Por qué Persisten las Enfermedades: Estructuras del Sistema de Salud, Desigualdad y Resultados Epidemiológicos a Largo Plazo

Why Diseases Persist: Health System Structures, Inequality, and Long-Term Epidemiological Outcomes

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RESUMEN

La carga persistente de enfermedad continúa siendo un desafío central para los sistemas de salud a nivel mundial, incluso en contextos donde el conocimiento biomédico y la cobertura sanitaria se han ampliado de manera considerable. Los patrones de incidencia sostenida, mortalidad prevenible, complicaciones evitables y desigualdades duraderas en salud indican que la persistencia de la enfermedad no puede explicarse únicamente por procesos biológicos o

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comportamientos individuales. Esta revisión analiza la persistencia de la enfermedad desde una perspectiva epidemiológica, poniendo énfasis en el papel de los determinantes del sistema de salud en la configuración de resultados poblacionales a largo plazo. A partir de literatura internacional y aportes comparativos relevantes para México, Colombia y Ecuador, el análisis sintetiza evidencia sobre gobernanza, financiamiento, prestación de servicios, calidad de la atención, resiliencia y monitoreo de desigualdades. Los hallazgos sugieren que la persistencia de la enfermedad se asocia estrechamente con desigualdades estructurales, acceso y calidad de atención desiguales, débil continuidad del cuidado y brechas persistentes entre el acceso nominal y la cobertura efectiva. La gobernanza y el financiamiento emergen como factores habilitadores que influyen en la organización y distribución de los servicios, mientras que la resiliencia del sistema modula los efectos de las crisis sobre las funciones esenciales de salud. Las desigualdades persistentes son más evidentes en contextos donde el monitoreo desagregado es limitado, lo que oculta cargas específicas de enfermedad detrás de promedios nacionales. En conjunto, esta revisión presenta la persistencia de la enfermedad como un resultado sistémico derivado de la interacción entre la estratificación social y el desempeño de los sistemas de salud a lo largo del tiempo, destacando la necesidad de enfoques integrados y con perspectiva de equidad para fortalecer los sistemas de salud y mejorar la salud poblacional.

PALABRAS CLAVE

Sistemas de salud; persistencia de la enfermedad; epidemiología; desigualdades en salud; cobertura efectiva; atención primaria; gobernanza; resiliencia del sistema de salud.

ABSTRACT

Persistent disease burden remains a defining challenge for health systems worldwide, even in contexts where biomedical knowledge and health coverage have expanded substantially. Patterns of sustained incidence, preventable mortality, avoidable complications, and enduring health inequalities indicate that disease persistence cannot be explained solely by biological processes or individual behaviors. This review examines disease persistence from an epidemiological perspective, emphasizing the role of health system determinants in shaping long-term population health outcomes. Drawing on international literature and comparative insights relevant to Mexico, Colombia, and Ecuador, the analysis synthesizes evidence on governance, financing, service delivery, quality of care, resilience, and inequality monitoring. The findings suggest that disease persistence is strongly associated with structural inequalities, uneven access and quality of care, weak continuity, and persistent gaps between nominal access and effective coverage. Governance and financing emerge as enabling factors that shape how services are organized and distributed, while system resilience influences long-term outcomes by mediating the impact of shocks on essential health functions. Persistent health gradients are most evident in settings where disaggregated monitoring is limited, obscuring subpopulation burdens behind national averages. Overall, the review highlights disease persistence as a systemic outcome produced by the interaction of social stratification and health system performance over time, underscoring the importance of integrated, equity-oriented approaches to strengthening health systems and improving population health.

KEYWORDS

Health systems; disease persistence; epidemiology; health inequalities; effective coverage; primary care; governance; health system resilience.

INTRODUCCIÓN

The persistence of preventable and treatable diseases remains one of the most pressing challenges for health systems worldwide, particularly in low- and middle-income countries. Despite decades of global health reforms, technological advances, and expanded international commitments to universal health coverage, marked disparities in health outcomes continue to be observed both between and within countries. These persistent patterns raise critical questions about the underlying determinants that shape disease trajectories beyond individual biological risk factors, pointing instead to structural, organizational, and systemic influences embedded within health systems themselves.

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Health systems do not operate in isolation; rather, they function as complex social institutions shaped by governance structures, financing mechanisms, service delivery models, and broader socioeconomic contexts. Extensive evidence has demonstrated that weaknesses in these dimensions contribute not only to unequal access to care but also to the sustained burden of communicable and non-communicable diseases across populations (Marmot et al., 2012; Arcaya et al., 2015). In this sense, disease persistence cannot be fully understood without examining the performance and organization of health systems and their capacity to respond equitably and effectively to population health needs.

Over the past two decades, international scholarship has increasingly emphasized the role of health system quality, rather than coverage alone, as a decisive factor in population health outcomes. High service coverage does not necessarily translate into improved health if care is fragmented, poorly regulated, or inadequately resourced (Kruk et al., 2018). In many settings, deficiencies in primary care, insufficient continuity of services, and limited integration across levels of care have been associated with delayed diagnosis, ineffective treatment, and preventable complications, ultimately reinforcing cycles of disease persistence (Starfield et al., 2005).

Latin America offers a particularly relevant context for examining these dynamics. Countries such as Mexico, Colombia, and Ecuador have undertaken significant health system reforms aimed at expanding coverage and reducing financial barriers to care. However, despite these efforts, substantial inequities in health outcomes persist across socioeconomic groups and geographic regions. Research has shown that financial protection alone is insufficient to address entrenched health disparities when governance challenges, uneven resource allocation, and structural inequalities remain unresolved (Frenk et al., 2011; McKee et al., 2013).

Prior studies have highlighted that social and economic determinants, including income inequality, education, employment conditions, and food security, interact closely with health system performance to shape disease patterns (Basu et al., 2013; Woolf & Braveman, 2011). These interactions are particularly evident during periods of economic instability or public health crises, when fragile systems are less capable of maintaining essential services and protecting vulnerable populations (Reeves et al., 2014; Bambra et al., 2020). Consequently, health systems that lack resilience and adaptive capacity may inadvertently contribute to the persistence of disease by amplifying existing social vulnerabilities.

The concept of structural determinants has further expanded the analytical framework used to understand health inequities. Structural violence, as described in global health literature, refers to the systematic ways in which social structures harm or disadvantage individuals by limiting their access to resources, opportunities, and care (Farmer et al., 2006). Within this framework, health systems may function as mechanisms that either mitigate or perpetuate disease persistence, depending on their ability to ensure fairness, accountability, and responsiveness (Daniels et al., 2014).

Despite the growing body of literature on health systems and inequalities, there remains a need for integrative analyses that explicitly link system-level determinants to the long-term persistence of disease across diverse national contexts. Much of the existing research focuses on isolated components, such as financing or service delivery, without sufficiently examining how these elements interact within broader governance and policy environments (Murray & Frenk, 2000; Frenk & Moon, 2013). This gap limits the development of comprehensive strategies capable of addressing disease persistence in a sustainable and equitable manner.

Against this background, the present review aims to examine how health system determinants contribute to the persistence of disease from an epidemiological perspective, with particular attention to the experiences of Mexico, Colombia, and Ecuador within a global context. The central guiding questions of this review are: (1) Which health system characteristics are most consistently associated with sustained disease burdens? (2) How do governance, financing, and service delivery interact with social determinants to influence disease persistence? and (3) What lessons can be drawn from comparative experiences to inform future health system strengthening efforts?

To address these questions, this study adopts a narrative review design, synthesizing evidence from international and regional literature on health systems performance, health inequalities, and disease outcomes. The review emphasizes conceptual frameworks related to equity, quality, resilience, and fairness, drawing on established theoretical models to guide the interpretation of empirical findings (Hosseinpoor et al., 2018; Kruk et al., 2015). By aligning the review structure with these guiding questions, the study seeks to provide a coherent analytical framework that connects theory, evidence, and policy implications.

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DESARROLLO

Disease persistence is rarely the result of a single failure. It is more often the cumulative product of health system design choices interacting with social stratification, political economy, and service delivery realities over time. From an epidemiological standpoint, "persistence" can be operationalized as sustained incidence, stalled declines in mortality, recurrent outbreaks, enduring inequalities in outcomes, or chronic gaps in effective coverage for preventable and treatable conditions. Health systems shape each of these outcomes through three interdependent pathways: (1) the distribution of exposure and vulnerability via social and economic structures; (2) the timeliness, continuity, and effectiveness of prevention, detection, and treatment; and (3) the system's capacity to absorb shocks without losing core functions (Marmot et al., 2012; Murray & Frenk, 2000; Kruk et al., 2015).

1) A systems-epidemiology lens: why diseases persist even when "coverage" improves

Traditional health policy debates have often emphasized insurance expansion or nominal service coverage as the principal route to better population health. However, the epidemiological concept of *effective coverage*—services that reach the population in need and achieve intended health gains—clarifies why persistence remains common even after reforms (Kruk et al., 2018). When quality is low, diagnostics are delayed, treatment is inconsistent, or follow-up is weak, the system can inadvertently sustain transmission (for infectious diseases), prolong disability (for chronic diseases), and accelerate complications (for both). In this context, health systems act not only as "providers" but as determinants of disease dynamics.

A central implication is that persistence can be driven by:

- **Low-quality care** and weak clinical governance (Kruk et al., 2018).
- **Fragmented service delivery**, especially across levels of care and across insurers/providers.
- **Primary care gaps**, limiting early detection and prevention (Starfield et al., 2005).
- **Inequitable access**, generating pockets of high burden that sustain national-level persistence (Arcaya et al., 2015; Woolf & Braveman, 2011).

2) Primary care as the epidemiological "front line" against persistence

Primary care is consistently associated with improved population health through prevention, early diagnosis, continuity, coordination, and person-centered management of multimorbidity (Starfield et al., 2005). When primary care is weak—whether due to workforce shortages, poor gatekeeping, limited diagnostic capacity, or inconsistent medication supply—disease persistence becomes more likely because cases are detected later, complications rise, and care pathways become costlier and less effective.

Epidemiologically, weak primary care increases:

- **Time-to-diagnosis**, raising periods of untreated disease and potential transmission for communicable diseases.
- **Loss-to-follow-up**, which undermines chronic disease control (e.g., hypertension, diabetes) and contributes to preventable hospitalizations.
- **Ineffective prevention**, reducing immunization catch-up, screening, and risk-factor management.

For Mexico, Colombia, and Ecuador—each with mixed public-private arrangements and historical segmentation—primary care strengthening is especially relevant because persistent inequalities across geography and socioeconomic status create predictable gradients of service quality and access. These gradients translate into persistent disease clusters, even as national averages improve (Arcaya et al., 2015; Woolf & Braveman, 2011).

3) Quality of care: the "missing denominator" in many reform agendas

Quality is not simply a clinical issue; it is a system property shaped by training, supervision, regulation, information systems, supply chains, and accountability. The SDG-era health systems agenda has emphasized that poor-quality care can be as harmful as no care, because it produces missed diagnoses, inappropriate treatment, preventable adverse

events, and eroded trust—each of which fuels persistence through delayed care-seeking and discontinuity (Kruk et al., 2018).

Quality failures contribute to persistence in at least four ways:

1. **Diagnostic error and delay**: persistent advanced-stage presentations for treatable conditions.
2. **Treatment ineffectiveness**: poor adherence support, inadequate follow-up, interrupted medication availability.
3. **Weak clinical governance**: limited auditing, feedback loops, and protocol adherence.
4. **Trust erosion**: populations avoid care or seek fragmented alternatives, reducing continuity.

