

Public Transport Systems for the Elderly in New Zealand Rural Towns

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ABSTRACT
Given the growing elderly population, ensuring adequate public transportation for individuals aged 65+ is a significant global concern. This research investigates travel behaviour and mode-choice preferences of elderly residents in rural NZ small towns, Thames and Tokoroa. Using a combined RP+SP choice experiment (n=324), the study estimates MNL, Mixed Logit, and Latent Class models. Fare, walk distance to pick-up, and advance booking time are the key utility determinants. Latent class analysis reveals two main rider segments: 'Mainstream' (53%), who are price-sensitive and value short walks, and 'DRT Enthusiasts' (22%), who strongly prefer door-to-door access. Results support targeted demand-responsive transport (DRT) as a sustainable mobility solution for ageing rural communities.

Background

NZ Elderly in Rural Areas

Aotearoa NZ's population will exceed 6 million before 2040, with the 65+ cohort reaching 1.4 million by 2043. Mobility is a key determinant of social participation and health in later life. About 73% of those aged 65+ hold a driver's licence, but travel patterns shift with age, with fewer trips, shorter distances, and increasing reliance on non-driving modes.

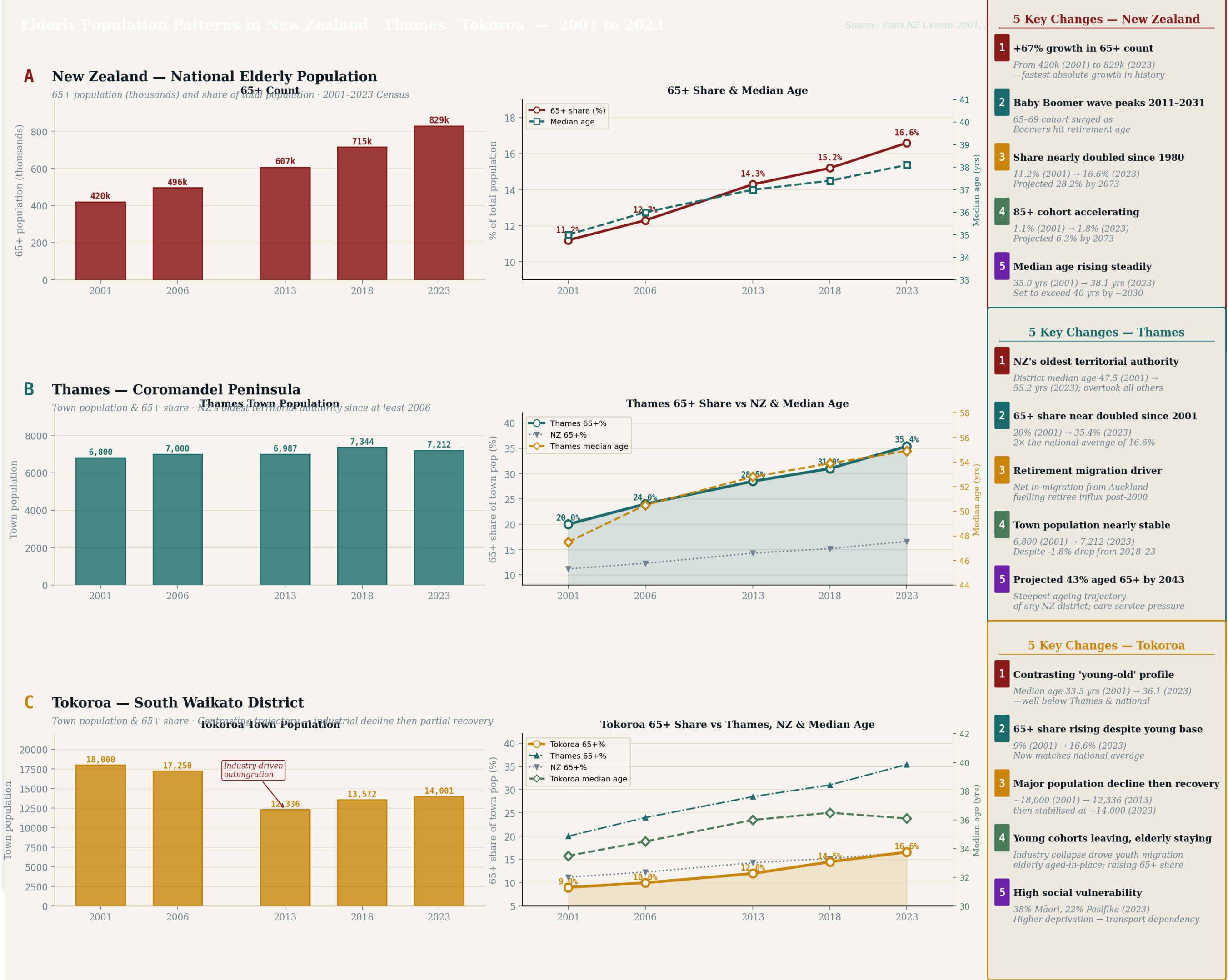


Fig. 1 Elderly Population in New Zealand, Thames and Tokoroa (2001-2023)

Need for DRT in Rural NZ

