

# Aging-In-Place Preference and Institutionalization Among Japanese Older Adults: A 7-Year Longitudinal Study

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## Research Article

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# Abstract

## Background

In Asia, where autonomous decision-making is not well accepted, little is known about whether and how individuals' preferences are considered when deciding where they receive care. This study examined the longitudinal association of aging-in-place preference when bedridden with institutionalization among Japanese older adults.

## Methods

We analyzed nationally representative data of 1,290 community-dwelling older adults aged 70 and above, applying the multiple imputation method. Baseline data were collected in 1999, shortly before the long-term care insurance system was introduced. The outcome was measured as self- or proxy-reported years of institutionalization over seven years. The explanatory variable was the aging-in-place preference. Participants were asked about their desired place of care (facility, home, or other) when bedridden. Covariates were sociodemographic and health-related factors. We used Cox proportional hazards models and calculated hazard ratios (HRs) with 95% confidence intervals (CIs) to evaluate the association of aging-in-place preference when bedridden with institutionalization.

## Results

Seventy-eight respondents (6.0%) were institutionalized during the follow-up period. Compared to individuals preferring to reside in long-term care facilities when bedridden (48.7%), those preferring to stay in their homes (39.6%) were less likely to be institutionalized, even after adjusting for relevant covariates (HR = 0.46, 95% CI 0.27–0.79 for model 1 including residential status; HR = 0.45, 95% CI 0.27–0.76 for model 2 including marital status and co-resident children).

## Conclusions

Our findings suggest that individuals' aging-in-place preferences are considered under the long-term care insurance system. Individuals' preferences should be shared by families and clinicians when deciding the place of care.

## Background

Aging in place refers to the preference to live in one's own home. The vast majority of older adults are known to prefer to age in place. In 2018, more than 90 percent of Japanese adults aged 65 and above preferred to live at home, and more than half of them also preferred to die at home (1). In fact, however, only 13.7% died in one's own home (2). Therefore, older adults and families with clinicians and

policymakers need to understand how individuals' aging-in-place preferences are considered when determining whether to stay at home versus moving to a nursing home or a hospital.

Previous research has examined predictors of institutionalization (i.e., nursing home admission and long-term hospitalization) among older adults. Poor health, including physical and cognitive impairment, is strongly predictive of institutionalization, according to meta-analytic and systematic reviews (3, 4). In addition, several sociodemographic factors, such as increasing age and living alone, are associated with institutionalization. These sociodemographic and health-related factors are relatively consistent predictors of institutionalization in Japanese older adults as well (5–10). However, few studies have directly tested whether the individuals' aging-in-place preferences are considered when deciding whether to stay in one's own home.

The limited evidence for the association between individual preferences and institutionalization may be partly because most studies have been conducted in individualistic cultures emphasizing individual autonomy (11, 12). Some researchers and clinicians have recognized that, while taken for granted that individuals have the right to make autonomous decisions in individualistic cultures, individual preferences toward autonomous decision-making vary within and across cultures (11, 12). Specifically, in individualistic cultures, such as North America, it is normative that individuals decide about medical treatment and care for themselves. On the other hand, in collectivistic cultures, such as Asia, decisions are shared and made by individuals, families, and clinicians. As a result, autonomous decision-making has been less accepted in Japan, where families and clinicians traditionally made medical decisions without consulting the individuals (13).

Empirical studies have shown that individuals perceive families and clinicians to have crucial roles in treatment decision-making in Asia, including Japan (14–16). In contrast, evidence remains scarce concerning whether and how individuals' preferences are considered when deciding where they receive care. As an exception, an earlier study of Japanese older adults with severe disabilities suggests that individuals' preference for aging in place enables them to live in their homes for a longer period (17). However, one of the limitations is that the study asked care managers, but not older adults, about individual preferences. To better understand the role of individual preferences in care decision-making, this study aimed to examine the longitudinal association of aging-in-place preference when bedridden with institutionalization among Japanese older adults.

