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The Human Dimension of Urbanization and Economic Development in Kazakhstan: Demographic Trends

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ABSTRACT

Cities are the main centres of economic growth and spatial development in Kazakhstan; therefore, studying their formation and dynamics is of particular relevance. The purpose of the study is to identify regional differences and patterns in urbanisation processes by analysing social, economic, and geographical factors that determine the dynamics of urban growth. The methodological framework includes comparative, statistical, and GIS analysis, as well as correlation and regression methods, aimed at studying the interrelationships among urbanisation levels, demographic changes, infrastructure development, and the quality of education. The empirical database is based on official data from the Bureau of National Statistics, the UNFPA, and the World Bank for 2014-2024. The results showed that the share of the urban population in Kazakhstan increased from 54% in 2014 to 60% in 2024, with the most significant increases observed in Almaty (+200 thousand) and Astana (+150 thousand). Large agglomerations concentrate economic activity and human capital, while small, single-industry cities face depopulation and a lack of infrastructure. A stable relationship has been established between the level of socio-economic development of the region and the quality of education: the integral indicators of educational achievement are 76-78% in Astana, 73-75% in Almaty and 68-70% in Shymkent. The practical significance of the results is determined by their applicability in shaping regional policies, spatial planning strategies, and sustainable urban development programs.

KEYWORDS: Urbanisation, Urban Economy, Human Capital, Demography, Economic Geography, Business Environment, Economic Growth

SCSTI: 06.61.53

JEL Code: I31, R11, R23

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1. INTRODUCTION

In the context of contemporary global development, cities have become the main pillars of economic and social progress. According to the United Nations (2023), more than 56% of the world's population currently resides in urban areas, and this figure is projected to reach nearly 70% by 2050. Urbanisation not only transforms settlement patterns but also drives innovation and technological advancement. Cities function as key catalysts of economic activity, investment flows, and scientific and technological development. They represent spatial concentrations of high-tech industries, education and culture, as well as financial and transportation networks (OECD, 2014). The study of urbanisation processes in emerging markets is of particular importance for the global discussion on balanced and sustainable urban development. Thus, Kazakhstan is an illustrative example of a country where rapid urbanisation coexists with spatial and social contrasts, making it a valuable model for comparative research.

At the same time, rapid urbanisation has generated complex challenges, including housing shortages, environmental degradation, and widening social inequality (World Bank, 2024). Therefore, contemporary urban development policies must be guided not only by the principles of economic growth but also by those of sustainable development, environmental security, and social inclusiveness.

For Kazakhstan, urbanisation is not merely a demographic phenomenon but a key factor shaping regional development, the concentration of human capital, and spatial organisation. Cities play a decisive role in accelerating national economic growth, disseminating innovation, and improving social infrastructure (Bureau of National Statistics, 2024). However, internal migration, particularly the steady movement from rural to urban areas, has led to demographic imbalances across regions, contributing to depopulation of rural territories and increased pressure on the housing market and urban social infrastructure. Despite the active development of cities and the implementation of government programs, spatial and socio-economic differences between large agglomerations and peripheral territories remain significant. The existing approaches to urban policy are mainly focused on infrastructure and investment, while the human dimension remains underdeveloped. This reinforces the need for a comprehensive analysis combining the economic, demographic and spatial factors of urban development.

These dynamics underscore the need for a deeper understanding of the spatial and demographic dimensions of urbanization. Such an approach is essential for formulating sustainable development strategies, optimising regional policy, and regulating migration. Moreover, evaluating urbanisation only through industrial and investment indicators is insufficient; modern urban research must also integrate human-centred factors such as quality of life, social mobility, cultural diversity, and demographic stability (Thisse, 2018; UN-Habitat, 2022).

Despite the growing body of research on urban growth, there remains a significant gap in the literature on the human dimension of urbanisation in Kazakhstan, particularly regarding spatial differentiation, migration dynamics, and quality-of-life disparities across cities. To address this gap, the present study analyses the spatial and demographic trends of urbanisation in Kazakhstan using quantitative, statistical, and Geographic Information System (hereinafter – GIS)- based approaches. The purpose of the study is to identify regional differences and patterns in urbanisation processes by analysing social, economic, and geographical factors that determine the dynamics of urban growth. Unlike most previous studies, this work uses a multidimensional approach that includes statistical, demographic, and spatial indicators, helping identify the typology and patterns of urbanisation differences across cities in Kazakhstan.

The remainder of this paper is structured as follows: Section 2 provides a review of the relevant literature; Section 3 presents the data sources and research methodology; Section 4 discusses the main results and findings; and Section 5 concludes with key implications and recommendations for policy and practice.

2. LITERATURE REVIEW

Urbanisation has evolved from a demographic trend into a complex and multidimensional process that fundamentally reshapes spatial structures, social systems, and economic models. According to UN-Habitat (2022), more than half of the global population now resides in urban areas, a proportion expected to reach 70% by 2050. Cities are increasingly seen not just as population centres but as engines of innovation and human capital development (Goodman, 2011; Thisse, 2018; Florida, 2019). The global literature interprets urbanisation as a catalyst of technological, institutional, and social transformation, underscoring that modern cities operate as knowledge networks where human creativity and innovation intersect (Adnan, 2016; Batty, 2018).

