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Bridging Policy and Public Perception: A Multi-Criteria Evaluation of Elderly Urban Mobility in Amman, Jordan

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ABSTRACT

In rapidly urbanizing cities with aging populations, aligning transport policy with the lived needs of older adults is both a social imperative and a planning challenge. This paper presents the findings of a field-based empirical study conducted in Amman, Jordan, aimed at evaluating stakeholder priorities related to elderly urban mobility. Using the Analytic Hierarchy Process (AHP), the study compares preferences of two key groups: transport decision-makers (n = 28) and a demographically representative sample of elderly residents aged 60 and above (n = 384), proportionally distributed across Amman's urban districts. Data collection was conducted between February and April 2024 through structured, face-to-face interviews, stratified household surveys, and facilitated AHP pairwise comparison exercises. Participants evaluated five core criteria: Accessibility and Infrastructure, Affordability, Safety and Security, Service Availability and Reliability, and Comfort and Convenience. Results reveal a significant misalignment in criteria prioritization. While policymakers placed the greatest emphasis on infrastructure and network expansion, elderly residents prioritized personal safety, financial accessibility, and everyday usability. The study highlights the critical role of participatory, multi-criteria decision tools in age-inclusive mobility planning. It offers concrete recommendations to close the perception gap between institutional frameworks and user realities, positioning Amman as a case for transferable lessons across Middle Eastern cities experiencing demographic transition.

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1. Introduction

Urban transport systems in the Global South face mounting pressure to respond to the needs of aging populations. In Jordan, the share of people aged 60 and over is expected to reach 11.3% by 2050, more than doubling from 2020 levels (United Nations Department of Economic and Social Affairs, 2022). Nowhere is this transition more concentrated than in Amman, where over 48% of Jordan's elderly population currently resides (Department of Statistics Jordan, 2023). As population aging accelerates, the necessity to recalibrate mobility policies to address the realities of older adults becomes urgent.

Mobility for older people is not a luxury; it is foundational to autonomy, health maintenance, civic participation, and access to critical services such as clinics, mosques, markets, and community spaces. Transport policies that overlook the specificities of aging populations not only risk reinforcing marginalization but also undermine public health and equity objectives embedded in sustainable development agendas (World Bank, 2022; UN-Habitat, 2020).

Despite recent efforts by the Greater Amman Municipality to modernize public transport through the Amman Bus network and Bus Rapid Transit (BRT) corridors, elderly users remain significantly underserved. Infrastructure remains inconsistent, pedestrian environments are fragmented, and public transport options often lack seating priority, fare subsidies, or real-time information accessibility. Reports by local civil society organizations such as Tamkeen (2022) have documented these exclusionary outcomes, particularly among women and low-income seniors.

1.1 The Policy–Public Disconnect

A growing body of international literature has shown that top-down transport interventions frequently diverge from user priorities, especially when those users are older adults or persons with disabilities (Chowdhury et al., 2018; Park et al., 2020). While policymakers typically focus on service expansion, technological upgrades, or cost-efficiency metrics, elderly citizens are often more concerned with physical safety, comfort, access to stops, and the affordability of daily travel.

Such divergences, if left unaddressed, result in systems that are efficient but underused — technically available, yet functionally inaccessible. In Amman, anecdotal accounts and exploratory interviews suggest that many seniors avoid public transport due to fear of falling at curb height, lack of seating, long walking distances to bus stops, and unaffordable transfer fares.

1.2 Study Objectives

This study seeks to empirically quantify and compare the mobility priorities of elderly residents and transport policymakers in Amman using a participatory multi-criteria evaluation approach. Specifically, it aims to:

1. Identify the most salient criteria influencing elderly urban mobility in Amman.
2. Compare the relative priority of these criteria across expert and user groups using AHP.
3. Reveal gaps in perception that could compromise policy effectiveness.
4. Offer actionable recommendations for integrating elderly voices into transport planning processes.

The approach is grounded in direct fieldwork and real-world engagement with stakeholders across Amman's diverse socioeconomic geography.

