

## Developing Smart and Affordable Housing Futures for Ageing Populations: Urban Demographic Change, Single-Person Living, and the Role of AI Agents in Emerging and Advanced Economies

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### ABSTRACT

Population ageing is reshaping cities across both emerging and advanced economies, generating unprecedented pressure on housing systems that were historically designed for younger, family-based populations. According to the United Nations, the number of people aged 65 years and above will reach approximately 1.6 billion by 2050, with a substantial majority residing in urban areas. At the same time, cities are experiencing a marked rise in single-person households among older adults, increasing exposure to social isolation, emotional stress, and delayed healthcare intervention. This paper examines the growing need for smart and affordable housing for ageing populations, with particular attention to urban contexts in emerging and advanced economies. Using the multi-level age-friendly housing framework, the study integrates demographic statistics, housing affordability data, and recent advances in artificial intelligence (AI). It argues that AI agents embedded within housing environments can play an instrumental role in supporting ageing-in-place by monitoring health, facilitating early intervention, and addressing emotional and social challenges associated with single-person living. This paper synthesises interdisciplinary evidence from urban studies, gerontology, housing policy, and AI research to demonstrate that AI-enabled smart housing—when governed ethically and delivered affordably—can contribute meaningfully to developing sustainable housing futures for ageing populations. The paper concludes with targeted recommendations for policymakers and international organisations seeking to align housing systems with demographic realities.

**Keywords:** Advanced Economies, Urban Areas, Social Isolation, Emotional Stress, Healthcare Intervention.

### Introduction

Population ageing has emerged as one of the most significant demographic transformations of the twenty-first century. Improvements in healthcare, sanitation, and living standards have increased life expectancy globally, while declining fertility rates have altered population age structures across both emerging and advanced economies (United Nations Department of Economic and Social Affairs [UN DESA], 2023; Warner et al., 2024). By 2050, one in six people worldwide is projected to be aged 65 years or older, compared with one in eleven in 2019 (UN DESA, 2023).

Urban areas are at the epicentre of this transformation. More than 65% of older adults globally are expected to live in cities by mid-century, reflecting long-term trends in urbanisation and internal migration (OECD, 2025; UN-Habitat, 2023). In emerging economies, population ageing is occurring at an accelerated pace, often before adequate welfare systems and age-friendly housing infrastructures have been established. In advanced economies, ageing coincides with housing affordability crises, labour shortages in care sectors, and shrinking household sizes (McKinsey Global Institute, 2025).

One of the most consequential dimensions of urban ageing is the rapid growth of single-person households. Across OECD cities, single-person households now account for between 28% and 45% of all households, with older adults representing the fastest-growing subgroup (OECD, 2025; SmartAsset, 2023). While living alone may reflect autonomy and independence, research consistently shows that older adults living alone face heightened risks of loneliness, depression, and delayed medical intervention (Prasad, 2024; Valkenburg et al., 2023).

Housing systems have struggled to adapt to these realities. Much of the existing urban housing stock remains unaffordable, inaccessible, or poorly suited to the physical and emotional needs of ageing residents (Harvard Joint Centre for Housing Studies [JCHS], 2023). Against this backdrop, the development of smart and affordable housing futures for ageing populations has become a critical policy and research priority.

This paper builds on the age-friendly housing framework and extends it by incorporating AI agents as a core enabling infrastructure within housing environments. The central argument is that AI-enabled smart housing—if designed inclusively and governed ethically—can support ageing-in-place, reduce emotional stress associated with single-person living, and alleviate pressure on healthcare systems in both emerging and advanced economies.

## Literature Review

### • Population Ageing and Urban Dynamics

Recent demographic research highlights population ageing as a structural, long-term trend with profound urban implications. UN DESA (2023) projects that the global old-age dependency ratio will rise from 16 in 2020 to 28 by 2050, signalling a sharp increase in the proportion of older adults compared to the working-age population. This shift is particularly pronounced in urban regions, where economic opportunities and healthcare access attract older residents.

