

Article

Frailty Prevention and Healthy Aging: Demand Analysis in a Japanese City

Mitsuko Kitamura ^{1*}, Mami Takahashi ²

¹ Faculty of Human Health Sciences, Shunan University, Shunan 745-8566, Japan

² Faculty of Economics and Business Management, Shunan University, Shunan 745-8566, Japan; takahashi@shunan-u.ac.jp

* Correspondence: kitamura_m@shunan-u.ac.jp

Received: Feb 10, 2025; **Revised:** Feb 29, 2025; **Accepted:** Mar 20, 2025; **Published:** Mar 31, 2025

Abstract: Frailty is a growing public health concern in Japan, as the elderly population is projected to reach 39.53 million by 2043. In response to the increasing demand for long-term care and the increasing risk of dementia, frailty prevention has become a priority in Japan's healthy aging policies. In this study, we conducted a cross-sectional survey in City A, Japan where 137 respondents were included in the analysis. Residents across different age groups including teenagers to those aged 70 years old and above were recruited in this study to assess their needs for social care and support, especially frailty prevention, community livability, and individual well-being. The results indicated that residents valued City A's security, convenience, and strong community ties. However, they also expressed concerns about limited leisure options, economic uncertainty, and low participation in community initiatives which contribute to improving the overall quality of life but increase frailty risks at the same time. Additionally, the respondents experienced work-related pressures, health concerns, and financial insecurity, which might increase their frailty risks, too. These findings underscore the need for integrated urban and community planning strategies to enhance recreational facilities, expand healthcare infrastructure, and provide adaptable social support systems to reduce frailty risks.

Keywords: Frailty Prevention, Healthy Aging, Local City Livability, Social Support, Community Development, Public Health, Japan.

1. Introduction

Japan, as the world's first super-aged society, is undergoing significant demographic changes with the elderly population projected to peak at 39.53 million by 2043, representing 35.8% of the total population [1,2]. This demographic change poses serious public health challenges, particularly the growing need for long-term care due to the increased prevalence of age-related conditions, such as frailty and dementia.

Frailty has been focused on in Japan's public health strategy, as it directly correlates with higher risks of disability, hospitalization, and mortality [3]. To address these challenges, the Japanese government launched the "Plan for Extending Healthy Life Expectancy" to increase the average healthy lifespan to 75 years or longer by 2040 [3]. The plan emphasizes disease prevention, frailty mitigation, and dementia risk reduction by developing proactive health measures to effectively support the aging population. Alongside national efforts, international frameworks, such as the World Health Organization's Integrated Care for Older People (ICOPE), advocate for community-based interventions to maintain the functional ability and well-being of seniors [4]. The Japanese version of the ICOPE Handbook [5], developed by the Japan Geriatrics Society, provides localized guidelines for implementing frailty prevention and integrated care, focusing on social participation and access to community resources.

Despite these nationwide initiatives, gaps in social care and support persist at the community level, underscoring the need for localized assessments and interventions. City A, a mid-sized Japanese city, exemplifies these challenges, as residents express concerns over economic uncertainty, insufficient recreational spaces, and low participation rates in initiatives to improve the community's overall quality of life—all factors that can increase frailty risks. Understanding these local needs is essential for developing targeted interventions that align with national health goals. Therefore, we investigated frailty prevention and community development in City A by assessing the residents' social care and support needs. With 137 residents from teenagers to those aged 70 years old and above, their perceptions of community livability, access to facilities, and levels of civic participation were surveyed. The findings provide a basis for urban planning strategies that promote healthy aging and reduce frailty risks.

2. Materials and Methods

2.1. Respondents

The study was conducted in City A, a mid-sized local area in Japan with a diverse demographic profile. A total of 137 responses were included in the final analysis. The respondents were categorized into broad age groups from teenagers to those aged 70 years old and above. In the survey, responses related to specific ages were not asked for. Ethical approval for the study was obtained from the Education and Research Ethics Review Committee of Shunan University on July 25, 2023. All participants provided informed consent before participating, and confidentiality was maintained throughout the study under ethical research guidelines.

2.2. Survey and Data Collection

The survey was designed to assess social care and support needs in City A focusing on frailty prevention and community development. Using a cross-sectional approach, quantitative and qualitative data were collected to examine residents' perspectives on livability, health maintenance, and social engagement. A questionnaire was created to investigate (1) the respondent's perceptions of City A's attractiveness and community needs, (2) individual health and well-being, and (3) participation in initiatives to improve the community's quality of life. To enhance accessibility, the survey was conducted both online and offline at Aeon Town A. A pilot test with 15 residents was conducted to refine question clarity and improve reliability. The respondents provided informed consent, and confidentiality was strictly maintained throughout the study period. The final dataset of the surveys provided valuable data to understand community perceptions and frailty prevention strategies.

