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## Original Article

# Factors Influencing Preference for Dying at Home among People Aged $\geq 65$ Years: A Cross-Sectional Study in a Super-Aged Area of Japan

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## SUMMARY

**Background:** Depopulated and aging areas in Japan, the proportion of older people who die at home tends to be lower than the national average. We investigated the trend regarding their preference for dying at home and associated factors among older residents living in a village.

**Methods:** We conducted a questionnaire-based cross-sectional study in February and June 2020, targeting residents of Mitsuse Village aged  $\geq 65$  years. We compared two groups for each factor, residents who preferred to die at home (Group H) and the remainder (Group O).

**Results:** In total, 223 (62%) residents responded to the survey. Participants' median age was 77 years, and 44% were men. Group H accounted for 47% of the total. Univariate analysis showed that Group H was older ( $p = 0.010$ ) and included a smaller proportion who used a private vehicle ( $p = 0.036$ ), compared with Group O. Multivariate analysis showed that male sex and not having a primary care physician were associated with a preference for dying at home ( $p = 0.031$  and  $p = 0.041$ ). Availability of transportation, social isolation, family economic status, or knowledge of long-term care were not independent associations with a preference for dying at home.

**Conclusions:** To fulfill the wishes of older people who prefer to die at home in depopulated areas of Japan, establishing better home medical, nursing, or long-term care systems with improved human and financial resources is essential. Further research on how to support individuals' preference for dying at home is needed.

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## 1. Background

An attitude survey conducted by the Japanese government in 2012 showed that 54.6% of older individuals preferred to die at home.<sup>1</sup> However, the actual rate of home deaths against all mortality in Japan has remained at 13%,<sup>2</sup> indicating the importance of narrowing this discrepancy. Dying at home enables individuals to maintain their daily life activities, improving both physical and emotional well-being.<sup>3</sup> Additionally, home care in the later stages of life can reduce medical costs because end-of-life care in hospitals or nursing homes tends to be expensive, especially when long-term care (LTC) is required.<sup>4,5</sup> Therefore, supporting dying at home are essential in Japan,<sup>6</sup> where rapidly increasing social security expenses, especially medical costs, have forced the government to mobilize enormous financial resources owing to the super-aging population.

The proportion of older people who prefer to die at home is reported to differ among different areas, being lower in rural or depopulated areas than the nationwide average.<sup>7,8</sup> Reported factors

associated with difficulties in dying at home can be classified into four groups: 1) the patient's condition, such as not being bedridden or having an infectious disease or disease other than cardiac disease or malignant neoplasm,<sup>9–11</sup> 2) factors that can be resolved by providing LTC services, such as a heavy workload or time constraints on the part of the caregiver,<sup>3</sup> lack of a home-visiting physician,<sup>8,11–13</sup> no or only one caregiver,<sup>13</sup> and a poor home-visiting nursing care system;<sup>11,12</sup> 3) limited skills of medical staff, such as assessing the patient's pain,<sup>11</sup> insufficient explanation of the patient's medical condition or treatment or nursing techniques from the attending physician;<sup>9,14</sup> and 4) less preference on the part of the patient for dying at home.<sup>9–13</sup> However, changes in the patients' condition at the end-of-life stage present challenges to dying at home. Additionally, creating an environment with sufficient medical, nursing, or LTC services in rural areas is challenging because depopulation and the aging of society lead to shortages in human resources. Therefore, we focused on the preference for dying at home.

In this study, we explored factors influencing the preference for dying at home and those involved in reducing social expenditure or human resources among older people living in an aged society. The results will be useful to help solve problems in Japan as well as many other countries worldwide with rapidly aging populations.<sup>15,16</sup>

