



Original Article

# Prevalence and characteristics of frailty in older adults in Japan: a cross-sectional study using data from the long-term care insurance system

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**Abstract.** [Purpose] Owing to rapid population aging, prevention of frailty in older adults and minimizing the burden on the long-term care insurance system are priorities for the Japanese government. However, limited data are available regarding the prevalence and characteristics of frailty among older adults requiring support in Japan. In this study, we investigated the prevalence and characteristics of frailty in older adults requiring support in Japan. [Participants and Methods] The study included 695 new users of preventive long-term care services certified as “requiring support” between 2011 and 2019. In this cross-sectional investigation, we used data obtained from a community comprehensive support center. Frailty prevalence was assessed using the Kihon Checklist, followed by a  $\chi^2$  test. Logistic regression analysis was performed to identify the characteristics (basic information and service type) associated with frailty. [Results] A significantly large percentage of robust/pre-frail participants (72.7%) belonged to urban areas, although we observed no significant difference in robust participants with regard to residence. Furthermore, we observed significant intergroup differences in age and orthopedic conditions. [Conclusion] It is important to encourage older adults to access the long-term care insurance system and seek support at an early stage.

**Key words:** Frailty, Support level, Long-term care insurance

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## INTRODUCTION

The Japanese population is aging at an unprecedentedly rapid rate. Aging-associated decline in older adults makes them susceptible to frailty, which puts them at a higher risk for disability and dependence on long-term care. Hence, implementing public health measures for frailty prevention in older adults is a high-priority policy issue for the Japanese government. In 2006, the government took steps to identify frail or prefrail older adults to provide them with care programs that would help prevent functional decline, delay dependence on long-term care, and mitigate the risk of disability<sup>1, 2)</sup>. Older people with disability risk were identified by screening them using the validated questionnaire, Kihon checklist (KCL)<sup>3, 4)</sup>. A study on frailty prevalence in Japanese older adults (>65 years) reported that 7.4% were frail, 48.1% were pre-frail, and 44.4% were robust<sup>5)</sup>. Regarding the home care of general older adults, older adults who require long-term care, and those in the terminal stage, hence it is important that caregivers are vigilant about changes in state and respond effectively if the patient exhibits frailty.

The government recognizes the importance of preventing Older adults certified as needing support (OANS) from progressing into needing long-term care and striving to maintain and improve the period of independent living with good quality

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of life. Long-Term Care Insurance System (LTCI) in Japan, there is a certification category called “needing support”. Older adults certified as needing support OANS receive care services to prevent progression into needing long-term care<sup>6)</sup>. While OANS are independent in basic activities of daily living (ADL), such as bathing and excretion, many are older adults who have disabilities in some ADL, such as shopping and going out, and are prone to fall into the state of needing long-term care. Ever since the establishment of LTCI, the number of persons certified as needing mild long-term care has been increasing. Comprehensive community support centers provide OANS preventive long-term care management that is tailored to their individual state<sup>7)</sup>. However, there are few studies on the prevalence and characteristics (Basic information and service type) of OANS frailty, and further research is needed to improve the quality of care prevention and services. Therefore, this study aimed to clarify the prevalence and characteristics of frailty in older adults needing support (OANS) in Japan.

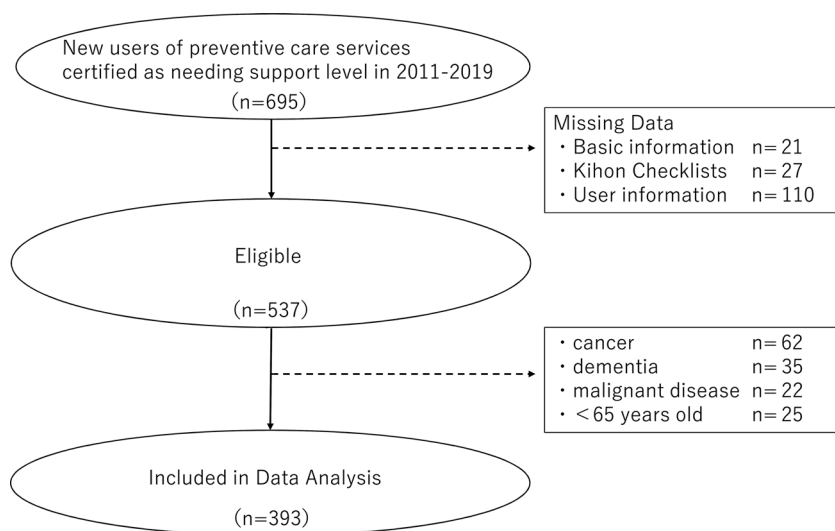
## PARTICIPANTS AND METHODS

In this study, participants were 695 new users of preventive long-term care services who were certified as needing support from 2011 to 2019. This study was conducted in A city in Tochigi Prefecture, having an area of 354.36 km<sup>2</sup> and, as of October 2023, a population of 69,048 with 21,543 (31.2%) individuals aged 65 years and older. Of the three comprehensive community support centers in the city, data accumulated at Support Center A, which has jurisdiction from the center of the city to the suburbs, were used. Of the 695 new users of preventive care services certified as needing support level during 2011–2019, a total of 393 participants were finally chosen in data analysis (Fig. 1). Participants with missing data for basic information, Kihon Checklist, or user information were excluded. Further, those with cancer, dementia, malignant disease, or aged under 65 years were also excluded.

