

Aging and Wages of Long-term Care Workers: A Case Study of Japan, 2002–2017*

By Atsuhiko YAMADA and Kayoko ISHII **

Abstract

This study uses Japan’s Employment Status Survey, covering approximately one million people in each of four survey years from 2002 to 2017, to identify the basic characteristics of long-term care (LTC) workers, the reasons for leaving their job, labor mobility between other occupations and industries, and to determine the level of wages that would be adequate for LTC workers in each region of Japan.

There are four main findings. First, the proportion of male care workers has increased in the past 15 years, and reached 20% in 2017, which is the highest of the OECD member countries. The median length of tenure of LTC workers rose by about one year over every five years. However, the number of female care workers aged 60 and above increased 12-fold in the same period, and LTC workers are aging rapidly.

Second, the main reason for males leaving LTC is “low wages”; while for females it is “old age.” To replace aging and retiring female LTC workers, wages must be raised to promote male LTC labor supply and to reduce their turnover rate.

Third, many care workers move back and forth within the same industry, that is, “medical, health care and welfare.” However, “wholesale and retail trade,” “manufacturing,” and “accommodations, eating and drinking services” are the most common sectors sources and destinations of LTC workers, so they could be regarded as “competing industries” for LTC workers.

Finally, the more aged the prefecture, the higher the ratio of health and welfare industry workers, but the lower the wage rate overall. In particular, for men in less aged regions, the wages of care workers are noticeably low compared to those of other industries.

JEL Classification Codes: J31, J48, J62

Keywords: Long-term care insurance, Long-term care workers, LTC unit price premium, regional wage differences

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高齢化と介護労働者の賃金：2002－2017年

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<要旨>

本研究では、2002年から2017年までの4回の調査年ごとに約100万人を対象とした「就業構造基本調査」を用い、介護労働者の基本的な特徴、離職理由、他職種・他産業間の労働移動を明らかにし、各地域における介護労働者の適正な賃金水準を明らかにした。

その結果、主に4つの知見が得られた。まず、男性介護労働者の割合は過去15年で増加しており、2017年には20%に達し、OECD加盟国の中では最も高い。また、介護労働者の勤続年数の中央値は5年ごとに約1年ずつ上昇している。しかし、60歳以上の女性介護労働者は同期間に12倍に増加しており、介護労働者の高齢化が急速に進んでいる。

第二に、男性介護労働者の離職の主な理由は「低賃金」であり、女性の場合は「高齢」が主な理由である。高齢化・退職する女性介護労働者を代替するには、男性介護労働者の供給を促進し、離職率を低下させるための賃金引き上げが必要である。

第三に、介護労働者の多くは同一業種、すなわち「医療・福祉業」の中を行き来している。しかし、「卸売・小売業」、「製造業」、「宿泊・飲食業」は、介護労働者の流出先として最も多い業種であり、介護労働者にとっての「競合産業」といえる。

最後に、高齢化が進んでいる都道府県ほど、医療・福祉業従事者比率は高いが、賃金率は低い。特に、高齢化が進んでいない地域の男性介護労働者の賃金の低さは顕著である。

JEL classification Codes: J31, J48, J62

Keywords: 介護保険、介護労働者、地域区分毎の単価、地域間賃金格差

1. Introduction

Japan is moving from a phase in which the number of elderly people (over the age of 65) is rapidly increasing (2000-2025) to a phase in which the number of working-age people (between the age of 15-64) is rapidly decreasing (2025-2040). At the same time, the demand for long-term care (LTC) workers has increased, as the number of single-person elderly households, which cannot rely on informal care from household members is rising. Between 2018 and 2040, the number of people in Japan's workforce is expected to fall from 65.8 million to 56.5 million, while the number of medical and welfare workers needed in 2040 is expected to reach 10.6 million, or 19% of the workforce (Subcommittee on LTC Benefits 2020a:3).

