

The Multicausal Nature of Immigration: A Systems-Level Scientific Analysis of Global Migration Dynamics

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ABSTRACT

Background: Immigration is a defining global phenomenon shaped by multiple interacting determinants. Traditional monocausal models fail to capture its systemic complexity.

Objective: To develop an integrated analytical framework explaining immigration as a multicausal and adaptive system.

Methods: Narrative synthesis of interdisciplinary migration literature, integrating economic, sociological, political, demographic, and environmental perspectives.

Results: Migration emerges from the interaction of macro-level drivers (e.g., inequality, governance, climate change), meso-level structures (e.g., migrant networks), and micro-level decision-making processes. These interactions generate nonlinear outcomes, feedback loops, and path dependency.

Conclusion: Immigration is best understood as a complex adaptive system. Policy approaches must move beyond single-factor explanations toward integrated, evidence-based strategies.

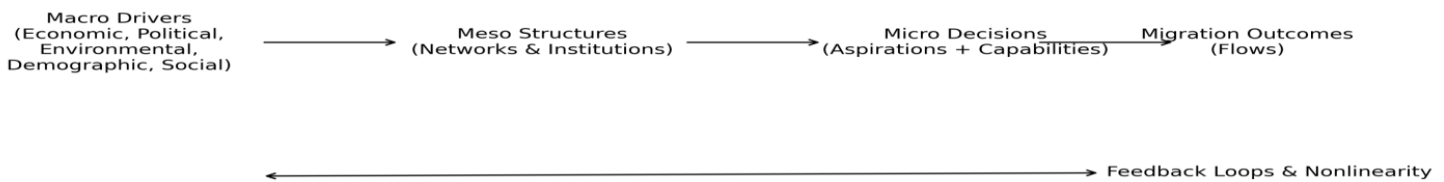


Figure 1 : **Graphical Abstract:** Graphical abstract illustrating immigration as a multicausal adaptive system. Migration outcomes emerge from the interaction of macro-level structural drivers, meso-level network systems, and micro-level decision-making processes, mediated by nonlinear dynamics and feedback mechanisms (Black et al., 2011; de Haas, 2021).

Keywords: immigration, multicausality, migration systems, economic governance, climate change, policy design

INTRODUCTION

Immigration is one of the defining processes of the 21st century, influencing economic development, demographic transitions, and geopolitical stability. Despite extensive research, the fundamental question of why people migrate remains contested. Contemporary scholarship increasingly recognizes migration as inherently multicausal, shaped by interacting structural and individual-level drivers rather than isolated determinants (Black et al., 2011; de Haas, 2021).

Early frameworks such as the push–pull model offered a simplified categorization of migration drivers but failed to capture real-world complexity. Migration decisions are now understood as embedded within dynamic systems of opportunity, constraint, and agency operating across spatial and temporal scales (Black et al., 2011; Tsegay, 2023).

THEORETICAL FRAMEWORK

From Push–Pull to Systems Theory

The push–pull model (Figure 1) conceptualizes migration as a response to unfavorable origin conditions and favorable destination conditions. While analytically useful, it lacks explanatory power for heterogeneous migration patterns (de Haas, 2021). Contemporary approaches incorporate multidimensional determinants operating simultaneously (International Organization for Migration [IOM], n.d.).

Multicausal Migration Paradigm

Migration decisions arise from interacting drivers rather than single causes (Parrish et al., 2020). A widely accepted framework identifies five key domains: economic, social, political, demographic, and environmental (Black et al., 2011). These drivers interact synergistically, producing complex migration outcomes.

Migration theory evolves from simple push–pull origin–destination factors to systems thinking, integrating economic, social, political, demographic, and environmental interactions (Figure 2).