The theoretical basis for understanding these dynamics stems from classical models of economic geography and growth theory. Krugman (1991) and Fujita et al. (1999) explained how spatial concentration generates cumulative advantages, while Lucas (1988) and Romer (1990) demonstrated that knowledge and human capital accumulation drive endogenous growth. These concepts provided a foundation for subsequent work by Florida (2019), who introduced the creative class as a key component of competitive cities, and by Sassen (2001), who conceptualised global cities as strategic nodes of finance and information exchange. Together, these frameworks highlight that innovation, talent, and governance collectively determine the sustainability and competitiveness of urban systems.

In the twenty-first century, digitalisation and technological innovation have become defining features of urban development. Caragliu et al. (2011) identified smart cities as ecosystems where information and communication technologies enhance efficiency, participation, and environmental performance. Empirical studies demonstrated that digital infrastructure not only supports economic diversification but also promotes new governance models (Acemoglu & Restrepo, 2018; Batty, 2018). OECD (2014) findings confirm that cities investing in digital transformation experience higher productivity, while the World Bank (2020) reports that integrating digital strategies into spatial planning reduces inequality and strengthens resilience. However, technological progress also brings challenges: automation alters labour markets, and unequal access to digital tools reinforces existing disparities (Gao, 2023).

Environmental and social sustainability have simultaneously emerged as critical dimensions of urbanisation (Henderson, 2002; Gao, 2023; Bekturganova et al., 2025). The rapid urbanisation in many developing countries over the past half-century appears to have been accompanied by excessively high levels of urban population concentration in large cities (Henderson, 2002). Gao (2023) emphasised that sustainable cities balance economic, ecological, and social objectives, while Yan and Liu (2023) linked urban growth to transformations in social equity and structure. Bekturganova et al. (2025) provided empirical evidence that environmental governance, when combined with digital technologies, contributes to lower CO_2 emissions and improved quality of life. Global policy frameworks, including those of UN-Habitat (2022), stress that urban resilience requires an integrated approach in which technology, governance, and public participation are interdependent.

In developing and transition economies, including Kazakhstan, urbanisation takes on a dual character: it accelerates modernisation but often amplifies regional disparities. According to the Bureau of National Statistics (2024), nearly 60% of Kazakhstan's population lives in

cities, yet urbanisation remains concentrated in Almaty, Astana, and Shymkent. Scholars (Kabdesov, 2020; Bekbossinova & Niyazbekov, 2024) argue that this imbalance creates uneven infrastructure quality and migration pressure, contributing to socio-spatial inequality. Similar to patterns described by Turok and McGranahan (2019) in Africa and Asia, Kazakhstan's regional centres outside major agglomerations are developing more slowly due to limited innovation capacity and weak institutional frameworks.

Human capital and education emerge as decisive factors in overcoming these constraints. Endogenous growth theory (Lucas, 1988; Romer, 1990) and empirical research highlight that knowledge diffusion and innovation capacity underpin sustainable urban development (Kireyeva, 2025). In Kazakhstan, regions with advanced universities and research institutions, primarily Almaty and Astana, demonstrated higher productivity and diversification. However, as Muratova et al. (2023) and Kenzhegulova et al. (2023) noted, smaller cities often lack digital access and institutional support, limiting their ability to attract and retain talent.

Institutional quality plays a pivotal role in determining how effectively cities translate urbanisation into inclusive growth. Acemoglu and Robinson (2019) argued that inclusive institutions foster innovation and equitable resource distribution, whereas extractive systems reinforce the concentration of wealth and power. In Kazakhstan, local governance remains highly centralised, constraining municipal autonomy and innovation potential (Bolysbek et al., 2024). OECD (2022) recommendations emphasise the need for decentralisation and multi-level coordination to enhance efficiency and citizen participation. Such reforms are essential to shift urban management from administrative control toward evidence-based governance, transparency, and accountability.

The environmental dimension of Kazakhstan's urbanisation reflects both global and domestic challenges. Research by Bekbossinova and Niyazbekov (2024) and Unerbayeva et al. (2025) showed that industrial cities such as Karaganda, Pavlodar, and Temirtau continue to generate high emissions and environmental risks. While technological innovations can reduce ecological footprints, their success depends on institutional integrity and public awareness. Integrating environmental objectives with digital solutions offers a path toward sustainable urban transition, yet requires policy coherence and long-term investment in green technologies.

Migration dynamics and spatial inequality further complicate Kazakhstan's urban trajectory. The concentration of human and financial capital in a few megacities generates regional imbalances, echoing findings by Turok and McGranahan (2019). Peripheral areas and mono-industrial towns experience depopulation and stagnation, which reinforces the uneven development cycle. Addressing these disparities demands a shift toward polycentric urban development and regional innovation clusters. Thus, Kenzhegulova et al. (2023) suggested expanding digital infrastructure and smart governance beyond major centres could foster broader participation and reduce territorial inequality.

