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Citation for final published version:

Perianayagam, Arokiasamy, Al-Ghanim, Kaltham Ali, Petcu, Catalina and Mourshed, Monjur 2026. Urbanization and sustainable cities in the Gulf states. *Discover Sustainability* 7 , 1537. 10.1007/s43621-026-03259-w

Publishers page: <https://doi.org/10.1007/s43621-026-03259-w>

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RESEARCH

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Urbanization and sustainable cities in the Gulf states

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Abstract

Urbanization is accelerating worldwide, driven by demographic transition and rapid urban development, with the United Nations reporting that more than half (54%) of the world's population now resides in cities. The six high-income Gulf Cooperation Council (GCC) countries, namely Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates, are among the most urbanized regions globally. While oil wealth has fueled expansive urban development since the 1990s, a critical research gap remains. There is a lack of comprehensive, comparative macro-level analyses that systematically link migration-driven demographic shifts, hyper-urbanization patterns, and the imperatives of sustainable urban planning amid escalating climate and economic vulnerabilities. This article addresses this gap by employing secondary data sources to rigorously investigate the historical and projected trends in urban population growth, spatial distribution across cities, and the emergence of Gulf global cities. The study also explores the implications of these trends on urban development planning and public policy in the GCC states. Key findings indicate unprecedented speed and tempo of urbanization in the last three decades, highlighting complex challenges in fostering sustainable cities, resilience, and enhanced quality of urban life. The Gulf states' high income and economic reserves have facilitated the Gulf's urban transformation, enabling three key pillars: strategic city planning, the cultivation of global urban centers, and the delivery of universal public services. However, the intensity of expansive urbanization in the Gulf cities calls for a two-fold strategy in urban development policy goals: (a) integrating social, economic, and environmental dimensions to ensure that urban development is sustainable, and (b) building resilience to tackle the impact of future climate and economic shocks with robust evidence-based urban planning and policy agenda.

Keywords Urbanization, Spatial distribution, Demography, Sustainable cities, Urban policy and planning, Gulf states

1 Introduction

Rapid urbanization is transforming the global urban landscape, with more than half of the global population now residing in urban areas—a historic milestone reached in 2008 with the urban population surpassing the rural population for the first time [71]. By 2030, the urban population is projected to reach 5.2 billion, roughly 60% of the 8.6 billion



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global population. Much of this surge is concentrated in Asia and Africa, where urban land expands at roughly twice the rate of population growth [61, 71]. Within this global trajectory, the Gulf Cooperation Council (GCC), a political and economic union of six high-income countries, namely Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates—has emerged as an exceptional region of urban transformation.

The GCC is home to over 61.2 million residents as of 2024, and has abundant financial wealth derived from oil and gas [31, 39]. Since the 1980s, oil and gas surpluses have accelerated economic diversification and global integration, driving one of the world's fastest rates of population and urban growth. Urbanization exceeded 85% across the GCC countries [61]. The region's strong institutions and governance structures have contributed to its economic resilience amid global economic volatility. The expanding urban population in the GCC states holds considerable promise for future economic growth, however, it also presents pressing environmental sustainability challenges, ranging from resource stress to spatial inequality, ecological vulnerability, and the overall quality of urban life [19, 56]. Achieving sustainable cities and equitable population distribution is vital for the GCC to realize the 2030 Agenda for Sustainable Development, which prioritizes urbanization's role in forging an equitable, resilient world—with Sustainable Development Goal 11 (SDG 11) mandating inclusive, safe, resilient, livable, and sustainable cities through integrated policies [1, 12, 60].

Despite a growing body of literature, existing research on Gulf urbanization challenges remains fragmented. Most studies examine single cities or countries, emphasizing either migration, infrastructure, or environmental conditions in isolation, rather than assessing the GCC's urbanization through a comparative, macro-level lens that integrates demographic dynamics, spatial distribution, and sustainable city planning across all six states. There is a scarcity of comparative, macro-level studies that integrate demography, spatial distribution, and sustainable city planning across all six GCC states. Consequently, critical questions about how migration-driven urban growth redefines spatial governance, planning policy, and sustainability pathways remain insufficiently addressed.

This study argues that current GCC urban planning strategies require an evidence-based, Gulf-specific framework integrating demography, sustainability, resilience, and quality of urban life (QoUL) to address rapid urbanization's unique challenges—intensifying heat islands, coastal vulnerability, expatriate-heavy demographics, and emerging elderly cohorts—while aligning with national visions like Qatar National Vision 2030. By adopting this integrated analytical framework connecting demographic change, urban expansion, and sustainable development policy in the GCC, the study aims to advance current knowledge. It has four core objectives: (a) to analyze demographic dynamics underpinning these transformations, particularly migration and population redistribution; (b) to assess long-term trends in urbanization across GCC states; (c) to examine the emergence of Gulf global cities and their role in regional spatial hierarchies; and (d) to evaluate the urban development policy challenges in promoting sustainable cities, resilience, the quality of life and wellbeing of residents in the GCC states implications of these processes for sustainable urban planning in alignment with the 2030 Agenda and SDG 11.

1.1 Theoretical framing and literature review

The demographic transition, both a phenomenon and a theory, describes the historical shift from regimes of high fertility and mortality in traditional agrarian societies to low birth and death rates in modern industrial and post-industrial contexts [40, 41, 48]. This theory is widely recognized as one of the most well-documented and broadly applicable generalizations across the social sciences [40]. The demographic transition framework has been central to broader debates in population, urban geography and development studies because it highlights how changing age and household structures, and labor-market dynamics reshape spatial organization and urban space. Urbanization is viewed not merely as a parallel process but a constitutive dimension of the demographic transition, mediating how the shift from rural to urban societies translates demographic changes into new patterns of land use, infrastructure demand, and everyday urban life [25]. Urbanization as a demographic process is deeply intertwined with modernization and sustained economic growth, having profound implications for urban policy, planning, sustainability, and the quality of urban life [59, 62].

In the GCC countries, rapid demographic changes, accelerated urbanization, and resource-based economic growth have resulted in an archetypal—but also contested—variant of this transition [35]. Across GCC countries, demographic transitions unfolded within highly distinctive institutional settings shaped by rentier economies, state-led urbanism, and large-scale labor migration, requiring analytical extensions beyond classical formulations [35, 68]. At the same time, the Gulf's bifurcated demographic structure—characterized by a predominantly working-age expatriate population alongside younger and ageing citizen cohorts—produces labor geographies and mobility patterns that conventional demographic transition theory does not anticipate. Integrating demographic transition perspectives with urban and spatial analysis can reveal how population change, labor migration regimes, and state planning co-produce density patterns, land consumption trajectories, and transport demand in Gulf cities.

Recent urban studies debates highlight how Gulf urbanization, shaped by rentier-state dynamics and mega-urban project development, raises concerns about inclusivity, distribution of demographics, and long-term social and ecological sustainability [27, 35]. A few recent studies with a limited focus on different Gulf states and cities tried to highlight the urban development challenges, weaknesses in spatial development strategies, integration of social dynamics into planning, and unsustainable urban ecosystem, but they are limited [3, 10, 52]. For the Gulf region, an integrated framework is especially critical for policy-oriented research addressing urban sustainability, mobility, and social cohesion under conditions of continued migration and evolving welfare regimes. Far from evolving organically from pre-existing settlements, the Gulf states largely followed the Western planning model, with the urban design adjusted to the cultural factors, characterized by spatial segregation, significant car dependency, family villas, and sub-urban living patterns [42]. The Western planning model of urban design is characterized by modern residential areas aligned with business and shopping centers and extensive road and transportation networks with substantial reclaimed lands [11, 50]. However, debates in spatial planning and sustainability stress that such models risk locking cities into carbon- and land-intensive trajectories, complicating efforts to advance sustainable mobility, compact urban form, and socially cohesive neighborhoods [7, 27].