From Push-Pull to Multicausal Systems Framework

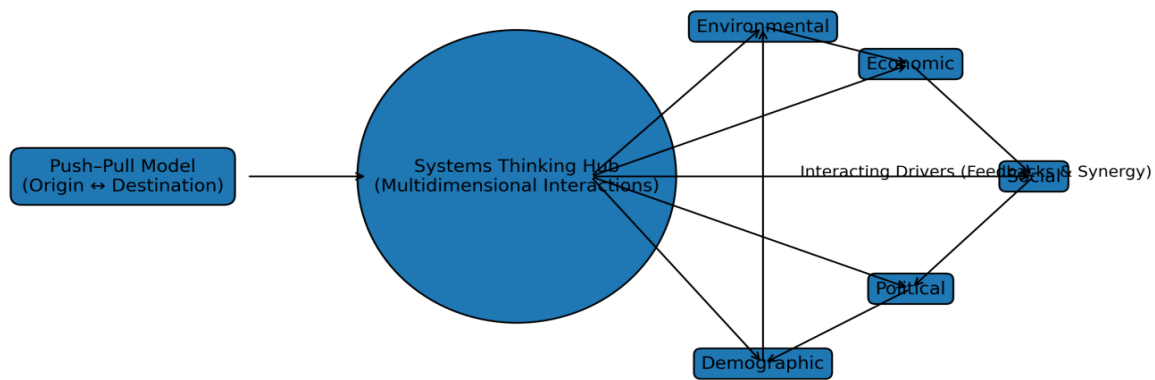


Figure 2: **From Push- Pull to Multicausal Systems Framework** - Migration theory evolves from simple push-pull origin-destination factors to systems thinking, integrating economic, social, political, demographic, and environmental interactions.

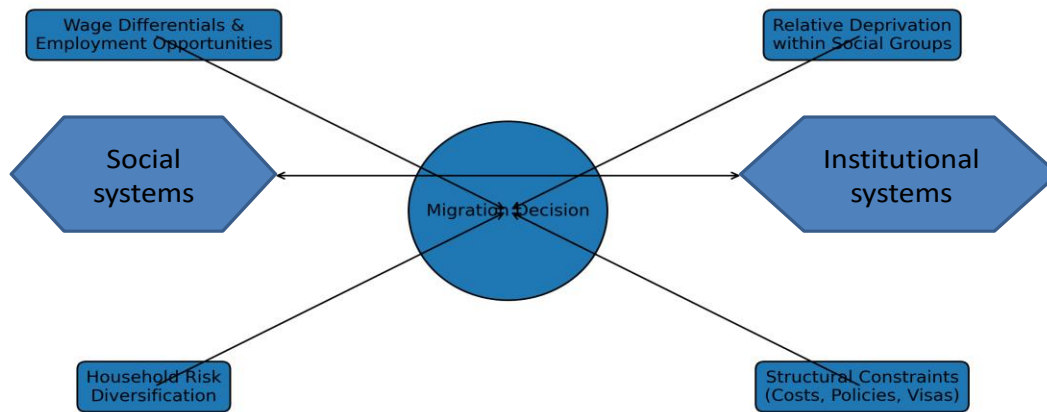
Economic Determinants

Economic models have traditionally emphasized wage differentials, employment opportunities, and income disparities as primary drivers of migration (Figure 3). Individuals are often motivated to migrate in pursuit of higher wages, improved living standards, and greater economic security in destination regions. Empirical evidence consistently demonstrates a strong relationship between labor market conditions and migration flows, particularly between developing and developed economies (IZA World of Labor, n.d.). However, contemporary migration research also highlights the limitations of purely economic explanations when considered in isolation.

Migration decisions are frequently shaped by relative deprivation, where individuals compare their socioeconomic position not only to absolute poverty levels but also to the living standards of surrounding social groups. Perceived inequality within communities can therefore become a powerful motivation for migration. In addition, migration often functions as a household risk diversification strategy, whereby families send one or more members abroad to diversify income sources and reduce vulnerability to local economic instability, unemployment, or agricultural failure.

Economic migration is also constrained and mediated by structural and institutional factors such as migration costs, visa regulations, labor recruitment systems, and border enforcement policies. These constraints determine who can migrate, where migration occurs, and under what conditions. Consequently, economic drivers operate within broader social, political, and institutional systems, making migration a multidimensional rather than purely market-driven phenomenon (IZA World of Labor, n.d.).

Economic Drivers of Migration



Economic Drivers Embedded within Broader Social and Institutional Systems

Figure 3: **Economic Drivers and Structural Determinants of Migration Decision-Making:** The figure illustrates how income disparities, employment opportunities, education, demographic pressures, and policies collectively influence migration decisions.

Social Networks and Migration Systems

Migration is deeply embedded within social structures and is strongly influenced by interpersonal relationships, family ties, and diaspora communities. Social networks play a critical role in facilitating migration by reducing the financial, informational, and psychological costs associated with moving across regions or countries. Migrants who already reside in destination areas often provide prospective migrants with information regarding employment opportunities, housing, legal procedures, transportation, and cultural adaptation, thereby lowering uncertainty and perceived risk (Ruyssen, 2012).