Overall, urbanisation in Kazakhstan reflects both opportunities and systemic constraints. Rapid growth in leading cities demonstrates the country's potential to build knowledge-based urban economies, while persistent inequality exposes institutional and infrastructural gaps. Global experience showed that sustainable urbanisation is achieved through the synergy of three pillars: substantial human capital, effective institutions, and technological inclusiveness (Henderson, 2002; Acemoglu & Restrepo, 2018; Florida, 2019). For Kazakhstan, aligning these dimensions requires coherent policy efforts aimed at decentralisation, education reform, and environmental innovation. The integration of digitalisation with social equity and ecological governance will determine whether Kazakhstan's urban transition evolves into a model of inclusive and sustainable development.

Overall, the literature demonstrates that urbanisation represents a multidimensional system of interrelations among human, spatial, and economic factors. While serving as a foundation for innovation and social progress, it also intensifies regional imbalances and social stratification. Therefore, this study aims to develop a balanced model of urban development in Kazakhstan by conducting a comprehensive analysis of spatial-demographic trends and the human dimension of urbanisation.

3. RESEARCH METHODS

The study of the spatial and demographic development of cities constitutes a key research area in contemporary geography and social sciences. This research aims to conduct a comprehensive analysis of the social, economic, and spatial factors shaping urbanisation in Kazakhstan's cities. Urbanisation is examined not only as a driver of national economic growth but also as a key indicator of social infrastructure development, migration dynamics, and quality of life. The main research problem is to identify the causes and consequences of spatial and demographic inequalities in urban development in Kazakhstan, and to propose effective mechanisms to reduce these disparities. The purpose of the study is to determine the patterns of urban development imbalances through a systematic and integrated analysis of the socio-economic and demographic aspects of urbanisation, and to provide a scientific justification for the spatial organisation of cities.

Accordingly, Kazakhstan's strategic documents, including the President's annual addresses, the "Kazakhstan-2050" Strategy, and the National Development Plan until 2029, clearly define the national priorities for reducing regional disparities and promoting sustainable urban development (Government of the Republic of Kazakhstan, 2023).

Figure 1 illustrates the key objectives outlined in the "Kazakhstan-2050" Strategy and the National Development Plan aimed at reducing regional disparities and promoting sustainable urban development across the country.

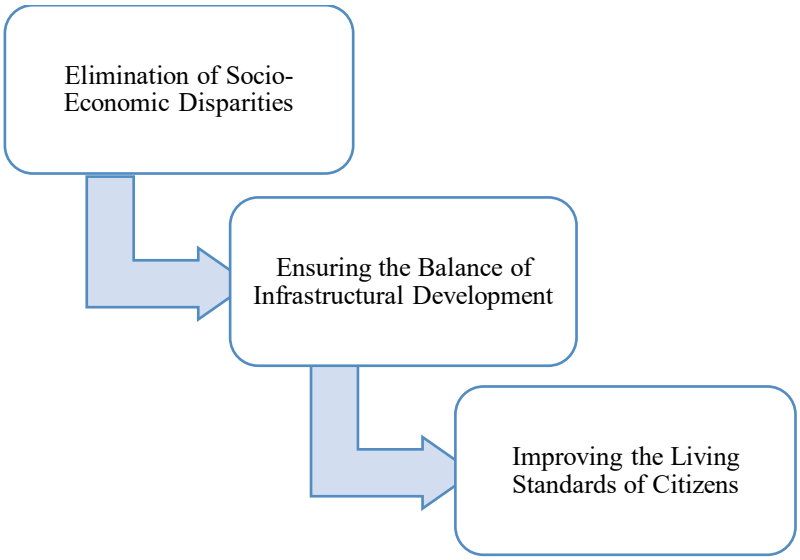

Figure 1. National priorities for regional and urban development

The diagram shows the strategic priorities of sustainable urban and regional development, reflected in the Strategy "Kazakhstan-2050" and the National Development Plan until 2029. They include balanced territorial growth, improving the quality of life of the population

in all regions, infrastructure development and strengthening the role of cities as drivers of economic and social progress. Kazakhstan has identified the transition from a raw-materials-based economy to an industrial and innovative one as a priority area of state policy. This transition aims to diversify regional economies, stimulate innovative industries, and improve transport and engineering infrastructure. Such measures not only promote economic growth but also reduce inter-regional differences, strengthening social equality.

In this context, the purpose of the study is to analyse the spatial and demographic trends in the development of Kazakhstani cities from a human dimension perspective and to identify their impact on regional inequalities and the overall trajectory of the country's development. The theoretical significance of the work lies in the scientific substantiation of the role of human capital in the spatial development of cities and in clarifying the concept of the "human dimension" in the context of urban geography. The practical significance lies in the possibility of applying the results to the development of regional policy, urban planning, and the management of migration and demographic processes. Thus, the study comprehensively examines the spatial and demographic evolution of cities in Kazakhstan, focusing on the human factor of their transformation. Scientific work helps identify ways to achieve balanced regional development and to improve national urbanisation policy.