2.3. Frailty Prevention and Multidimensional Intervention Strategies

Frailty is a significant public health concern of older adults, as it increases vulnerability to deteriorate their health causing disability, hospitalization, and mortality [6]. Frailty is a measurable and potentially reversible condition when timely interventions are required [7]. However, there is no universally accepted standard for frailty assessment, and various methods have been developed in different clinical and community settings [8].

Two predominant models have been used in frailty research: the frailty phenotype (FP) and frailty index (FI) models. The FP model classifies individuals as frail, pre-frail, or robust based on five clinical criteria: unintentional weight loss, exhaustion, reduced physical activity, slow gait speed, and weak grip strength [9]. While effective for clinical screening, this model does not fully capture the cognitive and social aspects of frailty, which are essential dimensions of aging [10]. The FI model, on the other hand, quantifies frailty as an accumulation of health deficits, including chronic illnesses, functional impairments, and psychological conditions [11]. Although the FI model provides a comprehensive assessment, its complexity and extensive data requirements hinder routine clinical application [12].

To address these limitations, alternative assessment tools have been developed including the Kihon Checklist, which has been validated for community-dwelling older adults in Japan [13]. Recent studies highlight the importance of multidimensional approaches that incorporate physical, cognitive, psychological, and social factors to better assess and manage frailty [14]. The concept of frailty-friendly healthcare emphasizes the need for early detection and community-based interventions to care for high-risk populations, advocating for integrative strategies that move beyond traditional clinical models [15].

A systematic review of intervention strategies was conducted to evaluate and improve frailty prevention programs with multi-component interventions—including physical exercise, nutritional support, cognitive training, and psychosocial engagement [16]. Through physical activity and dietary modifications, physiological balance can be restored with cognitive and social engagement to fully address the multifaceted nature of frailty [17]. Clinical trials, including the SPRINT project, further validate the effectiveness of integrated interventions in delaying or even reversing frailty progression [17].

Multimodal programs integrated with exercise, nutrition, and behavioral optimizations have shown effectiveness in delaying frailty progression and improving functional capacity in community-dwelling older adults [18]. However, frailty prevention in institutional care remains underdeveloped. Recent research results highlight the lack of multidisciplinary models in residential settings and emphasize the need for interventions from the physical, nutritional, and cognitive aspects of frailty [16]. The previous findings indicate the necessity of adopting a comprehensive, multidimensional approach to frailty prevention and research on how to standardize frailty assessment and refine early screening protocols while developing culturally adaptable intervention models.

2.4. Data Analysis

Quantitative data from the closed-ended survey items were analyzed using descriptive statistics including frequency distribution, percentages, means, and standard deviations. Using them, key variables were identified including demographic characteristics, perceptions of community livability, health maintenance behaviors, and levels of civic participation. To ensure

consistency and accuracy, 137 respondents were included in the survey. The respondents were allowed to leave items unanswered to respect their voluntary participation and comfort, resulting in missing data for specific questions.

For qualitative data collected from open-ended responses, content analysis was conducted to extract key themes related to community support needs and barriers to healthy aging in City A. The responses were coded according to frequently mentioned keywords and significant phrases, which were then categorized into meaningful themes. To enhance reliability, two independent analysts performed coding, and discrepancies were resolved through discussion. The finalized categorization enabled an understanding of residents' concerns and priorities regarding community development and frailty prevention.

3. Results

The survey results were organized by participant demographics, perceptions, community needs, and health maintenance, and compared with those of neighboring cities. From the results, social dynamics, health behaviors, livability perceptions, and essential strategies were identified to promote healthy aging and community development.

3.1. Respondent Demographics

137 respondents provided valid responses to the survey. The respondents represented different age groups, from teenagers to those aged 70 years old and above. 13 respondents were teenagers, 12 were in their 20s, 35 were in their 30s, 36 were in their 40s, 12 were in their 50s, 12 were in their 60s, and 11 were 70 years old and above. Additionally, 6 respondents did not specify their age. 44.5% of the respondents were male ($n = 61$) while 52.6% were female ($n = 72$), with 2.9% ($n = 4$) not specifying their gender. 67.2% ($n = 92$) were married, while 27.7% ($n = 38$) were single, and 5.1% ($n = 7$) did not specify their marital status. Most respondents (67.2%, $n = 92$) lived in City A, while 24.8% ($n = 23$) resided in neighboring areas, and 13.9% ($n = 19$) were from other cities (Table 1).

Table 1. Respondent demographics.