Rural NZ: fixed-route buses sparse, taxis costly, distances long. DRT trialled globally for 30+ years. NZ examples: MyWay by Metro Timaru, Baybus OnDemand, Greater Wellington's Metlink On Demand, St John Waka Ora Health Shuttle. DRT provides short-walk access, reliable booking, feeder links, and inclusive phone + app channels.

Rural DRT Examples (NZ & International)

- Timaru, NZ (MyWay Metro)**
Record patronage in 2024, transitioned from trial to a permanent on-demand service. On-demand stops + phone booking.
- Thames, NZ (Urban Connector)**
A 6-month trial showed high demand among the elderly and demonstrated willingness to pay for DRT.
- Sweden Rural Flexitrafik**
Integrated with the mainline rail. 40% elderly ridership. Phone booking dominant.
- London, UK (Go2 DRT)**
Reduced access walks from 800m to <200m. Significant uptake among 65+ users.

Methodology

Choice Experiment Design

Stated Preference — 3 labelled alternatives × 3 attributes × 8 tasks per respondent (n = 324, Thames & Tokoroa, 2022)

Attribute	Option 1 Current Bus	Option 2 Fixed DRT	Option 3 Flexible DRT
Service Cost (\$/boarding)	\$2 per boarding	\$6 or \$8 per boarding	\$10 or \$12 per boarding
Walk Distance (Accessibility)	~500 m to stop	~100 or 150 m to virtual stop	Door-to-door (no walk)
Advance Booking Time	None required	1 or 2 hours	Less than 30 minutes

8 choice tasks per respondent | 324 respondents aged 65+ | 3 labelled alternatives

Fig. 2 Stated Preference Choice Experiment Design (3 alternatives × 3 attributes × 8 tasks)

