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EDITORIAL

Population change: effects on the environment, society, and economy

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1 Introduction

Population change, driven by factors such as birth rates, death rates, migration, partnership relations, and aging, has profound implications for human societies and the environment. Over the past century, the world has witnessed unprecedented population growth, leading to global shifts in demographics and dominant urbanization, while influencing various facets of life. Understanding the effects of population change on the environment, society, and economy is crucial for sustainable development.

Population aging, in line with fertility decline, is the most relevant demographic phenomenon in the 21st century in the developed world. Both phenomena are expected to be increasingly prevalent in most of the remaining countries in the world. The demographic transition to low mortality and low fertility (now below the replacement level in Western societies), and the associated aging and shrinking of the working-age population, are some of the most dominant challenges for a prosperous future of many countries. The expected changes threaten the functioning of labor markets, the adaptability of societies, and the sustainability of pension and healthcare systems, and public budgets. The old-age dependency ratio is rising, whereas the working-age population is declining, processes that will escalate in the future. Therefore, methods

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and policies to mitigate the challenges of demographic change have become increasingly relevant for researchers and policymakers (Zaiceva and Zimmermann 2016).

This introductory section explores these interconnections, analyzing how population dynamics impact ecological systems, social structures, and economic models, while also discussing the challenges and opportunities these changes present.

1.1 Population change and the environment

Population dynamics are among the most significant drivers of environmental change, but the nature of these dynamics is evolving. Fertility rates have declined in most parts of the world, leading to slower population growth and profound shifts in age structures. While the global population has surpassed 8 billion (United Nations, 2023), growth is moderating, and in some regions populations are stabilizing or even shrinking. The world's population is expected to peak in the mid-2080s, while still increasing by over 2 billion (United Nations, 2024). In any case, environmental pressures remain acute because they are shaped not only by the number of people but also by patterns of consumption, technological choices, and institutional capacity to manage natural resources.

Although demand for food, water, and energy no longer rises at the pace implied by earlier demographic projections, the pressures of urbanization and economic development are intensifying. Expanding cities continue to encroach on wetlands, forests, and agricultural land, concentrating consumption and waste while fragmenting ecosystems (Seto et al., 2011). Deforestation, especially in tropical areas such as the Amazon, remains a pressing concern because it threatens biodiversity and weakens climate regulation (Foley et al., 2005). Similarly, overfishing, soil erosion, and water scarcity are acute in regions where growth remains rapid, such as South Asia and sub-Saharan Africa.

The link between population and climate change is complex. Slower demographic growth tempers aggregate emissions, yet aging societies often exhibit energy-intensive consumption patterns that maintain or even raise per capita carbon footprints. Wealthier nations, despite slower growth, continue to generate disproportionate emissions through high-consumption lifestyles, while emerging economies balance rising living standards with environmental costs (Matthews et al., 2012). Moreover, vulnerability to sea-level rise and extreme weather remains pronounced in densely settled coastal regions, where both historical settlement patterns and continuing urban expansion magnify risks of flooding, land loss, and displacement.

Population change and the environment are bound by more than just the arithmetic of growth. The demographic transition reshapes the scale and nature of environmental challenges, with slower growth reducing some pressures but altered age structures, persistent urbanization, and widening consumption inequalities sustaining others. The central challenge lies in integrating demographic realities with sustainable resource use, climate mitigation, and equitable adaptation strategies.

1.2 Population change and society

The effects of population change on society are both direct and indirect, influencing everything from public health to social structure and political stability. Societal responses may be diverse depending on the sign of the change.

Population growth can exacerbate social inequality, particularly in developing countries. Rapid population increases in low-income regions often outpace economic growth, leading to higher levels of poverty, unemployment, and limited access to essential services such as healthcare and education (Bloom & Canning, 2003). For example, in sub-Saharan Africa, where birth rates remain high, many countries struggle to provide adequate infrastructure and social services to meet the needs of a growing population (Cohen, 2006).

Conversely, in countries with declining populations, such as Japan and several European nations, there are concerns about aging populations and shrinking workforces. An older population requires more healthcare and social services, placing a strain on national budgets and potentially leading to intergenerational tensions over resource allocation (Lee & Mason, 2011).

