

The Changing Geography of Global Cities: A Spatiotemporal Analysis of Urban Population Growth from 1950 to 2035.

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Abstract

In the era of global urbanization, the spatial dispersion, the size and the rank of cities around the world have changed. The current study aims to explore the new geography of the world's cities by a spatiotemporal analysis of urban population growth between 1950 and 2035. A quantitative longitudinal approach was employed to estimate the population change, the continental distribution, the city-rank transitions and the growth of megacities in the main continents of the world. Long term trends and projections were identified by using descriptive statistics, comparative ranking, growth measurement, and graphical visualization. The results show significant growth in the total population of the big urban agglomerations and a significant change in the global urban hierarchy. Asia became the main hub of urban growth; Africa had the highest rates of proportional growth and more and more megacities. There was strong population growth and upward rank mobility in cities like Delhi, Dhaka, Kinshasa, Lagos, and Cairo. By contrast, other cities that have been historically dominant have seen their relative position wane, even whilst maintaining their urban importance, in Europe and North America. The number of megacities grew significantly, with most expected to be in Asia by 2035. The study finds that the global urban system is in a critical moment of dramatic transformation towards the Global South. The implications for metropolitan governance, infrastructure, housing, public services, adaptation to climate change and sustainable urban planning are significant.

Key Words: Global cities; Urban population growth; Megacities; Spatiotemporal analysis; Urban hierarchy

1. Introduction

The urbanisation processes are one of the most important demographic and spatial changes of modern times. Cities have grown in number, economic and social significance and complexity over the last few decades. The reshaping of settlement patterns, the reconfiguration of regional development pathways and the reorganisation of the position of cities in the global urban hierarchy. Though most urbanization took place in Europe and North America in the past, the current trend is towards the Asian, African and other rapidly developing world. Today, the geography of global cities is not simply about the historically strong urban centres but also decentralized urban clusters with rapid demographic growth.

The growth of the global population is strongly linked to the urbanization of the population. Assessments of the population in recent years show that further demographic growth, migration and economic restructuring will exert further pressures on cities, especially in developing regions (Department of Economic, 2024). It is also apparent from long-term population projections that a significant share of the future population increase will be taking place in urban settlements, making it imperative to understand population growth trends in the size and distribution of urban settlements (DESA, 2022). These trends have significant consequences for housing, infrastructure, transport, jobs, public services, environment and urban governance.

Urbanisation is a subject that needs a common understanding of what a city is and what an urban area is, as countries may have different definitions for cities (population thresholds) and urban areas (administrative criteria). International comparisons can be enhanced and a better understanding of the true extent of global urbanisation can be achieved through a harmonised approach (Dijkstra et al., 2021). The ability to make comparisons across historical periods and across countries has been further enhanced by developments in global urban databases and geospatial monitoring systems (Melchiorri, 2022). Likewise, the Global Human Settlement Layer provides standardized information on population and settlement for analysing urban concentration, spatial spread and regional inequalities (Schiavina et al., 2022).

Growth does not happen in the same way in all cities or regions. In some cities, population growth is regular, while in others, the population growth is rapid due to migration, natural population growth, industrialization or administrative reorganization. The phenomenon of unevenness in the pace and scale of urbanization exists in large cities around the globe and has been demonstrated in research (Sun et al., 2020). The growth paths of individual urban centres are affected by economic factors, political systems, infrastructure investments and geographical factors. Urbanization is also increasingly linked with a wider process of territorial development, as urban and rural areas are also increasingly linked through employment, services, mobility, and market access (Cattaneo et al., 2022). However, urban–rural catchment areas (Cattaneo et al., 2021) continue to show space inequality in access to services and opportunities.

Another major aspect of urban change globally is the spatial growth of cities. Population growth can be met in urban areas by expansion, density or a mix of both. Studies reveal that many cities have grown both their built-up areas and the density of their houses (Angel et al.,

2021). In the case of urban expansion, the demographic demand, land markets, planning systems, infrastructure provision, and governance capacity play a role in shaping urban expansion (Angel, 2023). Population and economic growth are recognised as significant factors of urban land growth, but vary in different cities (Mahtta et al., 2022). Urban expansion is projected to be strong in the future, especially under socioeconomic scenarios with rapid demographic and economic change (Chen et al., 2020).