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## 2. Patients and methods

### 2.1. Study design, participants, and data

We conducted a questionnaire-based cross-sectional study in February and June 2020 regarding dying at home, among all residents aged  $\geq 65$  years living in Mitsuse Village (S1 Appendix) as of January 2020. Individuals who were hospitalized or institutionalized and those with moderate or severe cognitive impairment were excluded. In February 2020, the researchers attended the first four of eight meetings of the senior citizens' association held at the regional community center in the village. We collected participants' data using the questionnaire. If participants had difficulty writing the answers owing to visual or writing impairment, the researchers assisted them, with full consideration of their privacy. Later in the study (June 2020), we changed the manner of collecting data to a self-report questionnaire sent by mail to participants who still had not completed the group survey because in-person meetings were cancelled owing to the Coronavirus disease 2019 (COVID-19) pandemic. Participants completed the questionnaires and returned them by mail. The questionnaire included participants' age, sex, items related to their caregivers, LTC, transportation, family economic level, and preference for dying at home (S2 Table).

### 2.2. Statistical analysis

Participants' background was reported using median (interquartile range) for continuous variables and absolute number (percentage) for nominal variables. First, we divided participants into two groups: those who preferred to die at home were included in Group H and the remaining participants formed Group O. We subsequently compared the two groups with respect to each item on

the questionnaire. We conducted univariate analysis using the chi-square test for nominal variables and the Mann-Whitney U test for continuous variables. We conducted multivariate analysis using binomial logistic regression for all survey items as explanatory variables and a preference for dying at home as the objective variable. Missing data were removed from the univariate and multivariable analysis. The analysis was performed using IBM SPSS version 27 (IBM Corp., Armonk, NY, USA). The significance level was set at  $p < 0.05$ .