The study was approved by the Ethics Review Committee of the International University of Health and Welfare (Approval No. 23-Io-11) and was conducted under an outsourcing agreement with A City. Informed consent was obtained in an opt-out format in the Comprehensive Community Support Center of A City.

The Kihon Checklist (KCL) is a representative assessment tool for frailty recommended by clinical guidelines<sup>3,4)</sup>. Specifically, KCL comprises 25 items (yes/no questions) that assess frailty: ADL (items 1–5), physical function (items 6–10), nutritional status (items 11 and 12), oral function (items 13–15), houseboundness (items 16–17), cognitive function (items 18–20), and depressed mood (items 21–25). KCL is characterized by the inclusion of questions related to oral function, which is rarely considered in other frailty assessments. KCL was performed on the participants by care managers during the introduction of preventive long-term care services. Total scores were calculated for each participant, and participants with 0–3 points were assessed as robust, those with 4–7 points as pre-frail, and those with 8 points or more as frail<sup>8)</sup>. With regard to basic information, the following factors were investigated: age, sex, regional characteristics, underlying disease (orthopedic disease, cerebrovascular disease, internal disease, psychiatric disorder, eye disease, others), and category of support needed (Needing Support Level 1, Needing Support Level 2). Those residing in areas with a population density greater than or equal to 473.3 persons/km<sup>2</sup> were classified as urban, and those from areas with a population density of less than 91.5 persons/km<sup>2</sup> were classified as rural following Hirose et al<sup>8)</sup>. In addition, types of preventive long-term care services (day-care, day-care rehabilitation, home-visit care, home-visit nursing, welfare equipment rental, short stay) were investigated.

For analysis, based on the results of KCL, the prevalence of frailty in OANS was calculated. Next, the participants were divided into two groups—robust/pre-frailty group and frailty group—and their basic information and the service types they



**Fig. 1.** Flowchart of study participants.

used were compared using a  $\chi^2$  test. Finally, logistic regression analysis (variable increase method: likelihood ratio) was performed with robust/pre-frail “0” and frail “1” as the dependent variables, and age, sex, regional characteristics, category of support needed, and underlying disease as the independent variables, and odds ratio and discrimination accuracy rate were calculated. To prevent the arbitrary operation of the author, the independent variables were all data. The statistical significance level was set at 5%, and JSTAT Version 22.1 J was used.

## RESULTS

Table 1 shows frailty prevalence among the participants. Based on the results of KCL, a large proportion (80.4%) were frail. No significant difference was observed in terms of age, sex, and category of support needed. Significant difference was detected in the regional characteristics between two groups: in the robust/prefrailty group 72.7% were from urban areas whereas in the frailty group 52.8% were from urban areas (Table 2). Moreover, the logistic regression analysis revealed significant differences between the two groups in terms of age, region, and orthopedic disease, with the discriminate accuracy rate of 79.95% (Table 3). There was no significant difference in other characteristics examined (Tables 2–4).

**Table 1.** Prevalence of frailty among the study participants

	Robust	Pre-frailty	Frailty	Total
Number (n)	8	69	316	393
Percentage (%)	2.0	17.6	80.4	100

**Table 2.** Comparison of basic information between robust/pre-frailty group and frailty group

		Total (n=393)		Robust/Pre-frailty group (n=77)		Frailty group (n=316)	
		n	%	n	%	n	%
Age (years)	65–74	62	15.8	15	19.5	47	14.9
	75–84	183	46.6	39	50.6	144	45.6
	>85	148	37.7	23	29.9	125	39.6
Sex	Male	113	28.8	19	24.7	94	29.7
	Female	280	71.2	58	75.3	222	70.3
Category of support needed	Support level 1	169	43.0	39	50.6	130	41.1
	Support level 2	224	57.0	38	49.4	186	58.9
Regional characteristics*	Urban area	223	56.7	56	72.7	167	52.8
	Rural area	170	43.3	21	27.3	149	47.2
Underlying disease	Orthopedics	267	67.9	57	74.0	210	66.5
	Cerebral blood vessel	72	18.3	13	16.9	59	18.7
	Internal disease	293	74.6	57	74.0	236	74.7
	Psychiatric disorder	24	6.1	3	3.9	21	6.6
	Eye disease	52	13.2	9	11.7	43	13.6
	Others	47	12.0	7	9.1	40	12.7

\*p<0.05:  $\chi^2$  test.