Variable	Category	Number	Percentage (%)
Age	10s	13	9.5
	20s	12	8.8
	30s	35	25.5
	40s	36	26.3
	50s	12	8.8
	60s	12	8.8
	70 and above	11	8.0
	Not specified	6	4.4
Gender	Male	61	44.5
	Female	72	52.6
	Not specified	4	2.9
Marital Status	Married	92	67.2
	Single	38	27.7
	Not specified	7	5.1
Occupation	Full-time employees	63	46.0
	Part-time	23	16.8
	Other	48	35.0
Residence	City A	92	67.2
	Neighboring areas	23	16.8
	Other cities	19	13.9

3.2. Perceptions of City A Residents

3.2.1 Attractiveness of City A

97 respondents expressed a positive perception of City A's livability. The contributing factors to this perception were comfort (26.6%), convenience (21.5%), and a sense of community attachment (17.7%). These factors are consistent with widely recognized urban livability indicators which are used to assess the security, accessibility, comfort, economic stability, educational opportunities,

and community cohesion of a city [19]. However, a sense of community attachment does not necessarily translate into active civic participation. Many respondents in this study associated community cohesion with familiarity, interpersonal trust, and a sense of security rather than direct involvement in local initiatives. Previous nationwide assessments indicated positive evaluations regarding safety and community engagement, supporting the result of this study's survey that highlighted strong social ties among residents [19]. These results suggested that while the respondents felt socially connected within their community, this did not lead to their engagement in civil activities. Consequently, City A was perceived as a city with strong social cohesion, despite relatively low levels of active participation in activities designed for "making life easier" which was further explored with the survey data (Table 2).

Table 2. Factors affecting attractiveness of City A.

Factor	Number	Percentage (%)	Correlation coefficient
Comfort	21	26.6	N/A
Convenience	17	21.5	N/A
Community attachment	14	17.7	N/A
Housing ease (correlation)	N/A	N/A	0.68
Child-rearing (correlation)	N/A	N/A	0.23

3.2.2 Unattractiveness of City A

While many residents expressed a positive perception of City A, several found it less appealing. The reasons included insufficient familiarity with the area (31.3%), a lack of engaging features or recreational spaces (28.1%), and dissatisfaction with existing support systems (12.5%). These concerns aligned with previous urban livability assessments, which indicated that City A, despite its strengths in security and economic stability, had less convenience and comfort than neighboring cities [19]. Additionally, several respondents did not specify a particular reason for their disinterest (21.9%). This presented a lack of awareness regarding City A's amenities or insufficient city branding efforts. In previous rankings, cities with higher livability scores featured well-developed commercial and recreational infrastructure, suggesting that City A's lower score in these areas may contribute to its perceived lack of appeal [19]. Addressing these concerns through targeted public engagement initiatives and improved accessibility to recreational and cultural opportunities can reshape residents' perceptions and encourage greater engagement with local spaces. These findings are summarized in Table 3.

Table 3. Reasons for unattractiveness of City A.

Reason	Number	Percentage (%)
Insufficient familiarity with the city	10	31.3
Limited features/recreational spaces	9	28.1
No specific reason / lack of interest	7	21.9
Dissatisfaction with support systems	4	12.5
Inaccessibility or transportation challenges	2	6.3

3.3. Community Needs and Preferences

By understanding which facilities are necessary or unnecessary for the residents of City A, important data on urban development and community planning can be obtained. The respondents expressed diverse preferences regarding essential services, leisure infrastructure, and commercial establishments, shaping the perceived livability of the city. While City A is recognized for its safety and strong community ties, it lacks sufficient commercial and entertainment infrastructure compared with its neighboring cities. Therefore, City A needs improvements in shopping, leisure, and cultural facilities to enhance overall urban livability.

3.3.1 Necessity of facilities

Residents of City A identified essential or unnecessary facilities. Those who found City A attractive thought shopping malls (31.3%), leisure facilities (18.3%), and supermarkets (11.3%) are necessary for City A while those who found City A unattractive prioritized shopping malls (34.9%), leisure facilities (19.0%), and sightseeing spots (17.5%), suggesting a large demand for tourism and entertainment infrastructure. Convenience stores and supermarkets were considered unnecessary by 15.5% of the respondents who found City A attractive and by 12.9 and 16.1% of the respondents who found City A unattractive. This result suggested that

these facilities were already available enough in the city. Lifelong learning centers were regarded unnecessary by 11.9 and 22.6% of the respondents who found City A attractive and unattractive, indicating the respondents who found City A attractive had sufficient resources while the respondents who found City A unattractive had a lower perceived demand. Additionally, 23.8 and 25.8% of the respondents who found City A attractive and unattractive listed medical centers, cultural venues, and certain public service centers in the “other” category. These results highlight the need for balanced urban development to enhance commercial and recreational spaces while ensuring efficient resource allocation (Table 4).