The central research question of the study is as follows:

RQ: How does urbanisation in Kazakhstan influence social and spatial inequality, and which factors and mechanisms can effectively mitigate these disparities?

To address this question, the following hypothesis is proposed:

Hypothesis: Socio-economic disparities among Kazakhstan's cities are determined by variations in natural resource potential, industrial and infrastructural capacity, and the effectiveness of regional policy implementation. It is further hypothesized that if innovative, digital, and ecological principles become the dominant framework for urban spatial management, regional inequalities will gradually decline, thereby fostering sustainable urban and economic development.

The study was conducted in three interrelated stages, including theoretical and analytical, empirical and generalising phases. At the first stage, the analysis of the scientific literature and the collection of socio-economic and demographic data on the cities of Kazakhstan were conducted. At the second stage, statistical and spatial methods (correlation and regression analyses, GIS visualisation) were used to identify patterns of urbanisation and regional differences. At the final stage, the results were summarised, and practical recommendations were formulated for regional policy and planning of sustainable urban development.

The study's methodological framework integrates theoretical, statistical, and spatial approaches to provide a comprehensive understanding of urbanisation processes. The research was conducted through three interrelated stages that combined literature synthesis, empirical analysis, and policy interpretation. At the initial stage, a systematic review of domestic and international sources on urbanisation and spatial development was conducted, followed by the collection and structuring of socio-economic and demographic data for Kazakhstan's cities. The main stage involved applying quantitative and qualitative methods, including correlation and regression analyses, to examine the dynamics of regional urbanisation rates, migration flows, infrastructure development, and the spatial concentration of economic and social activities. GIS tools were used to visualise spatial patterns, identify growth centres, and assess the extent of regional inequality.

At the final stage, the results were synthesized to formulate evidence-based recommendations for regional policy and urban planning. The integration of statistical analysis, GIS visualisation, and comparative assessment enabled the identification of key spatial-demographic trends in Kazakhstan's urban

development and the proposal of mechanisms to reduce socio-economic disparities. This mixed-methods design ensured the validity and reliability of findings while maintaining both scientific rigor and practical relevance.

To ensure the reliability of the results, a set of complementary methods was used in the study. The theoretical analysis was used to systematise and compare patterns of urbanisation and spatial development factors. The comparative geographical method was used to identify socio-economic and infrastructural differences between cities and regions. Statistical analysis enabled quantification of population dynamics, migration flows, urbanisation levels, and infrastructure conditions.

GIS methods were used to visualise spatial data, map urban centres, and identify areas of socio-economic activity concentration and spatial inequality. The use of GIS technologies, statistical modelling, and multifactor analysis has allowed us to develop a detailed typology and cartographic model of spatial inequalities, providing a new scientific perspective on the patterns of the urbanisation process. The inductive and deductive approaches provided a transition from particular empirical observations to generalising conclusions and testing the research hypothesis. In addition, a multifactorial analysis (regression and correlation) was used, enabling quato reducentification of the relationships among urbanisation levels, socio-economic indicators, and regional disparities.

As an empirical basis, demographic, social and economic indicators were analysed for all 16 urban regions of Kazakhstan, including the three largest agglomerations — Astana, Almaty and Shymkent — for the period up to 2025. The primary data sources included the Bureau of National Statistics of the Republic of Kazakhstan (2020-2024), materials from the United Nations Population Fund (UNFPA, 2022), World Bank reports (2021-2024), as well as publications and analytical reports from international research institutes on regional development and urbanisation.

The results obtained can serve as a basis for improving regional and urban policy, managing urbanisation processes in line with sustainability and balance principles, developing strategies for social infrastructure, housing, and human capital development, and planning migration and demographic policies to reduce socio-spatial disparities. Thus, the comprehensive integration of theoretical analysis, statistical methods, GIS visualisation, and comparative evaluation provided a holistic methodological framework for the study, enabling the formulation of scientifically grounded recommendations and enhancing the practical significance of the results.

4. RESULTS

This study aims to identify and analyse regional disparities in the socio-economic development of Kazakhstan's cities, with a primary focus on the factors driving spatial inequality and the dynamics of urbanisation. The analysis was based on statistical data by region and city, official reports, and results of spatial and GIS-based analyses. The findings reveal that regional disparities among Kazakhstan's cities remain significant despite a gradual trend toward convergence.

These disparities are determined mainly by differences in socio-economic development, infrastructure quality and entrepreneurial opportunities. One key trend is the growth of the urban population and intensified migration from rural to urban areas, particularly toward major metropolitan centres such as Almaty, Astana, and Shymkent. While this urban migration stimulates economic growth, it also leads to housing shortages, overburdened social and communal infrastructure, and increased social tensions.