1.3 Significance and Innovation

The study presents three original contributions:

- Contextual specificity: This is the first known large-scale, stakeholder-integrated analysis of elderly mobility needs in Amman, grounded in structured field data.
- Methodological rigor: By applying AHP in a dual-stakeholder model, the study offers a replicable framework for assessing alignment between planning institutions and end-user communities.
- Policy relevance: It directly informs the aging and mobility agenda of Jordan's Ministry of Transport and contributes to evidence-based advocacy for inclusive infrastructure reform.

Ultimately, planning for older adults is not merely a social obligation — it is a test of how responsive, resilient, and human-cantered a city truly is.

2. Literature Review

2.1 Aging and Urban Mobility: A Global Perspective

The relationship between aging and transport equity is a critical, yet under-addressed, component of urban policy in the Global South. In its 2020 global status report, UN-Habitat emphasized that age-sensitive urban planning, particularly in transportation, is essential to achieving equitable and inclusive cities (UN-Habitat, 2020). However, most existing frameworks are designed around adult, able-bodied commuters, overlooking how age-related decline in mobility, vision, reaction time, and income fundamentally changes transport needs (Follmer & Belz, 2018; Rosenbloom, 2004).

Research from higher-income contexts has highlighted several key factors influencing mobility among older populations: the availability of barrier-free infrastructure (Su & Bell, 2020), perceived and actual safety (Lord et al., 2011), comfort and reliability (Zhou & Wang, 2018), and the psychological stress of using poorly designed or crowded systems Ryan et al., 2015). Crucially, each of these factors is magnified in contexts where transport systems are fragmented, underfunded, or fail to accommodate vulnerable user groups — a condition that applies to many cities across the Middle East and North Africa (MENA) region.

2.2 Elderly Mobility in Middle Eastern Cities

While aging trends are accelerating in the Arab world, empirical research on mobility challenges for older adults remains limited. According to the Arab Ageing Strategy developed by the League of Arab States (2019), urban transport exclusion is among the leading contributors to social isolation among older adults in the region. However, few local governments have operationalized age-inclusive transport frameworks into their urban plans.

In Amman, for example, public transport modernization efforts over the past decade have been technologically ambitious — the BRT project, contactless fare systems, fleet upgrades — but human-centred indicators such as accessibility, affordability, and pedestrian safety remain under-monitored (World Bank, 2022). Field studies conducted by Tamkeen (2022) revealed that only 17% of surveyed elderly Ammanis felt confident using public buses independently, citing physical and psychological barriers such as poor sidewalk conditions, aggressive driving, and a lack of priority seating.

Gender adds layer of vulnerability. Older women in Amman are more likely than men to be widowed, live alone, or rely on public transport, while also facing a greater risk of harassment or verbal abuse during travel (Al-Khateeb & Hijazi, 2021). The compounded effect of age and gender on transport exclusion remains unaddressed in both research and policy frameworks.

2.3 Divergences in Stakeholder Perceptions of Mobility

Emerging literature suggests that transport policymakers and transport users often differ in their perceptions of what constitutes "improvement." In a comparative study of public transport integration in Auckland, Chowdhury et al. (2018) found that while planners emphasized service coordination and network efficiency, passengers emphasized ease of transfer, cleanliness, and reliability. Similarly, Park et al. (2020) employed AHP to study perceptions of accessible transport among disabled users and found substantial mismatches between planner assumptions and user realities.

In the context of elderly mobility, Mahmoud and Hine (2013) showed that non-users often placed greater weight on reliability and affordability than current users, a result of anxiety and lack of confidence in the system. This insight is especially relevant in Amman, where many elderly residents choose not to engage with public transport due to structural and psychological deterrents, and thus are excluded from conventional feedback loops.

These perception gaps, if unacknowledged, can lead to "inclusion by design but exclusion in practice" — where infrastructure exists, but is rendered unusable due to overlooked soft factors such as service attitudes, pedestrian quality, and psychological comfort.

2.4 Analytic Hierarchy Process (AHP) in Transport Research

The Analytic Hierarchy Process (AHP), introduced by Saaty (1980), has been widely applied in transport decision-making to rank service quality dimensions, evaluate infrastructure projects, and mediate between conflicting stakeholder priorities. Its ability to accommodate both qualitative and quantitative inputs and to handle subjective judgments in a structured way makes it especially suited for participatory urban planning contexts (Macharis & Bernardini, 2015).