Table 4. Necessary and unnecessary facilities by perceived city attractiveness.

Facility	Respondents who found City A attractive		Respondents who found City A unattractive	
	Necessary (%)	Unnecessary (%)	Necessary (%)	Unnecessary (%)
Shopping malls	31.3	7.1	34.9	12.9
Supermarkets	11.3	15.5	4.8	16.1
Convenience stores	0.9	15.5	0.0	12.9
Leisure facilities	18.3	3.6	19.0	3.2
Sports facilities	5.2	6.0	4.8	0.0
Hot spring facilities	7.0	9.5	4.8	3.2
Transportation infrastructure	7.8	3.6	6.3	0.0
Sightseeing spots	7.0	3.6	17.5	3.2
Lifelong learning centers	5.2	11.9	3.2	22.6
Other (e.g., medical centers, cultural venues)	6.1	23.8	4.8	25.8

3.3.2 Reasons for facility necessity

The respondents presented reasons for necessary facilities. The most frequent reasons included attractive content (25.3%), places for enjoying leisure and pursuing personal interests(24.2%), and a general shortage of such facilities (24.2%). While many respondents perceived City A as a livable city, they also emphasized the need for improved infrastructure to support social engagement and leisure activities (Table 5). Those who found City A unattractive emphasized facility shortages (26.7%) and the need for more engaging content (30.0%), reflecting dissatisfaction with current leisure and entertainment options. On the contrary, the respondents who found City A attractive cited needed to enjoy leisure and pursue personal interests (26.2%), suggesting a preference for facilities that support hobbies and personal development. Access issues (9.9%) and the availability of childcare-friendly environments (5.5%) were also mentioned by the respondents who found City A attractive. They also pointed out that relevant facilities can only be found in neighboring cities (4.4%) and insufficient publicity about existing facilities (1.1%). These findings underscored the importance of expanding commercial and recreational infrastructure and enhancing accessibility and public awareness to better accommodate diverse community needs (Table 5).

Table 5. Reasons for demanding facilities.

Reason	Respondents who found City A attractive (%)	Respondents who found City A unattractive (%)	Average (%)
Attractive content	23.0	30.0	25.3
No place to play (enjoy, self-actualization)	26.2	20.0	24.2
Shortage	23.0	26.7	24.2
Without reasons	0.0	10.0	3.3
Access issues	11.5	6.7	9.9
Childcare-friendly environments	8.2	0.0	5.5
Good Health and medical care environments	1.6	3.3	2.2
Insufficient publicity	1.6	0.0	1.1
Found only in neighboring cities	4.9	3.3	4.4

3.3.3 Unnecessary Facilities

The respondents identified unnecessary facilities with “No use for it” (29.7%), “no specific reasons” (27.0%), or “already existing” (23.0%). These responses suggested that such facilities in City A did not align with residents’ needs or usage patterns (see Table 6). The respondents who found City A attractive judged the necessity of facilities based on their availability (26.0%) while those who found the city unattractive lacked certain reasons (39.1%) or thought the same facilities in the neighborhoods (8.7%) could be used, suggesting that accessibility and awareness influenced the perceptions of facility necessity. 4.1 % of the respondents mentioned the absence of notable attractions (4.1%) or listed facilities with a low priority (5.4%). These results highlighted the need for strategic urban planning that optimizes facility development based on actual demand and improves the public awareness of existing infrastructure to maximize its usage (Table 6).

Table 6. Reasons for Considering Facilities Unnecessary.

Reason	Respondents who found City A attractive (%)	Respondents who found City A unattractive (%)	Average (%)
Already existing	26.0	17.4	23.0
Need a place to play	4.0	4.3	4.1
Unrealistic to build hot spring facilities	2.0	0.0	1.4
Security concerns	2.0	0.0	1.4
Lack of notable attractions	6.0	0.0	4.1
Low priority	6.0	4.3	5.4
No specific reasons	22.0	39.1	27.0
No use for it	32.0	21.7	29.7
Exists in the neighborhoods	0.0	8.7	2.7
Not for residents	0.0	4.3	1.4

Such findings highlight a strong preference for enhanced commercial and leisure infrastructure, particularly shopping malls and recreational spaces. The demand for sightseeing attractions of the respondents who found City A unattractive suggests potential for tourism development. Facilities such as lifelong learning centers and convenience stores were regarded as redundant or unnecessary. The need for strategic urban planning is revealed and aligns facility development with actual community needs. Expanding recreational and commercial spaces and optimal resource allocation can enhance City A’s overall livability. Based on the results, policymakers must allocate infrastructure investment to address accessibility and engagement to foster a more sustainable and vibrant urban environment.