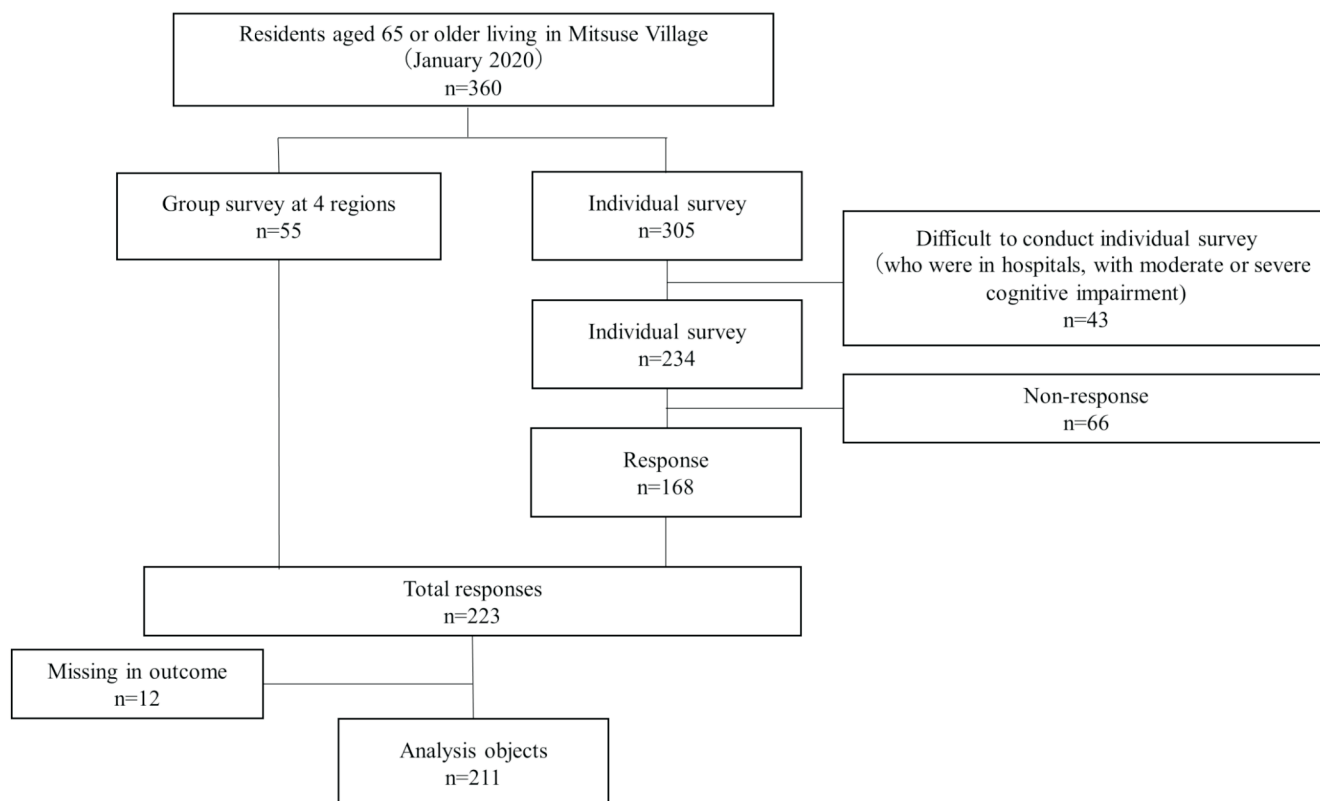
### 2.3. Ethical considerations

This study conformed to the ethical guidelines for medical and health research involving human subjects issued by the Ministry of Health, Labour and Welfare and the Ministry of Education, Culture, Sports, Science, and Technology of Japan. The Ethics Committee of Saga University Hospital approved this study (approval ID 2019-09-jinsoku-10). All participants gave their written informed consent. We analyzed survey responses in an anonymized manner.

## 3. Results

A total of 360 individuals aged  $\geq 65$  years were living in Mitsuse Village in January 2020. We received responses from 55 people in the group surveys. We targeted 234 village residents after excluding 43 who met the exclusion criteria; thus, a total of 168 participants completed the surveys (response rate 72%). The total study population from both the group and individual self-report surveys was 223 older village residents, with an overall response rate of 62%. A total of 211 participants were finally included, after excluding 12 who did not respond to the question regarding where the participant would like to die (Figure 1).

The median age of included participants was 77 years, and 44%



**Figure 1.** Data flow diagram. Owing to the COVID-19 pandemic, we could not conduct group surveys; we therefore changed the type of survey to individual self-report questionnaires.

were men. The median visual analog scale (VAS) score for health status was 32 (100 was the worst), and that of the sum of three questions from the shortened version of the Lubben Social Network Scale-6 was 8 (15 indicated not isolated at all). In total, 87% of participants used a vehicle that they drove themselves, 13% lived alone, 64% regularly visited the clinic in the village, and 5% did not have a primary care physician. Thirteen percent of participants were currently certified for the LTC insurance system,<sup>17</sup> and 61% had knowledge about the system. Concerning participants' involvement with the regional comprehensive support center, 18% had used it, and

49% had knowledge about the center (Table 1). As for the preferred place to die, 47%, 17%, and 29% of participants reported that their preference was at home, a LTC facility, and a hospital, respectively.

Univariate analysis showed that compared with Group O, Group H was significantly older (78 vs. 75 years,  $p = 0.010$ ) and included a larger proportion of participants who used public transportation or did not use any transportation at all (20% vs. 8%,  $p = 0.036$ ). Multivariate analysis of 144 available cases (68%) showed that male sex and not having a primary care physician were significantly associated with a preference for dying at home ( $p = 0.031$ , odds ratio 0.4, 95%