Over the past decade, the level of urbanisation in Kazakhstan has steadily increased: as of 2024, more than 60% of the country's population resides in cities (Bureau of National Statistics, 2024). Based on these data, a diagram illustrating the dynamics of urbanisation in Kazakhstan between 2014 and 2024 was developed (Figure 2).

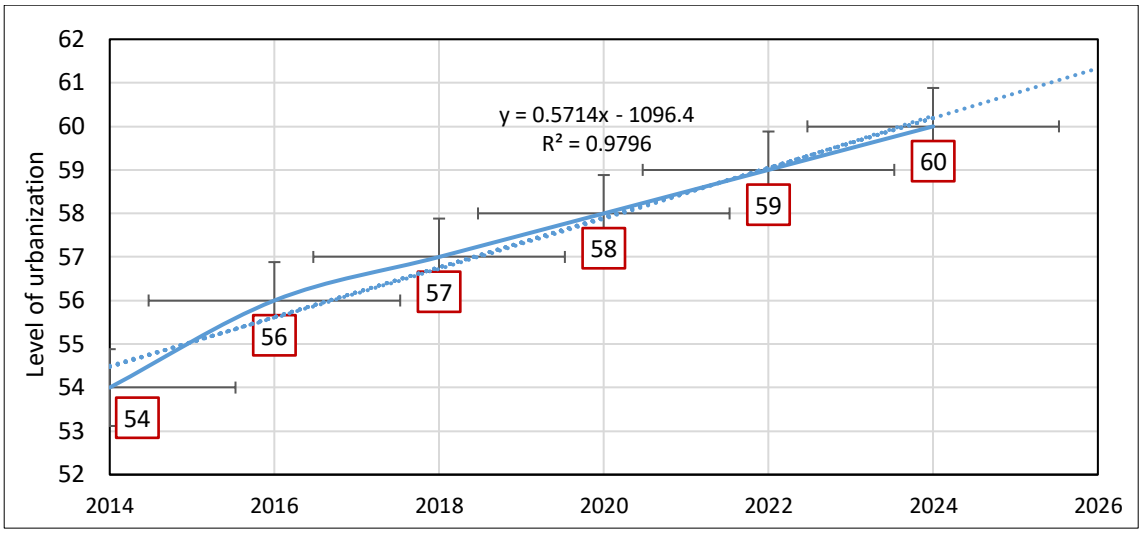

Figure 2. The trend of changes in the level of urbanisation in Kazakhstan for 2014-2024

As shown in Figure 2, over the past decade, the level of urbanisation in Kazakhstan has gradually increased, with the urban population share rising from 54% in 2014 to 60% by 2024. This trend demonstrates the steady pace of urbanisation and reflects the growing socio-economic attractiveness of cities. Urbanisation has become a key driver of socio-economic development in Kazakhstan. However, the process is uneven across regions. Southern and central areas exhibit higher urbanisation rates, whereas northern and western regions experience slower growth. Major cities such as Almaty, Astana, and Shymkent have developed into primary agglomeration centres, concentrating most internal migration flows.

Over the last five years, the population of Almaty increased by approximately 200,000 people, and Astana by around 150,000. In contrast, several smaller or mono-functional towns have experienced population decline. Such migration disparities contribute to changes in demographic structures, regional imbalances in labour resources, and increased pressure on social and infrastructural systems. These findings confirm that urbanisation in Kazakhstan is a multi-dimensional process, with both economic benefits and social challenges. They highlight the importance of balanced regional planning to mitigate inequality, optimise infrastructure, and ensure sustainable urban growth across all regions.

The data clearly demonstrate a steady flow of migration and high rates of urbanisation in Kazakhstan's largest megacities. The population growth dynamics of Almaty and Astana between 2014 and 2024 clearly illustrate the pace of urbanisation, the sustained pattern of migration, and the progressive trend of demographic concentration. Both megacities have experienced consistent population growth over the past decade, reflecting their growing economic attractiveness, expanded social infrastructure, and increasing labour market opportunities (Bureau of National Statistics, 2024). However, Kazakhstan's regions differ significantly in terms of natural and economic resources, which directly affects the rate of socio-economic development, investment potential, and residents' quality of life. These spatial disparities are determined mainly by the historical features of territorial development, differences in initial conditions of urban and regional growth, and the diversity of economic specialisation across territories.

This trend is further illustrated in Figure 4, which presents the population dynamics of Almaty and Astana from 2014 to 2024.