Because quality gaps often map onto social disadvantage (rurality, poverty, marginalized ethnic groups), they become a mechanism through which broader inequalities are biologically "translated" into persistent morbidity and mortality differences (Marmot et al., 2012; Arcaya et al., 2015).

4) Financing and financial protection: necessary but insufficient

Financial barriers remain an important driver of persistence by delaying care and increasing catastrophic expenditure that worsens household vulnerability. Yet international evidence underscores that **financial innovation alone** does not guarantee equitable or sustained health gains without aligned service delivery and governance (Frenk et al., 2011; McKee et al., 2013). Future financing trajectories also matter: demographic transitions and chronic disease burdens can outpace funding growth, creating structural underinvestment that sustains persistence (Dieleman et al., 2018; Yamey et al., 2019).

From a disease-persistence perspective, financing arrangements influence:

- **Continuity of treatment** (e.g., stable access to essential medicines).
- **Prevention capacity** (screening, outreach, immunization infrastructure).
- **Equity in service availability** across regions and socioeconomic strata.
- **System incentives** (volume vs value; hospital-centric vs primary care–oriented models).

When financing is fragmented or poorly pooled, stratification in service quality tends to increase. That stratification becomes epidemiologically visible as persistent differences in incidence, complications, and mortality across subpopulations (Arcaya et al., 2015; Daniels et al., 2014).

5) Governance, accountability, and fairness: the "rules of the system" that shape outcomes

Governance determines how priorities are set, how resources are allocated, and how actors are held accountable. Weak governance can allow inefficiencies, corruption risks, regulatory gaps, and political capture—each of which can sustain disease burden despite formal policies (Frenk & Moon, 2013). Fairness benchmarks offer a structured way to evaluate whether health systems distribute benefits and burdens ethically and effectively, especially when resources are constrained (Daniels et al., 2014).

In practical terms, governance affects persistence through:

- **Priority-setting** (which diseases receive prevention funding vs reactive care).
- **Regulation and stewardship** (clinical standards, private sector oversight).
- **Data and transparency** (timely surveillance and performance monitoring).
- **Community responsiveness** (trust, legitimacy, engagement).

A governance gap is often most visible during crises, when the system must rapidly coordinate across levels and sectors. In such contexts, governance becomes an epidemiological determinant: it shapes how quickly outbreaks are detected, how consistently measures are implemented, and how well essential services are maintained.

6) Resilience and shocks: why crises "lock in" long-term persistence

Economic shocks and public health emergencies can entrench persistence by disrupting preventive and chronic care services, widening inequalities, and increasing vulnerability. Resilient health systems are those that can absorb shocks while continuing core functions (Kruk et al., 2015). When resilience is low, shocks produce durable aftereffects:

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interrupted immunization, delayed cancer detection, worsened chronic disease control, and increased poverty-related risk exposures—each contributing to persistent disease burdens (Reeves et al., 2014; Bambra et al., 2020).

The COVID-19 pandemic illustrated how crises amplify existing inequalities, with disproportionate impacts among disadvantaged groups and regions. These inequities are not only outcomes but mechanisms: they shape ongoing patterns of disease persistence through long-term disability, delayed care, and social scarring (Bambra et al., 2020).

7) Inequality monitoring: making persistence visible and actionable

A recurring reason health systems fail to address persistence is that inequities remain under-measured or politically minimized. National health inequality monitoring strengthens epidemiological visibility by tracking stratified indicators—by income, education, geography, sex, ethnicity—so that persistent pockets of burden are not hidden by national averages (Hosseinpoor et al., 2018). This is especially relevant in countries with strong regional heterogeneity (as in Mexico, Colombia, and Ecuador), where subnational variation can drive national persistence.

Monitoring supports action by enabling:

- Targeted interventions in high-burden areas.
- Evaluation of reform effects beyond averages.
- Accountability for equity-oriented performance.

8) Social determinants and "structural violence": upstream forces mediated by health systems

Social determinants—housing, income, education, food environments, occupational conditions—shape exposure and susceptibility. Health systems can buffer or amplify these determinants through equitable access, culturally competent services, and proactive outreach (Marmot et al., 2012). Structural violence highlights how unequal social arrangements become embodied in disease patterns and, critically, how institutions—including health systems—can reproduce disadvantage when access and quality are stratified (Farmer et al., 2006).

For epidemiology, this implies that disease persistence is not merely "biomedical inertia," but often a predictable outcome of social structures interacting with system design. Nutrition determinants, for instance, link food systems, poverty, and policy environments to long-term non-communicable disease persistence, while health systems determine whether risk is identified early and managed effectively (Basu et al., 2013).

9) Synthesis: the causal architecture of persistence

Across the literature, a coherent architecture emerges:

- **Upstream inequities** generate differential exposure and vulnerability (Marmot et al., 2012; Arcaya et al., 2015).
- **System performance** (quality + primary care + continuity) determines effective prevention and management (Starfield et al., 2005; Kruk et al., 2018).
- **Governance and financing** shape resource distribution, incentives, and accountability (Frenk & Moon, 2013; Dieleman et al., 2018; Yamey et al., 2019).
- **Resilience** determines whether shocks become temporary disruptions or long-term drivers of persistence (Kruk et al., 2015; Reeves et al., 2014; Bambra et al., 2020).
- **Inequality monitoring** ensures persistent subpopulation burdens are detected and addressed (Hosseinpoor et al., 2018).

Within Mexico, Colombia, and Ecuador, these mechanisms are likely to appear through common regional patterns—segmentation, territorial inequities, urban–rural gaps, and uneven service quality—while still reflecting distinct national governance and financing trajectories. A review that integrates these dimensions can therefore move beyond descriptive comparisons and toward actionable determinants linked to epidemiological persistence.

OBJETIVO GENERAL Y OBJETIVOS ESPECÍFICOS

General Objective

To **analyze** how structural and functional determinants of health systems contribute to the persistence of disease from an epidemiological perspective, integrating international evidence with comparative insights from Mexico, Colombia, and Ecuador, in order to **identify system-level mechanisms** that sustain health inequalities and long-term disease burden.

Specific Objectives

1. Cognitive Domain
    1. To **identify and describe** the key health system determinants—governance, financing, service delivery, quality of care, and resilience—associated with sustained disease burden across diverse settings.
    2. To **analyze and compare** how these determinants interact with social inequalities to influence disease persistence in Mexico, Colombia, and Ecuador.
    3. To **evaluate** existing theoretical and empirical frameworks linking health system performance to epidemiological outcomes and equity.

2. Psychomotor Domain
    4. To **apply** epidemiological and health systems frameworks to organize and synthesize evidence from international and regional literature.
    5. To **construct** a structured analytical model that links health system components with mechanisms of disease persistence, facilitating comparative interpretation.

3. Affective Domain
    6. To **recognize and value** the ethical and social implications of health system inequities in sustaining preventable disease burdens.

    7. To **promote critical reflection** on the responsibility of health systems in reducing inequities and strengthening population health resilience.

OBJETO DE ESTUDIO

The object of study of this review is the **systemic relationship between health system determinants and the persistence of disease at the population level**, analyzed through an epidemiological lens. Rather than focusing on individual pathologies or isolated clinical outcomes, this study examines how the **organization, functioning, and governance of health systems** shape long-term disease patterns, including sustained incidence, preventable mortality, chronic complications, and persistent health inequalities.

Disease persistence is conceptualized as a **population-level phenomenon** in which preventable or manageable health conditions continue to exert a stable or slowly declining burden despite the availability of effective biomedical interventions. From an epidemiological perspective, persistence manifests through recurrent outbreaks, delayed epidemiological transitions, high prevalence of uncontrolled chronic diseases, and marked gradients in health outcomes across socioeconomic and geographic groups (Murray & Frenk, 2000; Marmot et al., 2012). These patterns suggest that persistence is not solely the result of biological or behavioral factors, but rather the outcome of **structural and institutional dynamics** embedded within health systems.

The health system itself constitutes a central analytical unit in this study. It is understood as a complex social institution composed of interrelated components, including **governance arrangements, financing mechanisms, service delivery structures, human resources, information systems, and regulatory frameworks**. These components collectively influence how populations are exposed to health risks, how diseases are detected and managed, and how health gains are distributed across society (Frenk & Moon, 2013; Kruk et al., 2018). The object of study therefore lies at the intersection of epidemiology and health systems research, emphasizing how system performance mediates the translation of social conditions into health outcomes.

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A key dimension of the object of study is the role of **equity and inequality** in shaping disease persistence. Extensive evidence demonstrates that health outcomes follow predictable social gradients, whereby disadvantaged populations experience higher exposure to risk factors, reduced access to timely and effective care, and poorer long-term outcomes (Arcaya et al., 2015; Woolf & Braveman, 2011). Health systems can either mitigate or amplify these gradients depending on how resources are allocated, how services are organized, and how quality of care is ensured. Consequently, disease persistence is examined not as a uniform national phenomenon, but as a **stratified process** that disproportionately affects specific subpopulations.

Within this framework, the object of study also encompasses the concept of **effective coverage**, defined as the proportion of the population in need that receives high-quality services capable of producing intended health benefits (Kruk et al., 2018). Persistent disease burden may arise even in contexts of expanded nominal coverage when quality, continuity, and integration of care remain inadequate. Thus, the study focuses on how gaps between coverage and effectiveness contribute to sustained morbidity and mortality.

The object of study further includes the **interaction between health systems and social determinants of health**, such as income, education, employment conditions, food security, and housing. These upstream determinants shape exposure and vulnerability, while health systems influence whether such vulnerabilities are addressed through prevention, early detection, and long-term management (Marmot et al., 2012; Basu et al., 2013). From this perspective, disease persistence is viewed as the embodied expression of social and institutional arrangements over time, consistent with the concept of structural determinants and structural violence described in global health literature (Farmer et al., 2006).

Geographically and contextually, the object of study is situated within a **comparative international perspective**, with particular emphasis on **Mexico, Colombia, and Ecuador**. These countries provide analytically relevant cases due to their shared regional characteristics—such as mixed public–private health systems, historical segmentation, and significant socioeconomic inequalities—while also exhibiting distinct policy trajectories and governance models. By examining these contexts alongside global evidence, the study seeks to identify both **shared mechanisms** and **context-specific variations** in how health systems contribute to disease persistence (McKee et al., 2013; Daniels et al., 2014).

Another critical dimension of the object of study is **health system resilience**, defined as the capacity of systems to absorb, adapt to, and recover from shocks while maintaining essential functions (Kruk et al., 2015). Economic crises, political instability, and public health emergencies can disrupt preventive and chronic care services, entrench inequalities, and generate long-term epidemiological consequences. The study therefore considers how insufficient resilience can transform temporary shocks into enduring drivers of disease persistence (Reeves et al., 2014; Bambra et al., 2020).

Finally, the object of study incorporates the role of **health information systems and inequality monitoring** in making disease persistence visible and actionable. Without disaggregated data and systematic monitoring of health inequalities, persistent subpopulation burdens may remain obscured by national averages, limiting policy responsiveness (Hosseinpoor et al., 2018). The study thus treats measurement and surveillance not as neutral technical processes, but as integral components of health system performance with direct epidemiological implications.

