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Employment status of older nursing staff aged 55 years and older in care facilities: A nationwide cross-sectional study in Japan

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Abstract: An aging nursing workforce requires addressing shortages due to retirement. This nationwide descriptive cross-sectional study in Japan clarified the employment status of older nursing staff aged ≥ 55 years by facility type during January–March 2022. Questionnaires were sent to 8,000 nursing directors, with 1,658 valid responses (response rate: 20.7%). Descriptive statistics and Kruskal–Wallis or χ^2 tests analyzed inter-facility differences. A violin plot depicted the proportion of older nursing staff across facilities by age group, and generalized estimating equation (GEE) models examined associated factors at the facility level. Older nursing staff's distribution differed significantly across age groups ($p < 0.01$), from 0% to 100% within the same facility type. Some facilities had high percentages of staff working beyond retirement age. GEE results showed higher percentages of full-time employees and nurses were negatively associated with the percentage of older nursing staff across most facility types ($p < 0.05$). For those aged ≥ 65 years, the total population was positively associated with employment in bedded clinics (coef. = 0.07, 95% CI: 0.01 to 0.14, $p = 0.03$), but negatively associated with the total population (coef. = -0.06, 95% CI: -0.10 to -0.01, $p = 0.02$) and percentage of the population aged ≥ 65 (coef. = -0.76, 95% CI: -1.43 to -0.08, $p = 0.03$) in long-term care insurance facilities. Working conditions and environments should be improvement to potentially retain older nursing staff. Job seekers should be matched with managers' needs in facilities with a higher proportion of older nursing staff to ensure a sustainable workforce.

***Keywords*:** aging, employment, nurse, retirement, workforce

Introduction

The aging nursing workforce poses significant challenges for many countries. According to the State of Global Nursing 2020, a report by the World Health Organization (*1*), one in six (*i.e.*, 17%) of the world's nurses are aged ≥ 55 years and are expected to retire within the next decade. Age-related retirement affects the entire nursing workforce and is a key global challenge (*2*). Consequently, retaining them in the workforce necessitates attention to individual and organizational factors, including attention to physical needs, flexible work arrangements, role redesign, development of educational programs, financial incentives, and respect for professional knowledge (*3-7*).

Japan, with the world's largest aging population, must lead in addressing this challenge (*8*). The number of nursing staff in Japan increased by 33.3% from 2007 to 2022. The proportion of employed nursing staff in their 40s slightly decreased from 25.8% in 2007 to 25.4% in 2022, while those in their 50s rose from 17.4% to 22.1%, and those aged ≥ 60 years increased from 4.5% to 12.9%. The proportion of older nursing staff aged ≥ 55 years also grew from 9.4% in 2007 to 23.0% in 2022, reflecting the aging trend in Japan's nursing workforce (*9*).

Japan's mandatory retirement age system, prevalent across industries, poses a concern for the nursing profession. Typically, labor contracts terminate when workers reach a predetermined age set by their organization, commonly 60 years for nurses (*10,11*). According to the 2017 General Survey on Working Conditions, 95.5% of industries have a mandatory retirement age, with 79.3% of them setting this age at 60 years (*12*). These findings are consistent with the results of a 2019 hospital survey, which also reported that the majority of hospitals set the retirement age for nurses at 60 years (*13*). There is growing apprehension regarding the potential mass retirement of nurses and their exit from the nursing labor market.

In several countries, including the United States, efforts to eliminate age discrimination, such as the Age Discrimination in Employment Act of 1967, which

raises the age at which pension benefits begin (*14*) and eliminates or raises the retirement age, seek to ensure the continued employment of older nurses (*15-17*). In 2004, the Japanese government enacted the "Law Concerning Stabilization of Employment of Older Persons" to alleviate restrictions on the employment of older individuals caused by the mandatory retirement age (*18*). Although the 2021 amendment to the same law, in addition to the obligation to ensure employment up to the age of 65 years, attempted to raise the retirement age to 70 years, introduce a continuous employment system, or abolish the mandatory retirement age, limited evidence has been collected on the employment status of older nurses by facility (*19-21*). To ensure effective employment continuity measures in Japan, facilities that employ nurses aged ≥ 55 years should first be identified.

In Japan, as of 2020, more than 90% of nurses aged ≤ 29 years and 75-80% of nurses in their 30s were employed in hospitals. However, as nurses age, the proportion working in hospitals decreases. Nurses in their 40s increasingly work in non-hospital settings, such as clinics, long-term care insurance facilities (LTCIFs), and home-visit nursing agencies (VNAs). By their 50s, more than half are employed in these non-hospital settings (*22*). However, existing surveys primarily focus on individual nurses, leaving a gap in understanding the broader employment landscape for older nurses. Therefore, this study aimed to: 1) provide a comprehensive overview of the proportion of older nursing staff aged ≥ 55 years employed across various facilities in Japan and 2) explore the factors associated with the percentage of older nursing staff at the facility level.

Materials and Methods

Study design and participants

This nationwide descriptive cross-sectional study was conducted between January and March 2022. The focus was on four specific types of facilities in Japan: hospitals, bedded clinics, LTCIFs, and VNAs. Stratified random sampling was employed, considering a skewed distribution based on the number of facilities per prefecture for each facility type; thus, there were 2,000 cases across a total of 8,000 facilities.

A list of addresses for each facility was obtained from the Local Health and Welfare Bureau (as of October 1, 2021) and the Ministry of Health, Labour and Welfare (MHLW) *via* their websites (as of June 30, 2021). Excluding inactive facilities, the list included 8,164 hospitals, 6,202 bedded clinics, 14,362 VNAs, and 12,812 LTCIFs. LTCIFs, in particular, included 7,895 welfare facilities, 4,184 healthcare facilities, and 733 sanatorium-type medical care facilities for older adults requiring long-term care.

Data were collected using anonymous, self-administered questionnaires sent to each facility's nursing director. A cover letter explaining the study's aim and ethical considerations was attached, along with a return envelope. Additionally, a reminder letter was sent three weeks after the initial survey was mailed.

Types of target facilities

The four types of facilities investigated were hospitals, bedded clinics, LTCIFs, and VNAs. At the time, more than 1.2 million nurses were employed across Japan, 69% of whom were employed in hospitals, 13.2% in clinics, 7.9% in LTCIFs, and 4.9% in VNAs. These facilities had the highest number of nurses employed, as indicated by statistics published by the MHLW (*12*). Given that nursing care is required in these facilities, staffing standards were established by law for each facility.

Hospitals

Hospitals in Japan are classified into various types according to their specialized services, sizes, and functions. This study included all hospital types.