Urbanization, driven by both population growth and migration, is another critical societal trend. While cities offer opportunities for economic growth, education, and healthcare, they also face challenges such as overcrowding, slums, and social fragmentation. In mega-cities like Mumbai, Lagos, and São Paulo, population growth has led to the development of sprawling informal settlements with limited access to basic services, resulting in poor living conditions and health risks for millions of people (UN-Habitat, 2016).

Urbanization also fosters social and cultural change. As people migrate to cities, they often adopt new lifestyles and values, leading to changes in family structures, gender roles, and social norms. This can result in shifts in traditional social frameworks and influence issues, such as fertility rates, family planning, and gender equality.

Population change also has significant implications for public health. High population growth, particularly in areas with limited healthcare infrastructure, can lead to higher rates of disease transmission, malnutrition, and mortality. The spread of infectious diseases such as cholera, malaria, and tuberculosis is more prevalent in densely populated regions with inadequate sanitation.

Conversely, in countries with aging populations, such as many European nations, there are concerns about the adequacy of healthcare systems to meet the needs of older citizens, particularly in terms of long-term care and chronic disease management. Additionally, lower birth rates in these regions may lead to labor shortages, further straining social services and public pensions.

1.3 Population change and the economy

The economic effects of population change are multifaceted and often vary depending on the pace and nature of the demographic shifts. While population growth can provide a labor force that fuels economic expansion, rapid growth without corre-

sponding increases in productivity or investment in infrastructure can lead to economic challenges.

In countries with high population growth, the expansion of the labor force can drive economic growth. A larger working-age population can boost productivity and increase the potential for innovation. However, this growth is only beneficial if there is adequate investment in education, skill development, and job creation. If these conditions are not met, rapid population growth can result in high unemployment rates, underemployment, and economic instability (Bloom & Canning, 2003).

On the other hand, in countries with declining populations, labor shortages can impede economic growth and reduce the potential for innovation. Countries such as Japan, Italy, and Germany, face significant challenges in maintaining economic output with a shrinking workforce. To counter this, many of these nations have turned to immigration to supplement their labor forces, although this brings its own set of social and political challenges (Kohler et al., 2011).

The global trend of aging populations, particularly in developed nations, presents a different set of challenges. As the proportion of elderly individuals increases, governments face greater pressure to provide sufficient pensions, healthcare, and long-term care services. This places a burden on national economies as the working-age population shrinks and tax revenues decline. Moreover, older populations tend to save more and spend less, which can slow economic growth (Borsch-Supan, 2013).

In addition, aging populations may lead to shifts in consumption patterns, with increased demand for healthcare services, pharmaceuticals, and retirement planning, and decreased demand for products and services typically favored by younger demographics. This demographic shift is likely to have a significant impact on labor markets, housing, and the overall structure of the economies.

Migration, whether voluntary or forced, is a significant aspect of population change. Migration can stimulate economic development by filling labor gaps and contributing to demographic diversity. Immigrants often play a vital role in sectors such as agriculture, healthcare, and construction. However, large-scale migration can also strain local resources, particularly in urban areas, leading to competition for jobs, housing, and social services (Dustmann & Frattini, 2014).

In developing countries, remittances from migrants abroad represent a crucial source of income, often contributing more to national economies than foreign aid does. However, the economic benefits of migration are not always evenly distributed, and tensions can arise in receiving countries over labor market competition and social integration. Overall, while immigration may alleviate demographic pressures in the short and medium run, it is unlikely to "solve" the challenges of an aging population on its own and needs to be complemented by appropriate fiscal, social and labor market policies (Zaiceva et al., 2016).

1.4 The articles in the special issue

The articles featured in this special issue have successfully passed the journal's stringent peer review process, with authors diligently meeting the demands for multiple revisions of their initial submissions. We extend our gratitude to the editorial board of the Eurasian Economic Review and the numerous anonymous reviewers for their

insightful suggestions and constructive feedback. The individual articles and the special issue as a whole have been significantly enhanced by their dedicated efforts.