The global city hierarchy is also shaped by the growth of cities in urban areas. The level of importance of a city is not only determined by the scale of its population, but also by the rate of growth of the city compared to other urban centres. Cities' growth pathways often follow regular statistical patterns, but the unique growth path of each city is influenced by local and regional conditions (Verbavatz & Barthelemy, 2020). Many of the future largest urban agglomerations of the world are expected to be in Asia and Africa, which represents a significant shift in the urban system in the world (Kii, 2021). This shift necessitates a new story for urban development that takes the increasing role of cities into account in the face of sustainability, inequality, resilience, and global development issues (Keith et al., 2023).

Economic concentration, innovation, access to services and social interaction are all opportunities that can be created by rapid urban growth. However, uncontrolled development can exacerbate issues such as congestion, the rise of informal settlements, environmental problems, health disparities, and poor infrastructure. The inclusion of public health aspects in urban and territorial planning is therefore critical to build inclusive and liveable cities (World Health Organization, 2020). Tracking long-term population growth can aid policymakers in identifying high-growth urban centres, forecasting the demand for future infrastructure, and establishing more efficient policies for urban development.

With this backdrop, this study investigates the evolving geography of the world's cities from 1950 to 2035. It analyzes the growth of the population in the long term, migration within the region, shifts in city rankings and the development of megacities. The study has integrated historical and projected trends to give a comparative interpretation of the evolution of the global urban hierarchy and how it is likely to continue to evolve.

Research Objectives

1. To explore the population trends of cities around the world from 1950 to 2035.
2. To make a comparison of population growth in urban areas on continents and major world regions.
3. To evaluate city ranking trends, population growth trends and megacity growth over the period of the study.

2. Methodology

2.1 Research Design

The research design for this study was quantitative research with a longitudinal and comparative design to analyze changes in the geographical distribution and the population growth of the global cities from 1950 to 2035. The spatiotemporal approach was applied for assessing population changes between cities, countries, regions, continents and successive

time periods. All secondary data were used, and historical population estimates and projections were added.

2.2 Data Source

The data set “World Cities 1950–2035” was used for the study, which is publicly available (Marchenko, 2021). The downloaded file was in a zip format and consisted of three files: urban.csv, urban_proportion_annual.csv and total_population_annual.csv. The urban.csv file was used as an analytical file because it had city-level population estimates and growth rates. The rest of the files were used for regional population and urbanisation comparisons. The data covered some 1,860 urban agglomerations in 153 countries, 20 regions and six continental groups.

2.3 Study Period and Unit of Analysis

The unit of analysis was the individual city or city-agglomeration. Population observations were available at five-year intervals for 1950, 1955, 1960, 1965, 1970, 1975, 1980, 1985, 1990, 1995, 2000, 2005, 2010, 2015, 2020, 2025, 2030, and 2035. Historical data were used as estimates up to 2015, and projections were made for 2025–2035. The 2020 observation is considered with caution and was treated as an estimated/transition value. Benchmark years of 1950, 1975, 2000, 2020, and 2035 were selected for detailed comparison.

2.4 Variables and Measurement

The principal variables were city name, city code, country, region, continent, benchmark year, the population level, and the five-year population growth rate. The population (in thousands) of the city was the primary outcome measure. The following indicators were derived: absolute increase, percentage increase, compound annual growth rate, city ranking, ranking change, regional population share and megacity status. The definition of megacity was given as an urban agglomeration of 10 million people.

2.5 Data Preparation

The data set was reviewed for missing data, duplicate entries, inconsistent city names, zero population and invalid growth rates. City & geographical names were stripped of leading and trailing spaces, and population variables were made numeric. No baseline population did not result in an infinite growth rate and was recorded as missing. City-country combinations were not automatically duplicated but checked for the same. The city-level data was reshaped from wide to long format, resulting in one observation per city-year.