A growing but limited body of research has critically examined the tensions between rapid urban growth, governance, and planning practices across Gulf states, highlighting how weak marginal social-environmental integration undermines sustainable spatial strategies [3, 10]. Beyond these built environments, recent research highlights the ecological consequences of prevailing development trajectories in the arid and desert ecosystems of the Gulf. Urban design and land-use change profoundly reshape land cover, water use, and biodiversity, yet biodiversity considerations have often been peripheral in Gulf planning practice. Frameworks associated with the Convention on Biological Diversity [16] advocate for biodiversity-inclusive urban planning, highlighting the importance of green and blue infrastructure, habitat connectivity, and nature-based solutions, all of which are particularly challenging but also urgently needed in hyper-arid contexts [57].

Despite recent advances, there remains a notable paucity of comparative and theoretically informed studies that systematically examine urbanization patterns, demographic dynamics, and the sustainability implications of urban development across the Gulf states. Understanding past and future trends in urbanization and sustainable cities is crucial for the success of Sustainable Development Agenda of 2030 [61]. Overall, this study aims to situate the Gulf cities within a wider, integrated framework of demography, sustainable cities, resilience, and quality of urban life (QoUL), anchoring them as fundamental to sustainable urban development and planning strategies. This study seeks to help fill this gap and to provide a critical evidence-based comparative framing of Gulf urban futures.

1.2 Data and methods

This study utilized publicly accessible secondary macro-level data to conduct cross-country comparative analysis of the six GCC countries: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (UAE). The analysis integrates historical trends with medium-term UN projections to situate contemporary patterns within longer-term demographic and urbanization trajectories. Overall, the study adopts an integrated framework encompassing demography, urbanization, sustainable cities and resilience, and quality of urban life (QoUL), anchored in an evidence-driven analytical approach that serves as a foundation for sustainable urban development and planning strategies in the Gulf. This approach aims to gain a deeper understanding of comparative urbanization trends within the six GCC states and the policy and planning implications for sustainable cities in the region.

Data were obtained from the following globally reputable and publicly accessible official sources to ensure accuracy, reliability and comparability:

- United Nations Department of Economic and Social Affairs [61]. World Urbanization Prospects and World Population Prospects Series: This provides comprehensive comparable historical and projected data on total population, urban population, level of urbanization, and population density for each GCC country (1950–2050).
- The World Bank: World Development Indicators and related open-access series supplied country-level data on gross domestic product (GDP), human development index (HDI), selected socio-economic indicators, and complementary demographic measures.
- GCC official statistical sources: National statistical offices, population censuses, annual statistical yearbooks, and the GCC Statistical Portal.

- Statista.com [58]. Arab world countries.

Specifically, our study examines (a) long-term trends and contemporary empirical patterns of urbanization, (b) the broader demographics of the GCC states, (c) the policy strategy for developing global cities, and (d) the challenges associated with sustainable cities, resilience, and the quality of urban life. The Population Division of UN-DESA disseminates demographic research data and insights relevant to intergovernmental processes related to population and development at the United Nations. The World Bank provides open access to a range of global development indicators, including time-series data, comprehensive annual statistics, survey data, and comparative methodologies. The GCC official statistical sources include data from national censuses, statistical yearbooks, the GCC Statistical Portal and research reports. These data were used to cross-check and, where necessary, refine country-specific demographic and urban statistics, including recent census-based estimates and distributions. In addition to these major sources, data were also used from global data and business intelligence platforms such as Statista.com and Macrotrends.net.

Our analysis included all six GCC member states for which comparable urbanization and population data were available from UN DESA and/or the World Bank for the period 1950–2050, and indicators were selected based on their relevance to the study objectives and the consistency of data across the six countries. The core quantitative indicators gathered according to sources are:

- Total population and urban population (UN DESA; 1950–2050)
- Level of urbanization (percentage of population living in urban areas; UN DESA; 1950–2050)
- Population density (persons per square kilometer; UN DESA/World Bank; 1961–2023, where available)
- Selected socio-economic indicators (e.g., HDI, GDP per capita; World Bank; earliest available year to most recent year)

For comparative trend assessment of urbanization and examination of contemporary demographic and population distribution patterns in the Gulf states, we compiled and tabulated the macro data from official sources of the Gulf countries, including census, statistical reports, data from the GCC statistical portal, in addition to data from the United Nations population prospects. The diagrams on urbanization trends are generated using UN demographic data, including past and projected data for the future. To address the challenges of global super-modern cities in the Gulf and the urban development policy strategies for promoting resilience and urban quality of life, we present a model framework to support evidence-based policy for enhancing urban quality of life and human well-being in the Gulf region. Where discrepancies appeared between international series and national sources, priority was given to UN DESA and World Bank series for cross-country comparability, with national figures used to contextualize and interpret deviations.

2 Results

2.1 The demography of Gulf states

This section presents an overview of the demographics of the six GCC countries. The GCC countries have been experiencing profound demographic and social changes over

Table 1 Population indicators—GCC countries

Country	Population size 2023	Population density (people/ km ²) 2023	Population growth rate 2023 (%)	Nationals (%) 2023	Total fertility rate 2020 (per women)	Life expectancy 2023 (year)	HDI 2021
Bahrain	1,485,509	1,892	0.90%	47%	1.8	79.2	0.875
Kuwait	4,310,108	242	0.97%	30%	2.1	80.2	0.831
Oman	4,644,384	15	1.49%	54%	2.7	73.9	0.816
Qatar	2,716,391	236	0.79%	14%	1.8	81.0	0.855
Saudi Arabia	36,947,025	17	1.48%	63%	2.5	77.9	0.875
United Arab Emirates	9,516,871	134	0.80%	11%	1.5	79.1	0.911

Sources UN [61]. World Urbanization Prospects 2018. United Nations Department of economic and Social Affairs Population Dynamics. <https://population.un.org/wup/download/>

UN [63]. World Population Prospects 2024. <https://population.un.org/wpp/downloads/>

World Bank [77]. World Development Indicators. World Bank. <https://data.worldbank.org/>

United Nations Development Programme (UNDP) [78]. Human Development Report 2021/2022: Uncertain Times, Unsettled Lives—Shaping our future in a Transforming World. <https://hdr.undp.org/>

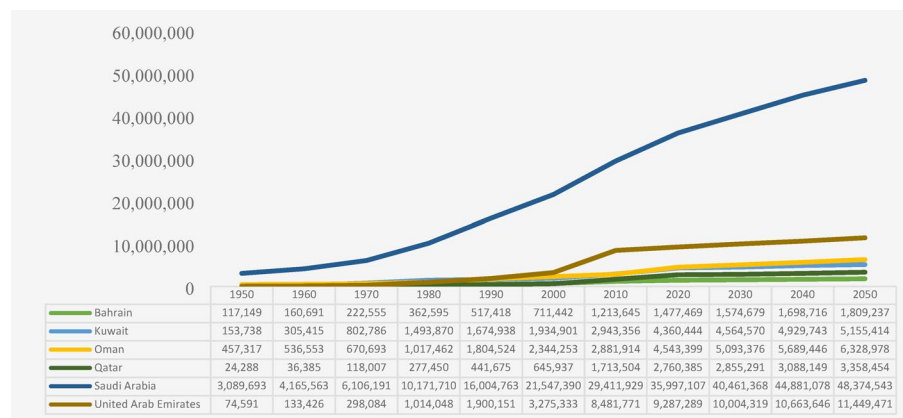


Fig. 1 Total population estimates and projections by country, 1950–2050. Source World Bank [79]. Data Bank: Population estimates and projections. https://databank.worldbank.org/indicator/SP.POP.TOTL?Id=fdaa1724%26Report_Name=Population%26populartype=series#

the past three decades, and this demographic transformation will continue over the next two decades (Table 1, Figs. 1 and 2). Over the past 15 years, the population of the GCC countries has grown exponentially. From an estimated 39.6 million in 2008, the population has increased to 61–5 million in 2024, representing a 40% increase. This rapid growth was primarily driven by a surge in international labor migration, attracted by jobs created during the oil-driven economic boom and subsequent economic diversification. In the five-year period leading up to the pandemic, the GCC witnessed an average annual population growth rate of 4%, reflecting the region's attractiveness to migrants and economic dynamism.