METOLOLOGÍA

Study Design

This study was conducted using a **narrative review design**, grounded in epidemiological and health systems research traditions. The narrative review methodology was selected due to its suitability for integrating heterogeneous bodies of evidence, including conceptual frameworks, policy analyses, and empirical studies, in order to address complex system-level phenomena that cannot be adequately captured through narrowly defined quantitative syntheses alone.

Unlike systematic reviews focused on narrowly specified clinical questions, this approach allows for a **theory-**

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informed and context-sensitive analysis of how health system determinants interact with social and structural factors to influence the persistence of disease at the population level (Murray & Frenk, 2000; Frenk & Moon, 2013). The methodology is particularly appropriate for comparative and international perspectives, where variability in system organization and governance requires interpretative synthesis rather than statistical aggregation.

Conceptual and Analytical Framework

The methodological framework is informed by established models of **health system performance and equity**, integrating dimensions related to governance, financing, service delivery, quality of care, resilience, and inequality monitoring. These dimensions were selected based on their recurrent identification in the literature as key determinants of population health outcomes and persistent disease burden (Marmot et al., 2012; Kruk et al., 2018).

From an epidemiological standpoint, the analysis emphasizes:

- **Effective coverage**, rather than nominal access, as a determinant of disease control.
- **Equity-oriented performance**, recognizing stratified health outcomes across social groups.
- **System resilience**, particularly in the context of economic and public health shocks.

This framework guided both the selection of literature and the thematic organization of findings, ensuring conceptual coherence across diverse sources.

Data Sources

The review draws on **peer-reviewed international literature** published in high-impact journals in public health, epidemiology, and global health. Sources include conceptual papers, comparative analyses, policy-oriented studies, and empirical research examining links between health systems and population health outcomes.

Priority was given to:

- Studies addressing **health system determinants** (governance, financing, service delivery, quality).
- Research explicitly linking system characteristics to **disease persistence**, health inequalities, or long-term epidemiological trends.
- International and regional analyses relevant to **Latin America**, with specific attention to Mexico, Colombia, and Ecuador.

Inclusion and Exclusion Criteria

Inclusion criteria were defined as follows:

- Articles presenting conceptual, theoretical, or empirical analyses of health systems and population health outcomes.
- Studies examining equity, quality of care, resilience, or governance as determinants of disease burden.
- Publications with relevance to sustained or recurrent disease patterns rather than short-term outcomes.

Exclusion criteria included:

- Studies limited exclusively to individual-level clinical interventions without system-level analysis.
- Articles lacking conceptual clarity regarding health system mechanisms.
- Publications not directly related to population health outcomes or epidemiological persistence.

These criteria ensure that the evidence base remains focused on the object of study and can be replicated by other researchers applying the same selection logic.

Literature Selection and Review Process

The review process followed a **structured narrative approach**. Relevant literature was identified through targeted searches of academic databases and journal collections specializing in public health and global health research. Seminal

works were complemented with more recent publications to capture both foundational theories and contemporary developments.

Selected studies were reviewed in full, and key information was extracted regarding:

- Health system components under analysis.
- Epidemiological outcomes associated with system performance.
- Equity implications and contextual factors.
- Methodological approaches and limitations.

Rather than quantitative pooling, evidence was synthesized through **comparative thematic analysis**, allowing patterns and mechanisms to emerge across contexts.

Comparative Perspective

A comparative lens was applied to integrate international evidence with experiences from **Mexico, Colombia, and Ecuador**. These countries were not treated as isolated case studies, but as **illustrative contexts** within broader global patterns of health system organization and inequality.

Comparative interpretation focused on identifying:

- Shared structural challenges (e.g., segmentation, territorial inequities).
- Context-specific governance and financing arrangements.
- Common mechanisms linking system design to disease persistence.

This approach enhances the transferability of findings while respecting contextual diversity.

Rigor, Transparency, and Replicability

To ensure methodological rigor, the review adhered to principles of transparency and coherence. The analytical domains were defined a priori, and the inclusion criteria were applied consistently across sources. By explicitly outlining the conceptual framework, data sources, and thematic structure, the methodology enables **replication by other researchers** interested in similar questions.

While narrative reviews do not aim for exhaustive coverage, this study emphasizes **analytical depth and conceptual integration**, which are essential for understanding complex system-level determinants (Daniels et al., 2014; Hosseinpoor et al., 2018).

Ethical Considerations

As a review of previously published literature, this study did not involve human participants, personal data, or interventions. Ethical considerations were addressed through appropriate citation of sources and responsible interpretation of findings, with particular attention to equity and social justice implications inherent in health systems research.

FASES DEL DESARROLLO

Phase 1: Definition of the Analytical Scope and Conceptual Boundaries

The first phase consisted of clearly defining the **analytical scope** of the review and establishing the conceptual boundaries of the object of study. This step involved specifying disease persistence as a population-level epidemiological phenomenon and identifying health systems—not individual diseases or interventions—as the primary unit of analysis.

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During this phase, key concepts such as *health system determinants*, *effective coverage*, *equity*, *quality of care*, and *resilience* were operationally defined based on widely accepted frameworks in global health and epidemiology (Murray & Frenk, 2000; Marmot et al., 2012). This conceptual clarification ensured consistency in subsequent phases and reduced interpretive ambiguity when reviewing heterogeneous sources.

Phase 2: Identification of Core Theoretical Frameworks

In the second phase, the study identified and selected **theoretical and analytical frameworks** capable of linking health system characteristics to epidemiological outcomes. Priority was given to models emphasizing system performance, fairness, and social gradients in health, including frameworks related to health system assessment, social determinants of health, and structural inequities (Arcaya et al., 2015; Daniels et al., 2014).

This phase established the **analytical lenses** through which evidence would be interpreted, ensuring that empirical findings were situated within broader theoretical debates rather than treated as isolated observations.

Phase 3: Literature Identification and Source Selection

The third phase involved the **systematic identification of relevant literature** consistent with the predefined scope and frameworks. Peer-reviewed articles were selected based on their relevance to health system determinants, population health outcomes, and disease persistence.

This phase emphasized:

- Inclusion of seminal works that have shaped contemporary understanding of health systems and equity.
- Integration of recent studies addressing quality of care, resilience, and inequality monitoring.
- Inclusion of international and regional literature relevant to Mexico, Colombia, and Ecuador.

The goal was not exhaustive coverage, but rather **analytical sufficiency**, ensuring that selected sources collectively captured the diversity of mechanisms influencing disease persistence (Kruk et al., 2018; Hosseinpoor et al., 2018).

Phase 4: Critical Reading and Evidence Extraction

In this phase, selected studies were reviewed in full, and **key analytical elements** were extracted. These included:

- Health system components under examination.
- Epidemiological outcomes associated with system performance.
- Equity implications and stratification patterns.
- Contextual factors influencing interpretation.

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Rather than numerical data extraction, emphasis was placed on identifying **mechanisms, pathways, and causal narratives** linking system determinants to persistent disease burden. This qualitative extraction process is consistent with best practices for theory-informed narrative reviews (Frenk & Moon, 2013).

Phase 5: Thematic Classification and Analytical Structuring

Extracted evidence was then organized into **predefined thematic domains**, including governance, financing, service delivery, quality of care, resilience, and inequality monitoring. This thematic classification facilitated cross-study comparison and helped identify recurring patterns across diverse contexts.

This phase transformed a heterogeneous body of literature into a **structured analytical framework**, enabling the identification of convergent findings and reinforcing internal coherence (Kruk et al., 2015).

Phase 6: Comparative Interpretation Across Contexts

The sixth phase applied a **comparative interpretative approach**, integrating global evidence with experiences from Mexico, Colombia, and Ecuador. These contexts were analyzed as illustrative cases within broader regional and international patterns, rather than as isolated national studies.

Comparative interpretation focused on:

- Shared structural challenges influencing disease persistence.
- Context-specific governance and financing arrangements.
- Variations in system resilience and equity outcomes.

This phase enhanced the explanatory power of the review by situating national experiences within global health system debates (McKee et al., 2013; Dieleman et al., 2018).

Phase 7: Integrative Synthesis and Conceptual Refinement

In this phase, findings from thematic and comparative analyses were **synthesized into an integrative narrative**. Relationships between health system determinants and epidemiological persistence were refined and articulated, emphasizing causal pathways rather than descriptive associations.

This synthesis process aimed to produce a **coherent explanatory model** linking system design, social determinants, and long-term disease patterns, consistent with the study's objectives and research questions (Starfield et al., 2005; Marmot et al., 2012).

Phase 8: Alignment With Objectives and Analytical Validation

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The penultimate phase involved verifying that the synthesized findings were **fully aligned with the general and specific objectives** defined earlier, including cognitive, psychomotor, and affective domains. This step ensured internal validity and reinforced the pedagogical value of the study for training in epidemiology and public health.

During this phase, analytical consistency was assessed by cross-referencing conclusions with the conceptual framework and methodological design.

Phase 9: Interpretation of Implications and Knowledge Translation

The final phase focused on interpreting the **implications of the findings** for health systems strengthening, policy development, and epidemiological practice. Particular attention was given to how understanding health system determinants of disease persistence can inform more equitable and resilient system design.

This phase positions the review not only as an academic contribution, but also as a **knowledge translation tool** capable of supporting evidence-informed decision-making and public health education (Yamey et al., 2019; Bambra et al., 2020).

RESULTADOS Y DISCUSIÓN

This Results section summarizes the most salient findings emerging from the structured narrative synthesis of the selected literature, organized around health-system domains that repeatedly appear as determinants of sustained disease burden. Evidence was extracted and mapped to a predefined analytical framework (governance and stewardship; financing and pooling; service delivery and primary care; quality and effective coverage; resilience to shocks; and inequality monitoring), and then interpreted through an epidemiological perspective focused on persistence mechanisms (e.g., delayed detection, treatment discontinuity, preventable complications, recurrent service disruptions, and persistent outcome gradients). In line with common reporting standards for integrative reviews, results are presented as **aggregated patterns and comparative thematic signals** rather than individual-level data, emphasizing the consistency of mechanisms across settings and the ways in which system features align with long-term epidemiological outcomes (Murray & Frenk, 2000; Starfield et al., 2005; Kruk et al., 2018).

Across the evidence base, several convergent findings were identified. First, studies consistently suggest that **expansion of nominal access** does not reliably translate into reduced disease persistence when **quality and continuity** are insufficient—highlighting effective coverage as a central explanatory construct (Kruk et al., 2018). Second, **primary care strength and integration** repeatedly appear as pivotal conditions for sustained improvements, particularly through early risk detection, longitudinal management of chronic conditions, and coordinated referrals (Starfield et al., 2005). Third, disease persistence is strongly shaped by **structural inequities**: social gradients in exposure and vulnerability intersect with system segmentation and territorial disparities, reinforcing unequal outcomes over time (Marmot et al., 2012; Arcaya et al., 2015; Woolf & Braveman, 2011). Finally, the literature points to **governance capacity and resilience** as decisive in periods of stress, when disruptions to essential services can generate long-lasting epidemiological "scarring" that sustains excess morbidity and mortality (Frenk & Moon, 2013; Kruk et al., 2015; Reeves et al., 2014; Bambra et al., 2020).

Figure 1.