2.6 Population Growth Analysis

Absolute population change was the difference between the population at the start and end of a period. For these calculations, percentage change was used for the period where the number of individuals had to be compared to the original population size, and compound annual growth rate was calculated for longer time periods to estimate the average annual change. These indicators have been computed for the entire 1950–2035 period and certain subperiods. No calculations were done with a missing or zero initial population value as this could result in misleading estimates.

2.7 Spatiotemporal and Ranking Analysis

The populations of the cities were ranked in decreasing order for each of the benchmark years. The cities were ranked, and those that rose and fell in the global ranking were identified. The geographical population shares and population changes in megacities were also estimated by region and continent. Based on the population dynamics, the spatial categories of rapid growth, moderate growth, accelerating growth, decelerating growth, stable population and population decline were established for cities.

2.8 Statistical Analysis and Visualization

For each benchmark year and geographical group, descriptive statistics (mean, median, minimum, maximum, standard deviation, and interquartile range) were generated. Population trends were illustrated using line graphs, ranked bar charts, heat maps, regional comparison figures, and slope charts. Historical estimates and projections were differentiated since their depictions. Due to the lack of latitude/longitude data in the dataset, the analysis of the data for spatial analysis was conducted more based on regional and continental redistribution than distance-based spatial autocorrelation.

3. Results

3.1 Overall Urban Population Growth

The data set consisted of 1,860 cities and urban agglomerations between 1950 and 2035. Their combined population rose by about 3.28 billion from 419.12 million in 1950 to 3.28 billion in 2035, as detailed in Table 1. There were also two more megacities than there were before (48 vs. 2). Global urban population growth is shown in Figure 1 and is expected to continue to grow after 2020.

Table 1. Global city population characteristics, 1950–2035

Year	Total population (million)	Mean population (million)	Largest city (million)	Megacities
1950	419.12	0.23	12.34	2
1975	877.37	0.47	26.62	4
2000	1,678.39	0.90	34.45	16
2020	2,568.98	1.38	37.39	34
2035	3,282.34	1.76	43.35	48

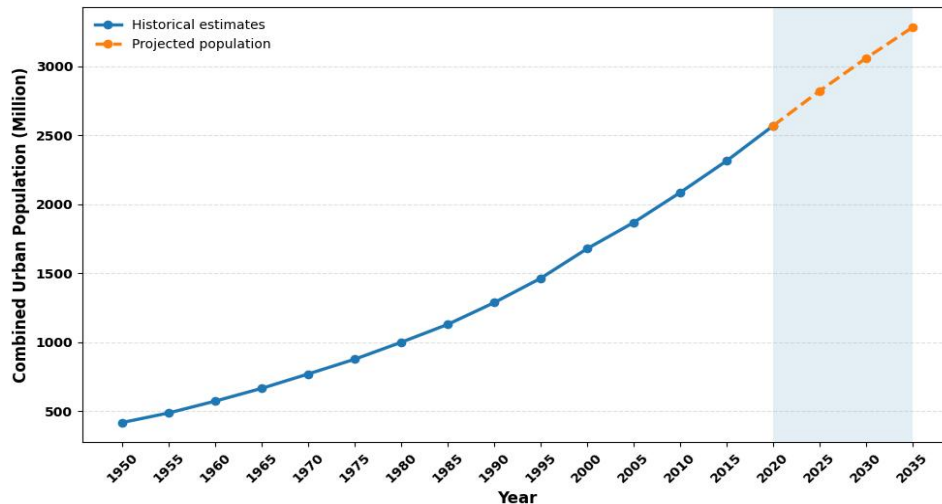


Figure 1. Global urban population growth, 1950–2035

3.2 Continental Redistribution

Growth in urbanization has been favoring Asia and Africa. As presented in Table 2, Asia's share increased from 36.0% in 1950 to 57.0% in 2035, while Africa's share rose from 4.7% to 15.0%. The share in Europe decreased from 31.2% to 7.7%. As can be seen in Fig. 2, the era of the rise of Asia is increasingly overtaking the era of the rise of Africa, and Africa is growing at an accelerating pace.