**Table 1**  
Background of all participants, Group H and Group O.

Characteristic, unit	Total (n = 211)	Group O (n = 112)	Group H (n = 99)	<i>p</i>
Age, years (interquartile range)	77 (71–84)	75 (71–82)	78 (73–86)	0.010
Sex, male	92 (44%)	44 (40%)	48 (49%)	0.212
Region				0.043
Regional community center A	15 (7%)	4 (4%)	11 (11%)	
Regional community center B	11 (5%)	7 (6%)	4 (4%)	
Regional community center C	15 (7%)	5 (5%)	10 (10%)	
Regional community center D	9 (4%)	3 (3%)	6 (6%)	
Mail	161 (76%)	93 (83%)	68 (69%)	
Certification of need for support/LTC				0.153
Not certified/Missing	117 (84%)	95 (85%)	82 (83%)	
Support level 1	11 (5%)	8 (7%)	3 (3%)	
Support level 2	4 (2%)	3 (3%)	1 (1%)	
Care level 1	1 (1%)	0 (0%)	1 (1%)	
Care level 2	0 (0%)	0 (0%)	0 (0%)	
Care level 3 to 5	3 (1%)	0 (0%)	3 (3%)	
Unknown	15 (7%)	6 (5%)	9 (9%)	
Current deterioration of health condition, VAS (higher is worse)	32 (19–52)	27 (15–52)	36 (22–51)	0.197
Went out alone in a past week	163 (79%)	90 (81%)	73 (76%)	0.676
Went out with an escort in a past week	25 (12%)	12 (11%)	13 (14%)	
Not go out in a past week	19 (9%)	9 (8%)	10 (10%)	
Social isolation scale <sup>a</sup> , points (interquartile range)	8 (6–10)	8 (5–10)	8 (6–10)	0.913
Usual means of transportation				0.036
Private vehicles	172 (87%)	97 (92%)	76 (80%)	
Public vehicles e.g., community bus	19 (10%)	6 (6%)	13 (14%)	
None	8 (4%)	2 (2%)	6 (6%)	
Lived with other people	178 (87%)	95 (86%)	83 (87%)	1.000
Number of people living with participant (interquartile range)	2 (1–4)	1 (1–4)	2 (1–4)	0.200
Had regularly visited the clinic in the village	132 (64%)	75 (68%)	57 (58%)	0.151
Had not had a primary care physician	11 (5%)	3 (3%)	8 (8%)	0.120
Type of public medical insurance				0.355
National health insurance	63 (30%)	34 (30%)	29 (29%)	
Employee's health insurance	22 (10%)	15 (13%)	7 (7%)	
Insurance of medical care system for senior citizens aged ≥ 75 years requiring policyholder to pay 10% or 20% of medical fees	119 (56%)	61 (55%)	58 (59%)	
Insurance of medical care system for senior citizens aged ≥ 75 years requiring policyholder to pay 30% of medical fees	5 (2%)	1 (1%)	4 (4%)	
Other	2 (1%)	1 (1%)	1 (1%)	
Had hospitalized or institutionalized in a LTC facility	112 (54%)	55 (51%)	57 (58%)	0.328
Participant had discussed with family members how they would like to spend their final years	59 (32%)	24 (26%)	35 (39%)	0.082
Participation in the public LTC insurance system in Japan				0.344
Had currently certified in the system	26 (13%)	14 (13%)	12 (13%)	
Had known about certification but not had certified	124 (61%)	61 (56%)	63 (66%)	
Had heard about certification but lacked detail	48 (24%)	31 (28%)	17 (18%)	
Had not heard about certification	6 (3%)	3 (3%)	3 (3%)	
Involvement with the regional comprehensive support center				0.148
Had used the support center	38 (18%)	14 (13%)	24 (25%)	
Had known the support center but had not used it	101 (49%)	59 (54%)	42 (44%)	
Had heard about the center but lacked detailed knowledge	62 (30%)	34 (31%)	28 (29%)	
Had not heard about the support center	5 (2%)	4 (3%)	2 (2%)	

VAS, visual analogue scale; LTC, long term care.

Group H included participants who preferred to die at home and Group O included the remaining participants.

<sup>a</sup> The social isolation scale in this study comprised three questions from the shortened version of the Lubben Social Network Scale-6, with a total score of 5 points each; questions were summed for a total of 15 points.

confidence interval 0.2 to 0.9 and  $p = 0.041$ , odds ratio 8.0, 95% confidence interval 1.1 to 59.2, respectively) (Table 2).