These networks contribute to what migration scholars describe as **cumulative causation**, where each wave of migration increases the likelihood of future migration from the same origin community. As migrant communities expand, migration becomes increasingly self-sustaining because established networks create supportive social and economic infrastructures for newcomers. This process helps explain why migration flows frequently persist even after the original economic incentives or labor shortages that initiated migration begin to weaken.

Diaspora communities also influence migration through remittances, cultural linkages, and transnational social identities, reinforcing long-term migration corridors between origin and destination regions. Consequently, migration systems are shaped not only by structural conditions but also by enduring social connectivity and network dynamics (Ruyssen, 2012).

Political and Institutional Drivers

Political and institutional conditions are major determinants of migration patterns and significantly influence both voluntary and forced mobility. Political instability, armed conflict, weak governance, and violations of human rights frequently compel individuals and communities to migrate in search of safety, stability, and better

living conditions. Conflict-driven displacement remains one of the largest contributors to forced migration globally, particularly in regions experiencing civil unrest, persecution, or state fragility (Tsegay, 2023).

Institutional frameworks also play a central role in shaping migration flows by influencing access, legality, and opportunities for movement. Restrictive immigration policies, strict border controls, and limited legal migration pathways may unintentionally increase irregular migration by reducing safe and authorized mobility options. Conversely, welfare systems, labor protections, and social security benefits in destination countries may function as selective pull factors for certain migrant groups (IZA World of Labor, n.d.). Consequently, migration outcomes are not determined solely by individual motivations but are co-produced through the interaction between state structures, institutional regulations, and individual agency within broader geopolitical contexts.

Demographic Dynamics

Demographic variables play a central role in shaping migration patterns and global labor mobility. One of the most significant demographic drivers is youth population growth in developing regions. Countries with rapidly expanding young populations often experience increased labor market pressure due to insufficient employment opportunities, limited educational infrastructure, and slower economic absorption capacity. As a result, migration becomes an important strategy for employment, income generation, and social mobility (IZA World of Labor, n.d.) (Figure 4).

Conversely, many developed countries are experiencing aging labor markets characterized by declining birth rates and increasing dependency ratios. These demographic transitions create labor shortages in sectors such as healthcare, construction, agriculture, and service industries. Migration therefore functions as a mechanism for balancing labor supply and demand across regions, supporting economic productivity and sustaining welfare systems in aging economies (IZA World of Labor, n.d.).

Educational attainment levels also strongly influence migration propensity and destination choice. Higher levels of education increase access to skilled migration pathways and improve individuals' ability to adapt to foreign labor markets. At the same time, disparities in educational and professional opportunities between countries contribute to international mobility among students and skilled workers. These demographic factors interact closely with economic conditions, producing dynamic patterns of global labor mobility and transnational workforce redistribution (IZA World of Labor, n.d.).

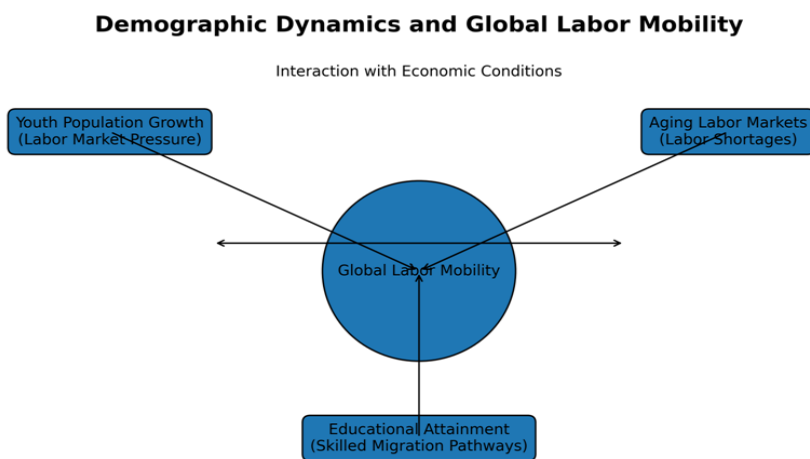


Figure 4: **Demographic Dynamics and Global Labor Mobility:** Youth growth, aging labor markets, and education interact with economic conditions to shape migration flows and global labor mobility.