## Methods

### Participants and procedure

We used data obtained from the National Survey of the Japanese Elderly (NSJE), a nationally representative survey of older Japanese aged 60 and above. The NSJE started in 1987, and the participants were interviewed every three to four years until 2006. In 1999, people aged 70 and above were recruited shortly before the long-term care insurance system was introduced in 2000, and 1,635 people participated in the baseline survey (response rate = 81.8%). The participants were followed up in

2002 and 2006. We thus used the seven-year three-wave longitudinal data for the subsequent analysis. The detailed methodology, including the research design and the response rates, is available on the website of the NSJE (JAHEAD/NSJE Project Group, n.d.).

The sampling procedure is illustrated in Fig. 1. The selection criteria were (i) 70 years old and above; (ii) self-report data provided at the first survey; and (iii) living at home at baseline. The exclusion criteria were (iv) participating in the first survey but lost to follow-up and (v) admission to a long-term care facility or died in 1999 just after the first participation. As a result, 1,290 respondents were selected for this study.

## **Institutionalization**

The outcome was measured as self- or proxy-reported years of institutionalization. In this study, we created a composite outcome by defining institutionalization as admission to long-term care facilities enacted by the long-term care insurance and long-term hospitalization. Then, time to institutionalization was calculated as the year of the baseline survey (1999) to the year of the last follow-up survey (2006) or the time when the participants were institutionalized, dropped out, or died. Residence status, including survival, was obtained and verified through the official residential registry.

We note that the temporary absence was considered as community-dwelling. In addition, residential places, such as low-cost social welfare facilities and retirement homes, were not regarded as institutionalization because those residents were assumed to live relatively independently.

## **Aging-in-place preference**

The explanatory variable was the aging-in-place preference. We converted the following eight desired places of care when bedridden into three places (i.e., facility, home, and other) and created two dummy variables with the facility as the reference category.

Participants were asked about their desired place of care when they were bedridden. Then, respondents chose one of the eight options: home with the hospital, nursing home, home with informal caregivers, home with formal caregivers, retirement housing, other, and do not know. In this study, we classified the responses into three preferences: (i) facility included two options (hospital and nursing home); (ii) home included three options (home with informal caregivers, home with formal caregivers, and retirement housing); and (iii) other included the remaining two options (other and do not know).

## **Covariates**

Considering known predictors of institutionalization (3,4), we included several sociodemographic and health-related variables as covariates: age at the first survey, gender (0 = *male*, 1 = *female*), education (0 = *less than 9 years*, 1 = *10–12 years*, and 2 = *more than 13 years*), perceived financial status (0 = *extremely difficult* to 4 = *not at all difficult*), living arrangement (0 = *living alone*, 1 = *living with others*), non-coresident children (0 = *no*, 1 = *yes*), and physical and cognitive function. To check the robustness of

results on family networks, we also considered marital status (0 = *not married*, 1 = *married*) and co-resident children (0 = *no*, 1 = *yes*), instead of living arrangement.

Physical function was indexed as activities of daily living (ADLs). ADLs were assessed using ten activities (e.g., taking a bath, getting dressed, and moving in and out of bed), answered on a scale ranging from 0 = (*cannot*) to 4 = (*not difficult*). We calculated the summary score, ranging from 0 to 40. A higher value represents better physical function.

Cognitive function was assessed using the Short Portable Mental Status Questionnaire (SPMSQ) (19,20). Nine items were measured in the NSJE (e.g., memory, time and place orientation, and serial calculation). The number of correct answers was summed and used as the indicator of cognitive function. The score ranged from 0 to 9. A higher score indicates better cognitive function.

## Statistical analysis

We first reported descriptive statistics and intercorrelations among the study variables. Next, we used Cox proportional hazards models and calculated hazard ratios (HRs) with 95% confidence intervals (CIs) to evaluate the association of aging-in-place preference when bedridden with institutionalization. The proportional hazard assumptions were graphically assessed using the Kaplan–Meier methods.