Bedded clinics

Clinics are categorized into bedded and non-bedded clinics. The former refers to small medical facilities with ≤ 19 beds that provide outpatient and inpatient care and are staffed by nursing personnel. The latter focuses solely on outpatient care and therefore does not follow nursing staffing standards. To clarify the actual employment status of nursing staff, this study only included bedded clinics.

Long-term care insurance facilities (LTCIFs)

LTCIFs provide physical care, daily living assistance, and preventive care services required by older adults to perform daily activities. This includes welfare, healthcare, and convalescent care facilities and is based on the long-term care insurance system. However, medical insurance systems are only applied when medical services are provided.

Home-visit nursing agencies (VNAs)

VNAs provide nursing care, monitor health status, administer medications, impart health education, and coordinate care with other healthcare providers within the user's home. VNAs generally leverage benefits from either long-term care or health insurance depending on the user's condition and needs. Approximately half of all VNAs operate with fewer than five full-time nurses (*23*).

Instruments

The questionnaire comprised two main elements: organizational characteristics and number of nursing staff. The questionnaire items were created by referring to several previous studies and surveys (*21,22,24–28*). In

addition to the questionnaire, national public data were obtained to examine the regional characteristics of the facilities.

Organizational characteristics

Organizational characteristics included ownership, year of establishment, prefecture, and number of beds, residents, and users. From the obtained questionnaire data, the number of nursing staff per 100 beds was calculated for each hospital, and the number of nursing staff per 10 beds was calculated for bedded clinics and LTCIFs. Regarding VNAs, the number of users per nursing staff was calculated.

Number of nursing staff

The nursing staff were calculated according to job category (registered nurses, associate nurses, and nursing assistants) and job type (full-time or part-time). In this study, the number of nursing staff members reflected the combined number of registered and associate nurses. Nursing staff aged 55 years and older were surveyed in five-year age brackets (55-59, 60-64, 65-69, 70-74, 75-79, and ≥ 80 years) to determine their numbers by age. These numbers were then used to calculate the total number of nursing staff aged ≥ 55, ≥ 60, ≥ 65, ≥ 70, ≥ 75, and ≥ 80 years. The employment percentage of older nursing staff was calculated by dividing the number of staff aged ≥ 55, ≥ 60, and ≥ 65 years by the total number of nursing staff.

Prefecture characteristics

The following variables were used as regional characteristics: total population, percentage of population aged ≥ 65 years, number of hospitals per 100,000 population, number of bedded clinics per 100,000 population, number of LTCIFs per 100,000 population aged ≥ 65 years, and number of VNAs per 100,000 population aged ≥ 65 years. The total population and the percentage of population aged ≥ 65 years were obtained from the 2020 population census (*29*). The number of hospitals and bedded clinics was obtained from the Survey of Medical Institutions, and the number of LTCIFs and VNAs was obtained from the Survey of Institutions and Establishments for Long-Term Care (*30*).

Statistical analysis

Descriptive statistics were calculated for each facility, considering the organizational characteristics and employment status of the nursing staff. Kruskal–Wallis or χ^2 tests were conducted to evaluate the differences between the facilities. A violin plot was prepared to depict the percentage of older nursing staff by age group. The violin plot depicted the volume of samples at each point by width, with lines corresponding to the 25th, median, and 75th percentiles.

Owing to the nature of data clustering within the region (prefecture), generalized estimating equation (GEE) models were used to examine the factors associated with the percentage of older nursing staff at the facility level. Univariate and multivariate GEE models were stratified by the type of facility, including hospitals, bedded clinics, LTCIFs, and VNAs. The following organizational and regional characteristics were selected as independent variables: total population; percentage of population aged ≥ 65 years; number of hospitals per 100,000 population; number of bedded clinics per 100,000 population; number of LTCIFs per 100,000 population aged ≥ 65 years; number of VNAs per 100,000 population aged ≥ 65 years; ownership; year of establishment; number of beds, residents, and users; number of nursing staff per 100 hospital beds, per 10 beds, and per 10 residents, and number of users per nursing staff (VNA); percentage of full-time nursing staff in all types of employment; and percentage of nurses among nursing staff. In Japan, although the retirement age system is being reconsidered and the age is gradually being raised, the actual retirement age is often 60 years old. Therefore, we used three dependent variables: cutoff ages of 55, 60, and 65 years. Multicollinearity in the models was assessed using calculated variance inflation factors (< 7). The *p*-value of significance was set at $p < 0.05$ (two-tailed). All statistical analyses were performed using SPSS version 29.0 (IBM Corp., Armonk, NY, USA), and R-4.3.0 was used to generate the figures.

Ethical considerations

This study was approved by the ethics review committee of the Institute for Integrated Education of Tokyo Medical and Dental University (no. C2021-005). Participation was voluntary, and the protection of private information and strict data handling were guaranteed. The participants provided consent by checking the research consent box on the questionnaire.

Results

In total, 2,438 questionnaires were collected from 8,000 facilities (response rate: 30.5%). After excluding 780 questionnaires due to lack of consent, missing data, unanswered questions, or errors, completed questionnaires from 1,658 facilities (valid response rate: 20.7%) were included in the analysis, representing 431 hospitals, 363 clinics, 451 LTCIFs, and 413 VNAs (Figure 1). The median (interquartile range [IQR]) number of beds, residents, and users was 134 (74-248) in hospitals, 17 (10-19) in bedded clinics, 86 (63-100) in LTCIFs, and 70 (50-110) in VNAs. The medians (IQR) of the number of nursing staff were 75 (42-156) in hospitals, 11 (6-17) in bedded clinics, 7 (5-11) in LTCIFs, and 6 (4-8) in VNAs. The proportion of nurses varied significantly across facility types, with the highest being 100% in VNAs and the lowest being 62.5% in LTCIFs (Table 1).