Figure 2 shows that all six GCC countries experienced robust population growth during 1970–2024, except for the slowdown in 1990–2000. The United Arab Emirates and Qatar document the largest growth rates in the GCC region. The region's projected population growth will remain positive over the next three decades, through 2050 (Fig. 2). The GCC Countries' overall population is expected to reach a peak of 68 million in 2048 and then decline, according to the UN World Population Prospects [61]. The combined population densities of Bahrain (1892), Kuwait (242), Qatar (236), and the United Arab

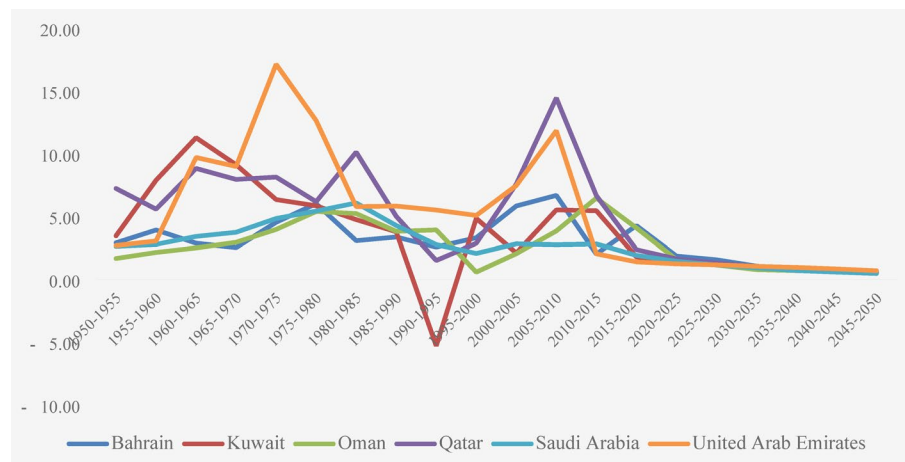


Fig. 2 Past and projected population growth rate (%) by country, 1950–2050. Source UN [61]. World Urbanization Prospects 2018. United Nations Department of Economic and Social Affairs Population Dynamics. <https://population.un.org/wup/Download/>

Emirates (134) (Table 1) are more than five-fold than the combined densities of Europe (34), America (25), and Africa (52) [61, 63, 79].

Since the 1950s, the population of GCC countries has grown more than tenfold, while Qatar and the UAE have grown by a factor of many. Figure 1 shows the unprecedented population increase in all GCC countries since 1950.

The demography of nationals of GCC countries, in terms of age-sex structure, fertility, and mortality rates, differs from that of non-nationals and from the combined national and non-national populations. The non-national population in the Gulf region is largely comprised of working-age individuals, aged 15–64, who account for about 85% of the total non-national population. Table 1 shows that the total fertility rate has declined in most GCC countries and has been declining steadily in Saudi Arabia and Oman. Rapid social transformation, including rising women's education and economic modernization have accompanied these demographic changes with the lowest mortality and a high-quality health care system.

Fertility decline in GCC countries is mainly driven by later marriage and delayed child-bearing, alongside rapid expansion of female education, urbanization, and rising costs of raising children [69]. Increased women's labor-force participation, changing family norms, and improved child survival have further reduced desired family size, leading to sustained fertility decline despite continued state support for families [45, 76]. Another study examined how life expectancy, HDI, literacy rates, female labor force participation, and urbanization have improved over the past four decades in Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE—each exhibiting a negative correlation with the total fertility rate [45]. Demographically, there is a steady aging of the nationals of the GCC population. However, with young adult labor migrants, the GCC will remain a youthful region with a relatively lower share of the 65 + population.

In contrast to the aging populations observed in high-income regions such as America, Asia, and Europe, the GCC countries' total population are projected to remain predominantly young in the years ahead as expatriates will sustain a broader working age base [63]. However, the GCC nationals, although they exhibit a younger age structure, face faster ageing risks due to fertility declines below replacement. The evolving

demographics of GCC countries carry significant implications for urban sustainability, resilience, and quality of life, which can be effectively addressed through evidence-based spatial planning and governance mechanisms. They include (a) calibrated management of labor and immigration policies that align workforce composition with long-term urban development and service needs (b) urban and spatial policies that account for changing gender roles as female education and labor force participation rise and (c) addressing the demand for infrastructure and public services to accommodate the growing young population and an emerging cohort of older nationals.

All GCC countries have invested substantially in educational improvements across all levels, including partnerships with foreign private education providers to drive curriculum innovation, new skill sets, and international accreditation. Additionally, this growth is fueled by substantial investments in creating educational opportunities for women, evolving social attitudes concerning women's roles in society and the emergence of inspiring role models for the new generation of female professionals. Women's employment rates in GCC countries vary considerably, shaped by diverse social and cultural norms. This disparity is observed not only between countries but also within regions of each country. Despite more women entering the labor force, traditional barriers persist in the GCC countries. The public sector employs more women than the private sector, indicating that certain obstacles will continue to affect Gulf women's career prospects [36]. The career expectations of young Gulf women are distinct, influenced by segregated higher education systems. Additionally, family and societal expectations significantly impact both job opportunities and career aspirations for women in the Gulf region.

The ongoing education reforms in GCC countries will help the development agenda, but problems of mismatches between educational skills and employment and labor market challenges for the young population will continue. Government spending on education is increasing across the GCC countries, with a growing emphasis on education quality. This trend is likely to have a profound social impact over the next decade. Foreign private education providers in the GCC are increasingly partnering with local institutions to deliver specialized programs that enhance skill alignment with labor market demands, such as technology and sustainability sectors, while also introducing international curricula and serving growing expatriate communities. However, skill mismatches among young graduates exacerbate youth unemployment, and economic challenges are likely to persist as oil and gas revenue declines. Declining oil revenues in the future could strain GCC government budgets, which fund most jobs for nationals and major public-sector projects, leading to hiring freezes or fewer positions [15]. Research in Gulf states further documents how housing regulations, sponsorship systems, and zoning codes perpetuate spatial segregation among nationals, skilled expatriates, and low-wage migrant workers, manifesting in labor camps, expatriate compounds, and nationals-only enclaves [30, 73].

The long-term economic prosperity depends heavily on successfully educating and employing its young population. The increasing exposure of this generation to education, international media, and new technologies indicates the potential for rapid evolution of social attitudes and norms. Immigration remains the principal engine of population growth in the GCC countries, with expatriates making up a substantial share of the regional population—ranging from 89% in the United Arab Emirates to 37% in Saudi Arabia [21]. However, the GCC countries lack a unified immigration management

policy, largely due to substantial differences in population size and natural resource endowments. Each GCC state has adopted its own approach to addressing the challenges and opportunities presented by immigration.