**Table 3.** Factors associated with frailty status

	Estimated value	Standard error	p-value	Odds ratio	95% confidence interval
Age	0.043	0.018	0.018	1.044	1.007–1.083
Regional characteristics	0.821	0.268	0.002	2.273	1.344–3.843
Orthopedics	–0.667	0.293	0.023	0.513	0.289–0.911
Certification category	0.432	0.254	0.089	1.540	0.937–2.531
Psychiatric disorder	0.969	0.637	0.128	2.635	0.756–9.188

Logistic regression analysis (variable increase method: likelihood ratio).  
Accuracy of regression formula 79.95%.

**Table 4.** Comparison of service type and service usage between robust/pre-frailty group and frailty group

		Total (n=393)		Robust/Pre-frailty group (n=77)		Frailty group (n=316)	
		n	%	n	%	n	%
Type of services	Service usage						
Day services	Day care	185	47.1	35	45.5	150	47.5
	Day care rehabilitation	45	11.5	10	13.0	35	11.1
Home visits services	Visiting care from caregiver	96	24.4	25	32.5	71	22.5
	Visiting care from nurse	10	2.5	2	2.6	8	2.5
	Visiting rehabilitation	1	0.3	0	0.0	1	0.3
Others	Welfare equipment rental	118	30.0	18	23.4	100	31.6
	Short-stay services	5	1.3	1	1.3	4	1.3
Nubmer of services	Service usage						
1 type	Day services	181	46.1	33	42.9	148	46.8
	Home visits	75	19.1	20	26.0	55	17.4
	Welfare equipment rental	73	18.6	11	14.3	62	19.6
	Short-stay services	2	0.5	0	0.0	2	0.6
	Total	331	84.2	64	83.1	267	84.5
2 types	Day care, home visiting	10	2.5	5	6.5	5	1.6
	Day care, equipment rental	32	8.1	5	6.5	27	8.5
	Home visiting, equipment rental	9	2.3	1	1.3	8	2.5
	2 types of home visiting services	4	1.0	0	0.0	4	1.3
	Total	57	14.5	12	15.6	45	14.2
3 types	Day care, home visiting, equipment rental	2	0.5	0	0.0	2	0.6
	Day care, equipment rental, short-stay	2	0.5	1	1.3	1	0.3
	Day care, 2 types of home visiting	1	0.3	0	0.0	1	0.3
	Total	5	1.3	1	1.3	4	1.3

\*p<0.05:  $\chi^2$  test.

## DISCUSSION

This study aimed to clarify the prevalence and characteristics of frailty in older adults needing support (OANS) in Japan.

This study found that frailty, pre-frailty and robust elderly were 80.4%, 17.6% and 2.0%, respectively. This means that, frailty prevalence among the study participants was very high compared to that of community-dwelling older adults in the same target community (15.5–24.3%)<sup>8, 9)</sup>.

With regard to the frailty characteristics, the present study detected that compared to the frailty group, the robust/pre-frailty group was characterized by having more participants in the urban area, and suffering from orthopedic diseases. The regional difference could be explained by the fact that urban citizens have better access to information regarding Long-Term Care Insurance, and generally, older adults possibly know people who are already using long-term care services and who have visited service offices. In other words, it is likely that the urban robust/pre-frail participants had considered receiving long-term care services while in the state of mildly needing support. In particular, they might have received long-term care services for orthopedic diseases, which temporarily reduce ADL due to pain and numbness. Thus, a course different from that of other diseases might have influenced the results of this study.

On the other hand, it was clarified that service type and number of service types used were not influenced by the presence or absence of frailty. According to a previous study, the usage of day-care services is involved in preventing the onset of frailty<sup>10)</sup>, but no difference was observed in services used in this study. This could be because preventive long-term care services tailored to the participants were appropriately provided, resulting in no regional differences. However, longitudinal studies are required to investigate the state of the participants after service usage, as this study is only a cross-sectional study.

This study has some limitations. First, as the participants were chosen from a single community, generalization is difficult. It is necessary to include more communities and participants. In addition, as this is a cross-sectional study, it is not possible to state a cause-and-effect relationship.

In conclusion of this study, the paper shows the prevalence of frailty, regional characteristics, and the percentage of underlying diseases among OANS, data that can help in long-term care prevention projects.

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### *Conflict of interest*

The authors declare no conflict of interest.

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