#### 4. Discussion

In this study, 47% of respondents stated that they preferred to die at home, which was lower than the 54.6% in a nationwide survey in Japan and the rate (51%–80%) in other countries.<sup>1,18</sup> Most factors surveyed in this study were not significant, including factors associated with dying at home, participants' environmental factors, and factors that could be readily resolved without investing substantial amounts of human or financial resources such as the usual means of transportation, degree of social isolation, and knowledge about the public LTC insurance system. The level of knowledge about the public LTC insurance system did not show a significant association with the preference for dying at home. However, reaching a conclusion in this regard is premature because according to previous reports, patients dying at home receive more LTC services,<sup>13</sup> the proportion of patients who die at home is higher than that in areas with better LTC services,<sup>8</sup> and the provision of LTC services would alleviate some difficulties in dying at home.<sup>7</sup> Because medical and LTC resources are severely limited in the village, the level of knowledge about the LTC insurance system as queried in our survey could refer to knowledge about difficulties in receiving LTC services in the community. Therefore, we consider it essential to establish a local system to provide LTC services for residents before focusing on the knowledge level among residents regarding LTC services. Only two factors, male sex and not having a primary care physician, were associated with the

preference for dying at home. Thus, our results showed that the preference for dying at home was independent from the other factors studied; however, clarifying how to promote this preference among older adults remains challenging. Further research is needed on how to enhance the preference for dying at home and other factors related to dying at home, such as the skills of medical personnel.

This study showed that the proportion of older residents in Mitsuse Village who wished to die at home was lower than that in a nationwide survey conducted among older people by the Japan Cabinet Office in 2012, in which 54.6% of respondents wished to be home at the end of their life.<sup>1</sup> In another study conducted in a rural city with a population of approximately 35,000 people (40% older adults), the proportion of older residents who preferred to die at home tended to decrease over time to a proportion that was lower than the national average;<sup>7</sup> this was similar to Mitsuse Village. One reason for this low percentage could be effects owing to the passage of time from 2012 in the previous study to 2020 in the present study. Additionally, one study reported that men were significantly more likely to die at home than women.<sup>19</sup> We also found that men had a significantly greater preference for dying at home. Older men tend to die before their spouse, with women having a much longer life expectancy than men in Japan. Therefore, older women might be discouraged from expecting that their spouse can act as a caregiver. Concurrently, women might wish for their children to be free from the constraint of caregiving. The percentage of all woman who participated in our study was 56%, which was higher than the 51% in the 2012 study.<sup>1</sup> Another reason for the low percentage with a preference for dying at home would be shortages of financial and human

**Table 2**  
Multivariate analysis for preference to die at home using 14 covariables.

Variable, unit (reference)	OR	95% CI		<i>p</i>
		Lower limit	Upper limit	
Age, years	1.1	1.0	1.2	0.241
Sex, female (male)	0.4	0.2	0.9	0.031
Number of people living with the participant	1.1	0.9	1.3	0.391
Not having a primary care physician (Had a primary care physician)	8.0	1.1	59.2	0.041
Insurance, Employee's Health Insurance (National Health Insurance)	0.3	0.1	1.4	0.117
Insurance, Insurance of Medical Care System for Senior Citizens aged $\geq 75$ years requiring the policyholder to pay 10% or 20% of medical fees (National Health Insurance)	0.4	0.1	1.6	0.195
Insurance, Insurance of Medical Care System for Senior Citizens aged $\geq 75$ years requiring the policyholder to pay 30% of medical fees (National Health Insurance)	9.6	0.3	364.8	0.224
Insurance, other, unknown (National Health Insurance)	0.0	0.0	-	1.000
Social isolation scale <sup>a</sup> , points	0.9	0.8	1.0	0.169
Means of transportation, public transportation (private car, motorcycle, electric cart)	3.0	0.4	19.7	0.262
Means of transportation, none (private car, motorcycle, electric cart)	14.5	0.4	541.9	0.149
Current deterioration of health condition, VAS (higher is worse)	1.0	1.0	1.0	0.983
Certification of need for support/LTC, support level 1 (Not certified or missing)	0.0	0.0		0.999
Certification of need for support/LTC, support level 2 (Not certified or missing)	0.0	0.0		0.999
Certification of need for support/LTC, level 3–5 (Not certified or missing)	0.1	0.0		1.000
Certification of need for support/LTC, unknown (Not certified or missing)	0.8	0.1	5.0	0.806
Had not hospitalized or admitted to a LTC facility (Had hospitalized or institutionalized)	0.9	0.4	2.3	0.850
Went out with an escort in a past week (Went out alone)	6.0	0.7	50.1	0.100
Not go out in a past week (Went out alone)	1.3	0.2	7.6	0.747
Had known well about LTC insurance system (Currently provided service by the system)	0.0	0.0		0.999
Had heard of LTC insurance system but had not had detail (Currently provided service by the system)	0.0	0.0		0.999
Had never heard of LTC insurance system (Currently provided service by the system)	0.0	0.0		0.999
Had known about the regional comprehensive support center but had never used it (Had used it)	0.3	0.1	1.6	0.157
Had heard about the regional comprehensive support center but had not had detail (Had used it)	0.7	0.1	3.7	0.625
Had never heard of the regional comprehensive support center (Had used it)	2.6	0.1	65.1	0.556
Had not discussed with family how they would like to spend their final years (Had discussed)	0.5	0.2	1.2	0.103

