%	5–<10%	10–20%	>20%
Delayed care	Percentage of people reporting delayed healthcare because of cost	<3%	3–<7%	7–<15%	15–30%	>30%
Treatment discontinuation	Percentage of patients discontinuing prescribed treatment because of financial constraints	<2%	2–<5%	5–<10%	10–20%	>20%
Declining insurance affordability	Percentage of insured people whose annual premium and	<3%	3–<7%	7–<15%	15–25%	>25%

	mandatory contributions exceed 5% of household income					
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Table 6 provides a preliminary operational framework for assessing economic and financial fragility across the five analytical levels identified in this study. Rather than relying on a single financial measure, the framework integrates multiple indicators reflecting macroeconomic conditions, health market dynamics, health financing performance, provider financial sustainability, and household financial protection. Together, these indicators allow decision-makers to evaluate both the current level of risk and the trajectory of deterioration across the health system, thereby supporting evidence-informed interventions before economic and financial fragility progresses to functional saturation or collapse.

5. Discussion

This study explored economic and financial fragility as one of the fundamental pathways leading to health system saturation and eventual collapse. Unlike conventional approaches that primarily examine financial performance through isolated indicators such as budget deficits, healthcare expenditure, or insurance financing, the findings of this study suggest that economic and financial fragility should be understood as a progressive, multi-level systemic process. The thematic analysis demonstrated that financial deterioration evolves across five interconnected levels, beginning with the macroeconomic environment, extending through health market dynamics and financing mechanisms, affecting healthcare providers, and ultimately compromising household financial protection. This sequential pattern indicates that financial collapse is rarely the consequence of a single economic shock; rather, it results from the accumulation and interaction of vulnerabilities across multiple components of the health system.

The proposed five-level framework provides a broader perspective on the relationship between the national economy and health system performance. Macroeconomic instability, including inflation, recession, fiscal constraints, and exchange-rate volatility, was consistently identified as the starting point of financial pressure. These external pressures gradually influence healthcare markets, increase production costs, weaken purchasing capacity, and reduce the financial sustainability of health financing institutions. As financing organizations experience increasing pressure, delayed reimbursements, growing deficits, and declining reserves progressively transfer financial stress to healthcare providers. Hospitals and other healthcare organizations subsequently experience liquidity shortages, increasing debt, delayed payments to employees and suppliers, and reductions in service capacity. Eventually, these organizational failures become visible to the public through increasing out-of-pocket expenditure, treatment discontinuation, delayed healthcare seeking, and declining financial protection. The findings therefore demonstrate that economic and financial fragility propagates throughout the health system as a cascading process rather than as isolated financial events.

An important contribution of this study is the integration of these findings within the Stability–Efficiency–Adaptability (SEA) framework. Economic and financial fragility directly undermines all three dimensions of system performance. Stability is weakened through increasing financial uncertainty, unpredictable funding streams, and declining fiscal capacity. Efficiency deteriorates as financial constraints reduce the effectiveness of resource allocation, increase operational costs, delay payments, and limit strategic purchasing. Adaptability progressively declines because financially constrained systems lose the capacity to invest, reorganize resources, respond to crises, and maintain essential functions during periods of economic stress. Consequently, economic and financial fragility should not be viewed solely as a financing problem but rather as a systemic process that progressively erodes the three core capacities required for a resilient health system.

Another important finding is that financial collapse is preceded by a recognizable sequence of early warning signals. Participants consistently emphasized that observable deterioration appears long before complete service disruption occurs. Traditional financial monitoring often focuses on annual deficits or expenditure trends after problems have already become apparent. In contrast, the framework proposed in this study identifies a broader set of operational indicators distributed across five analytical levels, allowing deterioration to be detected during its early stages. Monitoring inflation, procurement instability, reimbursement delays, provider liquidity, hospital debt, out-of-pocket expenditure, and treatment discontinuation together provides a more comprehensive understanding of system vulnerability than any single financial indicator alone.

The development of the Economic and Financial Fragility Risk Assessment Matrix represents the principal methodological contribution of this study. Rather than limiting the findings to qualitative themes, the study translates expert-derived warning signals into measurable operational indicators

with progressive risk thresholds ranging from Safe to Near to Collapse. This transformation substantially increases the practical value of the framework by enabling health system managers, financing agencies, and policymakers to monitor financial vulnerability systematically and to identify areas requiring intervention before widespread disruption occurs. Unlike conventional financial performance measures, which often evaluate individual organizations, the proposed matrix supports system-level assessment by integrating macroeconomic conditions, financing performance, provider sustainability, and household financial protection within a single analytical framework.

The findings also have important policy implications. First, maintaining financial sustainability requires coordinated action across all five analytical levels rather than isolated interventions within individual organizations. Policies focusing exclusively on hospital financing or insurance deficits are unlikely to prevent system-wide fragility if macroeconomic instability, inefficient purchasing, or declining household financial protection remain unaddressed. Second, strengthening strategic purchasing, improving financial governance, protecting public health expenditure during economic crises, and reducing financial barriers to healthcare should be regarded as complementary strategies for preserving health system resilience. Third, routine monitoring of the proposed early warning indicators may enable policymakers to detect financial deterioration before adaptive capacity becomes critically impaired, thereby reducing the probability of health system saturation and collapse.