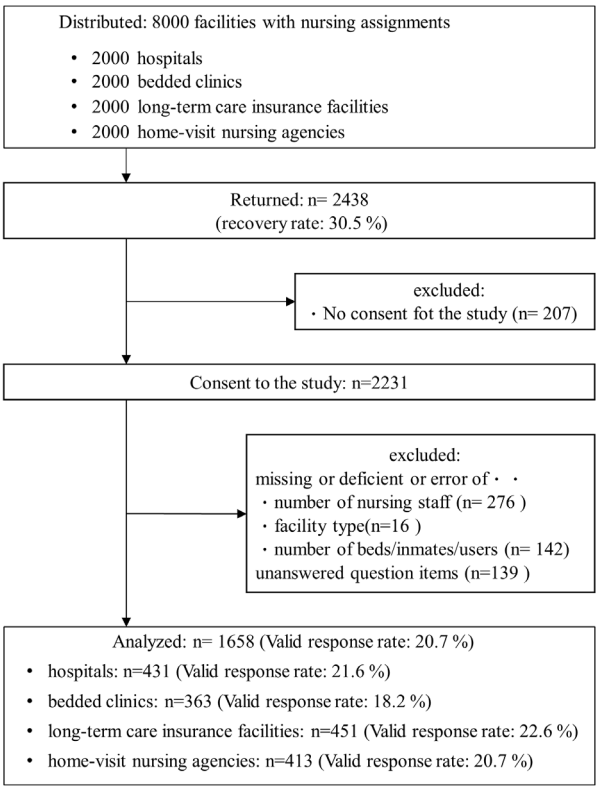

Figure 1. Selection flow of participating facilities.

Comparing the employment status of older nursing staff by facility types

The differences in the distribution of older nursing staff aged ≥ 55 years employed by facility type were statistically significant across all age groups ($p < 0.01$) (Figure 2). The percentage of older nursing staff employed in LTCIFs exceeded that of other facility types, followed by bedded clinics, VNAs, and hospitals. In the ≥ 55 years age group, clinics and VNAs had a median employment percentage of approximately 25%, whereas LTCIFs had a median employment percentage of approximately 45%. However, the distribution ranged from 0% to 100% and was slightly skewed. The proportion of older nursing staff employed in hospitals was distributed across a range of 0%-75%, with a monomodal right-skewed distribution of approximately 13%. When the cutoff age changed from ≥ 55 to ≥ 60 and ≥ 65 years, the percentage of older nursing staff decreased among all facility types. Although the mode for the percentage of nursing staff aged ≥ 65 years was 0%, 9.3% of the facilities had a percentage of 25% or more.

Factors associated with the percentage of older nurses

Univariate analysis results using GEE models showed that the factors associated with the percentage of older nursing staff aged ≥ 55 years differed across the four facility types: hospitals, bedded clinics, LTCIFs, and VNAs (Supplemental Tables S1-S4, *https://www.globalhealthmedicine.com/site/supplementaldata.html?ID=86*). In the case of hospitals, a higher proportion of older staff was associated with a lower number of beds (coef. = -0.02 to -0.01, 95% CI: -0.03 to 0.00, $p < 0.01$), a lower number of staff per 100 beds (coef. = -0.17 to -0.06, 95% CI: -0.22 to -0.04, $p < 0.01$), a lower percentage of full-time nursing staff (coef. = -0.31 to -0.12, 95% CI: -0.43 to -0.03, $p < 0.01$), a lower percentage of nurses among nursing staff (coef. = -0.58 to -0.22, 95% CI: -0.65 to -0.18, $p < 0.01$), and a lower total population (coef. = -0.08 to -0.05, 95% CI: -0.12 to -0.02, $p < 0.01$); these negative associations were consistently observed across all age categories. (Supplemental Table S1, *https://www.globalhealthmedicine.com/site/supplementaldata.html?ID=86*). In bedded clinics, a positive association with the number of beds was found only in the ≥ 65 years age group (coef. = 0.17, 95% CI: 0.01 to 0.33, $p = 0.03$), while the association with prefecture variables was minimal (Supplemental Table S2, *https://www.globalhealthmedicine.com/site/supplementaldata.html?ID=86*). In the case of LTCFs, an association with the number of nursing staff per 10 residents was found only in the ≥ 65 years age group (coef. = 1.13, 95% CI: -2.07 to -0.18, $p = 0.02$) (Supplemental S3, *https://www.globalhealthmedicine.com/site/supplementaldata.html?ID=86*). Finally, in VNAs, an association with the percentage of full-time nursing staff in all types of employment was found only in the ≥ 65 years age group (coef. = -0.07, 95% CI: -0.12 to -0.02, $p < 0.01$) (Supplemental S4, *https://www.globalhealthmedicine.com/site/supplementaldata.html?ID=86*).

Multivariate analysis using GEE models stratified by facility types revealed that the higher percentage of older nursing staff aged 55 years and older was negatively associated with ownership by a non-profit medical corporation (coef. = -3.96, 95% CI: -6.50 to -1.42, $p < 0.01$), number of beds (coef. = -0.01, 95% CI: -0.01 to -0.00, $p = 0.03$), number of nursing staff per 100 beds (coef. = -0.08, 95% CI: -0.12 to -0.03, $p < 0.01$), full-time nursing staff in all types of employment (%) (coef. = -0.20, 95% CI: -0.30 to -0.10, $p < 0.01$), and nurses among nursing staff (%) (coef. = -0.49, 95% CI: -0.59 to -0.39, $p < 0.01$) in hospitals. No association with prefecture variables was found for all four facility types for the percentage of nursing staff aged ≥ 55 years (Table 2).

When the age category was set to ≥ 60 years, the same trend was observed in the association with the percentage of older nursing staff. However, an association with the total population, which is a prefectural characteristic, was observed only in bedded clinics (coef. = 0.18, 95% CI: 0.05 to 0.31, $p < 0.01$) and VNAs (coef. = 0.08, 95% CI: 0.01 to 0.16, $p = 0.04$) (Table 3).

Regarding the percentage of nursing staff aged ≥

Table 1. Descriptive statistics of organizational characteristics according to total and facility type (*n* = 1,658)