VAS, visual analogue scale; LTC, long term care; OR, odds ratio; CI, confidence interval.

<sup>a</sup> The social isolation scale in this study comprised three questions from the shortened version of the Lubben Social Network Scale-6, with each total score of 5 points; questions were summed for a total of 15 points.

resources for medical care and LTC in the community. There is no other clinic to collaborate with the single clinic, no clinic for supporting home care, and no nursing station owing to the small population. Such circumstances are reported to be unfavorable conditions that affect the preference for dying at home.<sup>8,13,14</sup> Even in the 10 years since the introduction of the LTC insurance system in Japan, the circumstances surrounding LTC services have not improved in communities with insufficient resources.<sup>17</sup> Therefore, new strategies are required such as promoting institutional death enough to attract people who prefer a hospital, or expanding the unit of an LTC system from junior high school some areas to complement resources and for efficient administration of the LTC system.

Our study findings indicated that having a primary care physician was negatively related to the preference for dying at home. The primary care physician of most residents remains in the one clinic in the village, which has minimal health care workers and equipment and does not provide 24-hour services. Residents who visit the clinic would be very aware of the limited medical support for dying at home in the community, which would lead them to consider dying at home an unrealistic demand. The presence of home visits and clinics for supporting home care are reported to be important factors associated with dying at home.<sup>8,13</sup> In contrast, residents without a primary care physician would have fewer opportunities to understand the medical situation of their clinic, which could lead these residents to consider dying at home to be feasible. Further research is needed to clarify the influences of whether the primary care physician's medical institution has inpatient beds; the physician's specialty; or the individual's background, characteristics, or correct knowledge regarding dying at home, among patients with a primary physician.

This study had several limitations. First, this was a cross-sectional study involving older residents living in only one village on the outskirts of a rural city in Japan. Second, there were numerous nonresponses. These facts may have led to sample selection bias. Third, the data of this study could have heterogeneity between the two survey methods, which were changed from in-person to mailed questionnaires owing to restrictions during the COVID-19 pandemic. Additionally, the sample size was not accurately calculated, which could make the power of this exploratory research study insufficient. Finally, an outcome of our study was the preference for dying at home, which differs from the outcome of dying at home. Therefore, the factors found to be significantly associated with the former in our study may not necessarily be applicable to the latter.

## 5. Conclusions

In a rural, highly depopulated, and super-aged village, the proportion of older people with a preference for dying at home was lower than the national average. Because the social background or health condition of older people and their knowledge about medical care or LTC had no significant relationship with their preference for dying at home, we consider it essential to establish a public system supporting home care for older people before focusing on the level of knowledge about LTC services among residents. Further research on how to promote the preference for dying at home and the skills of medical personnel associated with dying at home is also needed.

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## Competing interests

Corresponding author is supported by grants from the Yuumi Memorial Foundation for Home Health Care. The sponsor of the study had no role in the study design, data collection, analysis, or preparation of the manuscript. This does not alter our adherence to International Journal of Gerontology policies on sharing data and materials.

## Supplementary materials

Supplementary materials for this article can be found at <http://www.sgecm.org.tw/ijge/journal/view.asp?id=30>.

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