The GCC countries will continue to experience a surge in their working-age population, driven by the influx of expatriates aged 15–65. As the private sector remains heavily reliant on expatriate labor, this trend is set to continue. Over time, the cost and skill disparities between the national and expatriate workforces are anticipated to gradually decrease. This could lead to a more balanced and integrated labor market in the GCC. The region's expatriate workforce will continue contributing to economic growth. The GCC benefits from a diverse talent pool, driven by the influx of skilled international professionals, which supports further economic diversification. While immigration provides the skills and manpower needed for economic growth, it also poses political and social challenges. To balance economic and social needs, the GCC countries will need to develop strategies that integrate expatriates' skills and contributions while empowering and integrating their national workforces.

2.2 Urbanization levels and trends in the Gulf states

The six GCC countries are the most urbanized (with 84% of urban population) in the Arab world [70]. Most of the population of these six Gulf countries currently resides in urban areas, with urban populations ranging from 84 to 100% (Fig. 3). The urbanization rate for Qatar and Kuwait had reached 99.28% and 100%, respectively, by 2021. Bahrain, the UAE, and Saudi Arabia have reached an urbanization rate of more than 80%, while for Oman, it was 87% in 2021 [58, 61]. Over the past four decades, the Gulf states have experienced unprecedented urban growth (Fig. 4). The urbanization levels in Saudi Arabia and Oman grew from less than 40% in the 1980s to more than 80% in 2021 [47]. The urban growth and expansion in the Gulf states are characterized by (a) a cluster of secondary cities around the bigger global megacities and (b) the growth of large agglomerations with an urban population of more than one million. The expansion of urban areas through urban development planning is a major contributor to the urban growth in the Gulf region.

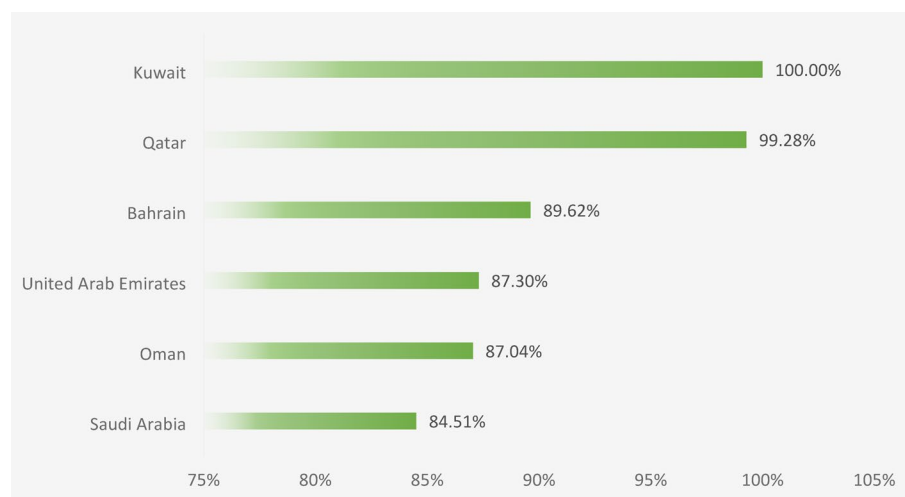


Fig. 3 Urbanization levels in the Gulf states, 2021. Source Statista.com [58]. Arab world countries: Urbanization in 2021, by country. <https://www.statista.com/statistics/806325/urbanization-in-the-arab-world-countries/>

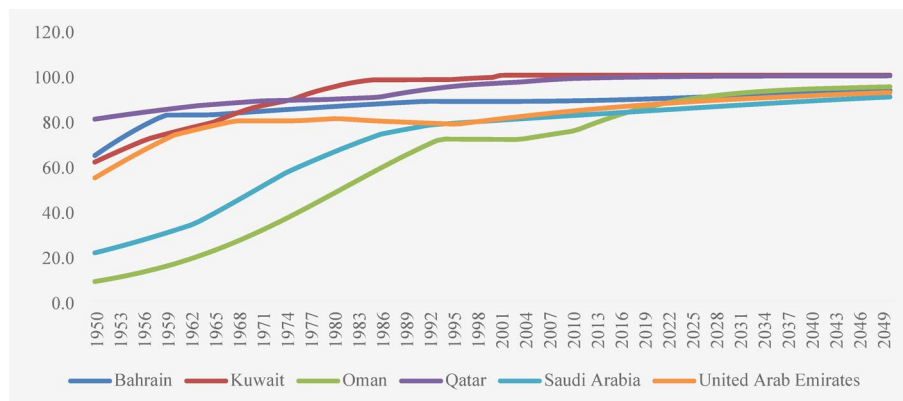


Fig. 4 Past and projected trends of urbanization in the Gulf countries, 1950–2050. *Source* UN (2023). World Urbanization Prospects 2018. United Nations Department of Economic and Social Affairs Population Dynamics. <https://population.un.org/wup/Download/>

Table 2 Urbanization trends in the Gulf states, 1950–2050

Country	Total population and percentage of urban population									
	1950		1975		2000		2025 (U.N. Projections)		2050 (U.N. Projections)	
	Total	Urban (%)	Total	Urban (%)	Total	Urban (%)	Total	Urban (%)	Total	Urban (%)
<i>Qatar</i>	24,288	80.5	195,043	88.9	645,937	96.3	2,757,220	99.4	3,358,454	99.7
<i>Kuwait</i>	153,738	61.5	1,095,998	89.4	1,934,901	99.0	4,387,109	100.0	5,155,414	100.0
<i>Oman</i>	457,317	8.6	787,194	38.2	2,344,253	71.6	4,780,706	89.5	6,328,978	94.9
<i>Bahrain</i>	117,149	64.4	285,116	85.0	711,442	88.4	1,511,676	90.1	1,809,237	93.2
<i>Saudi Arabia</i>	3,089,693	21.3	7,897,544	58.3	21,547,390	79.8	37,989,969	85.4	48,374,543	90.4
<i>UAE</i>	74,591	54.5	543,394	79.8	3,275,333	80.2	9,665,319	88.2	11,449,471	92.4

Source Macrotrends.net [43]. Countries Population 1950–2023. <https://www.macrotrends.net/countries/UN> [61]. World Urbanization Prospects 2018. United Nations Department of Economic and Social Affairs Population Dynamics. <https://population.un.org/wup/Download/>

In the GCC countries, the urban population grew more rapidly than the total population, implying continued growth and tempo of urbanization. Therefore, managing such a massive and unique pattern of urban growth is important to prevent unsustainable urban development (Table 2 and Fig. 4). The change towards high urbanization levels in the Gulf states has made the region's cities occupy a central stage in the global economy. The region's cities have become a major focus of urban planning and policy, profoundly impacting social and political relations at all levels [46]. They drive progress and barriers in economic systems and production methods. These urban centers also introduce new elements to societal norms, culture, and aesthetics [67]. However, the growth of global cities and the tempo of urbanization in the region will have a serious impact on the environmental and sustainability processes [53]. Future population growth will continue to concentrate in the region's major global cities. This influx will likely strain infrastructure, housing, public services and, critically, the environmental sustainability [46]. Additionally, this rapid growth may lead to labor market challenges stemming from mismatches in skills and experience and differing expectations regarding wages and working conditions.

Overall, urbanization trends (Fig. 4) in the Gulf region provide an underlying base, a dynamic process with momentum for various social, economic, and environmental

changes. The shift towards a predominantly urban context is not merely a demographic phenomenon characterized by an anticipated population movement from other parts of the world to the region. Rather, it is a transformative demographic process that drives many other aspects of development and social change.

The speed and tempo of urbanization have been unparalleled in the Gulf states, with profound environmental, ecological and societal consequences. Such expansive urban transformation presents significant challenges for urban policy makers and planners responsible for shaping a sustainable urban future. These challenges include managing future urban expansion, promoting sustainability, maintaining high standards of living, and enhancing the overall quality of urban life. Addressing such complex issues effectively requires policies grounded in evidence, well-informed, and inclusive of diverse perspectives. Policymakers must integrate sustainability, behavioral adaptations, and quality of life into the urban planning process. Equally important are strong coordination among key urban development stakeholders, a cohesive cross-sectoral engagement strategy, and integration of public perceptions of the built environment and quality of life.