Variable	By category				*p*-value†
	Hospital (*n* = 431)	Bedded clinic (*n* = 363)	Long-term care insurance facility (*n* = 451)	Home-visit nursing agency (*n* = 413)	
Ownership, *n* (%)					
National	12 (2.8)	0 (0.0)	0 (0.0)	1 (0.2)	< 0.001
Public medical institution	79 (18.3)	6 (1.7)	18 (4.0)	18 (4.4)	
Social insurance group	6 (1.4)	2 (0.6)	1 (0.2)	2 (0.5)	
Non-profit medical corporation	268 (62.2)	273 (75.2)	124 (27.5)	91 (22.0)	
Social welfare corporation	13 (3.0)	1 (0.3)	301 (66.7)	21 (5.1)	
For-profit corporation	0 (0.0)	0 (0.0)	0 (0.0)	202 (48.9)	
Private	5 (1.2)	71 (19.6)	0 (0.0)	24 (5.8)	
Other	48 (11.1)	10 (2.8)	7 (1.6)	54 (13.1)	
Year of establishment, Median (IQR)	1976 (1955–1991)	1994 (1981–2003)	1998 (1991–2006)	2016 (2007–2019)	< 0.001
Area, *n* (%)					
Hokkaido	34 (7.9)	21 (5.8)	18 (4.0)	25 (6.1)	< 0.001
Tohoku	39 (9.0)	41 (11.3)	56 (12.4)	30 (7.3)	
Kanto	103 (23.9)	57 (15.7)	123 (27.3)	114 (27.6)	
Chubu	69 (16.0)	54 (14.9)	68 (15.1)	57 (13.8)	
Kinki	70 (16.2)	28 (7.7)	76 (16.9)	86 (20.8)	
Chugoku/Shikoku	53 (12.3)	66 (18.2)	49 (10.9)	32 (7.7)	
Kyushu	63 (14.6)	96 (26.4)	61 (13.5)	69 (16.7)	
Number of beds/residents/users, Median (IQR)	134 (74-248)	17 (10-19)	86 (63-100)	70 (50-110)	< 0.001
Number of nursing staff, Median (IQR)	75 (42-156)	11 (6-17)	7 (5-11)	6 (4-8)	< 0.001
Percentage of nurses among nursing staff , Median (IQR)	90.0 (74.4-97.6)	66.7 (40.0- 83.3)	62.5 (45.5-78.8)	100 (90.0-100.0)	< 0.001
Percentage of full-time nursing staff in all types of employment, Median (IQR)	89.8 (82.4-95.2)	80.0 (60.0-100.0)	75.0 (57.1-100.0)	71.4 (50.0-100.0)	< 0.001
Number of nursing staff aged ≥ 55 years, Median (IQR)	12 (7-22)	3 (1-5)	3 (2-5)	1 (0-2)	< 0.001
Number of nursing staff aged ≥ 60 years, Median (IQR)	6 (3-10)	1 (0-2)	2 (1-3)	0 (0-1)	< 0.001
Number of nursing staff aged ≥ 65 years, Median (IQR)	1 (0-3)	0 (0-1)	0 (0-1)	0 (0-0)	< 0.001
Number of nursing staff aged ≥ 70 years, Median (IQR)	0 (0-1)	0 (0-0)	0 (0-0)	0 (0-0)	< 0.001

†Kruskal–Wallis test was conducted for quantitative variables, and the χ^2 test was conducted for categorical variables. Abbreviations: IQR, interquartile range.

65 years, higher percentages of full-time employees and nurses in nursing staff were negatively associated with most facility types, while the number of beds was not associated with any facility type, except VNAs. Additionally, regarding prefectural characteristics, the total population was positively associated with the percentage of older nursing staff in bedded clinics (coef. = 0.07, 95% CI: 0.01 to 0.14, p = 0.03), whereas in LTCIFs, negative associations were found with the total population (coef. = -0.06, 95% CI: -0.10 to -0.01, p = 0.02) and the percentage of the population aged ≥ 65 years (coef. = -0.76, 95% CI: -1.43 to -0.08, p = 0.03). Furthermore, in bedded clinics, the number of VNAs per 100,000 population aged ≥65 years was negatively associated (coef. = -0.12, 95% CI: -0.22 to -0.01, p = 0.03), while it was positively associated in VNAs (coef. = 0.10, 95% CI: 0.00 to 0.20, p = 0.04) (Table 4).

Discussion

This nationwide survey depicted the distribution of facilities in Japan employing older nursing staff. The results revealed that LTCIFs employed the highest median percentage of older nursing staff in all considered age groups (≥ 55 years, ≥ 60 years, and ≥ 65 years), followed by clinics, VNAs, and hospitals. Additionally, the percentage of nurses among nursing staff in the facilities and the number of full-time employees in the nursing staff were negatively associated with the percentage of older nursing staff in the facilities.

Although the biennial survey conducted by the MHLW reported the number of employed nurses by age group, this study was significant in that it showed employment trends for nursing staff in a facility. In a previous study, 21.8% of the total number of older nursing staff were aged ≥ 55 years, and 11.8% were aged ≥ 60 years (*22*). Conversely, this study found that some facilities, such as LTCIFs, VNAs, bedded clinics, and hospitals (particularly, smaller ones), rely on a workforce aged 55 to 60 years and older. Owing to the overall aging of the nursing workforce, this group may experience workforce shortages in the near future because of