3.4. Health Maintenance and Stress

3.4.1 Daily health maintenance and stress levels

Maintaining health and managing stress are crucial factors in frailty prevention and overall well-being. We explored the extent to which the residents of City A maintain their health, their efforts, and the levels and causes of their stress.

A high proportion of respondents reported health statuses. 94.9% of them indicated that they did not experience significant health issues affecting their daily activities. Notably, the respondents who perceived City A as attractive showed a higher rate of good health (96.9%) than those who found the city unattractive (89.5%). This suggested a possible link between perceived city livability and individual well-being. The reasons for maintaining good health included living healthily (30.9%), exercise (17.0%), self-care (17.0%), satisfaction with present life (16.0%), and diet (6.4%) (Table 7). These findings highlighted various approaches of the respondents to maintain their health, reflecting diverse lifestyles rather than strictly physical or psychological ones.

Despite the overall high levels of reported good health, 34.8% of the respondents experienced stress. The stress sources included work-related pressures, family responsibilities, and financial concerns, with notable differences between groups. Work-related stress was more frequently cited by the respondents who found City A attractive (22.4%) than those who found it unattractive (12.5%). Additionally, stress associated with family and childcare responsibilities was reported only by the respondents who perceived City A attractive (22.4%), indicating that residents who were positive about the city's livability also had responsibilities or burdens related to family life. These results underscored the complexity of factors contributing to stress and a need for targeted

community support and stress management at work and home. Married respondents perceived City A as attractive more (72.8%) than single respondents (65.8%), suggesting that marital status influenced perceptions of city livability. These findings indicated the need for community health strategies that integrate stress management and lifestyle support. Policies to improve work-life balance, financial stability, and access to mental health resources can alleviate stress and reinforce long-term well-being (Table 7).

Table 7. Health maintenance, stress levels, and contributing factors.

Reason	Respondents who found City A attractive (%)	Respondents who found City A unattractive (%)	Average (%)
Daily Health Maintenance			
Healthy	96.9	89.5	94.9
Not healthy	2.1	5.3	2.9
Reasons for Maintaining Good Health			
Living healthily	27.4	36.7	30.9
Exercise-conscious	17.7	16.7	17.0
Diet-conscious	6.5	6.7	6.4
Self-care conscious	22.6	6.7	17.0
Satisfied with present life	17.7	10.0	16.0
Other	8.1	23.3	12.8
Stress Levels			
Stressful	34.4	35.3	34.8
Stress-free	65.6	64.7	65.2
Reasons for Stress			
Work-related matters	22.4	12.5	19.0
Family/childcare responsibilities	22.4	0.0	16.7
Human relations	1.7	4.2	3.6
Economic/financial issues	5.2	4.2	4.8
Physical health concerns	3.4	4.2	3.6
Low stress	22.4	33.3	25.0
Other	22.4	41.7	27.4

3.4.2 Health concerns at age of 70 years old

Among 137 respondents, 44.7% expressed concerns about their health at age 70, while 55.3% reported no concerns. The most frequently mentioned concern was a decline in physical health (55.7%), followed by family and social support issues (11.5%) and financial insecurity (8.2%). 14.8% of respondents identified lifestyle and exercise habits as key factors influencing their future health. Due to the survey design, responses were analyzed by age groups not by specific ages. The trends in health concerns were consistent across different age groups. The respondents who found City A unattractive reported financial insecurity more as a future health concern (Table 8). While a majority of residents did not perceive immediate health risks, a significant number of them were concerned about aging-related problems. Addressing these concerns requires considering healthcare accessibility, financial security measures, and preventive health initiatives. By strengthening social networks and improving access to community support services, overall well-being in later life can be maintained.

Table 8. Health concerns at age 70.

Concern	Respondents who found City A attractive (%)	Respondents who found City A unattractive (%)	Average (%)
Concerned about health at age 70	43.6	47.2	44.7
Not concerned	56.4	52.8	55.3
Reasons for Concern			
Declining physical health	56.4	55.0	55.7
Financial insecurity	7.7	10.0	8.2

Family/social support concerns	12.8	10.0	11.5
Lifestyle/exercise	12.8	15.0	14.8
Other	10.3	10.0	9.8

4. Discussion

The results of the survey in this study provide essential information on the social and environmental factors influencing frailty prevention and healthy aging in City A. By examining community livability, health maintenance behaviors, and participation in activities, community livability can be improved. The survey results revealed the role of integrated City planning in fostering a supportive environment for aging populations.