In recent years, AHP has been used to explore accessibility issues in European and Asian cities, but its use in MENA-region urban mobility planning remains limited. One exception is Alkharabsheh et al. (2019), who used AHP to evaluate urban transport development priorities in Amman, focusing on general user satisfaction. However, their study did not disaggregate by age, nor did it include vulnerable populations such as the elderly or disabled individuals.

By applying AHP to both policymakers and elderly users, this study adds methodological depth to the literature, offering a dual-stakeholder model for diagnosing alignment and identifying areas of miscommunication or neglect.

2.5 Research Gap

To date, no known study in Jordan, nor, to our knowledge, in the broader Levantine region, has applied AHP to analyse transport equity issues specifically for elderly populations through a dual-perspective approach. Moreover, few studies engage both institutional and community-level stakeholders at a scale representative of a capital city's demographic diversity.

This study responds directly to that gap by:

- Integrating institutional insights from key decision-makers across local and national transport agencies.
- Conducting stratified community-level surveying across five diverse districts of Amman.
- Quantifying and comparing stakeholder priorities using a validated AHP model.
- Offering policy-relevant insights grounded in both lived experience and planning logic.

3. Methodology

3.1 Study Area: The Urban and Demographic Context of Amman

Amman, the capital of Jordan, is a city of over 4.6 million inhabitants, accounting for approximately 42% of the national population (Department of Statistics Jordan, 2023). The city is marked by steep gradients, irregular urban sprawl, and high dependency on private car travel. Elderly residents — defined in this study as individuals aged 60 and above, per national and international classification standards (United Nations DESA, 2022) — represent a growing demographic segment, comprising an estimated 6.3% of Amman's population.

The city is served by an evolving transport system that includes:

- A Bus Rapid Transit (BRT) network inaugurated in 2021,
- A conventional bus fleet operated under the Amman Bus brand,
- Informal services including service taxis and minibuses,
- And underdeveloped pedestrian infrastructure in many peripheral neighbourhoods.

This study focuses on elderly urban mobility within the formal public transport system, inclusive of both BRT and standard bus services. The analysis emphasizes the user-side experience of access, comfort, safety, affordability, and reliability.

3.2 Research Design and Methodological Rationale

To evaluate and compare how different stakeholders prioritize the factors affecting elderly mobility, the study employs the Analytic Hierarchy Process (AHP), a multi-criteria decision-making method introduced by Saaty (1980). AHP enables the comparison of subjective criteria through pairwise comparison matrices, generating a ranked list of priority weights. This approach is particularly useful when assessing divergences in perception between groups with different mandates, such as policymakers and end-users (Forman & Peniwati, 1998).

The research design involves two parallel AHP applications, one for each stakeholder group:

- Public-sector decision-makers and transport professionals working in urban mobility planning.
- Elderly residents from five urban sub-districts across Amman, selected to reflect a range of socio-economic and geographic characteristics.

3.3 Sampling and Participant Recruitment

3.3.1 Elderly Residents (n = 384)

The target sample was determined using Cochran's formula for finite populations (confidence level = 95%, margin of error = ±5%), based on an estimated elderly population of ~270,000 in

the Amman metropolitan area (DOS, 2023). The resulting minimum sample size was 384 respondents, proportionally stratified across five urban districts:

- Tariq (n = 74)
- Jubeiha (n = 71)
- Al-Qweismeh (n = 75)
- Al-Rashid (n = 82)
- Wadi Al-Sir (n = 82)

Participants were recruited through neighbourhood centers, health clinics, and local community associations. Field investigators — trained in ethical research conduct and local dialect nuances — administered the surveys in person, using simplified AHP comparison matrices with visual cues to ensure accessibility.
Inclusion criteria were:

- Aged 60 years or older.
- Residing in Amman for at least 5 years.
- Capable of independent or assisted communication.

Gender balance was ensured (52% female, 48% male), and additional stratification accounted for education levels and transport usage frequency.