2.3 Spatial distribution, urban planning and economic diversification

The spatial distribution of population represents the distribution of population over the geographical regions and areas, including (a) population shifts from rural to urban areas; (b) the population concentration, including density; and (c) class ranking of urban centers. Both urbanization and the spatial distribution of the population in the Gulf states are closely linked with urban developmental opportunities and challenges. Population redistribution and urban transformation from physical to conceptual space unfolded gradually over centuries in Europe and other industrialized regions [13, 34]. In contrast, supported by massive urban development planning strategies, the Gulf states witnessed dramatic urban growth, rapidly shifting population distribution toward urban centers over the last four decades.

First, urban development strategies in the GCC countries focused on building larger global cities while creating neighboring secondary cities, leading to expanding urban agglomerations around these cities. In the Gulf region, urban development is integral to infrastructure development, economic diversification and public service provision. The Gulf states' high income and economic reserves helped support extensive urban development planning and policies for comprehensive infrastructure and public service provision, including heavy investment in road networks. This includes the development of high-capacity highways and arterial roads that encircle neighborhoods and cities. However, the combination of increased personal wealth and an expansive road network have fueled a surge in private vehicle ownership across the GCC, leading to high car dependency, with residents relying heavily on personal automobiles for daily transportation. The heavy reliance on private vehicles has contributed to challenges such as traffic congestion, air pollution, and a lack of walkable, pedestrian-friendly environments in many Gulf cities [74].

Second, the GCC countries have implemented ambitious urban transport plans as part of their broader development vision. Researchers have advocated that urban planning strategies need to be aligned to (a) reduce reliance on private vehicles by investing in and promoting the use of public transportation systems; and (b) create livable cities that are

walkable, bikeable, and offer a high quality of life for residents [28]. The governments of the GCC countries have developed and implemented comprehensive transportation master plans. The primary goals of these plans are to reduce traffic congestion, improve public transit systems, and enhance pedestrian safety. The most ambitious urban public transportation projects are underway in Abu Dhabi, Dubai, and Jeddah. These include metro rail systems, light rail, and extensive bus networks to serve growing populations and reduce reliance on private vehicles. Overall, the GCC states are making significant strides in implementing multimodal transportation systems that prioritize public transit, walking, and cycling [29].

Third, Qatar's urban transformation over the past three decades represents a distinct model of rapid urbanization. Doha and its surrounding cities underwent an accelerated metamorphosis from traditional settlements to contemporary metropolises during the economic boom of the 1970s [30]. Due to the country's economic prosperity and the changing urban landscape, Doha and its neighboring cities in Qatar have experienced exponential growth, both horizontally and vertically. The urban environments in Qatar are inherently temporal, meaning they constantly evolve and adapt to the changing needs and demands of the population [17]. The implementation of a series of ambitious infrastructure projects has helped to reshape Qatar's urban landscape [5]. The flagship projects have transformed the country's cities and created new urban centers. These included Doha and the neighboring cities of Lusail and Al Wakrah, in addition to the urban agglomerations, which include Al Sadd, Msheireb Downtown, Education City, Katara, and Pearl Island. The current master plan for Doha and its neighborhood cities consists of building a multimodal modern transport system, modern city centers, multi-story residential units, leisure and recreation facilities, commercial office spaces, residential extensions and more.

Overall, the Gulf states pursued an ambitious and largely state-led trajectory of urban development, reflecting the long-standing role of urbanization as a catalyst for social and economic transformation. Comparative demographic and urban studies consistently show that urban populations tend to exhibit higher literacy levels, lower fertility and mortality rates, and improved access to employment opportunities, healthcare, mobility, and modern technologies—factors closely associated with rising living standards and human development [64]. In this context, the expansion and upgrading of urban infrastructure are not merely physical planning exercises but critical levers for advancing multidimensional well-being and the quality of urban life. Contemporary urban policy increasingly emphasizes that such improvements must align with residents lived experiences and perceived satisfaction, positioning subjective well-being alongside objective indicators as a core benchmark for sustainable urban development [23].

2.4 The urban spectacle vs. sustainable cities

Urbanization and development in the Gulf states are viewed as a spectacle, with global cities emerging as modern economic epicenters. The GCC global cities compete with world cities through records and spectacles [80]. Cities are constrained in size yet exert enormous environmental pressure and could disproportionately impact planetary boundaries. Cities are responsible for over 70% of global CO₂ emissions and consume over two-thirds of the world's energy [62, 81]. While these are global benchmarks, GCC countries rank among the world's highest per capita energy consumers and CO₂ emitters

(e.g. Qatar, UAE, and Kuwait) with their rapidly expanding cities [37]. Recent evidence points to an inverted U-shaped relationship between economic complexity and environmental pressures in the region [26], with Qatar-specific analysis suggesting that CO₂ emissions may be plateauing despite continued GDP and expenditure growth, consistent with the Environmental Kuznets Curve hypothesis [49]. Cities are resource-intensive, requiring massive inputs of building materials, fuel, chemicals, food, water, and land, with environmental and social consequences that extend globally. Sustainable development is essential for managing this urban expansion [62]. Consequently, government policy measures to promote sustainable urbanization and population redistribution are key to successfully implementing the 2030 Agenda for Sustainable Development [64]. Progress toward the SDGs depends on effective urban planning and management that tackles resource demands and environmental impacts in cities.

The Gulf cities originated from small ports or fishing villages, initially planned with geometric street layouts (e.g., Kuwait and Doha) or orthogonal grids (e.g., Al Khobar and Abu Dhabi). A defining feature was the Corniche: a seafront promenade with a wide avenue and green spaces. These hubs, with the creation of commercial and housing settlements, expanded into larger urban agglomerations [24]. Commercial and housing settlements have been created, forming urban agglomerations [32]. The urban agglomeration in the cities of Al Rayyan and Doha's Industrial Area, but more recently, the development plan for Doha urban agglomeration included the neighboring cities of Lusail, Pearl Island, Al Sadd, and Al Wakrah. Kuwait's urban landscape has evolved such that the city center now represents only 16% of the larger agglomeration, which includes satellite towns [20]. This linear expansion has led to the merging of these areas with the megacity. In Saudi Arabia, the Dammam metropolitan area, comprising Dammam, Dhahran, and Al Khobar, has been unified under a single governing authority since the 1980s. A similar trend is seen in Dubai, which, since the 1990s, has formed a conurbation with Sharjah and Ajman, creating a 70 km urban strip with a population of 3.5 million. Gulf global cities such as Dubai have sought to build the tallest structures possible, largely to present them as prominent symbols of the global economy. Other Gulf nations compete to replicate the Dubai model in their urban development plans [4].

The GCC region's eight largest global cities: Abu Dhabi, Dubai, Doha, Jeddah, Kuwait City, Muscat, Manama, and Riyadh, are expected to show positive demographic growth throughout 2015–2030. In addition to the National Development Strategies of the GCC member states, these major cities have unveiled their long-term strategic visions to transform into thriving global metropolises across five key domains: economic development and commerce, talent attraction and retention, information sharing and connectivity, cultural diversity and exchange, and international cooperation and influence [75]. The GCC states have transformed their major cities into thriving global hubs, shaping regional socio-cultural dynamics. Riyadh, Abu Dhabi, and Doha have emerged as the GCC's most influential centers of international political and economic power [22]. They have the resources to execute large-scale, visionary urban development master plans. However, the foundations of social welfare and economic prosperity—and the long-term sustainability of these foundations—are crucial factors that will determine the global standing and success of these cities. Overall, the cities in the GCC present a varied landscape, exhibiting different degrees of globalization.