The first article "AI for Climate change: Unveiling Pathways to Sustainable Development through Greenhouse Gas Emission Predictions" (by S. Toumi, A. Aljadani, H. Toumi, B. Ammouri and M. Dhiabi) seeks to enhance the accuracy of greenhouse gas (GHG) emission predictions by thoroughly examining machine learning regression models. The authors show that incorporating economic metrics, such as population growth, GDP, and energy consumption, into emissions forecasting models offers valuable insights for policymakers seeking to balance economic growth with environmental sustainability. Through meticulous experimentation and analysis of various datasets, this study offers new perspectives on the use of machine learning regression models to predict GHG emissions. The results are expected to improve existing methodologies, address critical research gaps, and promote a more sophisticated understanding of the intricate dynamics that govern greenhouse gas emissions. By aligning AI with environmental stewardship, the authors pave the way for informed decision-making and proactive strategies to mitigate the effects of climate change. As they confront the challenges of the future, the integration of advanced machine learning techniques will be a key asset in the collective effort to achieve a more sustainable and resilient world.

The second article "The role of migration-innovation nexus for population aging" (by L. Aldieri, A. Nese and C. P. Vinci) examines the relationship between immigration, technological innovation, and labor market dynamics in Western Europe between 2011 and 2019, focusing particularly on the different effects produced across various age groups of workers. The analysis draws on European labor force surveys and OECD patent data. The findings show that immigrant workers with low education levels tend to replace primarily two categories of native workers: young people aged 15 to 24, who are probably still in education, and older workers, who are often employed in physically demanding jobs. In contrast, a complementary dynamic emerges between immigrants and native workers in their adulthood (25–54 years). These patterns of complementarity and substitution are especially pronounced in high-tech sectors, likely because innovative firms adopt new production methods more quickly. Finally, the results suggest implementing targeted training programs and strategically managing migration flows to reduce the negative impacts on local employment, address demographic challenges related to workforce aging in host countries, and maintain social integration objectives.

The third article "Intergenerational (im)mobility in a developing economy context: is the social elevator broken?" (by Z. Andlib, M. Sadiq and S. Scicchitano) investigates multiple channels through which socioeconomic background, along with other household and individual traits, influences individuals' educational and social prospects in the developing economy of Pakistan. The empirical analysis reveals that parents' educational attainment is more significant than their occupational skills in determining individuals' social and educational opportunities. The authors show that promoting intergenerational occupational mobility in developing countries requires a comprehensive strategy that includes government intervention across various sectors. Decision-makers must prioritize education quality by integrating technology, enabling individuals to prepare for future labor market challenges. Furthermore,

developing regional and province-specific policies that address the unique needs of each province in Pakistan is crucial. Over the past decade, Pakistan has recorded the lowest female labor force participation rates in South Asia. There is a pressing need to establish employment quotas for women in high-skilled positions. Additionally, women should be encouraged to pursue traditionally male-dominated fields such as space technology and civil engineering. Moreover, fostering entrepreneurship and innovation by supporting startups, facilitating technology transfer, and improving access to financing is essential. Similar to many developing countries, a significant portion of the population in Pakistan, regardless of gender, is involved in informal and precarious employment. Therefore, decision-makers must formalize the informal sector and create policies that promote decent work while reducing precarious employment.

The fourth article "Got much, got nothing: Analyzing the impact of increased special interest groups' influence on utility" (by L. Shami and T. Lazebnik) examines the economic dynamics linked to interest groups that receive allowances and exert influence over public policy, with a particular emphasis on the ultra-Orthodox community in Israel. The objective of the study is to model the socio-economic consequences of raising transfer payments to members of interest groups who refrain from participating in the labor market. By employing an innovative differential equation model, this study assesses the long-term effects on utility for both the wider working population and members of the interest group. Significant findings reveal that while increased allowances boost private consumption among interest group members, they paradoxically lead to a decrease in the overall provision of public goods because of a reduction in the number of working contributors. This decline adversely affects utility and ultimately reduces the benefits for the members of the interest group. The model highlights a critical threshold beyond which, if allowances exceed a certain level, the provision of public goods and utilities is jeopardized. The study integrates theoretical analysis with sensitivity tests to evaluate the impacts of allowance levels, tax burdens, utility, and population growth rates. The results indicate that persistent increases in allowances may hasten the shift of working individuals to a non-working status, thereby destabilizing both the provision of public goods and the utility equilibrium across different populations.