In emerging economies, ageing is occurring more rapidly than in historical precedents from Europe or North America. Urban China, for example, is projected to experience a doubling of its population aged 65 years and over between 2020 and 2040, placing significant strain on housing and care systems (Pan et al., 2024; UN DESA, 2023). Advanced economies face similar challenges, compounded by long-standing housing affordability constraints and ageing infrastructure (Warner et al., 2024; McKinsey Global Institute, 2025).

### • Housing Affordability and Ageing-in-Place

Housing affordability has appeared as a critical determinant of wellbeing in later life. The Harvard Joint Centre for Housing Studies (2023) reports that more than 11.2 million older adults in the United States are housing-cost burdened, spending over 30% of their income on housing. Comparable patterns have been found in European and East Asian cities, where fixed retirement incomes are increasingly mismatched with rising housing costs (OECD, 2025).

Ageing-in-place—the ability to remain safely and independently in one's home—has been widely recognised as a preferred and cost-effective alternative to institutional care (Hu et al., 2024; Hong et al., 2022). However, the feasibility of ageing-in-place depends heavily on housing quality, accessibility, and proximity to services.

### • Single-Person Households and Emotional Wellbeing

The rise of single-person households represents a profound shift in urban social structures. Sociological studies indicate that living alone in later life is associated with higher levels of loneliness and lower subjective wellbeing, particularly in dense urban environments where social interaction is not automatically guaranteed (Prasad, 2024; Valkenburg et al., 2023).

Empirical evidence suggests that up to 40% of older adults living alone in metropolitan regions report frequent feelings of loneliness, compared with approximately 20% among those living with others (Valkenburg et al., 2023). These emotional stressors have been linked to increased healthcare utilisation and higher mortality risks (Pan et al., 2024).

### • Smart Homes and AI Agents for Older Adults

The integration of smart technologies into housing has expanded rapidly over the past decade. Systematic reviews find smart homes as effective tools for supporting mobility, detecting falls, and monitoring health conditions among older adults (Hu et al., 2024; Hong et al., 2022). More recently, AI

agents have appeared as a transformative development, enabling adaptive, conversational, and predictive capabilities within housing environments (Iqbal, 2023; Nature, 2026).

AI agents differ from traditional smart systems by their capacity to learn behavioural patterns, engage in natural language interaction, and support emotional wellbeing alongside physical health monitoring (Wong et al., 2024; Abadir et al., 2025). These capabilities position AI agents as particularly relevant for older adults living alone.

### Methodology

This study adopts a qualitative integrative literature review method as they have been found particularly suitable for synthesising evidence across disciplines and for developing conceptual frameworks that address complex social-technical challenges (Hu et al., 2024; Wong et al., 2024).

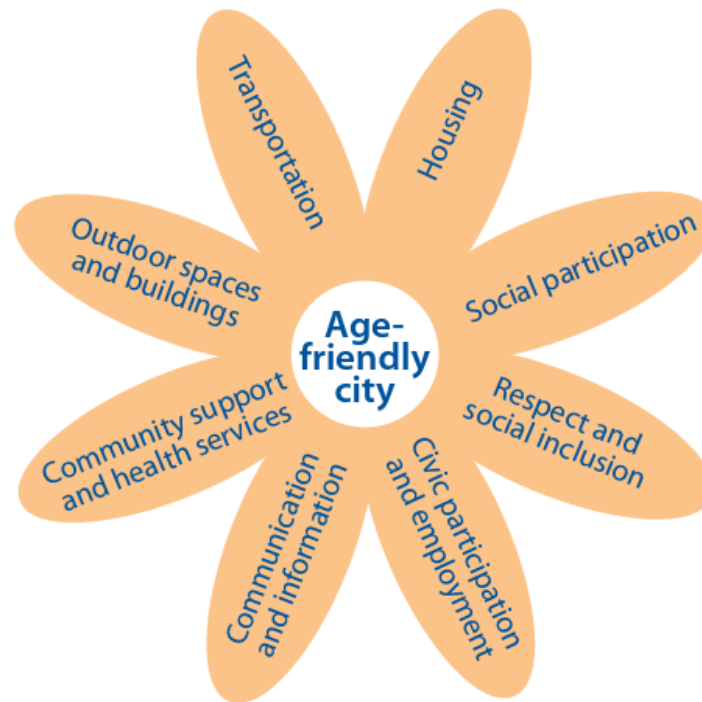


Figure 1: Domains of Age-friendly city (WHO, 2007)

- **Data Sources and Selection Criteria**

The review draws on peer-reviewed journal articles and institutional reports published between 2023 and 2026. Databases included MDPI, Springer, Nature, Oxford Academic, IEEE Xplore, JMIR, and ACM Digital Library. Institutional sources included UN DESA, OECD, UN-Habitat, and the Harvard Joint Centre for Housing Studies.