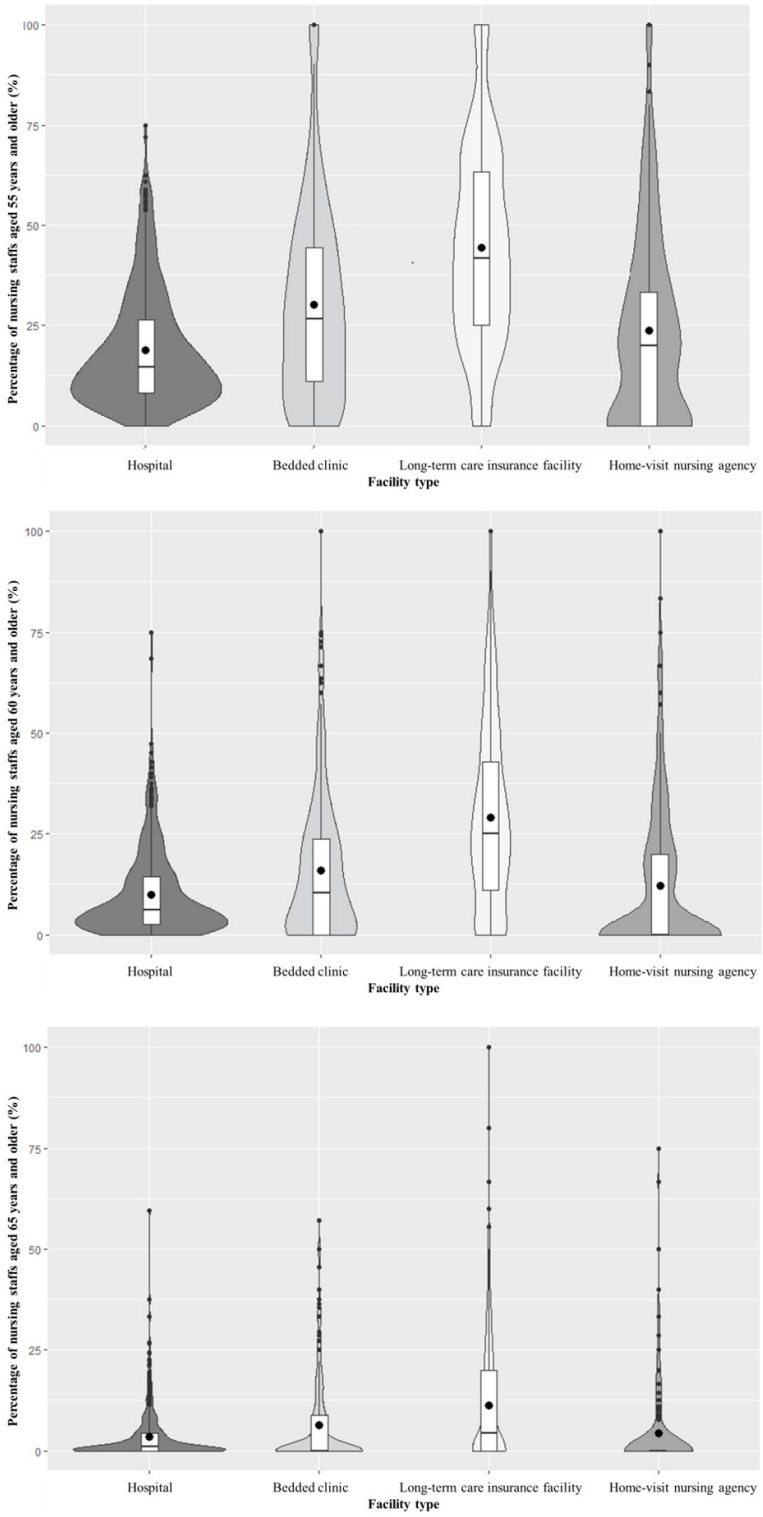

Figure 2. Violin plots showing the percentage of older nursing staff employed by facility type and age group. These plots show the sample size at each point in terms of width, with lines corresponding to the 25th percentile, median, and 75th percentile and dots corresponding to the mean. Kruskal–Wallis test results showed statistically significant differences between facilities concerning the percentage of older nursing staff employed based on all age groups ($p < 0.001$).

retirement and age-related departures. Based on this, strategies should be implemented to ensure that older nurses can work beyond the retirement age. Furthermore, in facilities with a high proportion of older nursing staff, the specific skills and working conditions required by managers must be further explored and clarified. By considering ways to match job seekers with managers' needs, stable nursing care can be provided.

Furthermore, this study also found that facilities with higher percentages of nurses among the nursing staff and those with a higher percentage of full-time employees among the nursing staff were less likely to employ older

Table 2. Generalized estimating equations results for the percentage of nursing staff aged 55 years and older by facility type

	Hospital				Bedded clinic				Long-term care insurance facility				Home-visit nursing agency			
	coef.	SE	95% CI	*p*	coef.	SE	95% CI	*p*	coef.	SE	95% CI	*p*	coef.	SE	95% CI	*p*
(Intercept)	109.34	32.48	45.67 - 173.00	< 0.01*	79.90	167.60	-248.58 - 408.38	0.63	455.62	166.53	129.23 - 782.01	< 0.01*	790.08	317.89	167.03 - 1413.12	0.01*
Facility characteristics																
Ownership (ref. Other)																
Non-profit medical corporation	-3.96	1.30	-6.50 - -1.42	< 0.01*	-5.33	3.00	-11.22 - 0.56	0.08								
Social welfare corporation									1.85	2.02	-2.10 - 5.80	0.36				
For-profit corporation													1.53	2.24	-2.86 - 5.92	0.49
Year of establishment	-0.01	0.02	-0.04 - 0.02	0.51	-0.03	0.09	-0.20 - 0.14	0.72	-0.19	0.09	-0.36 - -0.03	0.02*	-0.39	0.15	-0.69 - -0.08	0.01*
Number of beds/residents/users	-0.01	0.00	-0.01 - 0.00	0.03*	-0.32	0.31	-0.93 - 0.28	0.30	-0.07	0.03	-0.13 - -0.01	0.02*	-0.07	0.02	-0.10 - -0.04	< 0.01*
Number of nursing staff per 100 beds	-0.08	0.02	-0.12 - -0.03	< 0.01*												
Number of nursing staff per 10 beds/residents					-0.10	0.08	-0.26 - 0.06	0.24	-2.10	0.92	-3.90 - -0.29	0.02*				
Number of users per nursing staff													0.12	0.13	-0.13 - 0.36	0.35
Percentage of full-time nursing staff in all types of employment	-0.20	0.05	-0.30 - -0.10	< 0.01*	-0.11	0.07	-0.24 - 0.03	0.12	-0.18	0.05	-0.29 - -0.08	< 0.01*	-0.02	0.05	-0.11 - 0.07	0.69
Percentage of nurses among nursing staff	-0.49	0.05	-0.59 - -0.39	< 0.01*	-0.29	0.05	-0.39 - -0.18	< 0.01*	-0.19	0.05	-0.29 - -0.08	< 0.01*	-0.32	0.06	-0.45 - -0.20	< 0.01*
Prefectural characteristics																
Total population (100,000 persons)	-0.01	0.02	-0.06 - 0.04	0.67	0.12	0.10	-0.07 - 0.31	0.21	-0.07	0.04	-0.15 - 0.01	0.10	0.07	0.06	-0.04 - 0.19	0.20
Percentage of population aged ≥ 65	-0.24	0.31	-0.85 - 0.37	0.44	1.19	0.91	-0.59 - 2.96	0.19	0.60	0.73	-0.84 - 2.04	0.41	0.95	0.82	-0.67 - 2.56	0.25
Number of hospitals per 100,000 population	0.50	0.36	-0.20 - 1.21	0.16	-0.55	1.07	-2.65 - 1.55	0.61	-0.50	0.87	-2.19 - 1.20	0.57	-0.58	1.06	-2.65 - 1.50	0.59
Number of bedded clinics per 100,000 population	-0.22	0.18	-0.57 - 0.13	0.21	0.28	0.62	-0.94 - 1.49	0.65	-0.34	0.61	-1.55 - 0.86	0.57	0.68	0.76	-0.82 - 2.17	0.38
Number of LTCFs per 100,000 population aged ≥ 65	0.10	0.15	-0.19 - 0.39	0.51	0.06	0.38	-0.68 - 0.81	0.87	-0.19	0.24	-0.65 - 0.27	0.41	0.38	0.43	-0.46 - 1.23	0.38
Number of VNAs per 100,000 population aged ≥ 65	-0.05	0.06	-0.16 - 0.06	0.38	0.19	0.17	-0.14 - 0.52	0.26	0.13	0.13	-0.13 - 0.38	0.33	0.00	0.15	-0.29 - 0.30	0.99
(Scale)	107.55				540.50				598.95				524.53			

Dependent variable: Percentage of nursing staff aged 55 years and older among all staff. Results were based on generalized estimating equations. Each independent variable's regression coefficient (coef.), standard error (SE), and *p*-value (*p*) were reported. *$p < 0.05$ (statistical significance level). Additionally, 95% confidence intervals (CIs) were provided. Adjustments for clustering by prefecture and robust estimation were applied. Abbreviations: LTCF, Long-term care insurance facility; VNA, Home-visit nursing agency.