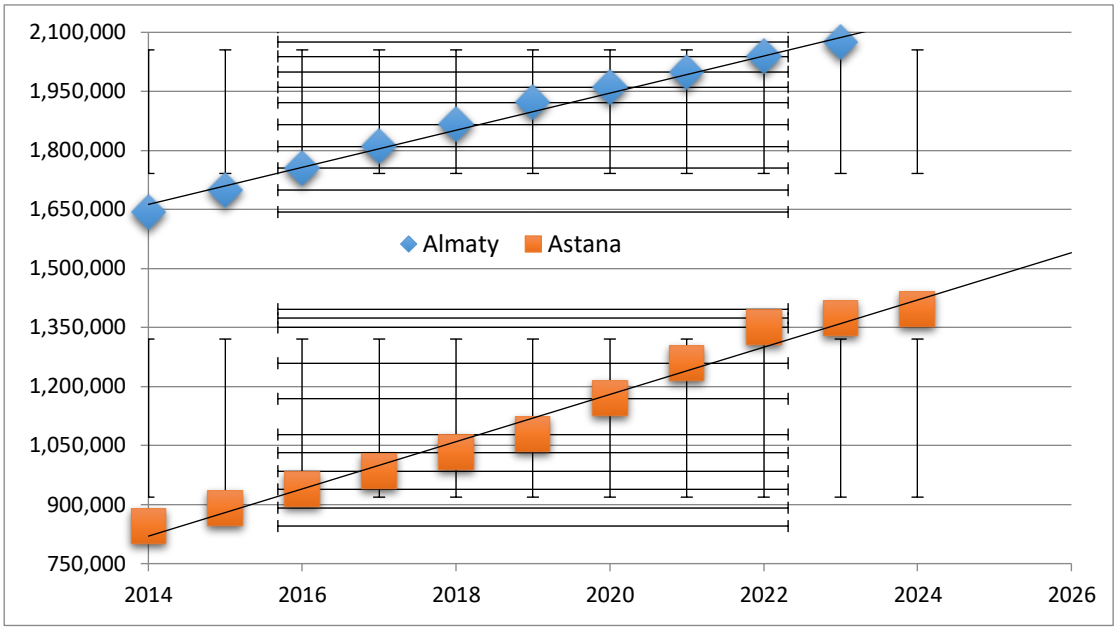

FIGURE 1. Population dynamics of Almaty and Astana cities between 2014-2024

The data clearly demonstrate a steady flow of migration and high rates of urbanisation in Kazakhstan's largest megacities. The population growth dynamics of Almaty and Astana between 2014 and 2024 clearly illustrate the pace of urbanisation, the sustained pattern of migration, and the progressive trend of demographic concentration. Both megacities have experienced consistent population growth over the past decade, reflecting their growing economic attractiveness, expanded social infrastructure, and increasing labour market opportunities (Bureau of National Statistics, 2024). However, Kazakhstan's regions differ significantly in terms of natural and economic resources, which directly affects the rate of socio-economic development, investment potential, and residents' quality of life. These spatial disparities are determined mainly by the historical features of territorial development, differences in initial conditions of urban and regional growth, and the diversity of economic specialisation across territories.

Such disparities are also evident in the education sector. The quality of education in Kazakhstan closely correlates with the overall socio-economic development of each region. In highly urbanised and economically developed cities, particularly Astana, Almaty, and Shymkent, educational infrastructure and human capital are significantly stronger, and modern technologies and innovative teaching methods are more widely implemented. Conversely, in less developed regions, schools tend to have fewer material and technical resources, and the quality of teaching remains lower.

At the city level, the relationship between educational quality and socio-economic development is increasingly evident. Economically strong regions concentrate educational infrastructure and skilled pedagogical staff, while resource-constrained regions face limited access to quality education (World Bank, 2022). For example, during the 2023–2024 academic year, the average academic performance indicator across Astana schools reached 62.03%, a +2.30% increase from 59.73% in 2022–2023 (Bureau of National Statistics, 2024).

Although overall education quality has improved, intra-urban disparities persist:

megacities continue to outperform smaller towns and rural areas, highlighting the unequal distribution of educational resources and opportunities. Spatial inequality in Kazakhstan's education system is directly tied to socio-economic disparities, the availability of infrastructure, and pedagogical capacity across cities. This demonstrates the mutually dependent relationship between a city's socio-economic development and educational outcomes: higher economic potential contributes to better education outcomes; improved education strengthens human capital and supports sustainable regional development (Kabdesov, 2020; Muratova & Baigojaeva, 2023; Kireyeva et al., 2025).

However, economic crises and uneven implementation of reforms during the transition to a market economy have disrupted this balance, deepening socio-economic inequality across regions. As a result, disparities have emerged in access to social infrastructure, income levels, migration flows, and economic activity. Nevertheless, with effective regional policies and favourable investment conditions, urban population growth can serve as a key driver of development. Population growth stimulates small- and medium-sized business growth, creates new jobs, enhances business activity, and ultimately improves the overall quality of life for citizens.

Analysis of population dynamics across Kazakhstan's cities

During the research, the population dynamics of 16 cities in Kazakhstan were analysed from their establishment to 2025. This longitudinal analysis allowed for tracking each city's demographic development trajectory, assessing the pace of urbanisation, and clarifying the nature of regional disparities.

The results indicate that major cities (Almaty, Astana, and Shymkent) have experienced consistent population growth, whereas several small and medium-sized cities have shown declining or slower population growth. These patterns confirm that the urbanization process in Kazakhstan possesses not only a quantitative dimension but also a qualitative aspect, as population concentration is closely linked to economic activity levels and the development of regional infrastructure (Table 1).