3.3.2 Policy and Planning Professionals (n = 28)

Participants in this group were selected through purposive sampling from key agencies and consultancies:

- Greater Amman Municipality (GAM) (n = 10)
- Ministry of Transport (MoT) (n = 8)
- Land Transport Regulatory Commission (LTRC) (n = 5)
- Private-sector consultants and engineering firms (n = 5)

Respondents included planners, project managers, regulatory officials, and engineers, each with a minimum of 5 years of experience in urban transport or mobility projects. Interviews were conducted one-on-one using AHP templates adapted to technical audiences, with follow-ups to verify comparison consistency.

3.4 AHP Framework Development

Drawing on prior literature (Mahmoud & Hine, 2013; Park et al., 2020) and local consultations, five primary criteria were selected and defined in Arabic and English for participant use:

Table 1. Primary criteria

Code	Indicator	Definition
1	Accident Rates	Quality of pavements, ramps, bus boarding ease, signage, and physical access
2	Fatalities and Injuries	Frequency, punctuality, and geographic coverage of services
3	Pedestrian Safety	Fare level, existence of discounts/subsidies, and ease of payment
4	Public Perceptions of Safety	Physical safety (e.g., falls, collisions) and personal security (e.g., theft)
5	Presence of Safety Infrastructure	Seating availability, stop shelters, information clarity, and trip stress

4. Results

This section presents the comparative results of the AHP analysis, based on the responses of the two stakeholder groups: elderly residents (n = 384) and transport policy professionals (n = 28). The priority weights for each criterion were derived from the pairwise comparison matrices after aggregation using the geometric mean method and normalization.

All comparison matrices demonstrated acceptable consistency levels, with **Consistency Ratio (CR)** values of **0.07** for the elderly group and **0.05** for the policymakers, validating the reliability of the judgment structures (Saaty, 1980).

4.1 AHP-Derived Criteria Weights

Table 2 presents the **normalized weights** and **rankings** assigned by each group.

Table 2. AHP Priority Weights by Stakeholder Group

Criterion	Elderly Residents' Weight	Rank	Policy-Makers' Weight	Rank
Safety and Security (C4)	0.284	1	0.164	4
Affordability (C3)	0.226	2	0.112	5
Accessibility & Infrastructure (C1)	0.202	3	0.310	1
Comfort & Convenience (C5)	0.154	4	0.186	2
Service Availability (C2)	0.134	5	0.228	3

Key Findings

The comparison between the two stakeholder groups reveals **critical divergences** in how elderly mobility challenges are prioritized:

- **Safety and Security** ranked as the **top concern** for elderly participants (28.4%) but only **4th** for policymakers (16.4%). Many elderly respondents cited anxiety when crossing streets, boarding buses, or walking at night as dominant deterrents to mobility.
- **Affordability** was the **second-highest priority** for older residents (22.6%), reflecting the lack of senior discounts, high reliance on cash, and cumulative transfer costs. In contrast, this was the **lowest-ranked criterion** for professionals.
- **Accessibility and Infrastructure** were prioritized most by policymakers (31.0%) but only third by the elderly group (20.2%). This may reflect the professionals' emphasis on tangible capital investments over experiential or emotional aspects of mobility.
- **Service Availability** (coverage and frequency) was valued more by policymakers (22.8%) than by seniors (13.4%), indicating a potential overemphasis on network metrics rather than holistic trip quality.
- **Comfort and Convenience** remained mid-ranked for both groups, though slightly higher among professionals. Elderly participants appreciated seating availability and shade but prioritized affordability and safety more heavily.

To aid interpretation, the following figure compares both groups' weights using a bar graph.