The fifth article "The impact of aging populations in Central Asia: economic opportunity or challenge?" (by M. Djumanova) investigates the impact of aging on economic growth in Central Asian countries. Despite the ongoing demographic transition and declining fertility rates, Central Asia remains an underresearched region in this context. The author uses data from 1960 to 2022 and employs empirical growth models, incorporating measures of functional capacity defined by mortality and body strength indices, to examine the impact of a shrinking working-age population on economic growth in the region. The 2SLS estimation results suggest that, while a higher share of the working-age population is associated with higher income per capita, supporting the demographic dividend argument, the lagged effect of the working-age population is negative. This finding aligns with the economic drag argument and indicates potential difficulties in achieving sustained economic growth in aging economies. Overall, these results highlight the need for appropriate policy measures to counterbalance the challenges posed by population aging in Central Asian countries.

2 Conclusion

Population change is one of the most powerful forces shaping the environment, society, and the economy in the modern world. While population growth can drive economic expansion and cultural innovation, it also poses significant challenges including resource depletion, environmental degradation, social inequality, and economic sustainability. Conversely, population decline introduces its own set of problems, including labor shortages, increased fiscal burdens, and shifts in consumption patterns. To address these challenges, governments and policymakers must develop strategies that promote sustainable development, invest in human capital, and ensure an equitable distribution of resources. Achieving a balance between population dynamics and environmental, social, and economic well-being will be key to securing a prosperous and sustainable future.

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References

Aldieri, L., Nese, A., & Vinci, C. P. (2024). The role of migration-innovation nexus for population aging. *Eurasian Economic Review*. https://doi.org/10.1007/s40822-024-00294-8.

Andlib, Z., Sadiq, M., & Scicchitano, S. (2025). Intergenerational (im)mobility in a developing economy context: Is the social elevator broken? *Eurasian Economic Review* . https://doi.org/10.1007/s40822-025-00313-2.

Bloom, D. E., & Canning, D. (2003). The demographic dividend: A new perspective on the economic consequences of population change. *Population and Development Review*, *29*(2), 257–289.

Borsch-Supan, A. (2013). *The economic consequences of aging societies*. NBER Working Paper No. 18058.

Cohen, J. E. (2006). Population growth and the environment: A review of the evidence. *Population and Environment*, *27*(3), 248–267.

Dustmann, C., & Frattini, T. (2014). The fiscal effects of immigration to the UK. *The Economic Journal*, *124*(580), F593–F643.

Foley, J. A., et al. (2005). Global consequences of land use. *Science*, *309*(5734), 570–574.

Kohler, H. P. (2011). The economic impact of aging societies. *Population and Development Review*, *44*(1).

Lee, R., & Mason, A. (Eds.) (2011). *Population aging and the generational economy: A global perspective* (pp. 151–184). Edward Elgar Publishing, Inc.

Matthews, H. D., Solomon, S., & Pierrehumbert, R. (2012). Cumulative carbon as a policy framework for achieving climate stabilization. *Philosophical Transactions of the Royal Society A: Mathematical Physical and Engineering Sciences*, *370*, 4365–4379.

Seto, K. C., Fragkias, M., Güneralp, B., & Reilly, M. K. (2011). A meta-analysis of global urban land expansion. *PLoS ONE*, *6*(8), e23777. https://doi.org/10.1371/journal.pone.0023777.

Toumi, S., Aljadani, A., Toumi, H., et al. (2025). AI for climate change: Unveiling pathways to sustainable development through greenhouse gas emission predictions. *Eurasian Economic Review*. https://doi.org/10.1007/s40822-024-00295-7.

UN-HABITAT. (2016). World cities report 2016. Urbanization and development. Emerging futures. Key findings and messages. https://unhabitat.org/sites/default/files/download-manager-files/WCR-2016-WEB.pdf. Accessed 20 Oct 2025.

United Nations. (2023). State of world population 2023. https://www.un-ilibrary.org/content/books/9789210027137. Accessed 20 Oct 2025.
United Nations. (2024). Department of economic and social affairs, population division. World population prospects 2024: Summary of results (UN DESA/POP/2024/TR/NO. 9).
Zaiceva, A., & Zimmermann, K. F. (2016). Migration and the demographic shift. In: J. Piggott, & A. Woodland (Eds.), *Handbook of the economics of population aging* (pp. 119–177), North Holland.