Publications were selected based on relevance to ageing, housing, urbanisation, and AI; methodological rigour; and applicability to appearing and advanced economies (UN DESA, 2023; OECD, 2025).

- **Analytical Framework**

Findings were analysed using multi-level framework, which examines interactions between:

- **Macro-level factors** (demography, housing markets, policy)
- **Meso-level factors** (housing design, community infrastructure)
- **Micro-level factors** (lived experience, emotional wellbeing)

AI agents were treated as a cross-cutting enabler linking these levels (Iqbal, 2023; Nature, 2026).

## Discussion

- **Statistical Imperatives for Housing Transformation**

Demographic statistics underscore the urgency of housing reform. By 2050, seniors are projected to account for nearly one-quarter of global consumption, while the working-age population shrinks in many countries (McKinsey Global Institute, 2025). In emerging economies, this shift is occurring alongside rapid urban growth, intensifying housing demand without corresponding expansion in age-friendly supply (UN-Habitat, 2023; Pan et al., 2024).

- **Single-Person Living and Emotional Risk**

Living alone amplifies emotional vulnerability among older adults, particularly in urban settings characterised by weak neighbourhood ties. AI agents embedded in housing can provide daily interaction, reminders, and emotional engagement, helping to mitigate loneliness and support mental health (Wong et al., 2024; Nature, 2026).

- **AI Agents as Housing Infrastructure**

Conceptualising AI agents as housing infrastructure—rather than optional consumer technologies—represents a paradigm shift. When integrated at scale into affordable housing, AI agents can support preventative healthcare, reduce caregiver burden, and extend independent living (Iqbal, 2023; Hu et al., 2024).

- **Ethical and Governance Considerations**

The deployment of AI agents raises ethical concerns related to surveillance, consent, and data protection. Recent studies emphasise the need for transparent governance, participatory design, and robust regulatory frameworks to ensure trust and equity, particularly in public and affordable housing contexts (Abadir et al., 2025; Nature, 2026).

## Recommendations for Policymakers and International Organisations

- **National and Local Policymakers**

Policymakers should integrate smart and affordable housing for ageing populations into national housing and urban development strategies. This includes embedding age-friendly and AI-enabled design standards into building codes and public housing programmes (OECD, 2025; JCHS, 2023).

Subsidies and public–private partnerships should prioritise AI infrastructure as a shared public good rather than an individual luxury, ensuring equitable access for low- and middle-income older adults (McKinsey Global Institute, 2025; UN-Habitat, 2023).

- **International Organisations**

International organisations such as the United Nations, WHO, and OECD should promote global guidelines for AI-enabled age-friendly housing, drawing on best practices across emerging and advanced economies (UN DESA, 2023; OECD, 2025). Funding mechanisms should support pilot projects in rapidly ageing cities in emerging economies, where institutional capacity is limited.

- **Ethical and Capacity-Building Measures**

Both policymakers and international organisations must invest in digital literacy programmes for older adults and housing providers. Ethical oversight mechanisms should be strengthened to ensure transparency, consent, and data security in AI-enabled housing systems (Abadir et al., 2025; Wong et al., 2024).

## Conclusion

This paper has demonstrated that developing smart and affordable housing futures for ageing populations is a critical challenge for cities in both emerging and advanced economies. Demographic statistics, housing affordability data, and social research collectively reveal a growing misalignment between existing housing systems and the realities of urban ageing, particularly the rise of single-person households.

By extending age-friendly housing framework to incorporate AI agents, this study highlights the potential of AI-enabled housing to support health monitoring, emotional wellbeing, and independence among older adults. However, technological innovation alone is insufficient. Developing future housing for ageing populations requires coordinated policy action, ethical governance, and international collaboration.

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