The percentage of respondents having missing information on the explanatory variable or covariates was 29.9%. To mitigate potential bias due to missing data, we applied the multiple imputation method. The method obtains unbiased estimates and standard errors when the missing at random assumption is satisfied (21). The imputation model included the explanatory variable and covariates at baseline. According to the guideline, we conducted 30 imputations, equivalent to the percentage of incomplete respondents. The underlying Markov chain was iterated ten times for each imputation. Then, we checked the imputation model by comparing the observed and imputed data (22). Finally, results were aggregated across the analyses to derive summary statistics by standard procedures (21). All statistical analyses were conducted using SPSS, version 28 (IBM Corp., Armonk, NY, USA).

## Results

### Descriptive statistics and intercorrelations

Participants were followed up for an average of 6.21 years ( $SD = 1.64$ ). During the seven-year period, 78 respondents (6.0%) were institutionalized. Of these, 43 respondents were admitted to long-term hospitals, and 35 of them were admitted to long-term care facilities. Figure 2 visualizes cumulative non-institutionalized survival stratified by the desired place of care when bedridden, using the Kaplan–Meier methods. As a result, the proportional hazard assumptions were not violated.

Table 1 shows descriptive statistics of the observed sample. When bedridden, 48.7% of respondents preferred to stay in long-term care facilities, whereas 39.6% preferred to stay at home. A detailed

breakdown of the place of care desired by the individuals indicated was as follows: the respondents preferring to live in long-term care facilities ( $N = 597$ ) chose hospital ( $n = 419$ ) or nursing home ( $n = 178$ ); (ii) those preferring to live in their homes ( $N = 542$ ) chose home with informal caregivers ( $n = 234$ ), home with formal caregivers ( $n = 277$ ), or retirement housing ( $n = 31$ ); and (iii) the remaining respondents ( $N = 151$ ) chose other ( $n = 9$ ) or do not know ( $n = 142$ ).

Table 1  
Descriptive statistics of the observed sample

Variables	<i>n</i>	<i>M (SD) / %</i>	Range
Age (years)	1,290	75.68 (4.80)	70–98
Gender (% female)	1,290	58.8	
Education	1,268	0.48 (0.67)	0–2
Perceived financial status	1,190	2.70 (1.00)	0–4
Living arrangement (% co-residing)	1,290	84.3	
Marital status (% married)	1,290	56.8	
Co-resident children (% yes)	1,290	47.7	
Non-coresident children (% yes)	1,113	86.1	
Physical function	1,277	38.94 (3.86)	2–40
Cognitive function	1,003	7.73 (1.38)	1–9
Aging-in-place preference (% yes)	1,290		
Facility		48.7	
Home		39.6	
Other		11.7	
<i>N = 1,290</i>			

Table S1 presents the intercorrelations between the observed variables (see Additional file 1). The results indicated multicollinearity among family networks: Living arrangement was moderately to strongly correlated with marital status and co-resident children ( $r_s = .54$  and  $.41$ , respectively). To avoid multicollinearity, we examined the associations of family networks with institutionalization in two models: Model 1 included living arrangements, whereas model 2 included marital status and co-resident children.

## Association Of Aging-in-place Preference With Institutionalization

To check the imputation model, we compared the distributions of the incomplete variables (i.e., education, perceived financial status, physical function, and cognitive function) between the observed and imputed data (see Table S2 for details in Additional file 2). As a result, the observed and imputed samples had similar means and standard deviations, ensuring that the obtained results were reliable.

Next, we examined the association of aging-in-place preference when bedridden with institutionalization using Cox proportional hazard models. Table 2 then summarizes the results of the estimated models based on the imputed samples. Respondents who preferred to reside in their homes when bedridden were less likely to be institutionalized than those preferring to reside in long-term care facilities across models (HR = 0.53, 95% CI 0.32–0.87 for crude model; HR = 0.46, 95% CI 0.27–0.79 for model 1 including living arrangement; HR = 0.45, 95% CI 0.27–0.76 for model 2 including marital status and co-resident children). In terms of covariates, older age and physical and cognitive impairment were associated with institutionalization.