Table 2. Continental population distribution

Continent	1950 population	2020 population	2035 population	Share in 1950 (%)	Share in 2035 (%)
Africa	19.6	300.7	491.8	4.7	15.0
Asia	151.1	1,454.0	1,872.6	36.0	57.0
Europe	130.7	240.6	252.5	31.2	7.7
Latin America and Caribbean	39.8	321.2	374.4	9.5	11.4
Northern America	72.7	231.4	265.8	17.4	8.1
Oceania	5.2	21.1	25.2	1.2	0.8

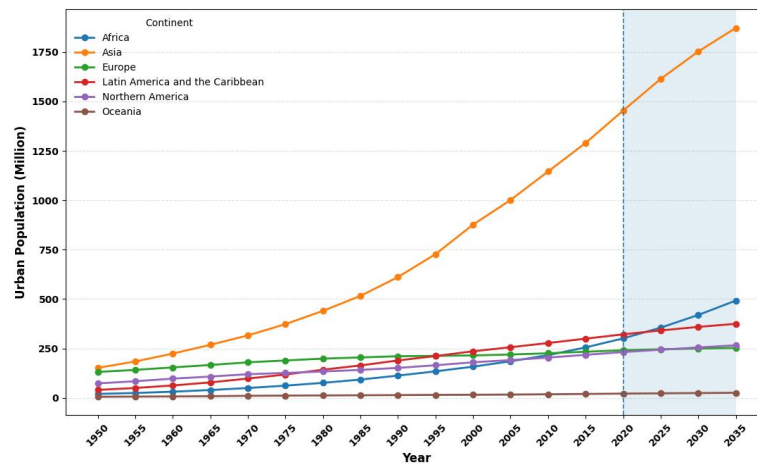


Figure 2. Continental urban population trends, 1950–2035

3.3 Changes in the Largest Global Cities

There was a significant shift in the urban hierarchy all over the world. The largest cities in 1950 were New York – Newark, Tokyo, London, Osaka and Paris. In 2035, Delhi, Tokyo, Shanghai, Dhaka and Cairo were expected to be the top five. Table 3 demonstrates that the urban hierarchy of the future was led by Asian and African cities. In 1950 and 2035, the ten largest cities are compared in Figure 3.

Table 3. Largest cities in 1950 and 2035

Rank	City in 1950	Population	City in 2035	Population
1	New York–Newark	12.34	Delhi	43.35
2	Tokyo	11.28	Tokyo	36.01
3	London	8.36	Shanghai	34.34
4	Osaka	7.01	Dhaka	31.23
5	Paris	6.28	Cairo	28.50
6	Moscow	5.36	Mumbai	27.34
7	Buenos Aires	5.17	Kinshasa	26.68
8	Chicago	5.00	Mexico City	25.42
9	Kolkata	4.60	Beijing	25.37
10	Shanghai	4.29	São Paulo	24.49