Table 3 summarizes the key features of major global cities of the Gulf region in terms of area, access, justification, and innovations in the Gulf region. These cities are envisioned as multi-model: smart-to-digital cities, low-carbon to carbon-neutral cities, with futuristic innovations as the key [55]. Long-term development plans are implemented with large financial outlays to boost business and commercial activities, manufacturing and economic diversification, educational infrastructure, sports, and cultural activities. While this vision represents the development of contemporary but modern cities, the city development vision for tomorrow and policy action on sustainable and resilient Gulf cities are more fundamental for the future of Gulf sustainability architecture/design [18]. A critical concern is that many Gulf cities are situated close to coastlines or environmentally sensitive areas. The concentration of economic assets, infrastructure, and populations in these low-lying coastal regions particularly exposes them to the severe impacts of natural disasters from climate change [14]. Such ecological vulnerability poses major challenges to the long-term sustainability and resilience of the Gulf's global cities. Without adequate disaster risk preparedness, a lack of capacity and time could result in catastrophic consequences.

The Gulf region's rapid urban expansion, driven by new planned cities coupled with the ever-expanding populations of existing urban centers, is driving up demand for critical ecosystem services (see Table 3). Urban concentration strains ecosystems through two primary mechanisms: (a) expansion of heavily paved and built-up areas that reduce green spaces and permeable surfaces, and (b) the city population also exhibits higher demand for a range of fuel and cleaning products. Acknowledging the role of urban green spaces in offsetting environmental pressures and creating substantial green spaces, the Gulf states have launched major initiatives such as Saudi Arabia's Green Riyadh (7.5 M trees), Qatar's 10 M-tree planting program, and the UAE's mangrove restoration projects [2]. Comprehensive environmental protection strategies aimed at moderating heat islands, improving microclimates, and enhancing air quality are crucial to building resilience and sustainability in Gulf cities [9].

Achieving sustainable urbanization in the Gulf requires a monitoring and evaluation framework that captures the multidimensional character of urban development, spanning society, economy, environment, culture, and governance. The Global Urban Monitoring Framework (UMF), endorsed by the United Nations Statistical Commission and developed by UN-Habitat and partners, provides such a structure [65]. The UMF operates as a matrix that cross-references five domains: Society, Economy, Environment, Culture, and Governance and Implementation, with four city-level objectives derived from SDG 11: making cities safe and peaceful, inclusive, resilient, and sustainable (Fig. 5). The intersection of each domain and objective creates a measurable "attribute" (e.g., a "Resilient Economy" or a "Sustainable Environment"), for which specific indicators can be selected and monitored.

Unlike sector-specific frameworks, the UMF's integrated architecture enables cities to diagnose interconnected challenges rather than treating environmental degradation and social exclusion as separate issues. Its design also accommodates city-specific indicator selection, including the use of proxies where standard data are unavailable, a feature that is particularly relevant for GCC cities, where conventional urban metrics often fail to capture the region's distinctive demographic duality and migration-driven growth patterns.

Table 3 Large, planned cities in the GCC: function, sustainability orientation, and environmental exposure, illustrating the interplay between ambitious urban development and climate vulnerability

Planned city	Size (km ²)	Cost (billion USD)	Primary function	Innovation and sustainability features	Coastal and climate exposure
Neom, SA	26,500	500	Cross-border city covering a wide region with access to economic and non-economic activities	Designed as a 100%-renewables city; proposition of several sustainability technologies	Red Sea coast location exposed to sea-level rise and extreme heat
Lusail City, Qatar	38	45	Large-scale city with economic and non-economic activities; hosting the opening and finals of the 2022 FIFA World Cup	Mostly based on smart city applications; local energy certification systems; some use of renewables	Coastal site on the Persian Gulf. Low-lying and exposed to sea-level rise and extreme heat
South Al-Mutlaa City, Kuwait	102	20	In planning, large city combining all economic & non-economic activities	Use of modern technologies including smart infrastructure systems	Inland location, primarily exposed to extreme heat
Education City, Qatar	14	15	Purpose-built for fostering education through hosting (foreign) universities and technology/research innovation hubs	LEED energy certifications; renewables deployment; green campus initiatives	Near-coastal location, exposed to extreme heat
Masdar City, UAE	1–2.3 (planned); 0.3 (developed)	18–22	Mainly hosting commercial, manufacturing and education facilities related to sustainability and energy	Original design as carbon neutral city; currently using renewables and energy certification for buildings	Inland, arid desert location subject to intensifying urban heat
Musheireb City, Qatar	0.31	5.5	Cultural district rebuilt from old Doha downtown; museums concentration; mixed use districts	Energy building certifications (LEED); sustainable transport; use of renewables; recycling systems	Central Doha, near coast and low-lying; exposed to coastal climate risks and extreme heat
Madinat Al Irfan, Oman	0.25 (phase one); up to 4.9 total	13 over 20 years	Depending on final shape, currently designed as cultural center; mixed use districts	Energy building certifications; light transport; low-carbon interventions; solar energy	Near coast and exposed to tropical cyclone risk and extreme heat
King Abdullah Economic City, KSA	168	35	Large cities planned as with economic and noneconomic uses; a part of the master plan to construct cities for economic diversification	Little announced; orientation towards modern infrastructure; no clear orientation towards sustainability technologies, renewables, etc	Red Sea coast; directly exposed to sea-level rise and coastal hazards
Prince Abdulaziz bin Mousaed Economic City, KSA	18 (originally 156)	8	Transportation and logistics hub in Ha'il; includes industrial, agricultural, educational, and residential zones	Modern infrastructure (airport, dry port, rail); no explicit sustainability or renewables commitment	Inland and arid desert location; exposed to extreme heat
Jeddah Economic City, KSA	5.2	20	Waterfront development centered on Jeddah Tower; residential, commercial, hospitality, and entertainment; gateway to Makkah and Madinah	District cooling, green mobility, and water optimization planned	Red Sea waterfront; heat and coastal flooding risks;

Table 3 (continued)

Planned city	Size (km ²)	Cost (billion USD)	Primary function	Innovation and sustainability features	Coastal and climate exposure
Medina Knowledge Economic City, KSA	4.8	7	Knowledge-based city; education, research, Islamic civilization studies, and ICT industries	Transit-oriented design on high-speed railway; ICT infrastructure	Inland and arid location; extreme heat
Jazan Economic City, KSA	100	27	Industrial city for energy, manufacturing, and logistics; oil refinery, petrochemical complex, seaport; first Saudi Special Economic Zone	First industrial city in the Middle East to achieve LEED Platinum rating; mangrove ecological buffer; Smart environment	Red Sea coastal exposure; proximity to mangroves; extreme heat
Al-Qiddiya, KSA	334 (by 2030)	NA	Designed to be a tourism hub and an entertainment city to become a major national and international attraction	Net-zero by 2060; wastewater reuse; organic waste composted; EV charging infrastructure; passive cooling through urban morphology	Inland; arid desert; extreme heat