Environmental Drivers

Environmental change has emerged as an increasingly important factor influencing migration dynamics, although its effects are rarely direct or isolated. Rather than functioning as an independent driver, environmental stress typically interacts with existing economic, political, and social vulnerabilities to shape migration decisions. Climate-related disruptions such as droughts, floods, desertification, rising sea levels, and extreme weather events can significantly affect livelihoods, agricultural productivity, water availability, and food security, thereby increasing pressures for migration (Black et al., 2011). These environmental stressors are particularly significant in regions where communities are heavily dependent on climate-sensitive sectors such as agriculture and fisheries.

Importantly, environmental change often operates through indirect pathways. For example, declining agricultural yields may reduce household income, intensify poverty, and contribute to resource competition, which can in turn increase social tensions and political instability. In such contexts, migration may emerge as an adaptive strategy for income diversification, risk reduction, or survival. Environmental degradation may also exacerbate urban overcrowding and strain public infrastructure, further contributing to mobility pressures.

However, not all environmentally exposed populations migrate. Migration outcomes depend heavily on adaptive capacity, socioeconomic status, governance quality, and access to social support systems. In some cases, the most vulnerable populations may become “trapped populations” due to a lack of resources necessary for migration. Consequently, environmental drivers rarely act independently; instead, they function as threat multipliers that amplify pre-existing inequalities and vulnerabilities within migration systems (Black et al., 2011).

Systems Dynamics of Migration

Feedback Mechanisms

Migration produces feedback loops such as remittances and network expansion, which influence future migration patterns (Figure 5).

Nonlinearity and Threshold Effects

Migration responses are nonlinear and often triggered by threshold conditions such as economic crises or environmental shocks.

Path Dependency

Historical ties, language, and institutional linkages create persistent migration corridors.

Systems Dynamics of Migration: A Complex Adaptive System

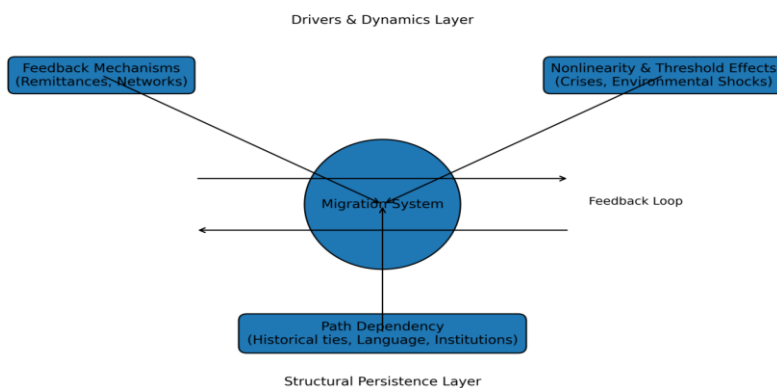


Figure 5: Systems Dynamics of Migration – A Complex Adaptive System

This figure conceptualizes migration as a complex adaptive system structured across interacting layers. The central node (Migration System) represents the aggregate outcome of multiple interacting processes rather than a single causal pathway.

The upper layer (Drivers & Dynamics) captures dynamic forces shaping migration in real time. Feedback mechanisms—such as remittances and migrant networks—create self-reinforcing cycles that sustain or amplify migration flows. Nonlinearity and threshold effects indicate that migration responses are not proportional; instead, sudden shifts can occur when economic crises, conflicts, or environmental shocks exceed critical thresholds.

The lower layer (Structural Persistence) highlights path dependency, where historical ties, shared language, colonial linkages, and institutional arrangements create stable migration corridors over time. These factors constrain and channel future migration patterns.

Arrows linking all components to the central system illustrate continuous interaction, while bidirectional arrows denote feedback loops, emphasizing that migration outcomes reshape the very drivers that produce them. Overall, the figure demonstrates that migration is governed by interdependent, nonlinear, and evolving processes, requiring systems-based analysis rather than linear explanations.

Immigration as a Complex Adaptive System

Immigration as a Complex Adaptive System

Immigration can be conceptualized as a complex adaptive system in which multiple agents—individuals, households, institutions, and states—interact across different scales to produce dynamic and often unpredictable migration outcomes. These interacting agents operate within structural constraints and opportunities, continuously adapting their behavior in response to changing economic conditions, policy environments, and social networks. A defining feature of this system is its nonlinear dynamics, where small changes in one driver, such as policy shifts or economic shocks, can generate disproportionately large effects on migration flows.