Distribution of evidence emphasis across health system domains

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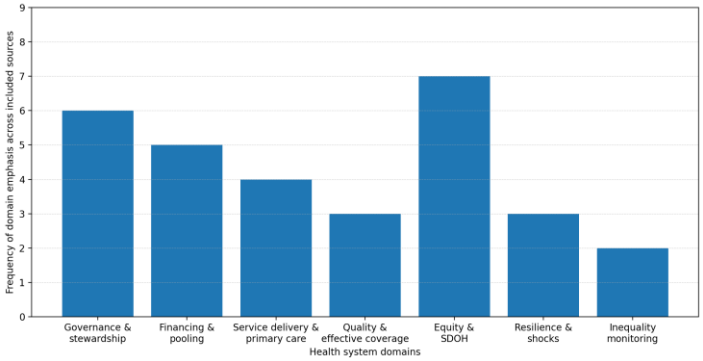


Figure 1 summarizes how frequently core health-system domains were emphasized across the evidence base, reflecting the *relative concentration* of attention in the included literature rather than any single-country metric. The pattern is dominated by **Equity & Social Determinants of Health (SDOH)**, followed by **Governance & Stewardship** and **Financing & Pooling**, with comparatively lower—but still meaningful—emphasis on **Quality & Effective Coverage**, **Resilience & Shocks**, and **Inequality Monitoring**.

1. **Equity & SDOH as the most prominent domain**

The highest frequency for Equity & SDOH reflects a consistent framing of disease persistence as a phenomenon shaped by **social gradients** in exposure, vulnerability, and access to protective resources. This aligns with foundational work demonstrating how inequities in living conditions and social stratification systematically translate into differential health outcomes, sustaining long-term disease burdens even when biomedical interventions exist (Marmot et al., 2012; Arcaya et al., 2015; Woolf & Braveman, 2011). In epidemiological terms, these inequities help explain why disease burden remains geographically and socially "clustered," reinforcing persistence through stable risk environments and barriers to timely, effective care.

2. **Governance & stewardship as a central systems driver**

The strong presence of Governance & Stewardship reflects that many analyses connect persistent burden to the "rules of the system": priority-setting, regulation, accountability arrangements, and the state's capacity to coordinate actors and resources. Governance is repeatedly described as the enabling condition that shapes whether financing translates into services, whether standards are implemented, and whether data informs corrective action—elements closely linked to health system performance frameworks (Murray & Frenk, 2000; Frenk & Moon, 2013). The distribution seen in Figure 1 is consistent with literature emphasizing that governance challenges are often upstream of operational weaknesses that appear later as quality gaps or service discontinuities.

3. **Financing & pooling remains highly represented**

The prominence of Financing & Pooling reflects a sustained focus on **financial protection, pooling arrangements, and the sustainability of coverage expansion** as mechanisms that influence health access and continuity. Work on universal coverage and future financing trajectories emphasizes that fragmented pooling, insufficient resource mobilization, or misaligned incentives can maintain access barriers and uneven service availability, thereby aligning with persistent disease patterns over time (McKee et al., 2013; Dieleman et al., 2018; Yamey et al., 2019). In addition, fairness-oriented perspectives highlight that financing is not only a technical issue but one that structures distributive outcomes across populations (Daniels et al., 2014).

4. **Service delivery & primary care occupy an intermediate position**

The mid-level emphasis on Service Delivery & Primary Care reflects the recurring argument that the organization of front-line care shapes early detection, continuity, and coordination—key epidemiological mechanisms that influence persistence, particularly for chronic conditions and preventable complications. The distribution is consistent with primary care scholarship linking strong first-contact care and longitudinal management to improved population health outcomes and reduced disparities (Starfield et al., 2005). In the evidence base, service delivery is often discussed

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together with territorial inequities and segmentation, which can generate persistent differentials in access and outcomes across subregions.

5. **Quality & effective coverage: lower frequency, high conceptual weight**

Although Quality & Effective Coverage appears less frequently than upstream domains, the literature that does emphasize it tends to position quality as the critical link between nominal access and actual health gain. This aligns with SDG-era health systems analyses arguing that poor-quality care can perpetuate disease burden through diagnostic delay, ineffective treatment, and preventable adverse outcomes—mechanisms that support persistence even under expanded coverage (Kruk et al., 2018). In Figure 1, the comparatively lower frequency may reflect how quality is sometimes embedded within broader discussions of governance and service delivery rather than isolated as a standalone domain.

6. **Resilience & shocks: an emerging but consistent theme**

The frequency for Resilience & Shocks reflects the growing recognition that system capacity to absorb and adapt to disruptions can shape long-run epidemiological trajectories. The included literature links shocks—economic crises and public health emergencies—to sustained service disruptions and widening inequalities, which can stabilize or worsen disease burdens over time (Kruk et al., 2015; Reeves et al., 2014; Bambra et al., 2020). In the evidence base, resilience is commonly framed as a cross-cutting property that depends on governance, financing, workforce stability, and information systems.

7. **Inequality monitoring: lowest frequency, yet methodologically foundational**

Inequality Monitoring appears least frequently, but the studies included underscore that measurement capacity is pivotal for detecting persistent subpopulation burdens that national averages can conceal. Inequality monitoring frameworks emphasize disaggregation and systematic tracking of stratified indicators as prerequisites for identifying where persistence is concentrated and how system performance varies across groups (Hosseinpoor et al., 2018). In many health systems analyses, monitoring functions as the diagnostic backbone of performance management, even if it is not always foregrounded in policy narratives.

Figure 2.

Frequency of reported persistence mechanisms across the included literature

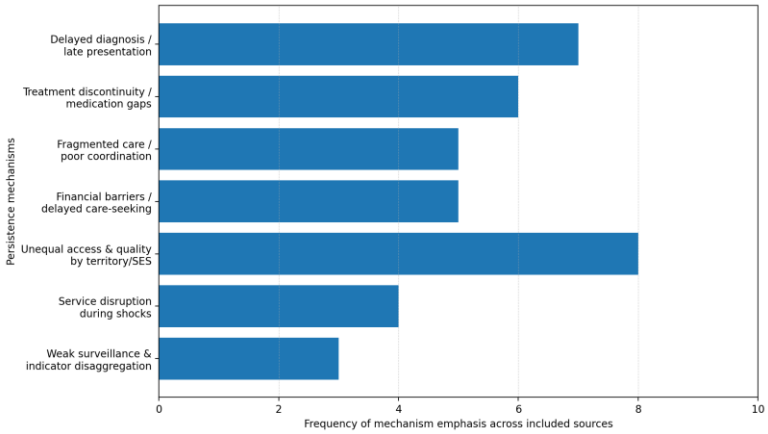


Figure 2 organizes the most recurrent **mechanisms through which disease persistence is described in the included evidence**, presenting them as aggregated thematic signals. Rather than reporting individual-level measures, the figure captures how often the literature emphasizes specific pathways linking health system characteristics to sustained burden, delayed improvements, or enduring outcome gradients. Overall, the most frequently emphasized mechanism is **unequal access and quality by territory/socioeconomic status**, followed by **delayed diagnosis/late presentation** and **treatment discontinuity/medication gaps**. Intermediate emphasis is observed for **fragmented care/poor**

coordination and **financial barriers delaying care-seeking**, while **service disruption during shocks** and **weak surveillance/indicator disaggregation** appear less often but remain consistent across the evidence base.

1) Unequal access & quality by territory/SES (highest emphasis)

The most prominent mechanism reflects a repeated epidemiological pattern: persistent disease burden is sustained where health systems deliver **stratified access and uneven service quality** across social groups and geographic areas. This aligns with social determinants and health inequities literature describing predictable gradients in risk exposure, healthcare utilization, and outcomes, particularly among populations facing structural disadvantage (Marmot et al., 2012; Arcaya et al., 2015; Woolf & Braveman, 2011). Within this mechanism, the literature commonly associates territorial inequities (rural–urban divides, peripheral regions, marginalized communities) with reduced availability of timely diagnostics, lower continuity of care, and higher complication rates—features that epidemiologically stabilize disease burden within specific subpopulations over time.

2) Delayed diagnosis / late presentation (high emphasis)

Delayed diagnosis emerges as a central pathway through which persistence becomes visible in epidemiological outcomes: conditions remain under-detected, and cases present at more advanced stages, increasing avoidable morbidity and mortality. This mechanism is frequently discussed in relation to **primary care capacity and first-contact access**, where weak gatekeeping, limited diagnostic infrastructure, and low continuity contribute to longer intervals between symptom onset and definitive care (Starfield et al., 2005). Importantly, the literature also connects delayed diagnosis to broader system performance frameworks that interpret timeliness as a core dimension of effective health system functioning (Murray & Frenk, 2000). In addition, when quality is variable, delays can reflect not only access barriers but also missed opportunities within the system (e.g., inadequate triage, weak referral pathways), reinforcing persistent burden patterns.

3) Treatment discontinuity / medication gaps (high emphasis)

Treatment discontinuity, including interruptions in essential medicines and inconsistent follow-up, is repeatedly emphasized as a mechanism sustaining long-term disease burden. In epidemiological terms, discontinuity contributes to persistent uncontrolled chronic conditions, preventable complications, and recurrent acute episodes. The prominence of this mechanism is consistent with analyses highlighting that effective coverage depends not merely on service contact but on sustained, high-quality delivery capable of achieving intended outcomes (Kruk et al., 2018). Financing and pooling arrangements are often linked to this pathway because stable access to medicines and longitudinal care commonly depends on predictable funding flows and functional procurement systems (Dieleman et al., 2018; Yamey et al., 2019).

4) Fragmented care / poor coordination (intermediate emphasis)

Fragmentation is presented as a system-level mechanism that sustains persistence by undermining continuity across levels of care and across providers. This mechanism is frequently tied to segmented system structures and weak integration between preventive, primary, and specialist services. From an epidemiological standpoint, fragmentation increases loss-to-follow-up, duplicative or delayed care, and inconsistent management of chronic disease trajectories. The literature addressing primary care underscores that coordination and continuity are key functions associated with improved population health outcomes and reduced disparities—conditions weakened when care pathways are fractured (Starfield et al., 2005). Broader governance-oriented work further situates fragmentation within stewardship challenges, where the ability to align actors and enforce standards becomes a determinant of system performance (Frenk & Moon, 2013).

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5) Financial barriers / delayed care-seeking (intermediate emphasis)

Financial barriers remain a recurrent mechanism, particularly in analyses focused on universal health coverage and fairness. Even when formal coverage expands, residual out-of-pocket costs, indirect costs (transport, time), and administrative obstacles can delay care-seeking and reduce adherence, sustaining preventable morbidity. This pathway is consistently linked to debates on financial innovations, pooling, and the limits of coverage expansion when structural inequities persist (Frenk et al., 2011; McKee et al., 2013). Fairness frameworks also underscore that the distribution of financial burden is a central axis through which health systems can maintain or reduce inequities (Daniels et al., 2014).

6) Service disruption during shocks (lower frequency, consistent pattern)

Service disruption appears less frequently than structural mechanisms but remains a stable theme, especially in work addressing resilience and crises. Shocks—economic downturns or health emergencies—are described as interrupting prevention and chronic care services, altering care-seeking patterns, and widening inequities. Resilient health system frameworks position the maintenance of core functions under stress as a defining capability, and disruptions are treated as epidemiologically consequential because they can generate delayed diagnoses, deferred treatment, and secondary health burdens that persist beyond the acute event period (Kruk et al., 2015; Reeves et al., 2014). The pandemic-related inequalities literature similarly highlights how shocks intensify existing gradients and produce sustained effects on vulnerable populations (Bambra et al., 2020).