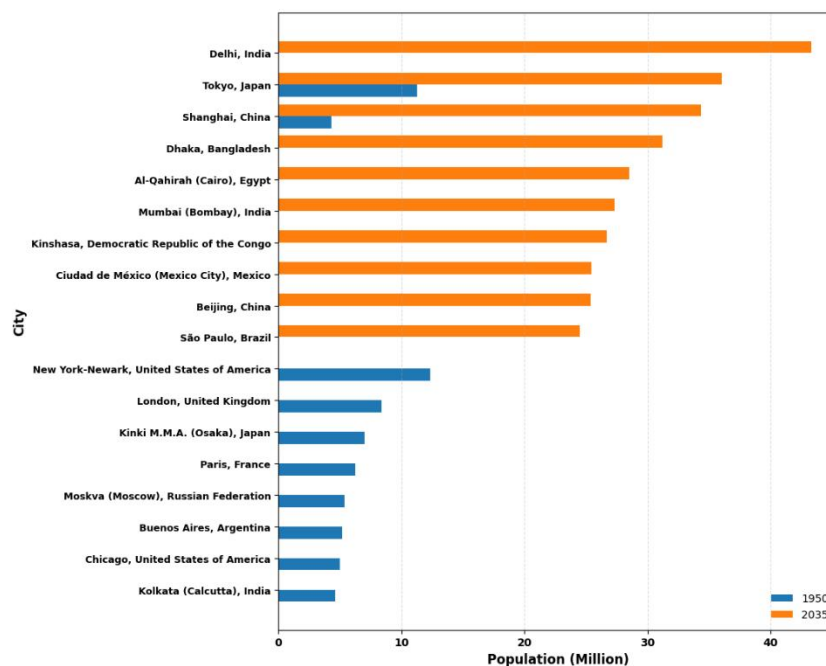


Figure 3. Comparison of the ten largest cities in 1950 and 2035

3.4 City Rank Changes

There were several cities that climbed quickly upward. Delhi went up from the 51st position in 1950 to the 1st place in 2035, Dhaka from 275th to 4th and Kinshasa from 444th to 7th. By comparison, London fell from third to 44th, and Chicago fell from eighth to 49th. These changes are stated below in Table 4 and shown in Figure 4.

Table 4. Rank changes of selected cities

City	Rank 1950	Rank 2020	Rank 2035
Delhi	51	2	1
Tokyo	2	1	2
Shanghai	10	3	3
Dhaka	275	6	4
Cairo	20	7	5
Kinshasa	444	18	7
New York–Newark	1	11	13
London	3	37	44
Chicago	8	40	49

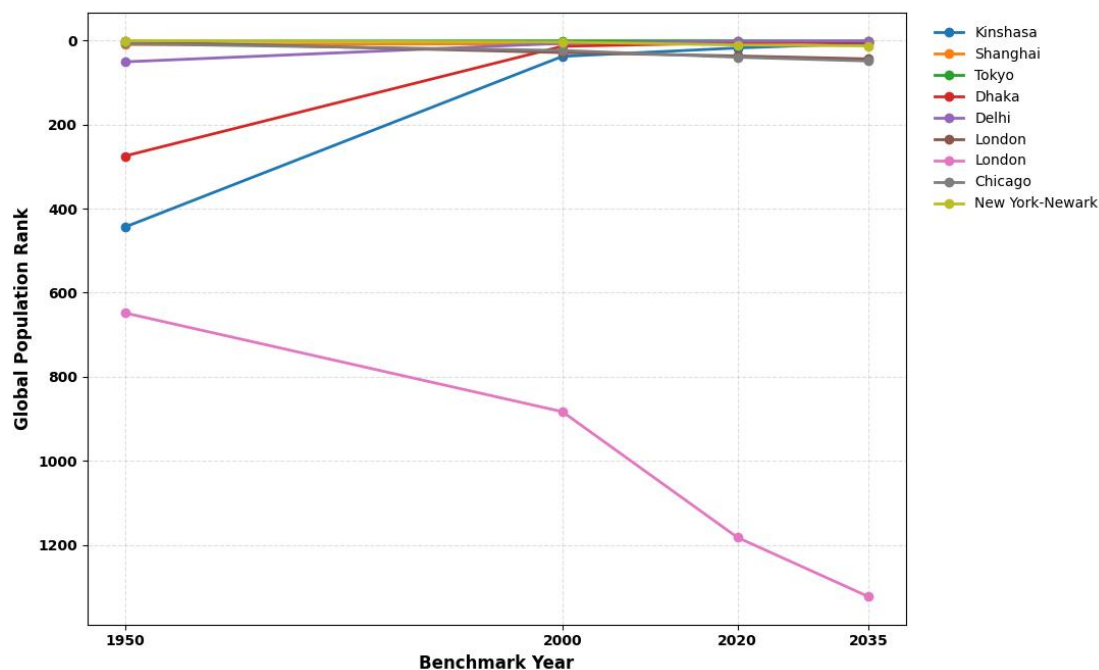


Figure 4. Rank transitions of selected global cities

3.5 Largest Population Increases

The number of people in Delhi rose by about 41.98 million between 1950 and 2035, the most of any place. Kinshasa, Cairo and Lagos also had significant gains, as did Dhaka and Shanghai. Table 5 shows that the highest growth rates were found in Asia and Africa in the long-term. The 10 cities with the greatest absolute gains are shown in Figure 5.