The system also exhibits emergent patterns, meaning that aggregate migration trends cannot be fully explained by individual decisions alone but arise from the collective interaction of multiple actors and drivers. Additionally, migration systems demonstrate adaptive behavior, as both migrants and institutions learn from past experiences and adjust strategies accordingly over time. This systems-based perspective provides a more comprehensive understanding of migration processes and aligns with foundational migration theory, which emphasizes the interplay of multiple determinants and decision-making contexts (Lee, 1966).

Empirical Evidence

Empirical research consistently supports the multicausal framework of migration, demonstrating that no single driver sufficiently explains observed patterns (Table 1). Economic factors show a strong and consistent correlation with migration flows, particularly through wage differentials, employment opportunities, and broader development gradients between origin and destination regions (IZA World of Labor, n.d.). However, these effects are often mediated by other structural conditions. Social drivers, especially migrant networks, play a critical role by reducing the costs and risks of migration and enabling cumulative causation, thereby sustaining flows over time even when initial economic incentives weaken (Ruysen, 2012).

Political factors remain central in shaping forced migration, with conflict, persecution, and weak governance structures acting as primary triggers for displacement across regions (Tsegay, 2023). At the same time, environmental drivers exert an indirect but increasingly significant influence. Environmental stressors such as climate variability and natural disasters rarely act independently; instead, they interact with economic vulnerability and political instability to influence migration decisions (Black et al., 2011). Finally, demographic factors, including population growth, age structure, and education levels, shape migration propensity and

destination choices, often reinforcing labor market dynamics in both sending and receiving regions (IZA World of Labor, n.d.). Collectively, these findings underscore the interconnected and systemic nature of migration processes.

Table 1 : Empirical Evidence Supporting the Multicausal Drivers of Migration

Driver	Evidence
Economic	Strong correlation with migration flows (IZA World of Labor, n.d.)
Social	Significant network effects (Ruysen, 2012)
Political	Major driver of forced migration (Tsegay, 2023)
Environmental	Indirect influence (Black et al., 2011)
Demographic	Shapes migration propensity (IZA World of Labor, n.d.)

POLICY IMPLICATIONS

Limitations of Single-Factor Policies

Policies that target individual migration drivers—such as border enforcement or labor market restrictions—are inherently limited because migration emerges from interacting structural forces. Evidence shows that restrictive policies often displace rather than reduce migration, sometimes increasing irregular flows due to unmet economic demand and persistent social networks (de Haas, 2021; IZA World of Labor, n.d.). Moreover, interventions that ignore underlying drivers such as inequality, conflict, or environmental stress fail to address root causes, resulting in short-term or counterproductive outcomes (Black et al., 2011). This underscores the need to move beyond reductionist policy approaches toward system-aware strategies.

Integrated Policy Frameworks

Effective migration governance requires coordinated, cross-sectoral policy frameworks that simultaneously address multiple drivers. Economic development policies can reduce involuntary migration pressures, while conflict resolution and governance reforms help stabilize fragile regions (Tsegay, 2023). Climate adaptation strategies—such as livelihood diversification and disaster risk reduction—can mitigate environmentally induced displacement (Black et al., 2011). In parallel, well-designed legal migration pathways and labor mobility agreements can align labor demand with migration supply, reducing irregular migration (International Organization for Migration [IOM], n.d.). Such integrated frameworks acknowledge the interconnected nature of migration systems and enhance policy coherence across domains.

Anticipatory Governance

Given the nonlinear and dynamic nature of migration systems, anticipatory governance is essential. Scenario-based planning, early warning systems, and predictive modeling can help policymakers prepare for sudden migration shifts triggered by economic crises, conflicts, or environmental shocks (Clemens & Mendola, 2020). Adaptive policy mechanisms that incorporate real-time data and feedback loops are critical for responding to evolving migration patterns. This forward-looking approach enables governments to transition from reactive crisis management to proactive and resilient migration governance (de Haas, 2021).

Future Research Directions

First, quantitative modeling of interacting drivers is essential to move beyond descriptive analyses toward formal, testable frameworks. Migration is shaped by simultaneous economic, political, demographic, and environmental forces whose interactions are nonlinear and context-dependent (Black et al., 2011; de Haas, 2021). Future work should employ system dynamics models, agent-based simulations, and advanced econometric techniques capable of capturing feedback loops, threshold effects, and cross-scale interactions (Clemens &

Mendola, 2020). Such models can improve forecasting accuracy and help identify tipping points in migration flows.