Table 1. Periods of establishment and population dynamics of Kazakhstan's cities

City	1939	1989	2009	2025
Oral	47 200	198 600	276 300	348 000
Atyrau	27 800	180 000	180 000	372 000
Aktobe	33 400	253 000	280 000	540 000
Aktau	26000	143 000	165 000	190 000
Kostanay	61 000	145 000	214 000	250 000
Kokshetau	37 000	123 000	147 000	158 000
Karaganda	166 000	436 000	459 000	520 000
Pavlodar	52 000	300 000	334 000	360 000
Petropavl	19 688	206 559	203 523	222 500
Taldykorgan	10 200	98 700	112 900	150 000
Semey	170 700	335 400	299 300	360 000
Turkistan	28 400	102 900	142 900	210 000
Oskemen	49 800	311 000	308 736	347 000
Almaty	311 000	1 136 000	1 365 600	2 150 000
Astana	33 000	281 000	613 000	1 420 000
Shymkent	101 700	401 200	603 500	1 300 000

Note: compiled by the authors

This table systematizes demographic data for Kazakhstan's 16 cities, presenting establishment dates and population trends over nearly a century. Such chronological data allow

for a comprehensive analysis of urbanization processes, regional development disparities, and changes in cities' economic potential. Based on these demographic indicators, a cartographic visualization was created to illustrate the spatial distribution of the population and the dynamics of urbanization across Kazakhstan's cities. This map provides a clear depiction of urban development levels, regional concentration patterns, and territorial differences in urbanization processes (Figure 4).

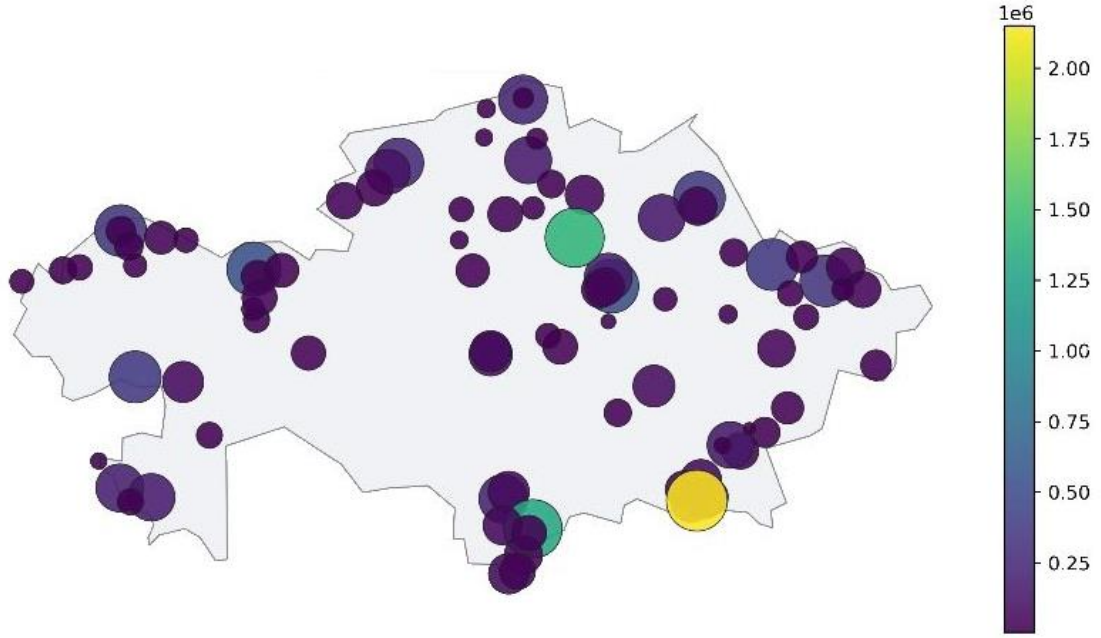

FIGURE 4. Map of the dynamics of population change in the cities of Kazakhstan

Based on the analysis of the map, several distinct trends in the development of Kazakhstan's cities were identified:

(1) Major metropolitan areas such as Almaty, Astana (Nur-Sultan), Shymkent, Atyrau, and Karaganda have experienced significant population increases over the past eighty years. These cities have become key economic, migration, and innovation centres, serving as hubs for investment and labour resources.

(2) Industrial cities, including Zhanaozen, Ekibastuz, Temirtau, and Rudny, largely depend on their industrial sectors. Economic crises in mining or energy industries have slowed demographic growth and caused instability in these areas.

(3) This trend is particularly evident in agrarian regions and single-industry cities (e.g., Derzhavinsk, Lisakovsk, Saran, Ridder, and Serebryansk), reflecting population concentration in major centres and internal rural-to-urban migration.

(4) Development in oil, gas, mining, and energy sectors led to the emergence of cities such as Aktau, Zhanaozen, Kulsary, Khromtau, and Kentau, which later evolved into regional economic centres.