4.1. Comparison with Existing Research

The findings of this study aligned with previous research emphasizing that frailty prevention requires a multidimensional approach, integrating physical, social, economic, and environmental factors [6]. In City A, the respondents who perceived their surroundings as attractive engaged more in physical and social activities showing that urban features such as green spaces, walkable areas, and community centers contributed to their healthy aging. Analysis by age groups indicated the preferences of younger and older respondents. Younger respondents valued natural environments, tranquility, and moderate commercial presence, whereas older respondents emphasized robust health, medical support, and local community presence. Full-time employees and public servants prioritized stable living environments and convenience, while part-time and self-employed respondents valued community support. Family structure also influenced perceptions; households with children prioritized child-friendly spaces and education facilities, while singles and seniors emphasized healthcare infrastructure and community support. Conversely, younger respondents were dissatisfied with City A's insufficient recreational and tourist facilities, while older respondents expressed economic insecurities and difficulties balancing work and family. Contract workers and students expressed economic instability and a lack of entertainment venues as reasons for dissatisfaction. While the perceptions of livability varied among different age groups, occupations, and family structures, the need for targeted urban development strategies is required for community segments.

Compared with neighboring cities, City A had less commercial and recreational infrastructure. While the respondents acknowledged its safety and strong community ties, the lack of shopping malls, leisure facilities, and cultural attractions made it less attractive, particularly for younger populations. The respondents who found City A unattractive significantly emphasized the need for hopping malls (34.9%) and sightseeing spots (17.5%) (Table 4), suggesting that limited entertainment options negatively impact perceptions of livability.

Other than commercial and recreational limitations, accessibility to essential services is also a critical issue. Unlike major urban centers with well-developed public transportation networks, City A is largely dependent on private transportation, which poses a challenge, particularly for older respondents. This aligns with existing study results indicating that mobility constraints can reduce social participation and access to healthcare [11]. Concerns about accessibility and service distribution highlight the role of infrastructure in shaping health behaviors and engagement levels among older populations. Despite these challenges, City A demonstrates strong community attachment. 17.7% of the respondents mentioned accessibility and service distribution as factors for their positive perception of the city. However, the respondents had a low level of participation to make the community easier to live in, and indicated a lack of general community involvement or volunteer activities. Existing informal social ties did not necessarily mean structured civil involvement. Prior research identified similar trends, where a sense of social cohesion exists independently of formal participation in community-enhancement activities [16] as observed in City A without larger urban centers and a well-established framework for encouraging structured community participation. Instead, social connections tended to be informal, relying on interpersonal familiarity rather than active organizational involvement.

These findings underscore the importance of adopting an urban development model to leverage City A's social strengths while addressing its infrastructure deficiencies. Improvements in public transportation, expansion of commercial and recreational facilities, and the promotion of structured participation in community-enhancement activities initiatives lead to a balanced and livable urban environment. By integrating these factors, City A can enhance livability while maintaining the social cohesion that distinguishes it from larger metropolitan areas.

4.2. Contribution to Policy-Making

The results of this study contribute to the policy-making for frailty prevention by providing a localized perspective on the socio-environmental factors that influence aging in mid-sized cities. Unlike national-level studies that generalize aging trends in Japan, we identified specific economic, infrastructural, and social challenges shaping frailty risks in City A.

Economic instability is closely related to the city's dependence on traditional industries. The respondents mentioned financial insecurity, employment uncertainty, and limited job opportunities as primary sources of stress and dissatisfaction, which aligns with existing study results showing financial insecurity increased vulnerability to frailty [12,15]. The elderly in City A faced limited employment opportunities post-retirement, causing financial uncertainty and exacerbating frailty risks by reducing access to healthcare and social support. These economic stressors were also found in previous study results indicating that financial insecurity, alongside psychosocial stressors, significantly impacts frailty risk [12,15].

The results of this study also presented community attachment and participation in activities to improve community livability. While the respondents demonstrated a strong psychological connection to City A, participation in structured initiatives for enhancing community quality of life remained low. This aligned with previous study results indicating that social ties contribute to a sense of belonging but do not lead to active involvement in structured improvement efforts [20]. The survey results on City A highlight the need for targeted interventions by fostering structured opportunities for respondents to engage in activities and enhance community livability. Efforts to improve public awareness and accessibility of such opportunities need to be placed to transform existing community attachment into active, structured participation. The necessity of adapting global frailty prevention frameworks is necessary in local contexts. While ICOPE emphasizes physical activity, cognitive stimulation, and social engagement [14], economic stability and infrastructure accessibility are equally critical for frailty prevention. Therefore, a holistic approach integrating healthcare interventions with economic and urban planning strategies is essential to support healthy aging comprehensively.