Several limitations should also be acknowledged. The proposed framework was developed through qualitative expert interviews and therefore reflects expert knowledge rather than empirical validation using longitudinal health system data. Although the operational indicators and risk thresholds were designed to facilitate practical application, their predictive performance should be evaluated across different health financing models and national contexts. Future studies should validate the proposed thresholds, examine the relative importance of individual indicators, and explore weighting approaches that may improve predictive accuracy. Furthermore, application of the framework within low-, middle-, and high-income countries will be necessary to determine its generalizability and support international benchmarking.

Overall, this study extends the understanding of health system collapse by demonstrating that economic and financial fragility is neither a single financial event nor merely a consequence of inadequate funding. Instead, it represents a dynamic and cumulative process that progressively weakens the Stability, Efficiency, and Adaptability of health systems. By combining qualitative evidence with a structured operational assessment matrix, the study provides a practical foundation for early detection of financial vulnerability and supports the development of proactive policies aimed at preventing health system saturation and eventual collapse.

6. Conclusion

Economic and financial fragility represents one of the most significant drivers of health system saturation and eventual collapse. However, the findings of this study demonstrate that financial collapse is rarely the result of a single budgetary deficit, funding shortage, or economic crisis. Instead, it emerges through the gradual accumulation of interconnected pressures operating across multiple levels of the health system. By identifying five analytical levels macroeconomic environment, microeconomic and health market dynamics, health financing system, financial sustainability of healthcare providers, and household financial protection this study provides a comprehensive framework for understanding how economic and financial disturbances propagate throughout the health system and progressively undermine its ability to sustain essential services.

The study further demonstrates that economic and financial fragility develops through a sequence of measurable early warning signals that appear well before widespread disruption of healthcare delivery becomes evident. Rather than focusing exclusively on traditional financial indicators, the proposed framework integrates macroeconomic conditions, financing performance, provider financial status, and household financial protection into a unified perspective. This multidimensional approach provides a more comprehensive understanding of financial vulnerability and highlights that deterioration occurring within one level is progressively transmitted to other levels, ultimately increasing the likelihood of health system saturation and collapse.

A major contribution of this study is the transformation of qualitative expert knowledge into an operational risk assessment framework. The proposed Economic and Financial Fragility Risk Assessment Matrix translates expert-derived early warning signals into measurable indicators accompanied by progressive risk thresholds ranging from Safe to Near to Collapse. This framework extends beyond conceptual analysis by providing health system managers, financing agencies, and policymakers with a practical tool for routine monitoring of financial vulnerability. The matrix enables decision-makers to identify emerging risks, prioritize corrective actions, and intervene before financial pressures compromise the continuity, accessibility, and quality of healthcare services.

The findings also reinforce the importance of viewing financial sustainability as a systemic property rather than the responsibility of individual organizations. Maintaining resilient health systems requires coordinated policies that simultaneously address macroeconomic stability, efficient health markets, sustainable financing arrangements, financially resilient healthcare providers, and adequate financial protection for households. Isolated interventions targeting only one component of the system are unlikely to prevent the cumulative progression of financial fragility when pressures continue to intensify across other levels.

From the perspective of the Stability–Efficiency–Adaptability (SEA) framework, economic and financial fragility progressively erodes all three dimensions required for sustainable health system performance. Financial instability reduces system stability by increasing uncertainty and weakening fiscal capacity; it compromises efficiency by limiting optimal resource allocation and increasing operational waste; and it diminishes adaptability by reducing the ability of health systems to respond effectively to emerging crises and changing healthcare demands. Consequently, preserving economic and financial resilience should be regarded as a strategic prerequisite for maintaining overall health system resilience.

Although the proposed framework offers a structured and operational approach to assessing economic and financial fragility, further research is required to strengthen its empirical foundation. Future studies should validate the proposed indicators and risk thresholds using longitudinal data from different health system models and economic settings. Comparative international studies may also facilitate refinement of indicator thresholds and the development of weighted scoring systems that improve predictive accuracy. Integration of the proposed matrix with the remaining domains of the broader Health System Collapse Framework including governance, workforce, trust, digital saturation, and infrastructure may ultimately support the development of a comprehensive early warning system capable of continuously monitoring the risk of health system saturation and collapse.

In conclusion, this study provides a novel conceptual and operational framework for understanding and assessing economic and financial fragility in health systems. By integrating qualitative evidence, a five-level analytical structure, and a practical risk assessment matrix, the proposed framework shifts the focus from retrospective financial evaluation toward proactive identification of emerging vulnerabilities. The ability to detect these vulnerabilities before they evolve into

systemic failure offers policymakers an opportunity to implement timely interventions, strengthen health system resilience, and ultimately reduce the risk of health system saturation and collapse.

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