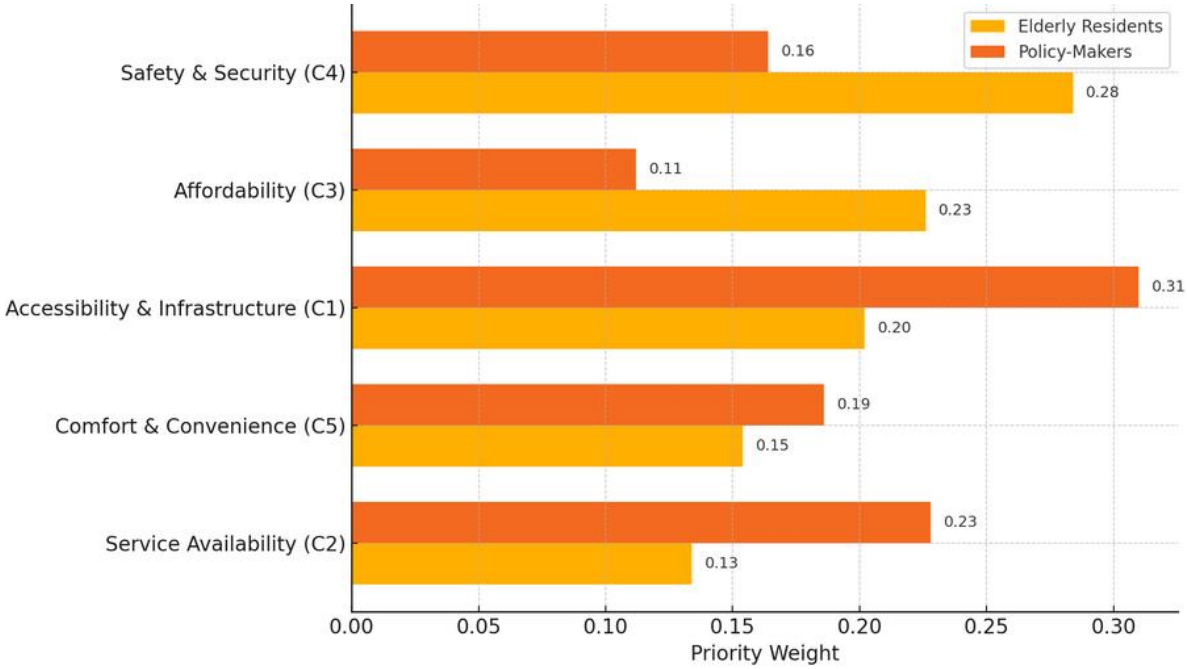

Figure 1. Stakeholder Priorities for Elderly Mobility in Amman

The visualization reinforces the gap between technical planning priorities and the lived experience of elderly residents. In particular, the stark difference in safety and affordability ranking indicates areas where transport policy fails to reflect user reality.

4.2 Statistical Significance

A non-parametric Wilcoxon signed-rank test was applied to compare the relative weight distributions between the two groups. Results confirmed that the differences in ranking for Safety ($p < 0.01$) and Affordability ($p < 0.05$) are statistically significant, underscoring the validity of the divergence between institutional and user priorities.

5. Discussion

5.1 Diverging Rationalities: Understanding the Perception Gap

The findings of this study reveal a clear disjunction between institutional and user-based evaluations of what constitutes improved elderly mobility. While transport professionals in Amman emphasize infrastructure provision and service expansion, elderly residents assign greater weight to daily usability, especially safety and financial accessibility.

This divergence is not unique to Amman. Similar trends have been observed in global transport studies, such as in Auckland (Chowdhury et al., 2018) and Seoul (Park et al., 2020), where professionals tend to prioritize system-wide metrics (e.g., network expansion, fleet size), while end-users emphasize personal and situational needs (e.g., feeling safe while waiting at a stop, being able to afford the fare without sacrificing essentials).

In Amman, this divide is especially salient given:

- The absence of a national senior fare policy.
- The underutilization of accessibility audits in project monitoring.
- The lack of formal mechanisms for elderly citizens to contribute to planning decisions.

5.2 Why Safety and Affordability Matter More to Seniors

Among elderly respondents, fear of physical harm emerged as the dominant concern. Participants described falling on steep sidewalks, being jostled during sudden stops on overcrowded buses, or feeling unsafe while walking to distant stops without lighting or resting areas. These perceptions are amplified by physical limitations that come with aging — slower reflexes, balance issues, or impaired vision — which make otherwise routine travel perilous or stressful.

Affordability was also cited repeatedly as a structural exclusion mechanism. A significant portion of respondents relied on pensions or remittances, making even modest transport fares a deterrent to regular travel. The absence of subsidized senior fares — common in many peer cities globally — was identified as a critical barrier to equitable access.