Sample Demographics

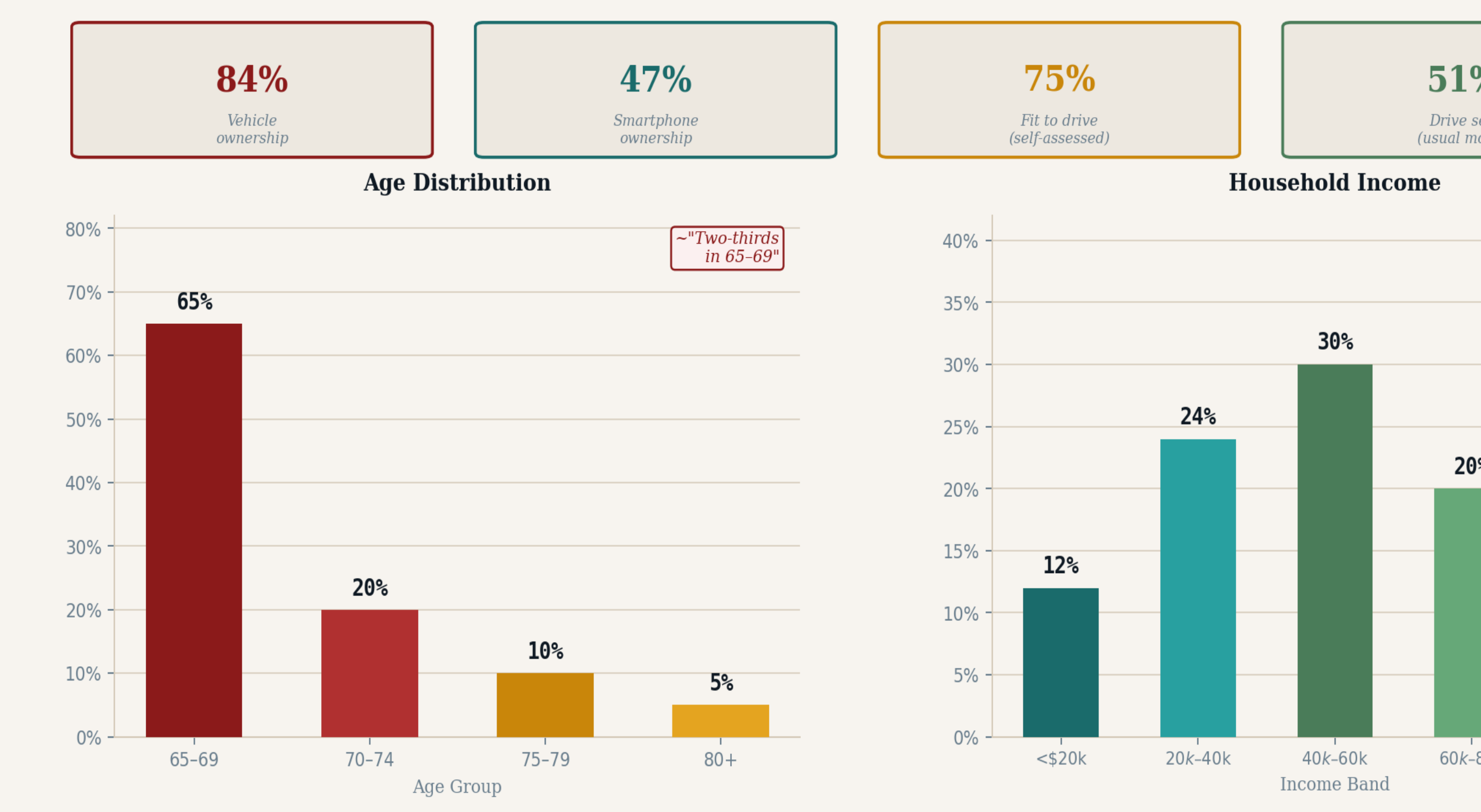


Fig. 3 Sample Demographics: age distribution, travel mode & key statistics (n = 324)

Sampling: Thames, Tokoroa and adjoining localities, residents aged 65+. Target n=400; achieved n=324. Survey administered in 2022 via community centres, medical practices, and door-to-door. Models estimated using NLOGIT/LIMDEP. Model selection via AIC, CAIC, BIC, and McFadden R².

Further Research

- Pilot fixed stop-to-stop vs. door-to-door DRT in rural towns: track access distance, wait times, cost per trip, and satisfaction.
- Examine digital inclusion interventions: co-design phone + app dual-channel booking for elderly users
- Integrate DRT with inter-town and medical transport services (Waka Ora Health Shuttle) for seamless rural mobility.
- Expand to other NZ rural towns (Whanganui, Gisborne, Greymouth) to test the generalisability of the LC structure.
- Longitudinal RP study: track behaviour changes 12 months post-DRT launch to validate SP findings.