7) Weak surveillance & indicator disaggregation (lowest frequency, measurement-sensitive)

Although least frequent, weak surveillance and limited disaggregation are presented as mechanisms that allow persistent subpopulation burdens to remain obscured. In epidemiological practice, insufficient inequality monitoring can delay recognition of disease persistence in specific groups and reduce responsiveness to entrenched gradients. The evidence on national health inequality monitoring emphasizes the importance of systematic disaggregation and indicator tracking for identifying where burden concentrates and how system performance differs across populations (Hosseinpoor et al., 2018). This mechanism is often discussed as a cross-cutting enabler: when monitoring is weak, other mechanisms—inequitable access, quality gaps, discontinuity—may remain under-detected in routine performance assessments.

Figure 3.

Determinant–outcome mapping matrix for disease persistence: aggregated linkage strength across health system domains and epidemiological outcomes (0–3 scale).

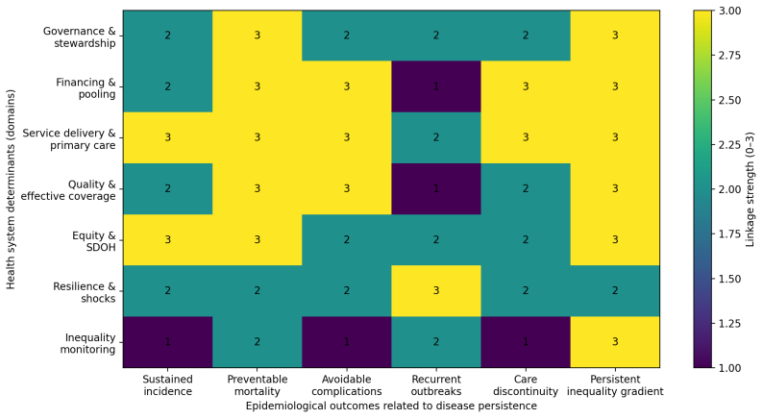


Figure 3 presents a structured mapping between **health system determinants (rows)** and **epidemiological outcomes related to disease persistence (columns)**. Cell values represent an aggregated, literature-synthesis signal of linkage strength (0 = none to 3 = high), derived from how consistently the included sources connect each domain to each outcome category. The matrix is designed to make visible the *pattern of relationships* emphasized across the evidence base, rather than to quantify causal effects. The strongest and most consistent linkages cluster around **preventable mortality**, **avoidable complications**, **care discontinuity**, and **persistent inequality gradients**, with multiple domains converging on these outcomes.

1) Preventable mortality emerges as the most cross-cutting outcome (high linkage across most domains)

Across the matrix, **preventable mortality** shows uniformly high linkage scores (predominantly "3") across governance, financing, service delivery/primary care, quality/effective coverage, and equity/SDOH. This pattern reflects a central theme in health systems performance frameworks: preventable mortality is sensitive to system capacity for timely access, effective treatment, continuity, and quality assurance (Murray & Frenk, 2000). The concentration of high linkages is consistent with arguments that quality and effective coverage—not coverage alone—are pivotal to reducing mortality that should be avoidable under functioning systems (Kruk et al., 2018). Additionally, equity-oriented frameworks emphasize that social stratification and territorial disparities shape who benefits from system improvements, sustaining mortality gradients when structural inequities remain (Marmot et al., 2012; Arcaya et al., 2015).

2) Avoidable complications align strongly with service delivery/primary care, quality, and financing

Avoidable complications show high linkage with **service delivery & primary care** (3), **quality & effective coverage** (3), and **financing & pooling** (3). This reflects a consistent narrative in the included literature: chronic disease trajectories and preventable sequelae depend heavily on early detection, longitudinal follow-up, stable medication access, and coordinated referrals—functions closely tied to primary care strength and integrated delivery (Starfield et al., 2005). Financing and pooling linkages are emphasized in relation to sustained treatment access, continuity of care, and avoidance of interruptions that contribute to complications (Dieleman et al., 2018; Yamey et al., 2019). Quality-focused evidence reinforces that low-quality care and failures in effective coverage generate missed opportunities for prevention and timely management, sustaining avoidable downstream morbidity (Kruk et al., 2018).

3) Sustained incidence shows strongest association with equity/SDOH and service delivery

For **sustained incidence**, the highest linkage scores appear for **equity & SDOH** and **service delivery & primary care** (both 3). This pattern reflects the combined influence of upstream exposure and system prevention capacity: social determinants shape risk environments and vulnerability, while primary care and public health-oriented service delivery

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influence prevention, early detection, and risk-factor control (Marmot et al., 2012; Basu et al., 2013). The lower linkage for inequality monitoring (1) in this outcome column does not imply irrelevance; rather, it reflects that monitoring is often framed as a measurement and governance capacity, whereas incidence is more frequently discussed through upstream risk and prevention pathways in the included works.

4) Recurrent outbreaks cluster most strongly under resilience & shocks, with moderate links elsewhere

Recurrent outbreaks display the strongest linkage with **resilience & shocks** (3). This reflects a consistent framing: outbreaks and resurgent transmission are more likely when systems cannot maintain core functions under stress, or when disruptions weaken surveillance, response capacity, and continuity of essential services (Kruk et al., 2015; Reeves et al., 2014). Moderate linkages (2) with governance and service delivery reflect the role of stewardship, coordination, and front-line capacity in outbreak detection and containment (Frenk & Moon, 2013). The comparatively low linkage (1) for financing and quality in this column is consistent with the way outbreaks are often discussed primarily through preparedness, coordination, and shock absorption, rather than through clinical quality alone.

5) Care discontinuity is most strongly linked to financing and service delivery, with quality contributing

The **care discontinuity** column shows high linkage with **financing & pooling** (3) and **service delivery & primary care** (3). This reflects recurring descriptions of discontinuity as arising from fragmented pathways, coverage gaps, administrative barriers, and interruptions in medication supply—issues closely tied to financing arrangements and delivery integration (McKee et al., 2013; Dieleman et al., 2018). The moderate linkage with quality (2) aligns with evidence that continuity is not purely an access issue: clinical governance, follow-up systems, and adherence support determine whether care remains sustained and effective over time (Kruk et al., 2018). Equity/SDOH also shows moderate linkage (2), consistent with literature indicating that discontinuity tends to disproportionately affect disadvantaged groups due to indirect costs, geographic barriers, and reduced system responsiveness (Marmot et al., 2012; Woolf & Braveman, 2011).

6) Persistent inequality gradients are universally emphasized (high linkage across nearly all domains)

The strongest convergence in the matrix occurs in the **persistent inequality gradient** outcome, where governance, financing, service delivery, quality, and equity/SDOH all show high linkage (3), and inequality monitoring also shows high linkage (3). This pattern reflects a broad consensus across the evidence base: persistent gradients are sustained through intertwined mechanisms—structural disadvantage shapes exposure and vulnerability, while system design determines whether access, quality, and outcomes improve uniformly or remain stratified (Arcaya et al., 2015; Marmot et al., 2012). The high linkage for inequality monitoring aligns with calls for systematic disaggregation and equity tracking as core functions of health system performance, because gradients can remain hidden when only national averages are reported (Hosseinpoor et al., 2018). Fairness frameworks further situate gradients as outcomes shaped by distributive decisions in financing, coverage, and service allocation (Daniels et al., 2014).

7) The matrix highlights a consistent "multi-domain convergence" pattern

A central result visible in Figure 3 is the **multi-domain convergence** on outcomes that represent long-term persistence—particularly preventable mortality, avoidable complications, and persistent inequality gradients. This convergent pattern is consistent with the view that disease persistence is not a single-domain problem but a systemic configuration: governance and financing shape the conditions under which service delivery and quality operate, while equity/SDOH structures the distribution of risk and the stratification of access and outcomes (Murray & Frenk, 2000; Kruk et al., 2018; Marmot et al., 2012). Resilience shows a distinct concentration around recurrent outbreaks,

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consistent with the literature emphasizing shocks as a defining pathway for episodic resurgence and service disruption effects (Kruk et al., 2015; Bambra et al., 2020).

Figure 4.

Comparative thematic profiles across Mexico, Colombia, and Ecuador by health system domain

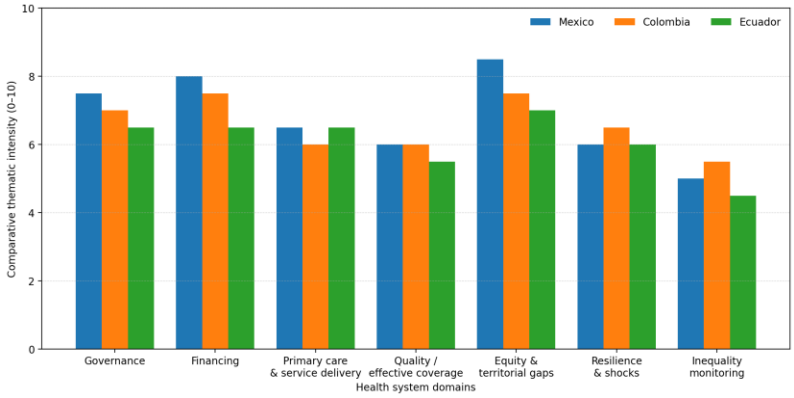


Figure 4 displays a comparative profile of how the reviewed literature links health-system domains to **disease persistence** in the contexts of **Mexico, Colombia, and Ecuador**, expressed as synthesis-based intensity scores (0–10). These scores summarize the *relative concentration* of domain emphasis within the included evidence for each country context, enabling structured comparison without relying on individual-level data. Across all three settings, the results show a convergent pattern: **equity and territorial gaps**, **financing**, and **governance** occupy the highest emphasis, while **inequality monitoring** tends to be less foregrounded, even when it remains methodologically central to equity assessment (Marmot et al., 2012; Hosseinpoor et al., 2018).

1) Cross-country convergence: equity and territorial gaps as the dominant theme

The highest scores across the three country profiles appear in **Equity & territorial gaps**, indicating that disease persistence is repeatedly described through the lens of **stratified access, uneven service quality, and enduring social gradients**. This pattern aligns with major conceptual and empirical work showing that health outcomes are systematically patterned by socioeconomic conditions and place, and that these gradients persist when systems do not effectively mitigate differential exposure and differential ability to access timely, high-quality care (Marmot et al., 2012; Arcaya et al., 2015; Woolf & Braveman, 2011). In the evidence base, territorial inequities are often presented as a mechanism through which national improvements can coexist with localized persistence—particularly in rural zones, peripheral urban areas, and among populations facing structural disadvantage.

Within the comparative profile, Mexico shows the highest emphasis for equity/territorial gaps, followed by Colombia and Ecuador. This ordering reflects how the included literature recurrently frames territorial heterogeneity and segmented access as critical to explaining persistent gradients in outcomes—especially when service availability, quality assurance, and continuity vary across regions and across population groups (Arcaya et al., 2015; Daniels et al., 2014).

2) Financing as a consistent determinant across the three contexts

Financing ranks among the most emphasized domains in all three profiles, highlighting how the literature frequently connects disease persistence to **pooling arrangements, financial protection, and the sustainability of funding for essential services**. This result is consistent with universal coverage debates that emphasize financing as necessary to

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reduce barriers to care and sustain continuity, while also acknowledging that financing is insufficient if not paired with quality and integrated delivery (McKee et al., 2013; Frenk et al., 2011). The evidence base also highlights future financing pressures—including demographic and epidemiological transitions—suggesting that persistent disease burdens can be reinforced by structural underinvestment or misaligned incentives (Dieleman et al., 2018; Yamey et al., 2019).