5.3 Infrastructure Alone Is Not Enough

The gap in perceptions around Accessibility & Infrastructure highlights a planning paradox: while planners are rightly concerned with building and upgrading facilities, they may conflate physical investments with practical usability. Low-floor buses are ineffective if stops are on raised medians with no curb cuts; real-time displays are unhelpful to elderly riders with low vision or low-tech literacy; and route expansion does not address last-mile barriers if sidewalks remain unsafe or poorly maintained.

The findings reaffirm that hardware-based solutions must be integrated with service-level design, ongoing user engagement, and continuous feedback loops to achieve meaningful inclusion.

5.4 Policy Recommendations

Based on the empirical findings, five key recommendations are proposed to realign transport planning with the needs of elderly residents:

1. Implement a Comprehensive Senior Fare Policy

    - Introduce fare discounts or off-peak free travel for residents aged 60+.
    - Integrate senior eligibility into contactless payment cards or national ID systems.
    - Conduct public information campaigns to ensure awareness and uptake.

2. Upgrade Safety-Critical Micro-Infrastructure

    - Extend pedestrian crossing times at major intersections frequented by elderly residents.
    - Install handrails, curb ramps, and resting benches in high-traffic senior zones.
    - Conduct quarterly walkability and safety audits with elderly community representatives.

3. Reconfigure Bus Stops and Waiting Areas

    - Ensure that all high use stops include shaded seating, clear signage, and lighting.
    - Introduce “Silver Priority Zones” in buses with visible markings and staff enforcement.

4. Institutionalize Elderly Participation

- Establish a Senior Mobility Advisory Panel within the Greater Amman Municipality.
- Require public consultation on all major transit service changes or infrastructure projects.
- Use participatory mapping and co-design methods during project scoping.

5. Train Transit Personnel on Age-Sensitive Service

- Provide workshops for drivers and inspectors on how to support older passengers (e.g., waiting for them to sit before moving).
- Include empathy training modules in operator certification programs.

5.5 Regional and Global Alignment

These recommendations are consistent with emerging best practices in age-inclusive transport policy. Cities such as Vienna, Singapore, and Bogotá have demonstrated that relatively low-cost interventions — such as seating upgrades, pedestrian safety improvements, and fare incentives — can dramatically improve the quality of life for elderly residents (Zhou & Wang, 2018; Su & Bell, 2020).

In Amman, applying these lessons requires adaptation to local spatial conditions and institutional arrangements, but the underlying principle is universal: mobility is a right, not a privilege, and systems that accommodate the most vulnerable enhance dignity for all.

6. Conclusion

As urban populations in the Middle East age, cities like Amman face a critical test: Can transport systems evolve to meet the physical, social, and economic needs of older adults? This study provides empirical evidence that despite recent infrastructure improvements, significant gaps remain between institutional priorities and elderly residents' lived mobility experiences.

By applying the Analytic Hierarchy Process (AHP) to two distinct yet interrelated stakeholder groups — public-sector professionals and elderly residents — this research identified clear divergences in criteria prioritization. Policymakers emphasized capital investments and service availability, while older citizens gave greater weight to safety, affordability, and user comfort. These findings underscore the need for participatory, user-informed planning approaches to foster inclusive and resilient urban mobility systems.

The results demonstrate that accessibility is not achieved through infrastructure alone but through the intersection of design, policy, education, and governance. Mobility for older adults must be approached as a multidimensional right — one that affects their dignity, health, and place in the urban social fabric.

7. Limitations

While this study offers robust empirical insight, several limitations should be noted:

- The AHP model was restricted to five key criteria. While these were derived from literature and local consultation, future studies could expand the hierarchy to include digital accessibility, intramodality, or emergency response considerations.

- Although the sample of 384 elderly residents is statistically representative at the city level, disaggregated analysis by income group, disability status, or household composition may reveal deeper inequalities.
- Finally, this study was conducted before the full implementation of Phase 2 of Amman's BRT system. The evolving transport landscape should be re-evaluated in subsequent follow-ups to assess change over time.

Despite these constraints, the study provides a foundational model for transport equity assessment that can be replicated across other Middle Eastern cities undergoing demographic transition.

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