Source Adapted from Al-Saidi & Zaidan [6] and extended by the authors

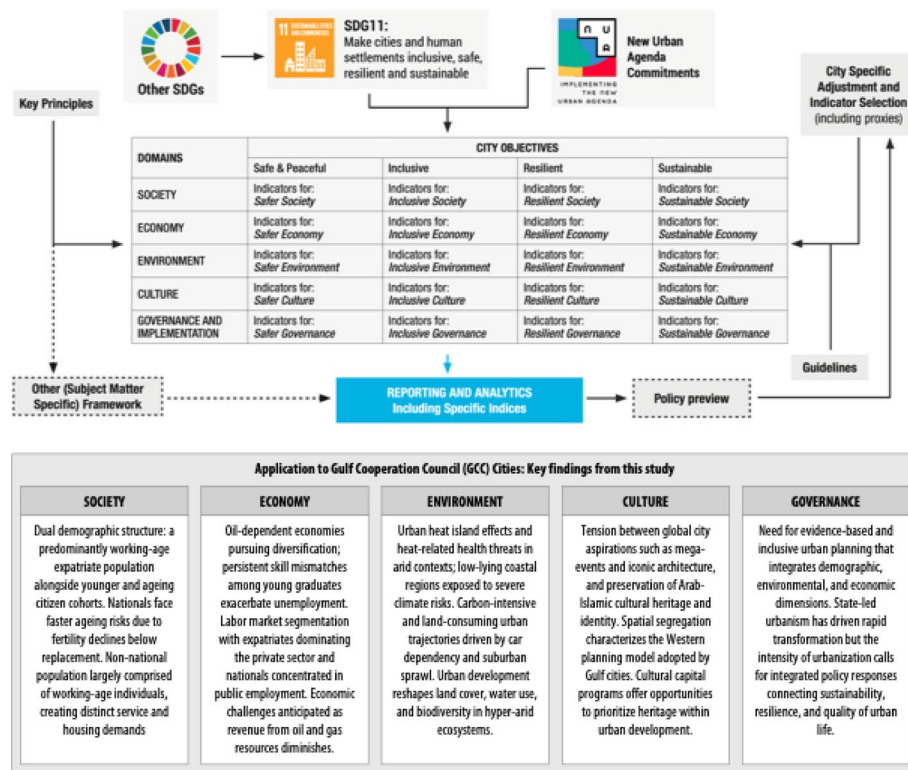


Fig. 5 The global urban monitoring framework (UMF) structure and its application to GCC cities. The upper panel presents the UMF matrix cross-referencing five domains with four city-level objectives derived from SDG 11. The lower panel maps key empirical findings from this study onto each domain, illustrating the distinctive urbanization challenges facing the Gulf region. Source Adapted from UN-Habitat [65] and extended by the authors

For the Gulf states, the UMF's five-domain structure aligns with the compounding challenges identified in this study. First, the "society" and "economy" domains correspond to the labor market tensions and demographic imbalances documented in Sects. 4.1 and 4.2, where rapid expatriate-driven growth strains housing, services, and social cohesion. Second, the Environment domain directly addresses the ecological vulnerabilities: urban heat islands, coastal flooding, water stress, and biodiversity loss, which are intensified by the region's arid climate and carbon-intensive development trajectories [33, 82]. Third, the "culture" domain offers a structured entry point for assessing how Gulf cities balance global aspirations with the preservation of local heritage and identity, a tension highlighted by the region's pursuit of mega-events and cultural capital status [67]. Fourth, the "governance and implementation" domain aligns with the study's call for evidence-based planning and integrated policy responses that move beyond siloed sectoral approaches.

The UMF thus provides a contemporary, internationally endorsed structure within which the empirical findings of this study, on demographic dynamics, urbanization trajectories, and sustainability imperatives, can be situated and operationalized for GCC-specific policy and planning.

Additionally, the UN-Habitat model for a better urban future emphasises the importance of systematic risk assessment and the implementation of risk-reduction and mitigation policies to foster sustainable, resilient cities [64]. The framework calls for the integration of climate policy actions into urban spatial planning, the adoption of a human-centered approach, and the identification of hazard and vulnerability mapping for high-risk urban areas. It further promotes country-specific disaster-resilient design, the robust infrastructure development, and the strengthening of human and institutional capacities to effectively respond to disasters [5].

2.5 Sustainable cities and human wellbeing: need for evidence-based urban planning and policy agenda

The near-universal urbanization across the six Gulf states raises important questions regarding the effectiveness of current urban development planning strategies in ensuring sustainable, resilient and viable cities into the future. The Gulf states are actively pursuing transformative shifts toward sustainable urban environments, emission reduction, and enhanced quality of life [56]. These policy efforts need to integrate empirical evidence on regional vulnerabilities, such as urban heat islands, coastal flood risks, inefficient transport systems, and heat-related health threats. To achieve transformative, sustainable cities, these policies must align with initiatives to improve urban quality of life and human well-being. A multi-scalar approach to urban planning is widely recognized as having significant potential to alleviate the negative effects of urbanization on sustainable development [3]. Implementing such a multi-scalar urban planning approach requires robust institutional frameworks, data-driven decision-making, and collaborative governance mechanisms.

Urban development planning and management are two essential and interconnected elements for achieving sustainable development and promoting a high quality of life for all city-dwellers, both permanent residents and temporary migrants [44]. To support evidence-based policy efforts, we propose a model multidimensional framework for the "Assessment of Quality of Urban Life and Human Well-Being in Gulf Cities" in Fig. 6.

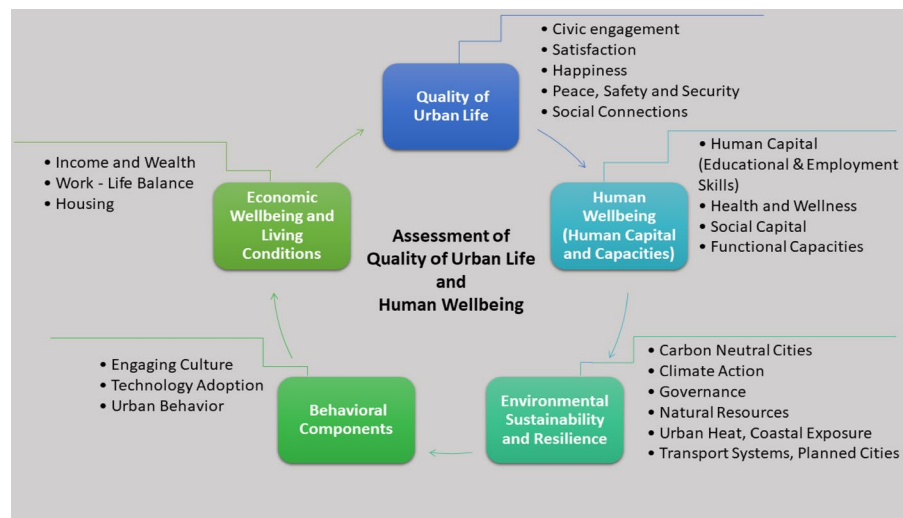


Fig. 6 A framework for assessment of quality of urban life and human wellbeing: dimensions and components. Source Developed by the authors

This framework encompasses five dimensions: investing in urban life quality, promoting human well-being and capacity building, fostering environmental sustainability and resilience, integrating technology with behavioral urbanism, and ensuring standards for human well-being and material living conditions. It provides a complementary policy framework to the GCC global cities framework. The GCC states are resource-strong to build research evidence, plan and achieve the goal of sustainable and resilient cities.

The framework is aimed as a practical tool for explicitly mapping key Gulf urban sustainability challenges such as intensifying urban heat-island effects, coastal exposure and sea-level rise vulnerability, transport inefficiencies, and low-density planned city morphologies, onto each dimension, ensuring Gulf-specific relevance. Strengthening the environmental sustainability dimension requires evidence synthesis on renewable energy integration, energy-efficient urban design, and emission controls aligned with national climate agendas. Concurrently, disaster and heat-risk mitigation must be embedded through climate-responsive spatial planning, resilient infrastructure, and adaptive capacity-building.