Table 3. Generalized estimating equations results for the percentage of nursing staff aged 60 years and older by facility type

	Hospital				Bedded clinic				Long-term care insurance facility				Home-visit nursing agency			
	coef.	SE	95% CI	*p*	coef.	SE	95% CI	*p*	coef.	SE	95% CI	*p*	coef.	SE	95% CI	*p*
(Intercept)	81.41	22.93	36.47 - 126.36	< 0.01*	152.54	107.21	-57.60 - 362.67	0.16	194.18	167.01	-133.16 - 521.52	0.25	122.43	146.66	-165.02 - 409.88	0.40
Facility characteristics																
Ownership (ref. Other)																
Non-profit medical corporation	-1.05	1.10	-3.20 - 1.10	0.34	-1.65	2.08	-5.73 - 2.43	0.43								
Social welfare corporation									1.69	1.83	-1.89 - 5.27	0.35				
For-profit corporation													2.06	1.53	-0.95 - 5.06	0.18
Year of establishment	-0.01	0.01	-0.03 - 0.01	0.28	-0.06	0.05	-0.17 - 0.04	0.23	-0.06	0.08	-0.23 - 0.10	0.46	-0.06	0.07	-0.21 - 0.08	0.38
Number of beds/residents/users	0.00	0.00	0.00 - 0.00	0.77	-0.29	0.20	-0.68 - 0.11	0.15	-0.06	0.03	-0.11 - -0.01	0.03*	-0.04	0.01	-0.06 - -0.02	< 0.01*
Number of nursing staff per 100 beds	-0.05	0.01	-0.07 - -0.02	< 0.01*												
Number of nursing staff per 10 beds					-0.12	0.05	-0.22 - -0.03	0.01*	-1.61	1.03	-3.62 - 0.40	0.12				
Number of users per nursing staff													0.02	0.06	-0.11 - 0.14	0.80
Percentage of full-time nursing staff in all types of employment	-0.11	0.05	-0.21 - -0.02	0.02*	-0.13	0.05	-0.24 - -0.03	0.01*	-0.22	0.06	-0.33 - -0.11	< 0.01*	-0.06	0.03	-0.11 - 0.00	0.04
Percentage of nurses among nursing staff	-0.40	0.04	-0.48 - -0.31	< 0.01*	-0.17	0.04	-0.24 - -0.10	< 0.01*	-0.18	0.05	-0.27 - -0.08	< 0.01*	-0.19	0.06	-0.31 - -0.07	< 0.01*
Prefectural characteristics																
Total population (100,000 persons)	0.00	0.01	-0.02 - 0.03	0.77	0.18	0.06	0.05 - 0.31	< 0.01*	-0.05	0.05	-0.16 - 0.05	0.32	0.08	0.04	0.01 - 0.16	0.04*
Percentage of population aged ≥ 65	-0.20	0.17	-0.53 - 0.12	0.22	0.21	0.63	-1.03 - 1.46	0.74	-0.07	0.59	-1.22 - 1.08	0.91	0.94	0.70	-0.43 - 2.30	0.18
Number of hospitals per 100,000 population	0.24	0.23	-0.22 - 0.70	0.31	-0.36	0.71	-1.74 - 1.02	0.61	0.52	0.67	-0.80 - 1.84	0.44	-0.63	0.86	-2.31 - 1.05	0.46
Number of bedded clinics per 100,000 population	-0.10	0.15	-0.39 - 0.18	0.47	0.54	0.39	-0.22 - 1.29	0.16	-0.30	0.45	-1.18 - 0.57	0.50	0.05	0.51	-0.95 - 1.06	0.92
Number of LTCFs per 100,000 population aged ≥ 65	0.13	0.10	-0.08 - 0.33	0.23	0.26	0.27	-0.27 - 0.79	0.33	-0.18	0.22	-0.60 - 0.25	0.42	0.41	0.26	-0.09 - 0.91	0.11
Number of VNAs per 100,000 population aged ≥ 65	-0.05	0.04	-0.12 - 0.02	0.14	-0.24	0.13	-0.49 - 0.02	0.07	0.01	0.13	-0.24 - 0.27	0.91	0.00	0.08	-0.15 - 0.15	0.98
(Scale)	56.74				273.88				501.12				295.07			

Dependent variable: Percentage of nursing staff aged 60 years and older among all staff. Results were based on generalized estimating equations. Each independent variable's regression coefficient (coef.), standard error (SE), and *p*-value (*p*) were reported. *$p < 0.05$ (statistical significance level). Additionally, 95% confidence intervals (CIs) were provided. Adjustments for clustering by prefecture and robust estimation were applied. Abbreviations: LTCF, Long-term care insurance facility; VNA, Home-visit nursing agency.

Table 4. Generalized estimating equations results for the percentage of nursing staff aged 65 years and older by facility type