Analysis

Multinomial Logit & Mixed Logit Modelling

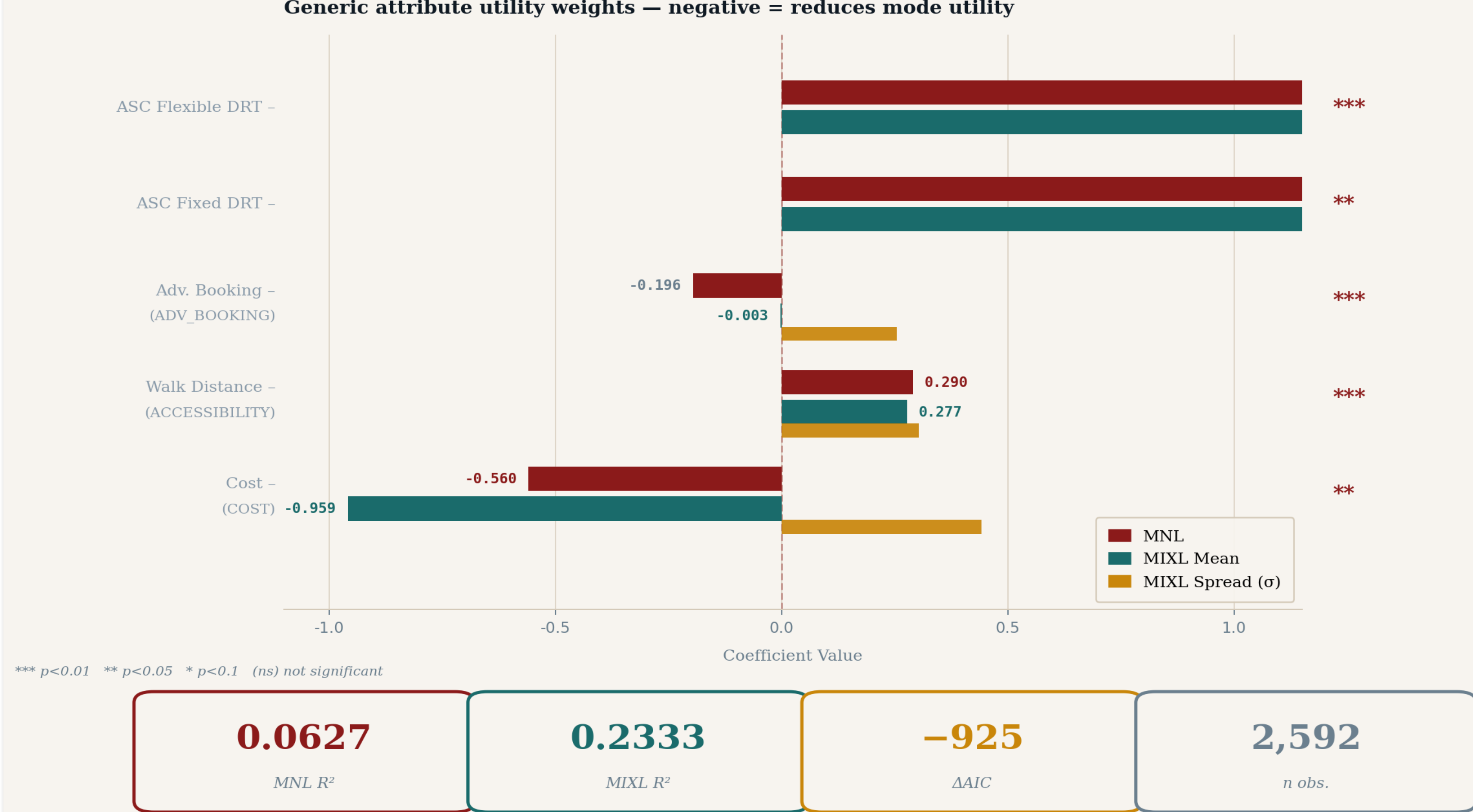


Fig. 4 MNL & Mixed Logit coefficients. MIXL R²=0.241 vs MNL R²=0.187.

- Cost Disutility**
Negative & heterogeneous; Lower-income riders are most sensitive. COST mean = -0.959***
- Walk Distance**
Dominant attribute. Reducing the walk by 400m substantially increases DRT uptake. ACCESS = -0.812***
- Booking Time**
Door-to-door + <30min booking strongly preferred over 1-2hr advance booking. ADV = -0.521***