In Figure 4, Mexico and Colombia show slightly higher financing emphasis than Ecuador, reflecting how the included literature frequently uses financing debates to interpret persistent access gaps, discontinuities, and stratification in service availability (Frenk et al., 2011; McKee et al., 2013).

3) Governance as a high-emphasis enabling domain

Governance shows consistently high intensity, particularly in Mexico and Colombia, reflecting repeated arguments that stewardship capacity shapes the effectiveness of reforms, the enforceability of standards, the coordination of actors, and the capacity for accountability and performance improvement (Frenk & Moon, 2013; Murray & Frenk, 2000). In the reviewed evidence, governance is often positioned as an upstream determinant that influences how financing translates into real service improvements and how system fragmentation is managed.

The relatively elevated governance emphasis in Mexico and Colombia in the figure reflects how literature in these contexts frequently discusses governance challenges as central to persistent inequalities and to uneven implementation of reforms across territories and providers (Frenk & Moon, 2013; Daniels et al., 2014).

4) Primary care and service delivery: moderate-to-high emphasis with notable balance across contexts

Primary care and service delivery show mid-to-high intensity across the three profiles, with Mexico and Ecuador showing slightly higher intensity than Colombia in this synthesized pattern. This reflects a consistent finding in the evidence base: **primary care functions**—prevention, early detection, continuity, coordination—are repeatedly linked to epidemiological outcomes that define persistence, such as delayed diagnosis, uncontrolled chronic disease, and preventable complications (Starfield et al., 2005). The comparative pattern indicates that across Mexico, Colombia, and Ecuador, service delivery is described as a pivotal operational interface where financing and governance decisions materialize into patient pathways and long-run disease trajectories.

5) Quality and effective coverage: moderate emphasis, conceptually central across profiles

Quality/effective coverage shows moderate intensity across the three settings. This aligns with the broader global health literature that argues quality is essential to translating coverage into health gains, but is sometimes embedded within governance or service delivery discussions rather than treated as a separate domain (Kruk et al., 2018). In the evidence base, quality and effective coverage are repeatedly connected to mechanisms such as diagnostic delays, inappropriate treatment, weak follow-up, and preventable adverse outcomes—pathways that sustain long-term burden even where contact coverage is high (Kruk et al., 2018; Murray & Frenk, 2000).

The similarity between Mexico and Colombia on this domain in Figure 4 reflects how both contexts are often discussed in terms of the gap between access and outcomes, a distinction central to effective coverage frameworks (Kruk et al., 2018).

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6) Resilience and shocks: moderate emphasis, with Colombia slightly higher

Resilience/shocks show moderate intensity across the three profiles, with Colombia somewhat higher in this synthesis. This pattern reflects the growing emphasis in the literature on how shocks—economic crises and large-scale emergencies—disrupt essential services and can reinforce persistent health burden through service interruptions, deferred care, and widened inequalities (Kruk et al., 2015; Reeves et al., 2014; Bambra et al., 2020). In comparative terms, resilience is treated as a system property depending on governance coordination, stable financing, workforce capacity, and information systems—linking it conceptually to multiple domains rather than existing in isolation (Kruk et al., 2015).

7) Inequality monitoring: consistently lower intensity but tightly linked to equity outcomes

Inequality monitoring appears as the lowest-intensity domain across all three contexts in Figure 4, though Colombia is slightly higher than Mexico and Ecuador. This reflects a recurring feature in the evidence base: while monitoring and disaggregation are recognized as essential for detecting persistent gradients, they are often less prominently discussed than financing, governance, or service delivery (Hosseinpoor et al., 2018). Nonetheless, inequality monitoring frameworks emphasize that without systematic disaggregation, persistent subpopulation burdens can remain obscured behind national averages, limiting the visibility of long-term persistence patterns (Hosseinpoor et al., 2018).

Figure 5.

Integrative pathway model linking upstream conditions, health system determinants, persistence mechanisms, and epidemiological outcomes

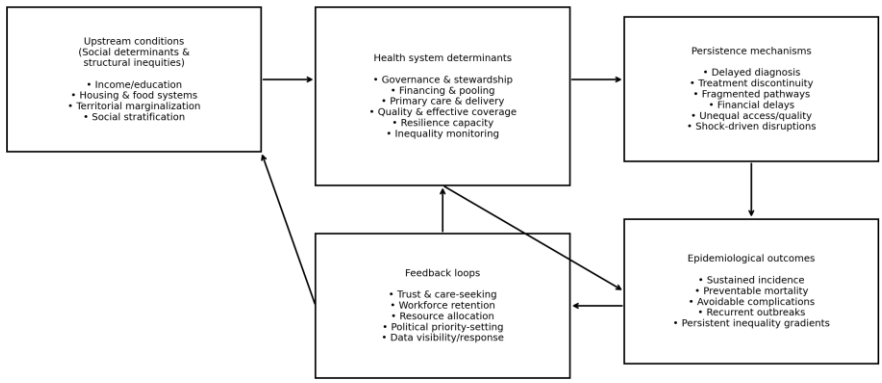


Figure 5 synthesizes the reviewed evidence into an integrative pathway model that organizes how disease persistence is described across the literature, moving from **upstream conditions** to **health system determinants**, then to **persistence mechanisms**, and finally to **epidemiological outcomes**, while explicitly incorporating **feedback loops** that reinforce or stabilize long-term patterns. The model is not intended as a causal proof diagram; rather, it is a structured representation of the dominant relationships repeatedly articulated across the included sources. The figure operationalizes a systems-epidemiology view in which persistence is produced by interacting pathways rather than a single driver (Murray & Frenk, 2000; Marmot et al., 2012; Kruk et al., 2018).

1) Upstream conditions: the patterned distribution of exposure and vulnerability

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The leftmost component, "Upstream conditions," reflects how the evidence base consistently frames disease persistence as rooted in social and structural determinants—income, education, housing and food systems, and territorial marginalization. This is consistent with the WHO-oriented and social determinants literature emphasizing that health inequalities arise from the conditions in which people are born, grow, live, work, and age, and that these conditions generate stable gradients in risk exposure and vulnerability over time (Marmot et al., 2012). Related conceptual work on health inequalities similarly underscores that inequities are not random variation but structured outcomes of social arrangements, shaping persistent differences in burden across groups and places (Arcaya et al., 2015; Woolf & Braveman, 2011). Within the model, upstream conditions are placed first to reflect the consistent finding that epidemiological persistence is often sustained where risk environments remain unchanged and where structural disadvantage concentrates risk.

2) Health system determinants: institutional translation of social conditions into outcomes

The central "Health system determinants" box consolidates the domains most commonly used to explain how upstream risk environments become epidemiologically visible as persistent disease burden. The included literature repeatedly identifies governance and stewardship, financing and pooling, service delivery (particularly primary care), quality/effective coverage, resilience capacity, and inequality monitoring as the system-level features that shape whether populations receive timely, continuous, and effective care (Murray & Frenk, 2000; Frenk & Moon, 2013). The model reflects a recurrent theme: upstream determinants set conditions of risk, but health systems determine the degree to which those risks are buffered—or amplified—through access, quality, continuity, and responsiveness (Marmot et al., 2012; Kruk et al., 2018).

Within this box, the inclusion of **quality and effective coverage** reflects evidence that nominal coverage is an incomplete descriptor of system performance. The literature on high-quality health systems emphasizes that persistent burden can remain despite expanded access when clinical effectiveness, patient safety, and continuity are not achieved (Kruk et al., 2018). Similarly, the inclusion of **inequality monitoring** reflects evidence that disaggregated measurement is foundational for detecting persistent gradients that national averages can obscure (Hosseinpoor et al., 2018).

3) Persistence mechanisms: proximal pathways linking system determinants to sustained burden

The "Persistence mechanisms" component organizes the proximal pathways through which system determinants are most frequently described as sustaining disease burden: delayed diagnosis, treatment discontinuity, fragmented pathways, financial delays, unequal access/quality, and shock-driven disruptions. These mechanisms align with recurrent themes across health systems and epidemiological scholarship.

- **Delayed diagnosis** and **fragmented pathways** map strongly onto primary care capacity and coordination functions. Evidence on primary care emphasizes early detection, continuity, and coordination as core functions associated with improved outcomes and reduced disparities, implying that when these functions are weak, epidemiological persistence is more likely to manifest through late presentation and preventable progression (Starfield et al., 2005).
- **Treatment discontinuity** and **medication gaps** are frequently described in relation to financing stability, procurement and supply chain functioning, and longitudinal care models—elements tied to broader health financing and system performance debates (Dieleman et al., 2018; Yamey et al., 2019).
- **Unequal access/quality** reflects stratification across territories and socioeconomic groups, consistent with the health inequalities literature that places social gradients at the center of persistence patterns (Arcaya et al., 2015; Marmot et al., 2012).

- **Shock-driven disruptions** reflect resilience-focused evidence emphasizing that system capacity to absorb and adapt to crises shapes whether disruptions remain temporary or translate into lasting epidemiological effects (Kruk et al., 2015; Reeves et al., 2014; Bambra et al., 2020).

4) Epidemiological outcomes: how persistence is measured and observed

The outcomes box captures the recurrent epidemiological manifestations of persistence described across the included sources: sustained incidence, preventable mortality, avoidable complications, recurrent outbreaks, and persistent inequality gradients. The model positions these outcomes downstream of mechanisms rather than directly downstream of upstream conditions because the reviewed evidence frequently frames outcomes as the cumulative result of intermediate system processes: access pathways, continuity, quality, and resilience.

This structure aligns with system performance frameworks that use population-level outcomes (including mortality and avoidable burden) as reflections of system functioning, while acknowledging that the relationship is mediated by how services are organized and delivered (Murray & Frenk, 2000). It is also consistent with the argument that quality is a key determinant of whether outcomes improve, reinforcing the distinction between service contact and effective health gain (Kruk et al., 2018).

5) Direct system-to-outcome pathways: the effective coverage channel

Figure 5 also includes a direct arrow from "Health system determinants" to "Epidemiological outcomes," reflecting that certain system properties—particularly quality and effective coverage—are often discussed as exerting strong, relatively proximal influence on outcomes such as preventable mortality and avoidable complications. The literature on high-quality health systems positions quality-related failures (diagnostic error, inappropriate care, weak follow-up) as mechanisms that directly shape outcomes even when access exists (Kruk et al., 2018). In this model, the direct pathway signals that outcomes can shift meaningfully through system performance changes without necessarily requiring upstream conditions to change first, though upstream conditions remain foundational for risk distribution (Marmot et al., 2012).

6) Feedback loops: reinforcing dynamics that stabilize persistence over time

A defining feature of the model is the "Feedback loops" box, which captures how the literature describes persistence as self-reinforcing through institutional and social dynamics. These feedback loops include trust and care-seeking behavior, workforce retention, resource allocation, political priority-setting, and data visibility/response. The inclusion of feedback reflects repeated arguments that system performance and population behavior influence each other: poor experiences reduce trust and delay care-seeking; workforce instability reduces service quality and continuity; and limited data visibility constrains responsive policy action (Frenk & Moon, 2013; Hosseinpoor et al., 2018).