Table 5. Largest city population increases, 1950–2035

City	1950 population	2035 population	Increase
Delhi	1.37	43.35	41.98
Dhaka	0.34	31.23	30.90
Shanghai	4.29	34.34	30.05
Kinshasa	0.20	26.68	26.48
Cairo	2.49	28.50	26.01
Tokyo	11.28	36.01	24.74
Mumbai	3.09	27.34	24.25
Lagos	0.33	24.42	24.09

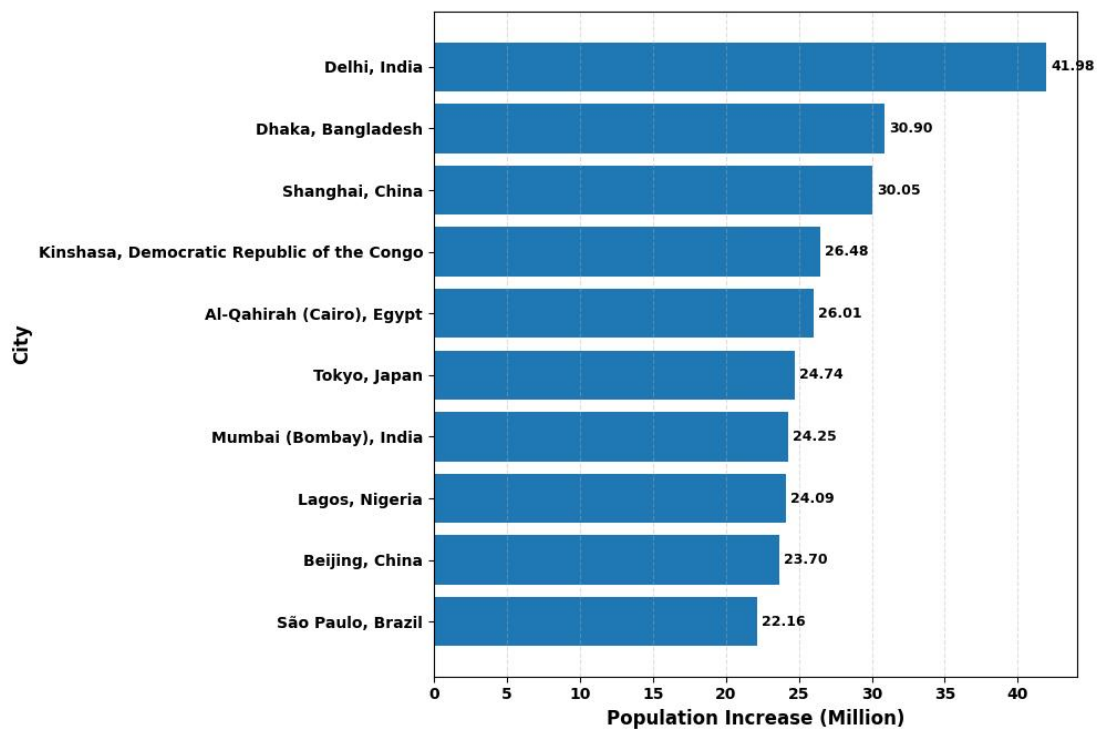


Figure 5. Largest absolute population increases, 1950–2035

3.6 Expansion of Megacities

By 2035, there will be 48 megacities (compared to 2 in 1950). By 2035 it is expected that Asia will have 32 megacities, followed by Latin America, Africa, Europe, and North America. Table 6 and Figure 6 show the growth of Megacities in Asia.