Appropriate policies to improve public transportation and service accessibility must be made, particularly for the elderly who face mobility challenges. Additionally, by enhancing commercial and recreational infrastructure, demands for leisure and shopping facilities can be met for City A to ensure attractiveness and livability for diverse age groups. Structured participation programs need to be tailored to various demographic segments to transform existing social cohesion into tangible community engagement. Given that the perceptions of livability differ significantly by age groups, occupation, and family structure, urban planning needs to be strategically focused on identifying target populations and their distinctive needs. By defining the vision of City A and strategically addressing the identified needs of targeted residents, the city's appeal can be maximized to ensure long-term community resilience against frailty risks. The results of this study presented the importance of the interconnectedness of urban infrastructure, structured participation opportunities, and economic security in shaping frailty outcomes. While City A benefits from strong informal community ties, solving problems in transportation, commercial development, and structured community-enhancement activities is essential to fostering a sustainable and inclusive environment for healthy aging. Integrating these elements into urban planning and policy development ensures that mid-sized cities such as City A remain livable and supportive of aging populations in the long term.

5. Conclusion

We examined the execution of frailty prevention and community development in City A, emphasizing the relationship between urban infrastructure, social participation, and economic stability in shaping healthy aging. While City A provides a safe and convenient living environment, limited recreational facilities, economic uncertainty, and low participation are still challenges in community enhancement activities for targeted interventions. The results of this study highlight the importance of integrated urban planning to enhance access to essential services, including recreational and healthcare facilities, which are critical for reducing social isolation and mitigating frailty risks. By addressing economic concerns and promoting informal social networks, healthy aging is promoted. Despite the respondents' strong community attachment, their low participation rates in structured community enhancement necessitate engagement strategies to reduce participation barriers rather than relying solely on formal programs.

Compared with neighboring cities, City A lacks sufficient commercial and leisure infrastructure, negatively affecting overall livability. Improving public transportation, expanding recreational spaces, enhancing service accessibility, and strategically developing infrastructure are required to enhance residential and lifestyle needs for the development of mid-sized regional cities such as City A. However, it is difficult to ensure all citizens find the city "attractive." Therefore, a strategic approach is required to extract the attractiveness of City A by enhancing individual lifestyles. By clarifying City A's visions, the city's strategic measures can be identified. The results of this study provide a reference to address aging-related challenges in a mid-sized city, emphasizing the need for region-specific adaptations of international frameworks such as the WHO's ICOPE [4]. While existing models prioritize physical and cognitive interventions, economic security and community-based support are also required.

Future research is necessary to explore long-term frailty prevention methods and assess the effectiveness of interventions across different regional and urban areas. Strengthening infrastructure, economic stability, and social connections is the key to fostering supportive environments for aging populations. Rather than simply responding to immediate resident requests or adding incremental improvements, strategically developing and managing the city based on a clear, long-term vision is demanded to proactively address demographic changes and challenges expected by 2040.

Author Contributions: For research articles with several authors, a short paragraph specifying their contributions must be provided. The following statements should be used “conceptualization, M. Kitamura and M. Takahashi; methodology, M. Kitamura and M. Takahashi; formal analysis, M. Kitamura; investigation, M. Kitamura and M. Takahashi; data curation, M. Takahashi; writing—original draft preparation, M. Kitamura; writing—review and editing, M. Kitamura and M. Takahashi; supervision, M. Kitamura. All authors have read and agreed to the published version of the manuscript.” Authorship must be limited to those who have contributed substantially to the work reported.

Funding: This research did not receive external funding.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board (Education and Research Ethics Review Committee) of Shunan University (approval date: July 25, 2023).

Informed Consent Statement: Not applicable” for studies not involving humans.