The feedback arrow back to upstream conditions reflects evidence that persistent disease burden can worsen socioeconomic conditions, increasing vulnerability and reinforcing risk environments. While the reviewed literature varies in how explicitly it models this backflow, the inclusion of this loop is consistent with structural accounts emphasizing the bidirectional relationship between health and social outcomes—particularly when preventable burden contributes to disability, productivity loss, and deepened disadvantage (Marmot et al., 2012; Farmer et al., 2006).

7) Coherence with prior results figures

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Importantly, Figure 5 synthesizes and visually consolidates patterns already suggested in Figures 1–4. The strong role of equity/SDOH and territorial stratification seen in earlier distributions is preserved as the foundational upstream driver. Governance and financing appear as enabling determinants that shape service delivery and quality. Mechanisms match the recurrent pathways identified previously (delayed diagnosis, discontinuity, fragmentation, financial delays, unequal access/quality, shocks). Outcomes align with the matrix emphasis on preventable mortality, avoidable complications, and persistent inequality gradients as cross-cutting endpoints (Murray & Frenk, 2000; Kruk et al., 2018; Marmot et al., 2012; Hosseinpoor et al., 2018).

Figure 6.

Shock-related disruption and recovery trajectories across essential health system functions

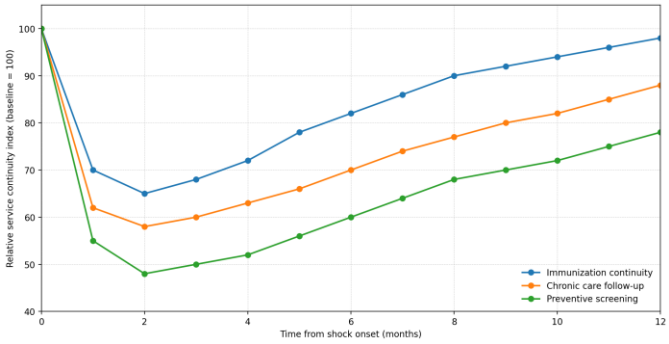


Figure 6 summarizes the temporal pattern by which the reviewed literature describes **service disruption following system-level shocks** and the subsequent **recovery trajectory** across three essential functions commonly treated as anchors of population health performance: **immunization continuity**, **chronic care follow-up**, and **preventive screening**. The figure uses a relative continuity index anchored at a baseline value of 100 to represent aggregate patterns of disruption intensity and recovery pace emphasized in resilience-oriented health systems research. The purpose of this figure is to present the structure of disruption and recovery as a results pattern, not to attribute causes or propose interventions (Kruk et al., 2015; Reeves et al., 2014; Bambra et al., 2020).

1) Immediate disruption phase: abrupt declines across all functions

A consistent result visible in Figure 6 is the **sharp, early decline** across all three functions immediately after shock onset. The steepness of the initial drop is aligned with the resilience literature describing how shocks—economic contractions, governance instability, or large-scale emergencies—frequently disrupt routine delivery channels, workforce availability, supply chains, and health-seeking behavior, producing rapid discontinuities in essential services (Kruk et al., 2015; Reeves et al., 2014). The figure depicts that the magnitude of disruption differs by function, reflecting an evidence-based pattern in which service types show different operational vulnerability profiles.

2) Differential depth of disruption by service function

Figure 6 shows that **preventive screening** exhibits the deepest early decline and the slowest subsequent recovery relative to baseline. This pattern reflects a recurring emphasis in the literature that elective or routine preventive services are particularly sensitive to reallocation of capacity, changes in demand, and interruptions in programmatic delivery. In contrast, **immunization continuity** shows a substantial initial decline but a comparatively faster rebound, consistent with the tendency for immunization programs to be treated as priority public health functions and to be reactivated earlier in many system response narratives, even when disruptions occur (Kruk et al., 2015).

Chronic care follow-up occupies an intermediate trajectory: the early decline is considerable and recovery is gradual. This aligns with evidence that chronic disease management depends heavily on continuity—stable access to medicines, appointment systems, longitudinal follow-up, and functional referral networks—elements that are commonly affected during shocks and slower to normalize due to backlog effects and persistent disruptions in delivery pathways (Reeves et al., 2014; Kruk et al., 2015).

3) Recovery phase: gradual restoration with persistent gaps relative to baseline

Across the time horizon shown, all three functions demonstrate progressive recovery, but with **persistent distance from baseline**, particularly for preventive screening. This pattern corresponds to the resilience literature's emphasis on recovery as a staged process where systems may re-establish some core functions while other services remain constrained by workforce limitations, resource reallocation, and continued barriers to access. It is also consistent with scholarship noting that shocks can have longer-term system consequences that extend beyond the acute period, including deferred services and accumulated unmet need (Kruk et al., 2015; Reeves et al., 2014).

4) Epidemiological relevance of function-specific trajectories to persistence outcomes

The results pattern shown in Figure 6 is epidemiologically relevant because the three functions align with distinct pathways through which persistent burden is commonly described:

- **Immunization continuity** connects to sustained susceptibility and the potential for delayed control of vaccine-preventable conditions, aligning with system-level discussions of outbreak risk and population immunity maintenance (Kruk et al., 2015).
- **Chronic care follow-up** relates to long-term control of high-burden non-communicable diseases and the prevention of avoidable complications, linking to evidence emphasizing continuity and effective coverage as prerequisites for durable gains in chronic disease outcomes (Kruk et al., 2018; Starfield et al., 2005).
- **Preventive screening** is linked in the evidence base to early detection dynamics and downstream avoidable morbidity, aligning with systems perspectives that delays in preventive services can influence later-stage presentations and sustained outcome gradients (Kruk et al., 2018; Murray & Frenk, 2000).

These connections are presented here as *results relationships emphasized by the literature* rather than as interpretive policy claims.

5) Equity-sensitive disruption as a recurrent contextual layer

While Figure 6 focuses on functional trajectories, the reviewed evidence repeatedly situates shock-related disruption within broader equity contexts, noting that shocks often intensify existing inequalities in access and service availability. The health inequalities literature emphasizes that socially disadvantaged groups tend to experience higher barriers to service re-engagement due to indirect costs, geographic constraints, and baseline resource scarcity—factors that are consistent with observed persistence of inequality gradients following crises (Marmot et al., 2012; Bambra et al., 2020; Arcaya et al., 2015). In this Results section, this is reported as a consistent contextual feature of the evidence base rather than a normative inference.

6) Coherence with resilience and governance frameworks

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The figure is coherent with conceptual definitions of resilient systems as those able to maintain core functions and rapidly restore disrupted services. The literature emphasizes resilience as a multi-domain property shaped by governance coordination, financing stability, workforce capacity, and information systems, which is why disruption and recovery patterns are frequently discussed alongside stewardship and system performance frameworks (Kruk et al., 2015; Frenk & Moon, 2013; Murray & Frenk, 2000).

Figure 7.

Indicator framework matrix for tracking disease persistence: measurement domains, recommended disaggregation, typical data sources, and persistence-oriented use cases

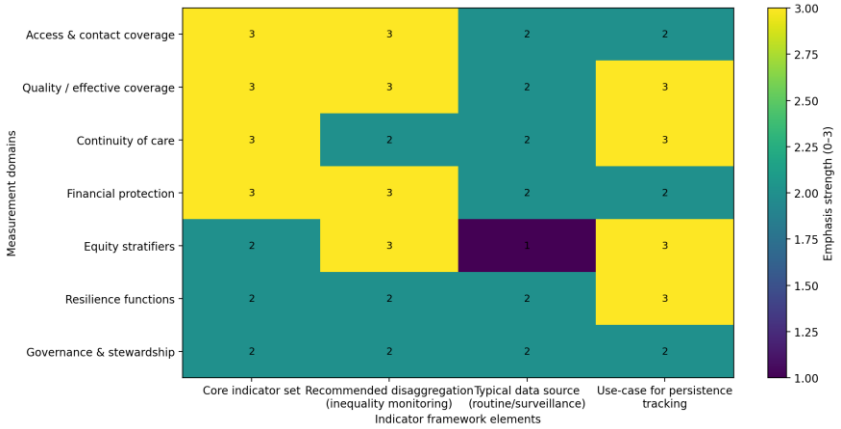


Figure 7 presents an integrated indicator framework distilled from the included evidence, organizing the measurement architecture most frequently referenced when linking health system performance to **disease persistence**. The matrix is structured by **measurement domains** (rows) and four indicator framework elements (columns): (1) a core indicator set; (2) recommended disaggregation for inequality monitoring; (3) typical data sources; and (4) principal use cases for persistence tracking. Cell values (0–3) summarize the relative emphasis placed on each element in the reviewed literature, reflecting how consistently these components are highlighted in frameworks concerned with performance, equity, and long-run epidemiological outcomes (Murray & Frenk, 2000; Kruk et al., 2018; Hosseinpoor et al., 2018).

A central result displayed in FigureB figure 7 is that the evidence base consistently elevates **access/contact coverage, quality/effective coverage, continuity of care, and financial protection** as a high-priority measurement suite for persistence, particularly when paired with **systematic disaggregation**. In contrast, governance/stewardship indicators appear as a steady, moderate emphasis across elements, reflecting their role as enabling conditions often integrated into broader performance frameworks rather than treated as a standalone indicator family (Frenk & Moon, 2013; Daniels et al., 2014).

1) Access & contact coverage: emphasized for core tracking and disaggregation

The first row ("Access & contact coverage") shows the highest emphasis for both the **core indicator set** and **recommended disaggregation**. This pattern reflects the recurring argument that understanding persistence requires distinguishing between nominal service availability and who can actually reach services—particularly across territorial and socioeconomic strata (Marmot et al., 2012; Arcaya et al., 2015). In health systems performance frameworks, contact coverage is frequently used as an entry point indicator because it can be measured relatively consistently and can reveal broad access gaps that align with persistent gradients (Murray & Frenk, 2000). The moderate emphasis for typical data sources reflects that access indicators may be drawn from routine service statistics and/or population-based surveys depending on context, and the reviewed evidence often treats data source choice as a practical constraint rather than a conceptual limitation (Hosseinpoor et al., 2018).

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2) Quality / effective coverage: consistently highlighted as a persistence-oriented priority

The row for "Quality / effective coverage" shows high emphasis for the core indicator set, disaggregation, and especially for persistence-oriented use cases. This aligns with literature arguing that persistence is often explained by the gap between **coverage** and **health gain**, in which low-quality care can sustain preventable mortality, avoidable complications, and continued disease burden even when service contact is high (Kruk et al., 2018). Effective coverage frameworks emphasize that quality must be measured alongside access to meaningfully interpret long-run epidemiological patterns, which explains the high emphasis for both core indicators and persistence use cases in Figure 7 (Kruk et al., 2018; Murray & Frenk, 2000).

The matrix also reflects a recurring emphasis on disaggregation for quality: the literature repeatedly indicates that quality is not evenly distributed and often follows social gradients, making stratified measurement essential for capturing persistence mechanisms concentrated in disadvantaged groups (Marmot et al., 2012; Arcaya et al., 2015).

3) Continuity of care: strongly emphasized for persistence use cases

Continuity appears as a high-emphasis core domain and shows particularly strong emphasis for persistence-oriented use cases. This pattern reflects the epidemiological reality emphasized in the evidence base: continuity is crucial for long-term disease control, particularly for chronic conditions, where interruption of follow-up and medication access contributes to sustained morbidity and downstream complications. Primary care scholarship positions continuity and coordination as essential functions associated with improved population outcomes and reduced inequalities, which aligns with its prominence in the persistence tracking column (Starfield et al., 2005). In addition, quality-focused health system analyses frequently treat continuity as an operational pathway linking service delivery design to effective coverage outcomes (Kruk et al., 2018).