Second, the integration of climate and migration research remains a critical frontier. Climate change does not act as an isolated driver but influences migration indirectly through livelihood disruption, resource scarcity, and increased exposure to environmental hazards (Black et al., 2011). Interdisciplinary approaches combining climate science, development studies, and migration theory are required to understand how environmental stressors interact with socioeconomic vulnerabilities (Parrish et al., 2020). This integration will enable more robust projections of climate-related mobility and inform adaptation and resilience policies (IOM, n.d.).

Third, behavioral decision-making models should be incorporated to better capture the micro-level processes underlying migration. Traditional economic models assume rational decision-making; however, migration decisions are influenced by aspirations, risk perception, social norms, and bounded rationality (de Haas, 2021). Integrating insights from behavioral economics and cognitive science can provide a more realistic account of how individuals and households evaluate migration opportunities under uncertainty (Czaika & Reinprecht, 2020).

Finally, big data and machine learning approaches offer transformative potential for migration research. The use of satellite imagery, mobile phone data, and digital trace data enables high-resolution, real-time analysis of population movements (Lu et al., 2016). Machine learning algorithms can detect complex patterns and improve predictive modeling, although careful attention must be paid to data ethics, bias, and interpretability (Jean et al., 2016).

Together, these four domains form an integrated research agenda aligned with the systems-based representation shown in the figure 6.

Future Research Directions in Migration Studies

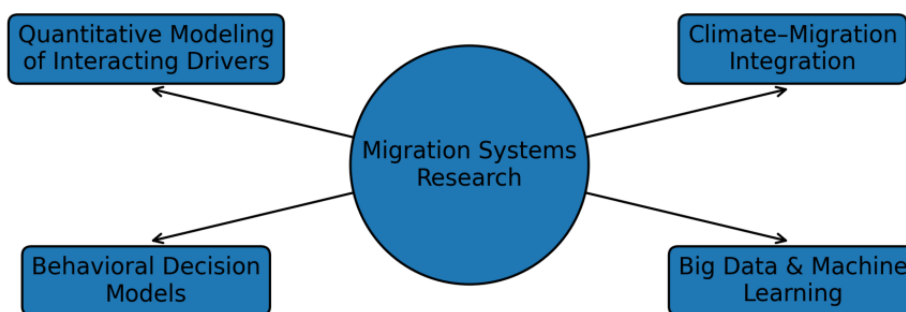


Figure Figure 6: **Future Research Directions** -The figure adopts a radial systems framework, placing “Migration Systems Research” at the center to emphasize that all future research domains are interconnected extensions of a unified analytical core rather than isolated themes.

Limitations and Future Directions

Limitations of the Current Study

While the proposed multicausal framework offers significant conceptual and theoretical contributions to migration scholarship, several important limitations must be acknowledged. First, the present study relies exclusively on narrative literature synthesis, meaning that the conclusions remain largely theoretical and have not been empirically tested against real-world migration data. As Czaika and Reinprecht (2020) caution, synthesized frameworks, however comprehensive, risk remaining prescriptive rather than explanatory unless subjected to systematic empirical validation. Second, the framework does not sufficiently articulate how its components—macro-, meso-, and micro-level determinants—can be operationalized or measured in practice, a gap that limits its immediate utility for quantitative research and policy evaluation (de Haas, 2021). Third, although the model integrates multiple determinants, it may inadvertently oversimplify the considerable diversity of migration experiences across different regions, cultures, and political contexts. Migration systems in Sub-Saharan Africa, South Asia, Latin America, and the European periphery are each shaped by historically and institutionally distinct configurations that a singular theoretical framework may not fully capture (Black et al., 2011; Tsegay, 2023).

Recommendations for Empirical Validation

To address these limitations, future research should prioritize the empirical testing of the proposed framework using quantitative, qualitative, and mixed-method approaches across diverse migration contexts. Mixed-method designs are particularly well suited to migration research because they allow for the simultaneous analysis of large-scale structural patterns and the lived experiences of individual migrants (Creswell & Creswell, 2018). For instance, quantitative panel data analyses drawing on datasets such as the World Bank Migration and Remittances Database or the United Nations High Commissioner for Refugees (UNHCR) displacement statistics could be used to test hypothesized relationships between macro-level drivers—such as income inequality, governance quality, and climate variability—and observed migration flows (Clemens & Mendola, 2020). Complementary qualitative approaches, including in-depth interviews, ethnographic fieldwork, and participatory methods, would provide the interpretive depth necessary to understand how meso- and micro-level factors mediate these structural influences (Czaika & Reinprecht, 2020).