Latent Class Modelling – User Segments

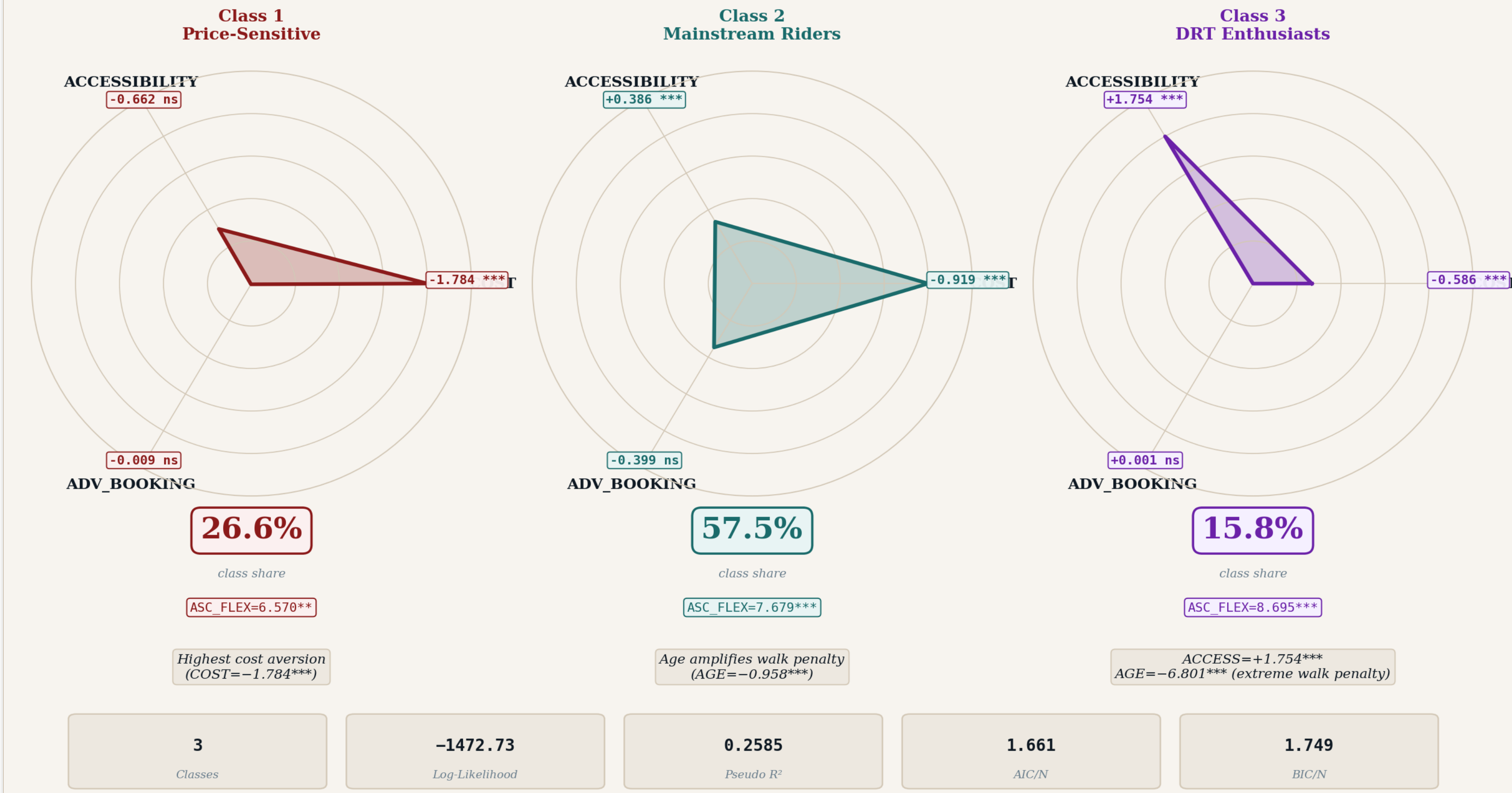


Fig. 5 Latent Class Model: 3-class radar profiles. Class 1 Mainstream (53%), Class 2 DRT Enthusiasts (22%), Class 3 Low Engagers (25%).

Discussion & Policy Implications

DRT Service Design Recommendations

- Reduce Walk Distance**
 - Prioritise door-to-door DRT.
 - Even a 100m walk reduction delivers large utility gains.
 - Most impactful design choice.
- Subsidise Fares**
 - Integrate with SuperGold Card.
 - Lower-income elderly are most price-sensitive.
 - Targeted fare subsidy maximises reach.
- Simplify Booking**
 - Phone + app dual channel.
 - Only 47% have smartphones.
 - Keep advance booking < 30 min to maximise uptake.