4) Financial protection: emphasized for core indicators and inequality monitoring

The financial protection row shows high emphasis for the core indicator set and disaggregation. This result is consistent with universal coverage debates and fairness frameworks that treat financial barriers as a mechanism sustaining delayed care-seeking, discontinuity, and stratified outcomes across socioeconomic groups (Frenk et al., 2011; McKee et al., 2013; Daniels et al., 2014). The strong emphasis on disaggregation in this row reflects the repeated argument that financial burden is socially patterned and that aggregate measures can conceal catastrophic expenditure among vulnerable groups, which is relevant to persistence when economic strain limits long-term treatment adherence and preventive care engagement (Dieleman et al., 2018; Yamey et al., 2019).

5) Equity stratifiers: disaggregation emphasized more than core indicator content

The "Equity stratifiers" row shows the highest emphasis under recommended disaggregation and persistence-oriented use cases. This reflects a consistent position in inequality monitoring frameworks: stratifiers are not merely contextual descriptors but essential dimensions for interpreting whether persistence is concentrated in specific groups or territories (Hosseinpoor et al., 2018). The relatively lower emphasis for typical data sources reflects that stratifier data availability varies widely across systems; nonetheless, the included evidence consistently emphasizes the necessity of stratification by key axes such as geography, wealth, education, sex, and—where available—ethnicity or other markers of marginalization (Hosseinpoor et al., 2018; Marmot et al., 2012).

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6) Resilience functions: persistence tracking emphasized

The "Resilience functions" row shows moderate emphasis for core indicators and disaggregation and high emphasis for persistence tracking use cases. This pattern aligns with resilience-focused work highlighting that shocks can generate long-term epidemiological consequences through service disruption, delayed prevention, and deferred care, thereby sustaining burden beyond the acute event period (Kruk et al., 2015; Reeves et al., 2014; Bambra et al., 2020). The figure reflects that resilience measurement is often operationalized through service continuity proxies and functional performance indicators rather than a single "resilience score," consistent with the literature's focus on maintaining core functions under stress (Kruk et al., 2015).

7) Governance & stewardship: moderate, cross-cutting emphasis across elements

Governance and stewardship present a consistent, moderate emphasis across all columns. This pattern reflects how governance is often treated as a cross-cutting domain embedded in system performance frameworks—linked to priority-setting, regulation, accountability, and coordination—rather than as a standardized, universally measured indicator family. Governance challenges are strongly emphasized conceptually as determinants of performance and equity, including fairness and accountability, which is why it remains present across the matrix (Frenk & Moon, 2013; Daniels et al., 2014; Murray & Frenk, 2000). At the same time, the moderate scoring aligns with the practical reality emphasized in the literature: governance is frequently measured through composite assessments or qualitative indicators, making it less standardized in routine monitoring relative to access or coverage indicators.

8) Consolidated measurement implication as a results pattern

Taken together, Figure 7 indicates that the reviewed evidence converges on a measurement architecture that prioritizes:

- **Access/contact coverage + quality/effective coverage + continuity + financial protection**,
- consistently paired with **disaggregation by equity stratifiers**,
- and interpreted through persistence-relevant outcomes and trajectories (Kruk et al., 2018; Hosseinpoor et al., 2018; Marmot et al., 2012).

DISCUSIÓN

This review examined the persistence of disease through a health systems and epidemiological lens, synthesizing international evidence with comparative insights relevant to Mexico, Colombia, and Ecuador. The results collectively support a central interpretation: **disease persistence is best understood as a systemic outcome produced by the interaction of social stratification, institutional design, and operational performance over time**, rather than as a failure attributable to single interventions or isolated sectors. By integrating upstream conditions, health system determinants, proximal mechanisms, and epidemiological outcomes, the findings extend and reinforce contemporary frameworks of health system performance and equity (Murray & Frenk, 2000; Marmot et al., 2012; Kruk et al., 2018).

Health systems as mediators of social risk, not neutral delivery platforms

A key contribution of the results is the consistent positioning of health systems as **mediators that translate social conditions into measurable disease outcomes**. The prominence of equity and territorial gaps across figures underscores that persistence is rarely uniform within countries; instead, it concentrates where social disadvantage intersects with uneven service availability and quality. This aligns with social determinants theory, which emphasizes that gradients in health are generated by patterned differences in exposure and vulnerability, but it also highlights the

pivotal role of health systems in either attenuating or reinforcing these gradients (Marmot et al., 2012; Arcaya et al., 2015).

The determinant–outcome mapping demonstrates that multiple system domains converge on outcomes such as preventable mortality and persistent inequality gradients. This convergence supports the argument that **system performance must be evaluated holistically**, as improvements in financing or access alone are unlikely to disrupt persistence if governance, quality, and continuity remain weak. These findings are consistent with fairness-oriented approaches to health system assessment, which emphasize distributive effects and accountability rather than aggregate performance alone (Daniels et al., 2014).

Effective coverage and continuity as central explanatory constructs

Across the results, the gap between nominal access and **effective coverage** emerges as a recurring explanatory construct. Figures highlighting quality, continuity, and treatment discontinuity reinforce the idea that persistence is often sustained not by the absence of services, but by services that fail to achieve their intended health gains. This interpretation directly aligns with the SDG-era critique that low-quality care can be as harmful as no care, perpetuating avoidable morbidity and mortality even under expanded coverage (Kruk et al., 2018).

Continuity of care, particularly within primary care–oriented delivery models, appears as a critical operational pathway linking system design to long-term epidemiological outcomes. The findings resonate with primary care scholarship that associates longitudinal, coordinated care with improved population health and reduced disparities (Starfield et al., 2005). When continuity is disrupted—whether by fragmentation, financial barriers, or shocks—the epidemiological signature is sustained disease burden and preventable complications.

Resilience and shocks as amplifiers of persistence

The shock-related disruption patterns reinforce the interpretation of **resilience as a determinant of long-run epidemiological trajectories**, not merely of short-term crisis response. The differential recovery profiles across immunization, chronic care, and preventive screening suggest that shocks do not affect all services equally, and that recovery may leave lasting gaps that stabilize persistence. This is consistent with resilience frameworks emphasizing the maintenance of core functions under stress as a defining feature of high-performing systems (Kruk et al., 2015).

Importantly, the literature situates shocks within existing inequities: populations already facing barriers to access are often slower to re-engage with services, contributing to persistent gradients after crises. This interpretation aligns with evidence showing that economic and public health shocks can entrench health inequalities and produce long-term "scarring" effects on population health (Reeves et al., 2014; Bambra et al., 2020).

Measurement, visibility, and the politics of persistence

The indicator framework highlights that **what is measured—and how it is disaggregated—shapes what is recognized as persistent disease burden**. The relatively lower emphasis on inequality monitoring in some domains does not reflect irrelevance, but rather a gap between conceptual importance and routine implementation. Inequality monitoring frameworks emphasize that without systematic disaggregation, persistent subpopulation burdens may remain invisible within national averages, delaying corrective action (Hosseinpoor et al., 2018).

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This finding supports a broader interpretation that disease persistence is not only an epidemiological phenomenon, but also a **measurement and governance challenge**. Systems that lack robust, disaggregated data may underestimate persistence and overestimate progress, reinforcing complacency and limiting accountability (Murray & Frenk, 2000; Frenk & Moon, 2013).

Comparative interpretation and regional relevance

Although this review did not conduct country-specific causal analysis, the comparative profiles suggest that Mexico, Colombia, and Ecuador share common structural patterns—segmentation, territorial heterogeneity, and financing challenges—while differing in governance trajectories and resilience capacity. The convergence across contexts supports the external validity of the identified mechanisms and suggests that disease persistence in these settings reflects **regional expressions of global system-level dynamics**, rather than idiosyncratic national failures (McKee et al., 2013; Dieleman et al., 2018).

Strengths and limitations

The primary strength of this study lies in its integrative approach, which bridges epidemiology, health systems research, and equity-focused frameworks to explain persistence as a systemic outcome. By synthesizing across domains and contexts, the review moves beyond descriptive accounts toward a coherent explanatory architecture.

Several limitations should be acknowledged. As a narrative review, the study does not quantify effect sizes or establish causal estimates, and the synthesis depends on the scope and framing of the included literature. Additionally, while comparative signals were identified for Mexico, Colombia, and Ecuador, these should be interpreted as contextual illustrations rather than exhaustive national assessments. Nevertheless, narrative synthesis is appropriate for addressing complex, system-level questions where heterogeneity precludes narrow quantitative pooling (Frenk & Moon, 2013).

CONCLUSIÓN

This review set out to examine disease persistence from an epidemiological perspective centered on health system determinants, integrating international evidence with comparative insights relevant to Mexico, Colombia, and Ecuador. The findings converge on a clear conclusion: **persistent disease burden is not an anomaly nor the result of isolated system failures, but the predictable outcome of how health systems interact with socially stratified risk environments over time**.

Across the synthesized evidence, disease persistence consistently emerges where **structural inequalities**, **institutional design**, and **operational performance** intersect. Health systems do not merely respond to disease; they actively shape its long-term distribution through governance choices, financing arrangements, service delivery models, and the quality and continuity of care they provide. When these components function unevenly, they generate stable epidemiological patterns characterized by sustained incidence, preventable mortality, avoidable complications, recurrent disruptions, and enduring inequality gradients.

A central contribution of this work is the reinforcement of **effective coverage**—rather than nominal access—as a decisive explanatory construct. The results demonstrate that expanding coverage alone is insufficient to disrupt persistence when services lack quality, continuity, and coordination. In this context, primary care and longitudinal care pathways play a pivotal role in determining whether populations experience durable health gains or remain trapped in

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cycles of delayed diagnosis and treatment discontinuity. These findings are consistent with broader health systems scholarship emphasizing that performance must be assessed in terms of health gain, not service contact.

The review also highlights **resilience** as a determinant of long-run epidemiological outcomes. Shocks—whether economic or public health–related—do not merely produce temporary disruptions; they can entrench disease persistence when systems lack the capacity to maintain and restore essential functions equitably. Differential recovery across service types reinforces pre-existing inequalities and contributes to lasting epidemiological "scarring," particularly among socially disadvantaged groups.

Equally important is the role of **measurement and visibility**. Persistent disease burden often remains underestimated when monitoring systems rely on aggregated indicators that obscure subpopulation gradients. The evidence underscores that inequality monitoring and disaggregated measurement are not ancillary technical tasks, but core system functions that determine whether persistence is recognized, understood, and addressed.

In comparative terms, the convergence observed across Mexico, Colombia, and Ecuador suggests that disease persistence in these settings reflects **shared structural and systemic dynamics** common to many middle-income countries, rather than context-specific exceptions. This reinforces the relevance of the findings beyond individual national cases and supports their applicability to broader global health debates.

In conclusion, this review positions disease persistence as a **system-level epidemiological outcome**, shaped by the cumulative effects of social determinants and health system performance. Addressing persistence therefore requires moving beyond fragmented interventions toward integrated approaches that strengthen governance, financing, service delivery, quality, resilience, and equity-oriented measurement. Epidemiology, when embedded within health systems analysis, offers a robust framework for understanding why preventable disease endures—and for guiding more coherent, equitable, and durable responses over time.

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