Table 2

Association of aging-in-place preference with institutionalization based on the imputed samples

	Institutionalization	Crude model	Adjusted model 1	Adjusted model 2
Predictors		HRs (95% CI)	HRs (95% CI)	HRs (95% CI)
Aging-in-place preference				
Facility <sup>†</sup>	47 (7.9%)	Ref.	Ref.	Ref.
Home	23 (4.2%)	0.53 (0.32–0.87)*	0.46 (0.27–0.79)**	0.45 (0.27–0.76)**
Other	8 (5.3%)	0.62 (0.29–1.32)	0.53 (0.25–1.13)	0.51 (0.24–1.10)
Age		1.12 (1.08–1.17)***	1.10 (1.05–1.15)***	1.09 (1.05–1.14)***
Gender (ref: male)		1.70 (1.04–2.78)*	1.05 (0.62–1.77)	1.03 (0.59–1.80)
Education		0.65 (0.43–0.97)*	0.90 (0.58–1.38)	0.91 (0.59–1.39)
Perceived financial status		0.74 (0.60–0.92)**	0.85 (0.69–1.06)	0.84 (0.68–1.05)
Living arrangement (ref: living alone)		0.62 (0.37–1.05)	0.73 (0.42–1.28)	—
Marital status (ref: no)		0.51 (0.33–0.80)**	—	0.85 (0.50–1.44)
Co-resident children (ref: no)		1.15 (0.74–1.80)	—	1.08 (0.69–1.71)
Non-coresident children (ref: no)		0.71 (0.40–1.24)	0.75 (0.43–1.34)	0.76 (0.43–1.34)
Physical function		0.92 (0.90–0.95)***	0.95 (0.91–0.98)**	0.95 (0.91–0.98)**
Cognitive function		0.67 (0.59–0.77)***	0.78 (0.66–0.93)**	0.79 (0.67–0.94)**
* $P < .05$ , ** $P < .01$ , *** $P < .001$ . $N = 1,290$ . HR = hazard ratio; CI = confidence interval.				
<sup>†</sup> Reference group.				

To check the robustness of the results reported above, we also conducted the Cox proportional hazard models based on the complete sample without missing values on the study variables. As shown in Table S3 (see Additional file 3), we observed a similar, albeit statistically not significant, association of aging-in-place preference with institutionalization in the models based on the complete sample.

## Discussion

This study examined the longitudinal association of aging-in-place preference when bedridden with institutionalization (i.e., nursing home admission and long-term hospitalization) among Japanese older adults. Using nationally representative data collected from 1999 to 2006, we found that, compared to individuals preferring to reside in long-term care facilities when they were bedridden, those preferring to stay in their homes were less likely to be institutionalized, even after adjusting for relevant covariates. Our findings suggest that individuals' aging-in-place preferences are considered under the long-term care insurance system when deciding whether to stay at home versus move to a nursing home or a hospital.

Our findings have implications for policymakers and clinicians. When older adults are bedridden and prefer to live at home, adequate care provision from their families and community is required. However, there are still gaps between the desired places for living and dying or between the actual and desired places of death (1, 2). The Japanese government and local municipalities should continue to facilitate community-based integrated care (23) to enable older care recipients to live at home as long as possible. Furthermore, despite the traditional paternalism (13), shared decision-making between patients and clinicians is recently facilitated in medical settings (24, 25). Such support for older adults' care decision-making would also be important in care settings. To our knowledge, only one interventional study plans to directly test the effect of facilitating decision-making for aging in place (26). More studies are needed to promote individual autonomy in care decision-making.