	Hospital				Bedded clinic				Long-term care insurance facility				Home-visit nursing agency			
	coef.	SE	95% CI	*p*	coef.	SE	95% CI	*p*	coef.	SE	95% CI	*p*	coef.	SE	95% CI	*p*
(Intercept)	44.96	16.33	12.95 - 76.97	< 0.01*	117.28	56.29	6.94 - 227.61	0.04*	193.22	98.59	0.01 - 386.45	0.05	101.68	82.96	-60.92 - 264.27	0.22
Facility characteristics																
Ownership (ref. Other)																
Non-profit medical corporation	-0.37	0.86	-2.06 - 1.33	0.67	-3.89	1.69	-7.21 - -0.57	0.02*								
Social welfare corporation									1.26	1.09	-0.86 - 3.39	0.24				
For-profit corporation													1.45	0.90	-0.32 - 3.22	0.11
Year of establishment	-0.01	0.01	-0.02 - 0.01	0.26	-0.05	0.03	-0.11 - 0.00	0.07	-0.07	0.05	-0.17 - 0.03	0.15	-0.04	0.04	-0.12 - 0.03	0.27
Number of beds/residents/users	0.00	0.00	0.00 - 0.00	0.33	0.20	0.08	0.04 - 0.36	0.02*	-0.01	0.01	-0.04 - 0.02	0.61	-0.01	0.01	-0.02 - 0.00	0.01*
Number of nursing staff per 100 beds	-0.02	0.01	-0.03 - 0.00	0.05												
Number of nursing staff per 10 beds/residents					0.02	0.03	-0.05 - 0.08	0.61	-1.21	0.52	-2.23 - -0.20	0.02*				
Number of users per nursing staff													0.02	0.02	-0.02 - 0.07	0.34
Percentage of full-time nursing staff in all types of employment	-0.08	0.04	-0.16 - 0.00	0.05	-0.10	0.03	-0.16 - -0.03	< 0.01*	-0.19	0.04	-0.26 - -0.11	< 0.01*	-0.06	0.02	-0.10 - -0.02	< 0.01*
Percentage of nurses among nursing staff	-0.19	0.03	-0.25 - -0.14	< 0.01*	-0.09	0.02	-0.13 - -0.04	< 0.01*	-0.10	0.04	-0.18 - -0.03	< 0.01*	-0.15	0.05	-0.25 - -0.04	0.01*
Prefectural characteristics																
Total population (100,000 persons)	0.01	0.01	-0.01 - 0.03	0.24	0.07	0.03	0.01 - 0.14	0.03*	-0.06	0.02	-0.10 - -0.01	0.02*	0.01	0.03	-0.05 - 0.07	0.76
Percentage of population aged ≥ 65	-0.13	0.10	-0.31 - 0.06	0.19	0.05	0.40	-0.73 - 0.84	0.89	-0.76	0.34	-1.43 - -0.08	0.03*	-0.21	0.42	-1.04 - 0.62	0.62
Number of hospitals per 100,000 population	0.16	0.16	-0.15 - 0.47	0.31	-0.35	0.44	-1.22 - 0.52	0.43	0.09	0.58	-1.05 - 1.23	0.88	-0.11	0.41	-0.91 - 0.70	0.80
Number of bedded clinics per 100,000 population	-0.14	0.08	-0.30 - 0.03	0.10	0.46	0.24	-0.01 - 0.92	0.05	-0.17	0.28	-0.71 - 0.37	0.54	-0.04	0.26	-0.55 - 0.48	0.89
Number of LTCFs per 100,000 population aged ≥ 65	0.08	0.06	-0.05 - 0.20	0.24	0.08	0.14	-0.19 - 0.35	0.56	0.13	0.14	-0.15 - 0.41	0.35	0.26	0.17	-0.07 - 0.58	0.12
Number of VNAs per 100,000 population aged ≥ 65	-0.04	0.02	-0.08 - 0.01	0.12	-0.12	0.05	-0.22 - -0.01	0.03*	-0.01	0.08	-0.16 - 0.15	0.95	0.10	0.05	0.00 - 0.20	0.04*
(Scale)	25.30				104.70				205.21				120.82			

Dependent variable: Percentage of nursing staff aged 65 years and older among all staff. Results were based on generalized estimating equations. Each independent variable's regression coefficient (coef.), standard error (SE), and *p*-value *(p)* were reported. *p <0.05 (statistical significance level). Additionally, 95% confidence intervals (CIs) were provided. Adjustments for clustering by prefecture and robust estimation were applied. Abbreviations: LTCF, Long-term care insurance facility; VNA, Home-visit nursing agency.

nursing staff, at all cut-offs of ≥ 55 years, ≥ 60 years, and ≥ 65 years. This finding was consistent with the results of previous studies (*22,31*). The number of associate nurses in training is declining, and the workforce is aging. Additionally, they are more often employed on a part-time basis compared to nurses. Consequently, facilities that employ a large number of assistant nurses may be concerned about an aging workforce and the challenges of securing nursing staffs. Negative associations with the number of beds and staffing levels may stem from training programs in large hospitals and VNAs, which attract younger nursing staff who tend to prefer these settings. The negative correlation with years of establishment and the number of beds in LTCIFs and VNAs may be due to the small number of nursing staff who continue to work. On the contrary, the association between regional variables and the percentage of employees aged ≥ 55 years and those ≥ 60 years was minimal. Based on this, future research should consider the supply and demand of nursing staff and the age of working nursing staff at the secondary medical care level, which serves as a general unit for healthcare provision, rather than at the prefectural level.

Notably, some facilities employed a certain percentage of nursing staff aged > 65 years. Currently, policies are being implemented to promote home healthcare and long-term care services to meet the growing demand for nursing and long-term care, prioritizing the need to secure human resources (*19,32-34*). However, an association was observed between the percentage of nursing staff aged ≥ 65 years in bedded clinics and LTCIFs, and regional variables such as total population warrant consideration. Delaying the retirement of older nursing staff affects the overall supply of the nursing workforce (*35*). Policies to address the concurrent retirement of an aging nursing workforce should consider the impact of facilities that employ a high proportion of older nurses.

This study had several limitations. First, owing to the stratified random sampling of facilities nationwide, it did not constitute a complete survey. However, the distribution of the number of beds across the surveyed facilities was similar to that of the national data and may be somewhat representative. Second, the employment percentage of older nursing staff was used as the primary outcome variable. Therefore, the results should be interpreted with caution, particularly for facilities with a small overall number of employees such as VNAs, owing to the high per capita rate. Third, this study did not examine the reasons for hiring older nursing staff. Nursing staff well beyond retirement age may continue to be employed not only to secure human resources but also because they are expected to be highly proficient in their jobs. Further studies are required to examine this phenomenon.

Future studies should clarify the characteristics of facilities with a higher percentage of older nurses, as revealed in this study. The results of this study can serve as important material for policies that consider the impact of employing older nurses to secure human resources in Japan, where increased demand for medical and long-term care services is expected.