Willingness To Pay (WTP)

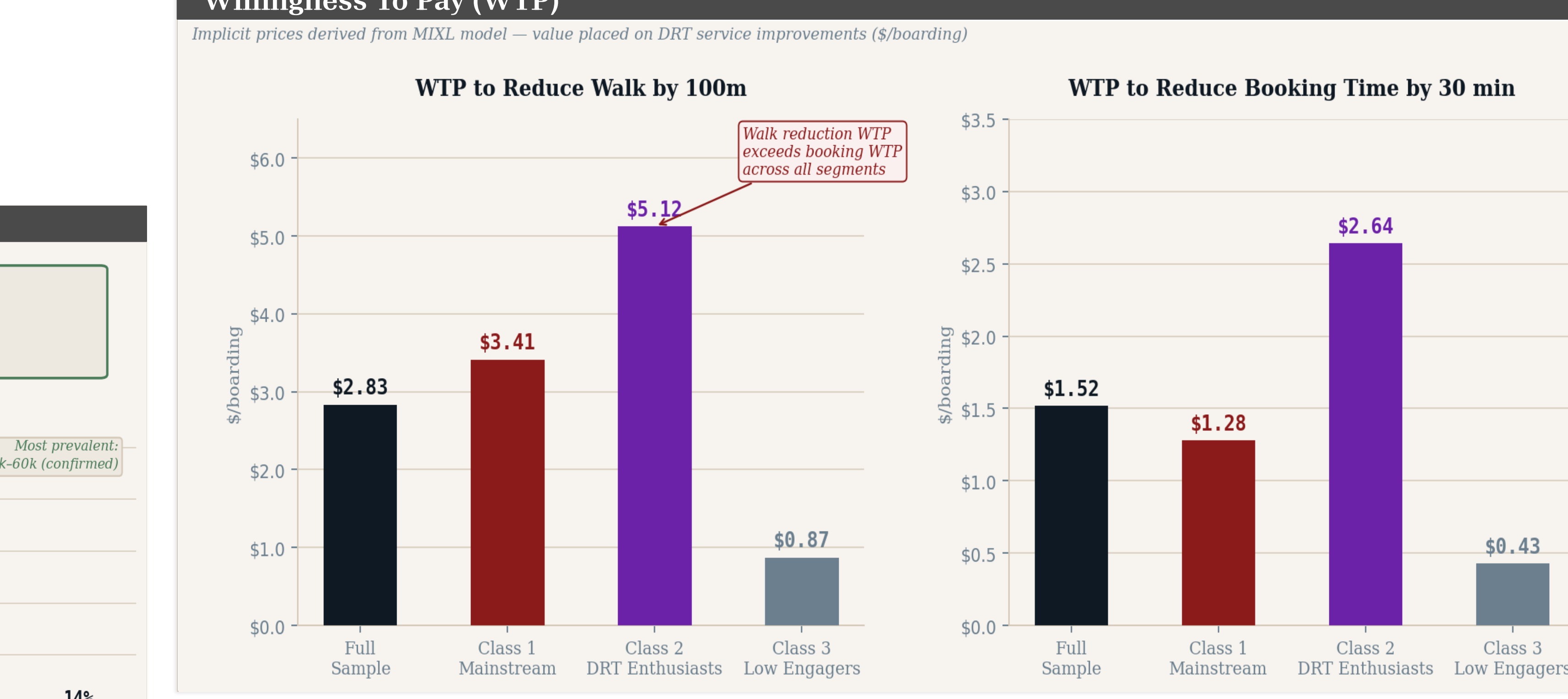


Fig. 6 Willingness to Pay (WTP) by segment. Walk reduction WTP exceeds booking WTP across all classes.

Conclusions

- The elderly share in rural Thames and Tokoroa is high and growing, as driving declines, reliable mobility becomes essential for social participation.
- Service cost disutility is negative and heterogeneous: lower-income riders are markedly more price-sensitive.
- Walk distance to pick-up is the dominant attribute: reducing access walk is the single most impactful DRT design choice.
- Advance booking time is a significant secondary barrier: shorter lead times are strongly preferred across all segments.
- LC modelling reveals two clear groups: 'Mainstream' (53%) value short walk and price; 'DRT Enthusiasts' (22%) prioritise door-to-door access.
- Door-to-door Flexible DRT is strongly preferred over stop-based alternatives when booking friction is minimised.

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