(5) In recent decades, urbanisation has focused not only on population growth but also on improving the quality of life through social infrastructure, transportation networks, education, and services.

The data demonstrate that the demographic development of cities is closely linked to historical, economic, and political factors, including industrialisation policy, migration, and regional development programs. Long-term population analysis allows for an assessment of socio-economic potential and

provides a scientific basis for regional development strategies.

Comparative analysis indicates that Almaty and Astana are the leading financial and innovation centres, characterised by substantial budgetary resources, well-developed infrastructure, strong investment potential, and highly concentrated human capital. Regions such as Atyrau, Aktobe, and Karaganda are economically important due to their natural resources and industrial capacity, particularly in oil, gas, and metallurgy. Conversely, Zhambyl, Kostanay, and Kyzylorda are marked by lower budget levels and limited industrialisation, reflecting low investment, poor economic diversification, and high dependence on agriculture. For the cities in the Almaty region (Taldykorgan, Konaev, and Shymkent), an economic environment quality index of 1.69 was identified, with recommendations to enhance economic activity through infrastructure investments. Measures include modernisation of transport and utility networks, industrial capacities, and support for small and medium-sized businesses, aimed at reducing socio-economic inequalities.

For sustainable cities such as Pavlodar, Oskemen, Zhambyl, Astana, Semey, and Turkistan, optimising existing programs is recommended, including reassessing effectiveness, reallocating resources, and strengthening cooperation between the government and the private sector to improve regional competitiveness. Environmental sustainability is critical for leading cities. Priority measures include reducing emissions, implementing eco-friendly technologies, modernising industrial processes, waste management, recycling, and ecosystem restoration. These initiatives improve living conditions, attract investors and tourists, and enhance regional development.

Despite positive trends, territorial inequality persists. “Leading cities” continue to outperform “peripheral cities,” creating fiscal disparities in which some regions serve as budget donors and others as recipients. To reduce these inequalities, enhancing regional policy effectiveness, supporting local entrepreneurship, developing transport and social infrastructure, and implementing smart city technologies are essential. A comprehensive spatial development policy will stimulate economic activity in remote areas and promote balanced territorial growth. Overall, the research findings confirm that regional disparities in Kazakhstan’s cities remain significant, requiring systematic, evidence-based strategies to ensure sustainable urban development, reduce socio-economic inequalities, and improve quality of life for the population.

5. CONCLUSION

The primary objective of this study was to conduct a comprehensive analysis of the socio-economic development dynamics and spatial-demographic trends of Kazakhstan’s cities, examining their impact on urbanisation and education quality. The research relied on official data from the Bureau of National Statistics of the Republic of Kazakhstan, the Ministry of Education and Science, and municipal education departments’ reports for 2024. Methodologically, the study employed comparative-analytical, statistical, and graphical methods, as well as data visualisation techniques. Dynamic comparison, diagrammatic analysis, and cartographic visualisation were applied to examine the interrelations between geographic and socio-economic factors.

Key findings:

1. Urbanisation trends. Over the past decade, Kazakhstan has experienced steady urbanisation: as of 2024, approximately 60% of the population resides in urban areas. This process is most pronounced in major cities such as Almaty, Astana, and Shymkent, which have become central drivers of economic and social development. For example, over the last five years, Almaty’s population increased by about 200,000, while Astana grew by 150,000, reflecting the concentration of population in megacities and the pivotal role of urbanisation in national spatial development.

2. Demographic and regional disparities. Analysis of population data from 90 cities, including historical formation periods and population dynamics, revealed apparent regional inequalities. Large cities show continuous growth, while smaller settlements and monotowns often face population decline. Natural resource availability, industrial potential, historical development patterns, and uneven infrastructure and market reforms influence regional disparities.

3. Education and socio-economic interdependence. The study demonstrates a strong correlation between education quality and socio-economic development. In Almaty, Astana, and Shymkent, educational facilities are modern, teaching staff are highly qualified, and digital technologies are widely implemented. In contrast, smaller and mono-industrial towns face teacher shortages, limited resources, and weaker educational outcomes. Improved economic potential enhances education quality, while high-quality education strengthens human capital, supporting sustainable regional development.

4. Policy implications. To reduce spatial inequalities and promote balanced urban development, it is essential to: ensure equitable progress in infrastructure and educational capacity across all regions; provide targeted teacher training programs and integrate innovative educational technologies; foster economic diversification and investment in medium-sized and small cities to mitigate population decline; promote sustainable urbanisation policies that align economic growth with social and environmental priorities.

The findings can inform regional development strategies, urban infrastructure planning, educational quality assessment systems, and efforts to promote social balance. Future studies could expand to include spatial correlation modelling of educational quality and economic indicators using GIS, as well as quantitative analysis of urbanisation's impact on human capital and labour markets. This study highlights the critical role of urbanisation and human capital in Kazakhstan's socio-economic development. Systematic and evidence-based assessment of regional disparities and education quality is essential for fostering sustainable development, improving quality of life, and enhancing the country's global competitiveness.

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