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References

1. World Health Organization. State of the world's nursing 2020: Investing in education, jobs and leadership. *https://www.who.int/publications/i/item/9789240007017* (accessed June 20, 2023).
2. Buchan J, Catton H. Ageing well? Policies to support older nurses at work. *https://www.intlnursemigration.org/wp-content/uploads/2020/12/FINAL-Ageing-ICNM-Report-December-9-2020.pdf* (accessed June 20, 2023).
3. Cleaver K, Markowski M, Wels J. Factors influencing older nurses' decision making around the timing of retirement: An explorative mixed-method study. J Nurs Manag. 2022; 30:169-178.
4. Denton J, Evans D, Xu Q. Managers' perception of older nurses and midwives and their contribution to the workplace-A qualitative descriptive study. J Adv Nurs. 2023; 79:727-736.
5. Haines S, Evans K, Timmons S, Cutler E. A service improvement project of a legacy nurse programme to improve the retention of late career nurses. J Res Nurs. 2021; 26:648-681.
6. Fackler CA. Retaining older hospital nurses: Experienced hospital nurses' perceptions of new roles. J Nurs Manag. 2019; 27:1325-1331.
7. Sirisub P, Suwannapong N, Tipayamongkholgul M, Howteerakul N, Noree T. Intention to extend working life among Thai registered nurses in Ministry of Public Health: A national survey. Nurs Res Pract. 2019; 7919404.
8. Nakatani H. Population aging in Japan: Policy transformation, sustainable development goals, universal health coverage, and social determinantes of health. Glob Health Med. 2019; 1:3-10.
9. Statistics Bureau, Ministry of Internal Affairs and Communications. 2022 employment status survey. *https://www.stat.go.jp/english/data/shugyou/index.html* (accessed February 20, 2024).
10. Mizuochi M, Raymo JM. Retirement type and cognitive functioning in Japan. J Gerontol B Psychol Sci Soc Sci. 2022; 77:759-768.
11. Ministry of Justice. Act on Stabilization of Employment of Elderly Persons. *https://www.japaneselawtranslation.go.jp/en/laws/view/2621/je* (accessed September 20, 2023).
12. Ministry of Health, Labour and Welfare. Handbook of Health and Welfare Statistics 2022. Part 2 Health, Chapter

2 Healthcare, Table 2-47. Director-General for Statistics, Information Policy and Industrial Relations Ministry of Health, Labour and Welfare. *https://www.mhlw.go.jp/english/database/db-hh/index.html* (accessed October 9, 2023).
13. Japanese Nursing Association. 2019 Survey of Hospital Nursing. Japanese Nursing Association research report No. 95. *https://www.nurse.or.jp/nursing/home/publication/pdf/research/95.pdf* (accessed February 18, 2024). (in Japanese)
14. Organisation for Economic Co-operation and Development. Pensions at a glance 2021: OECD and G20 indicators. *https://www.oecd-ilibrary.org/finance-and-investment/pensions-at-a-glance-2021_ca401ebd-en* (accessed February 18, 2024).
15. Duffield C, Graham E, Donoghue J, Griffiths R, Bichel-Findlay J, Dimitrelis S. Why older nurses leave the workforce and the implications of them staying. J Clin Nurs. 2015; 24:824-831.
16. Eley R, Eley D, Rogers-Clark C. Reasons for entering and leaving nursing: An Australian regional study. Australian Journal of Advanced Nursing. 2010; 28:6-13.
17. Pilipiec P, Groot W, Pavlova M. The effect of an increase of the retirement age on the health, well-being, and labor force participation of older workers: A systematic literature review. J Popul Ageing. 2021; 14:271-315.
18. Higo M, Klassen TR. Reforms of retirement policies: Three common paths in aging in Japan and Korea. J Aging Soc Policy. 2017; 29:70-83.
19. Japanese Nursing Association. Nursing in Japan 2023. (English version). *https://www.nurse.or.jp/english/nursing/index.html* (accessed June 20, 2023).
20. Ministry of Health, Labour and Welfare. Annual Health, Labour and Welfare Report 2021. *https://www.mhlw.go.jp/english/wp/index.html* (accessed October 20, 2023).
21. Kida R, Kunie K, Sasaki M, Horigome Y, Yonekura Y, Takemura Y. A study on the recruitment status of nurses and recruitment activities by bed size: A national survey. Journal of the Japanese Society for Healthcare and Hospital Administration. 2021; 58:119-130. (in Japanese)
22. Ministry of Health, Labour and Welfare. Report on public health administration and services (Practicing health professionals) 2020. *https://www.mhlw.go.jp/english/database/db-hss/dl/rophas_2020_biennialyear.pdf* (accessed June 20, 2023). (in Japanese)
23. Japanese Nursing Association. Nursing for the Older People in Japan. 2. Nursing for the older people: Current situation and challenges. *https://www.nurse.or.jp/assets/pdf/info-02.pdf* (accessed October 18, 2023).
24. Oishi S. Quantitative analysis of the changes in the number of nurses and assistant nurses in Japan from 1998 to 2004. J Jikei Univ Hosp. 2008; 123:15-25. (in Japanese)
25. Kawashiro Y, Ishii K, Torita M, Takeuchi K, Otaki C, Kawamura N. Employment realities and needs of nurses returning to the workforce at long-term care facilities and visiting nursing stations. Bull Chiba Prefect Univ Health Sci. 2018; 9:11-16. (in Japanese)
26. Smiley RA, Ruttinger C, Oliveira CM, Hudson LR, Allgeyer R, Reneau KA, Silvestre JH, Alexander M. The 2020 national nursing workforce survey. J Nurs Regul. 2021; 12:S1-S96.
27. Morioka N, Tomio J, Seto T, Kobayashi Y. The association between higher nurse staffing standards in the fee schedules and the geographic distribution of hospital nurses: A cross-sectional study using nationwide administrative data. BMC Nurs. 2017; 16:25.
28. Sakata Y, Morioka N, Nakamura F, Toyokawa S, Kobayashi Y. The distribution of hospital nurses and associated factors. Nihon Koshu Eisei Zasshi. 2016; 63:367-375. (in Japanese)
29. Statistics Bureau, Ministry of Internal Affairs and Communications. Population census in 2020. *https://www.e-stat.go.jp/en/stat-search?page=1&query=population%20census* (accessed February 20, 2024).
30. Ministry of Health, Labour and Welfare. The survey of institutions and establishments for long-term care. *https://www.mhlw.go.jp/toukei/itiran/index.html*. (accessed February 22, 2024). (in Japanese)
31. Ministry of Health, Labour and Welfare. Survey on admissions into nurse schools and work statuses of graduates 2023. *https://www.mhlw.go.jp/toukei/list/100-1.html* (accessed February 20, 2024). (in Japanese)
32. Arai H, Ouchi Y, Toba K, Endo T, Shimokado K, Tsubota K, Matsuo S, Mori H, Yumura W, Yokode M, Rakugi H, Ohshima S. Japan as the front-runner of super-aged societies: Perspectives from medicine and medical care in Japan. Geriatr Gerontol Int. 2015; 15:673-687.
33. Scales K. It is time to resolve the direct care workforce crisis in long-term care. Gerontologist. 2021; 61:497-504.
34. Katori T. Japan's healthcare delivery system: From its historical evolution to the challenges of a super-aged society. Glob Health Med. 2024; 6:6-12.
35. O'Brien-Pallas L, Duffield C, Alksnis C. Who will be there to nurse? Retention of nurses nearing retirement. J Nurs Adm. 2004; 34:298-302.

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