Table 6. Number of megacities by continent

Continent	1950	2000	2020	2035
Africa	0	1	3	5
Asia	1	8	21	32
Europe	0	1	2	3
Latin America and Caribbean	0	4	6	6
Northern America	1	2	2	2
Oceania	0	0	0	0

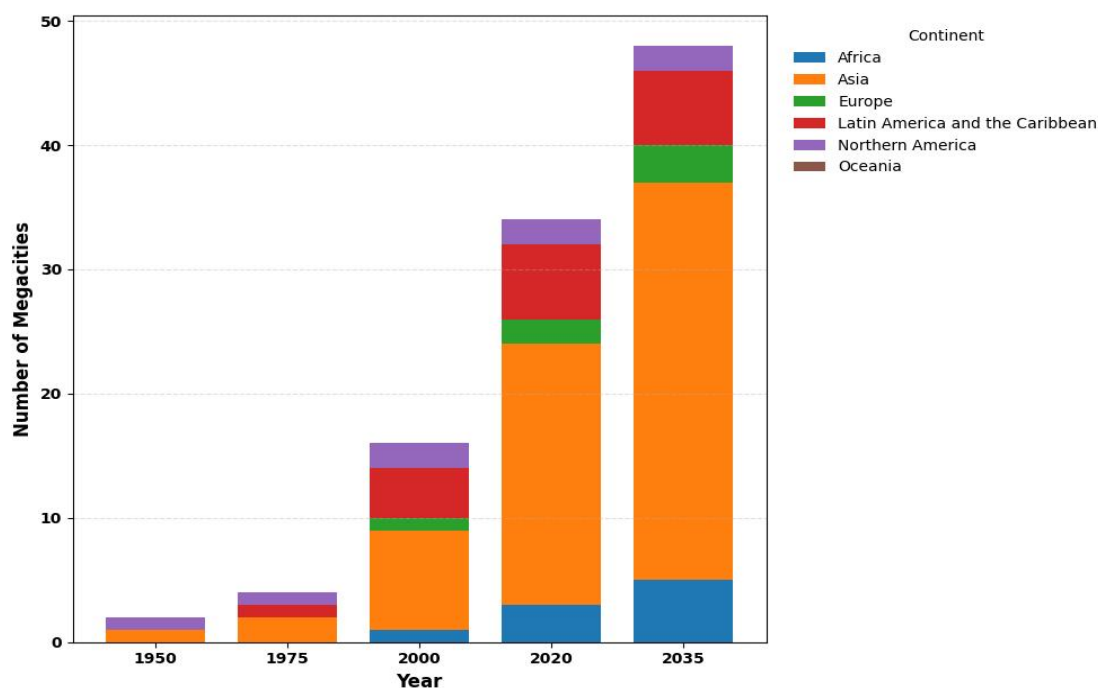


Figure 6. Continental distribution of megacities, 1950–2035

3.7 Summary of Findings

The data illustrates the dramatic reorientation of urban population growth from Europe and Northern America to Asia and Africa. In Asia, urbanization was the new growth centre, while African cities experienced both high rate of urbanization and high mobility up. The results also reveal significant growth in megacities and that the urban hierarchy of 2035 will be dominated by cities in the Global South.

4. Discussion

The results show that the urbanization geography has significantly changed from 1950 to 2035. The population of the analysed cities grew consistently, and the number of megacities grew from two in 1950 to a forecast of 48 by 2035. This pattern is indicative of a transformation of the urban hierarchy as well as an expansion of existing cities. Asia and Africa accounted for the greatest growth, while the proportions of Europe and North America shrank. The findings illustrate a wider shift toward the rapidly developing, global southern centres of urban growth being occupied by the main centres of urban growth.

By 2035, Asia will become the world's largest centre of urban population growth, with the largest proportion of the global population. The growth of cities such as Delhi, Dhaka, Shanghai, Mumbai, and Beijing is an illustration of the synergy of population growth, migration, economic agglomeration, and urban metropolitan expansion. The impacts of population and economic development on urban growth have been previously demonstrated, but they differ greatly among different cities and regions (Mahtta et al., 2022). This is corroborated by the present findings, which show the Asian cities with large absolute population growth rates, as well as those with a significant rise in their global rank. While the growth is good, it can also put pressure on land, houses, public services, transport, water and infrastructure if not managed properly (Angel, 2023).