Data Availability Statement: The data of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Statistics Bureau. Population Estimate (as of October 1, 2022 (Reiwa 4)). Available online: <https://www.stat.go.jp/data/jinsui/2022np/index.html> (Accessed May 18, 2023).
2. Statistics Bureau. Population Estimate (Final Figures for October 2024 (Reiwa 6), Preliminary Figures for March 2025 (Reiwa 7)). Available online: <https://www.stat.go.jp/data/jinsui/new.html> (Accessed January 17, 2025).
3. Ministry of Health. Labor and Welfare: Available online: <https://www.mhlw.go.jp/english/wp/wp-hw13/dl/summary.pdf> ((Accessed March 31, 2025).
4. World Health Organization. Integrated care for older people: WHO launches new report of findings from the ICOPE implementation pilot programme. Available online: <https://www.who.int/news/item/25-04-2022-integrated-care-for-older-people--who-launches-new-report-of-findings-from-the-icope-implementation-pilot-programme> (Accessed May 18, 2023).
5. Kuzaya, M., Aita, K., Katayama, Y., and Katsuya, T.: Japan Geriatrics Society "Recommendations for the Promotion of Advance Care Planning": End-of-Life Issues Subcommittee consensus statement. *Geriatrics and Gerontology International* **2020**, 20, 1024–1028.
6. Cesari, M. Prince, M. Thiyagarajan, J. A., De Carvalho I. A. D., Bernabei, R. Chan, P., Gutierrez-Robledo, L. M., Michel, J.-P., Morley, J. E., Ong, P., Manas, L. R., Sinclair, A. Won, C. W., Beard, J. and Vellas, B: Frailty. An emerging public health priority. *Journal of the American Medical Directors Association* **2016**, 17, 188–192.
7. Dent, E., Kowal, P., and Hoogendijk, E.O. Frailty measurement in research and clinical practice: A review. *European Journal of Internal Medicine*, **2016**, 31, 3–10.
8. Fried, L. P. Tangen, C., Walston, J., Newman A.B., Hirsch, C., Gottdiener, J. S., Seeman, T.E., Tracy, R. P. Kop, W. J., Burke, G., and McBurnie, M. Frailty in older adults: Evidence for a phenotype. *The journals of gerontology. Series A, Biological sciences and medical sciences* **2001**, 56(3), M146–M156.
9. Mitnitski, A.B., Mogilner, A.J., and Rockwood, K.: Accumulation of deficits as a proxy measure of aging. *The Scientific World Journal* **2001**, 1, 323–336.
10. Jung, H.W., Yoo, H.-J., Park, S.-Y., Kim, S.-W., Choi, J.-Y., Yoon, S.-J., Kim, C.-H., and Kim, K.-I: The Korean version of the FRAIL scale: clinical feasibility and validity of assessing the frailty status of Korean elderly. *The Korean Journal of Internal Medicine*, **2014**, 69, 745–751.
11. Watanabe, D. Yoshida, T., Watanabe, Y., Yamada, Y., Miyachi, M., and Kimura, M.: Validation of the Kihon Checklist and the frailty screening index for frailty defined by the phenotype model in older Japanese adults. *BMC Geriatrics* **2022**, 22, 333–340.
12. Gobbens, R.J., Luijkx, K.G., Wijnen-Sponselee, M.T., and Schols, J.M.: Towards an integral conceptual model of frailty. *The Journal of nutrition, health & aging* **2010**, 14, 175–181.
13. Volpato, S., Bazzano, S., Fontana, A., Ferrucci, L., Pilotto, A., Atudy Group M.-T.: Multidimensional Prognostic Index predicts mortality and length of stay during hospitalization in the older patients: a multicenter prospective study. *Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, **2020**, 75, 1154–1161.
14. Mooijaart, S.P., van der Klauw, M.M., and Conroy, S. P.L: Geriatric emergency medicine-a model for frailty friendly healthcare. *Age Ageing* **2022**, 51, afab274.
15. Apóstolo, J., Cooke, R., Bobrowicz-Campos, E., Santana, S., Marcucci, M., Cano, A., Vollenbroek-Hutten, M., Germini, F., D’Avanzo, B., Gwyther, H., and Holland, C.: Effectiveness of interventions to prevent pre-frailty and frailty progression in older adults: a systematic review. *The JBI Database of Systematic Reviews and Implementation Reports*, **2018**, 16, 140–232.

16. Ambagtsheer, R. C., Leach, M. J., O'Brien, L. M., Tyndall, J., Wardle, J., and Beilby, J.: Multidisciplinary, multicomponent interventions to reduce frailty among older persons in residents of residential care facilities: a scoping review. *Systematic Reviews* **2024**, *13*, 154.
17. Lee, S. H. and Yu, S.: Effectiveness of multifactorial interventions in preventing falls among older adults in the community: A systematic review and meta-analysis. *International Journal of Nursing Studies*, **2020**, *106*, 728–735. 103564.
18. Delaire, L., Courtay, A., Humblot, J., Aubertin-Lecheudre, M., Mourey, F., Racine, A. N., Gilbert, T., Niasse-Sy, Z., and Bonnefoy, M.: Implementation and core components of a multimodal program including exercise and nutrition in prevention and treatment of frailty in community-dwelling older adults: A narrative review. *Nutrients*, **2023**, *15*, 4100.
19. Tōyō Keizai. "2024 Livability Ranking" Top 200 Nationwide. Available online: <https://toyokeizai.net/articles/-/845007> (Accessed on December 20, 2024).
20. Akiyama, H. Science and Technology, and the Intellectual Spirit of Culture. Available online: https://www.jst.go.jp/ristex/output/files/57_akiyama2017.8.pdf (Accessed January 18, 2025).

Publisher's Note: IJKII stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



© 2025 The Author(s). Published with license by IJKII, Singapore. This is an Open Access article distributed under the terms of the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/) (CC BY), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.