Regarding covariates, we found that older age and physical and cognitive impairment were associated with institutionalization. These findings were consistent with previous studies (3, 4). In contrast, the role of family networks was inconsistent across studies. Specifically, while earlier studies indicate that living alone is predictive of institutionalization (7), especially among men (9), this study did not observe such an association. There could be several reasons for the inconsistent results. First, the proportion of respondents living alone was relatively small (15.7%), which may have caused this study to be limited in statistical power to detect differences among living arrangements. Yet, given the increasing rates of living alone among Japanese older adults, from 19.7% in 2000 to 26.4% in 2017 (1), more recent cohorts may be more likely to face difficulty continuing to stay up at home when bedridden. Second, this study did not specify detailed family relationships with the participants, except for marital status. Indeed, in the crude model, those having a spouse were more likely to continue to live at home. Spouses might continue caring for their partners even if the caregiver burden became severer. Conversely, a previous study reported, when daughters-in-law were caregivers, older care recipients were at risk of institutionalization (5). Third, we did not consider the time-varying nature of family networks. For example, even if older adults lived alone independently at baseline, they could start to need care and live with families. Future research should capture dynamic family networks over time.

This study has strengths, such as a nationally representative sample, a high response rate at baseline, and a long follow-up period. However, there are also limitations to note. First, we assessed institutionalization using self- and proxy-reported data. Objective data sources should be utilized to

obtain information about institutionalization. In addition, we created a composite outcome by defining institutionalization as nursing home admission and long-term hospitalization. Because of the low occurrence rates, this study lacked sufficient statistical power to examine the association of aging-in-place preference with the two outcomes separately.

Second, the timing of the baseline survey should be interpreted with caution. In this study, aging-in-place preference was assessed in 1999. Since 2000, however, individuals' preferences for the place of care might change after the long-term care insurance system was introduced. Before the implementation of the long-term care insurance system, 43% of older patients stayed in hospitals for more than six months due to the lack of long-term care facilities (27), but the provisions of formal care, including long-term care facilities and home care services, have been enriched in both quantity and quality since then. Therefore, our findings should be updated to reflect more recent data.

Third, although families play a crucial role in care decision-making, particularly in collectivist cultures (11, 12), the NSJE did not collect data detailed on families. For instance, even if older adults preferred to reside in their homes, their families might not be able to provide sufficient care. Indeed, previous studies suggest that a severer caregiver burden predicts institutionalization among older adults with dementia (28). Relatedly, the data on formal care was not utilized. Several studies of Japanese older adults reported that home care services, including home-visit nursing services and rental services for assistive devices, were related to continuing to live at home (29, 30), indicating that formal care could compensate for informal care. Also, we did not consider the region of residence (e.g., urban versus rural). Available formal care varies according to regions, which may impact the place of care and death (31).

## Conclusions

This study demonstrated that individuals preferring to reside in their homes were less likely to be institutionalized. Autonomous decision-making has been traditionally less accepted in Japan, but our findings suggest that individuals' aging-in-place preferences were considered after the implementation of the long-term care insurance system in 2000. Given that decisions are shared and made by individuals, families, and clinicians in collectivistic cultures, such as Asia (11, 12), families should consider older adults' preferences for place of care whenever possible. Also, clinicians should respect and incorporate such shared decision-making processes when deciding where individuals receive care.

## Declarations

### Ethical approval and consent to participate

Ethical approval was not required as this study performed a secondary analysis using publicly available data and the original research team obtained informed consent.

### Consent for publication

Not applicable.

## Available of data and materials

The NSJE datasets analysed during the current study are publicly available in the Social Science Japan Data Archive repository, <https://ssjda.iss.u-tokyo.ac.jp/Direct/gaiyo.php?lang=eng&eid=0823> and <https://ssjda.iss.u-tokyo.ac.jp/Direct/gaiyo.php?eid=1185>.

## Competing interests

Not applicable.

## Funding

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## Authors' contributions

T.Nakagawa and A.K. conceived the study. T.Nakagawa preprocessed the dataset, performed the analysis, and drafted the manuscript. T.Noguchi and T.S. supervised the analytic procedure. A.K., T.Noguchi, M.I., and T.S. provided critical feedback on the manuscript.