In Africa, urbanisation growth was the highest in absolute terms, and cities experienced significant growth in the number of megacities. The development of Kinshasa and Lagos is especially significant, as both were relatively small urban centres in 1950, and are expected to become two of the largest agglomerations by 2035. This trend has been confirmed by research demonstrating that the demographic change of cities is diverging further across regions, with migration and natural population increase playing significant roles in the growth of cities in Africa (Zimmer et al, 2026). The rapid rise of African cities in the global ranking suggests that cities in Africa are increasingly facing challenges such as infrastructure shortages, informal settlement proliferation, job creation and access to basic services, which need to be taken into consideration in urban policy decisions for the future.

The relative position of European and Northern American cities is declining, but this is not necessarily equated with a loss of population. Instead, it's a sign of slower growth than the fast-growing Asian and African cities. New York-Newark, London, and Chicago continued to increase or maintain the size of their populations and their role in the world, but at a lesser rate than the growth of other cities. It is important to remember to read city rankings relative to others, as this finding indicates. The upward or downward movement of the individual city is not only determined by the growth of the city but also by the general transformation of the urban system. Multi-tier city-region analysis also indicates that the influence of the urban areas is growing beyond the traditional administrative boundaries and that this influence should be understood in terms of functional relationships between cities, settlements, and services (Cattaneo et al., 2024).

There are also important spatial implications of the rapid growth of megacities. While the growth of cities is often linked to outward expansion, in recent years, a few cities have embraced growth through vertical development and increased built-up density (Frolking et al. 2024). Simultaneously, however, there has been a decline in some indicators of urban sprawl, though there has been significant growth in land use in some rapidly expanding areas in the world (Hanberry, 2023). The density of cities' growth in Delhi, Dhaka, Kinshasa, Lagos and Cairo indicates that both dense development and expansion to new areas is likely to be important features of their future growth, but these are not measured in the present study.

A shift in population from urban to warmer and climate-sensitive areas is also of concern concerning environmental exposure. The urban heat-island effect can amplify heat due to high population density, high building density, and lack of vegetation. Evidence suggests that urban warming due to urbanization is leading to greater exposure to compound heatwaves, particularly in cities of the Global South (Gao et al., 2024; Nations, 2018). If this trend continues, the Asian and African population is likely to be more vulnerable to climate-related risk factors such as heat stress, flooding, water scarcity, and others due to the projected high rates of population growth. Climate adaptation should then be incorporated into long-term metropolitan planning and infrastructure development, as well as land use planning (Dodman et al., 2023).

The findings also indicate that governance systems need to be at a suitable spatial scale. Rapidly expanding urban agglomerations often span across several municipal and administrative areas, making the task of transport planning, environmental management, housing and infrastructure coordination difficult. Good governance in urban areas cannot be achieved without collaboration at local, metro, regional and national levels; it is about how to

work together (Krawchenko & Krawchenko, 2021; UN, 2014). It is particularly applicable for the growing megacities with functional areas that are much larger than their official city limits.

5. Conclusion

This study aimed to analyse how the geography of global cities has evolved, focusing on population growth in cities over the last three decades, the redistribution of cities across the continents, the movement between city ranks and the expansion of megacities between 1950 and 2035. The results show that the world's major city agglomerations have experienced a steady and high growth, which is evidenced by a strong urbanisation hierarchy. Asia became the focus of urban expansion, Africa the fastest growing proportion and also had an increasing number of cities in the top 10 list of the world's largest cities. As for the rest of the world, Europe and North America saw a reduction in their share of the urban population compared to the rest of the world. The results also reveal that cities, like Delhi, Dhaka, Kinshasa, Lagos, and Cairo, have become increasingly considerable in terms of their demographic significance, while formerly powerful cities like New York–Newark, London and Chicago have lost ground in relative terms even though they remain key urban centres. The population in megacities has been growing at a fast pace, reflecting the overall trend of people moving to big cities, especially in the Global South. The changes have significant implications for urban planning, infrastructure, housing, mobility, public health and environmental management, and climate resilience. Thus, harmonised metropolitan governance, fair service provision, compact development and risk-adaptation to climate risks should be of great concern for future urban policies.

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