3 Discussion

In this article, we examine four decades of rapid urbanization in the Gulf states, focusing on the rise of global cities, the expansion of urban clusters, and the resulting challenges for future urban growth and sustainability. The accelerated pace of urbanization in Gulf cities poses mounting pressure on ecological resources, urban resilience, and residents' well-being. Building on the theoretical framing and literature reviewed, the study unpacks three interrelated dimensions of these challenges: evolving urbanization trends and patterns, global-city formation, demographic transformation reshaping Gulf societies, and the implications of these shifts for advancing sustainable, climate-resilient cities into the future.

Urbanization is a critical policy concern presenting complex sustainable development challenges shaped by global, regional, and national factors [3]. In the Gulf Cooperation Council (GCC) countries, these challenges are intensified by rapid urban growth, climate vulnerability, and ecological frailty. Our study identifies key policy issues related to

sustainability, the built environment, technology, behavioral urbanism, and urban quality of life that demand immediate attention [19]. Recent research on Saudi Arabian cities highlights how the effects of climate change compound the already severe impacts of urbanization in the Arab world [3]. Biodiversity-inclusive urban design and planning, as advocated by the Convention on Biological Diversity frameworks (2012), are essential for maintaining ecological integrity and shaping land cover, especially in the Gulf's arid and desert zones [57]. To create livable, resilient cities that support growing populations and safeguard the environment, planners must continuously integrate evidence-based insights on urban behavior and dynamics into policymaking. Such inclusive, research-driven approaches are vital to the Gulf region's sustainable urban future.

The Gulf's global cities are multicultural hubs, characterized by a diverse population of nationals and expatriates, making them truly cosmopolitan. While hydrocarbons continue to drive the economic growth of Gulf states, competitive global dynamics have fostered this cosmopolitan identity as a hallmark of Gulf urbanism. Yet rapid expansion and the allure of global cities have often overshadowed pressing sustainability and disaster-resilience challenges [24]. Innovative urbanization models and spatial planning strategies are vital for steering GCC cities towards a sustainable and inclusive future. As the Arab region experiences unprecedented urban growth, it is crucial to prioritize inclusion, resilience, safety, prosperity, and sustainability [69]. Urban development strategies must prioritize the protection of the Gulf's fragile ecological resources to secure a sustainable future for their global cities [38].

Engaging citizens, communities, and academia is crucial for transforming Gulf cities. The pivotal role of cultural mega-events such as the Arab Capital of Culture and other UNESCO-led initiatives in shaping urban imagination and reinforcing place-based identity has been widely recognized in cultural policy scholarship [51, 66]. Established in 1996 under the auspices of the Arab League in cooperation with UNESCO, the Arab Capital of Culture program serves as a strategic platform for celebrating and revitalizing Arab cultural heritage within rapidly transforming urban contexts. Host cities such as Sharjah (1998, 2019), Doha (2010), and Kuwait City (2022) have leveraged this designation to expand cultural infrastructure, stimulate creative economies, and enhance civic participation, thereby anchoring urban development in socio-cultural continuity. In the Gulf context, these initiatives exemplify soft power strategies embedded within urban and cultural planning frameworks [54], highlighting how the integration of cultural dimensions into policy processes can guide modernization toward more inclusive, sustainable, and culturally grounded urban futures.

Engaging researchers to investigate key dimensions such as quality of life, work-life balance, leisure, and socialization is essential for fostering harmonious urban development in the Gulf region. Policymakers must rely on robust, evidence-based research to address the multifaceted aspects of urban sustainability, energy transition, and overall well-being. Such an approach can support holistic policymaking, strengthen decision-making, and secure public trust [17]. Further research is needed to understand how urbanization, climate change, and health and economic shocks are linked. Building urban resilience is critical to reducing the severity and duration of disruptions caused by environmental vulnerability. Urban policymakers and planners in the Gulf GCC states should integrate behavioral science insights and illustrative urban models into their planning processes, guiding the creation of healthier and more sustainable [54].

Lastly, climate change poses a fundamental challenge for the Gulf states, particularly with respect to the intertwined issues of climate change, environmental pollution, and human health. The GCC states already experience the highest ambient temperatures globally, and climate change is expected to further intensify heat stress in these countries. In a broader regional context, the Middle East and North Africa (MENA) are recognized as one of the most climate-vulnerable regions worldwide, particularly to extreme heat and water scarcity, which situates GCC countries within a wider hotspot of climate risk [72]. The intensity and frequency of heatwaves and dust storms have increased in the Gulf states due to anthropogenic climate change [82]. Global warming is significantly contributing to rising average temperatures across the Arabian Gulf, with the region warming at twice the global average, leading to summer temperatures reaching 50 °C [8]. However, the potential health and mortality impacts in this region remain underexplored compared to other parts of the world [33].

Study Limitations: The explanatory scope of demographic analysis in our study is limited. It focused primarily on female-centric demographic drivers such as educational attainment, labor force participation, and marriage patterns—and their contribution to fertility decline, reflecting their central role in recent social and demographic transformations. However, the study does not explicitly account for complementary male-centric factors, including men's employment trajectories, marriage timing, or gendered decision-making dynamics within households. Incorporating these dimensions into future research would yield a more comprehensive understanding of the gendered pathways shaping demographic change. In addition, the assessment of spatial distribution remains constrained to a descriptive demographic narrative; visually explicit or spatially analytical approaches (e.g., GIS-based mapping) represent a further avenue for methodological extension.

4 Conclusion

This study makes three main contributions to the understanding of GCC urbanization and sustainable cities: comparative patterns across six states, demographic dynamics (including expatriate-driven youth and nationals' fertility declines), and urban planning challenges for sustainability. The Gulf states have undergone one of modern history's fastest urban transformations, evolving from small settlements into globally significant metropolitan regions. Across six GCC countries, this study reveals urbanization's dual nature—driving economic prosperity and connectivity, yet straining environmental sustainability, resilience, and well-being amid demographic shifts, rapid growth, and expatriate dependence that intensify infrastructure, housing, and ecological pressures.

In conclusion, this study demonstrates that (a) GCC urbanization (85–100% rates) demands Gulf-contextualized frameworks beyond generic models; (b) demographic pressures and opportunities of their young populations alongside aging nationals call for integrated QoUL planning; and (c) evidence synthesis reveals critical gaps in climate-resilient spatial strategies. Accordingly, this study recommends a two-fold strategy. First, it calls for multi-scalar policy integration that links human, social, economic, and environmental pillars in line with national visions such as Qatar National Vision 2030. Second, it recommends developing empirical measurement tools and urban QoUL indicators specifically attuned to Gulf realities to enhance data-driven urban governance.

These findings yield three core policy recommendations: (a) evidence-based, multi-scalar planning; (b) integrating quality-of-life and well-being metrics; and (c) prioritizing climate-resilient urban development to secure resilient, inclusive urban futures. Practical implications include mainstreaming climate/heat-risk assessments into master plans, aligning transport and land-use to curb car dependency, and developing urban life quality indicators/surveys to inform zoning and evidence-based policies. Strengthening governance via institutional capacity, public participation, and adaptive strategies will ensure resilient, inclusive cities amid rapid urbanization.

Acknowledgment

We acknowledge that the research for this article was supported by Qatar Research, Development, and Innovation (QRDI) Grant No. CCE01-1105-230135.

Author contributions

AP and MM conceptualized and wrote the manuscript. KAG and MM contributed to results reporting, manuscript review, and revision. CP conducted data analysis. All authors reviewed and approved the manuscript for submission.

Funding

The authors received no specific funding for this work.

Data availability

The results presented in this paper are based on publicly accessible macro data from sources stated in the data and methods section of the paper. These data can be directly accessed from URL link provided for each source.

Declarations

Ethics approval and consent to participate

Not applicable.

Consent to Publish

Not applicable.

Conflict of interest

The authors declare no conflict of interest.

Received: 25 August 2025 / Accepted: 9 April 2026

Published online: 03 May 2026

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