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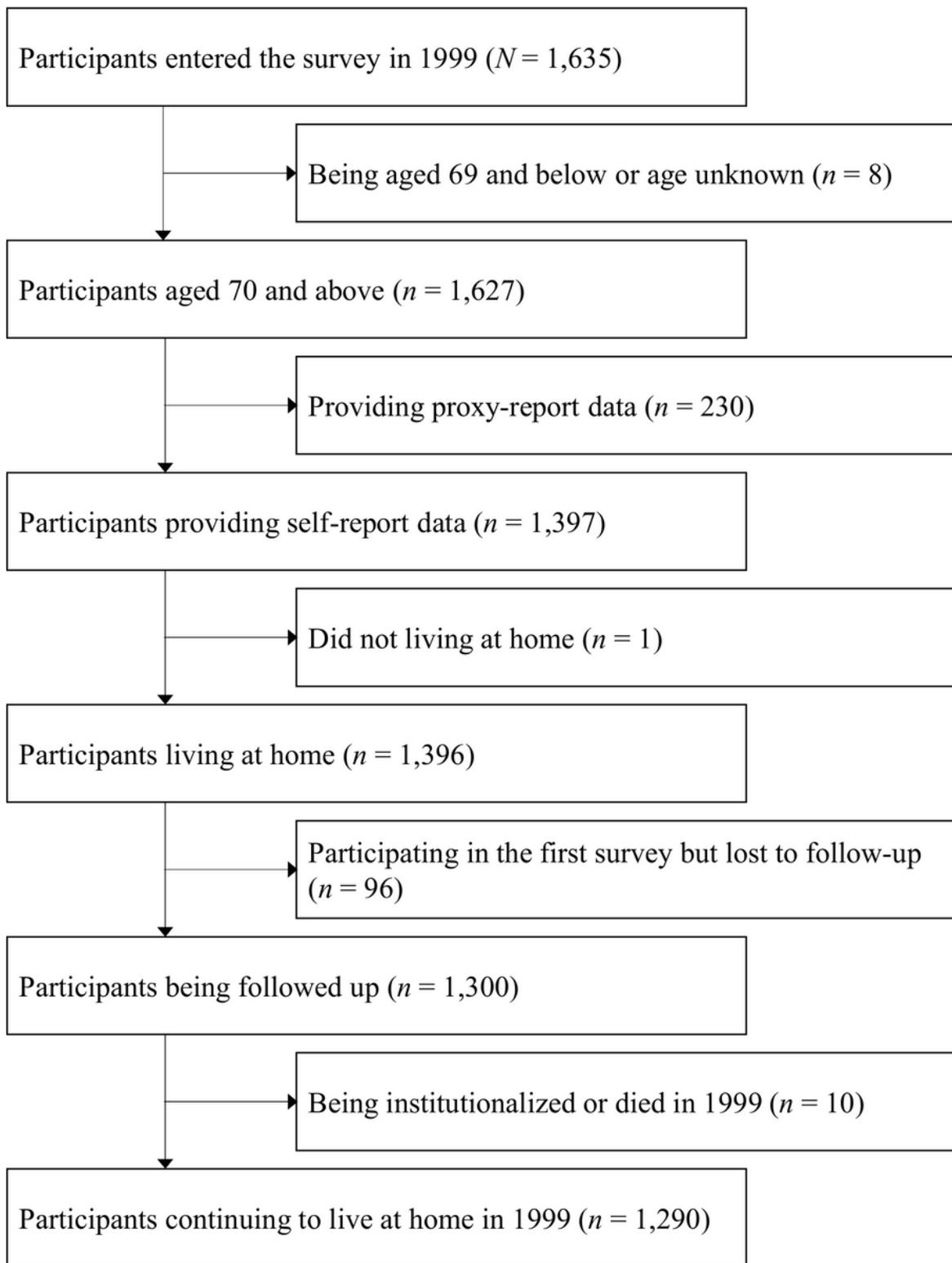
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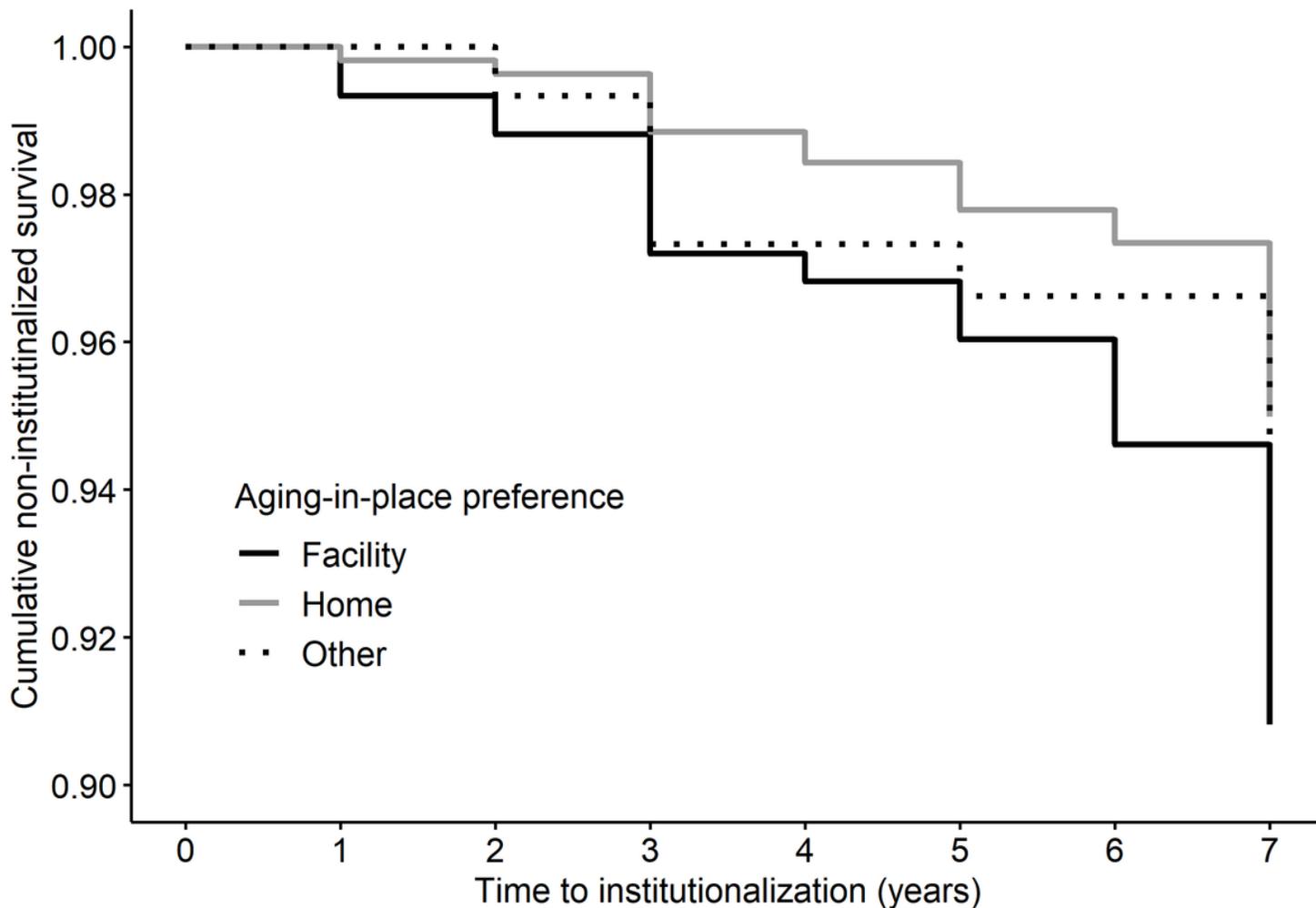
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## Figures



**Figure 1**

The sample selection procedure.



**Figure 2**

Cumulative non-institutionalized survival stratified by aging-in-place preference when bedridden.

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

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