Furthermore, comparative case studies drawn from geographically and politically distinct migration systems would help to demonstrate concretely how macro-, meso-, and micro-level factors interact in specific contexts. For example, a comparative analysis of climate-induced migration in Bangladesh and the Sahel region could illuminate how similar environmental stressors produce divergent mobility outcomes depending on differences in governance capacity, social network density, and household economic resilience (Black et al., 2011; Parrish et al., 2020). Similarly, examining labor migration corridors between Mexico and the United States alongside South Asian migration to Gulf Cooperation Council (GCC) states would reveal how institutional arrangements, bilateral agreements, and diaspora networks differentially shape migration system dynamics across regional contexts (de Haas, 2021; Ruysen, 2012). Such region-specific case studies are essential for avoiding the analytical overgeneralization that systems-level frameworks sometimes risk producing (Tsegay, 2023).

Developing Measurable Indicators for the Framework

A further critical priority for future research is the development of measurable, context-sensitive indicators for each component of the proposed framework. The absence of operationalized indicators currently limits the framework's applicability for comparative analysis and evidence-based policy evaluation. Drawing on precedents from related fields, researchers could construct composite indices to capture the multidimensional nature of each driver domain. For example, macro-level economic drivers could be measured through wage differential ratios, Gini coefficients, and unemployment rate differentials between origin and destination countries (IZA World of Labor, n.d.). Governance and political instability at the macro level could be operationalized using existing indices such as the Fragile States Index or the World Governance Indicators

(Tsegay, 2023). Environmental pressure could be captured through precipitation anomaly indices, agricultural productivity volatility measures, and exposure scores from climate vulnerability assessments (Black et al., 2011).

At the meso level, social network intensity could be measured through diaspora density ratios, remittance-to-GDP proportions, and migrant stock data disaggregated by corridor (Ruysen, 2012). Micro-level indicators could include household-level aspiration scores, migration intention surveys, and capability proxies such as educational attainment, language proficiency, and financial savings (de Haas, 2021; Czaika & Reinprecht, 2020). Once operationalized, these indicators would enable systematic comparative analysis across migration systems, support longitudinal tracking of framework components over time, and provide a more rigorous empirical foundation for policy evaluation and design. The integration of big data sources—including mobile phone records, satellite imagery, and digital trace data—could further enhance the precision and timeliness of these measurements (Lu et al., 2016).

Together, empirical validation, comparative case studies, and the development of measurable indicators constitute an integrated methodological agenda that would substantially strengthen the scientific standing of the multicausal framework proposed in this article and enhance its practical utility for migration governance (de Haas, 2021; Clemens & Mendola, 2020).

CONCLUSION

Immigration is a fundamentally multicausal and dynamic phenomenon shaped by the interaction of economic, social, political, demographic, and environmental forces operating across multiple scales. These drivers do not act independently; rather, they interact in complex and often nonlinear ways, producing outcomes that vary across contexts and over time. As such, migration cannot be adequately explained through reductionist or monocausal frameworks. Instead, it must be conceptualized as a complex adaptive system, characterized by feedback loops, path dependency, threshold effects, and emergent properties that arise from the interaction of individual agency and structural constraints.

This systems-based perspective has important implications for both research and policy. It highlights the need for interdisciplinary approaches that integrate insights from economics, sociology, political science, environmental studies, and data science. It also underscores the importance of incorporating both macro-level structural factors and micro-level decision-making processes into analytical models. From a policy standpoint, it suggests that fragmented or single-sector interventions are unlikely to be effective. Instead, migration governance must adopt integrated, adaptive, and evidence-based frameworks that address root causes while remaining responsive to changing global conditions. As global challenges such as climate change, inequality, and geopolitical instability intensify, embracing this holistic perspective will be essential for designing sustainable and humane migration policies.

Disclosures

Contributions: AMS- concept development and manuscript writing, AN- source extraction, VBG-designing the concept, TMR- critical review

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