As a result, there is a growing concern about the potential shortage of LTC workers. According to government estimates, the number of LTC workers necessary to meet demand will be 2.45 million in 2025, requiring an increase of 60,000 new LTC workers every year. However, while the average jobs-to-applicants' ratio for all industries was 1.5:1 in 2019, the ratio for LTC workers was 4.2:1 (Subcommittee on LTC Benefits 2020a:5, 16). Moreover, the corresponding average ratio for home visit LTC workers is 15:1 (Subcommittee on LTC 2020b:53), although there are large regional differences in these ratios (Subcommittee on Long-Term Care Benefits 2020a:6).

One of the factors contributing to the supply–demand gap for LTC workers is their shorter tenure and low wages compared to other industries and occupations. Indeed, the average tenure of LTC workers is four years shorter, and their average wage 23% lower, than those of workers in all industries and occupations, even though their average age is the same (Subcommittee on LTC Benefits 2020a: 7–12). The shorter average tenure in the LTC industry compared to all industries may be due to the fact that the LTC labor market has rapidly evolved since the year 2000, when LTC insurance was introduced as the fifth form of social insurance in Japan.¹

Therefore, the purposes of this study are as follows: First, to clarify the basic composition of LTC workers, reasons for leaving their job, and trends in labor mobility among other occupations and industries; and second, to indicate the adequate level of wages for formal care workers in each region, using data from Japan's Employment Status Survey, which is one of the largest individual data sets in Japan. If significant regional differences and labor mobility to and from certain industries (e.g., other service industries with lower wages) are found, then there may be no need to raise wages by 23% to ensure an adequate supply of LTC workers.

This paper is organized as follows: in the next section, we describe the institutional background of LTC, and in section 3, we discuss related literature and clarify issues that have not yet been uncovered. Section 4 presents the analytical framework, and in section 5, we describe changes in the

¹ There are four other social insurances in Japan: pension, health care, workers' compensation, and unemployment insurance.

basic compositions of LTC workers, reasons for leaving their jobs compared to other occupations and industries, and the labor inflow/outflow of LTC workers. In section 6, we clarify the adequate level of wages for LTC workers at the regional level compared to other occupations and industries, controlling for individual attributes such as gender, education level, and years of service. Section 7 presents our concluding remarks.

2. Institutional background

Twenty years have passed since the introduction of LTC insurance, which was Japan's fifth form of social insurance, enacted in 2000. Over the past two decades, both the number of persons qualified to receive LTC services and the number of LTC workers have tripled (Subcommittee on LTC Benefits 2020a:4). The LTC labor market has developed rapidly as a consequence.

Despite the term LTC “insurance,” the social insurance premiums, which are paid by those over 40 years old who are compulsorily insured, cover only 50% of the necessary expenditure on LTC. The remaining 50% is covered by public expenditure, which is shared by the national treasury, prefectures, and municipalities (National Institute of Population and Social Security Research 2019: 42–44). To raise the funding necessary for LTC, the insurance premiums paid by those insured and employers must be supplemented by funds from other stakeholders, such as municipalities, prefectures, and the Ministry of Finance, who must find the necessary funds from their tax revenue. As a result, LTC insurance has faced severe financial constraints ever since its introduction.

Standards relating to personnel, facilities, and management aim to ensure the quality of LTC services. Personnel standards stipulate the required knowledge, skills, and number of LTC workers; facility standards regulate the equipment necessary for LTC facilities; and operational standards regulate the management of LTC businesses, such as information given to LTC users, and records of service provision (LTC Insurance Committee 2007: 2).

The LTC fee schedule, which is an official unit price, is determined by the Minister of Health, Labour and Welfare, with reference to the opinions of the Subcommittee on LTC Benefits. Fees vary according to the type of LTC service, the Activities of Daily Life level of the recipients, and the region (National Institute of Population and Social National Institute of Population and Social Security Research 2019: 45). Reflecting severe fiscal constraints, average LTC fees have often been revised downwards. Table 1 shows the evolution of the average LTC fee schedule; the simple sum of the revision rates from 2003 to 2018 is -0.46%; this occurred despite the consumption tax being raised from 5% to 8% during this period.²

² For FY2021, a 0.7% increase in the average LTC fee schedule is planned to help finance the introduction of IT (e.g., use of robots and sensors) to reduce the burden on staff, and for enhancing measures to address infectious diseases (*The Nikkei*, 18th Dec 2020, "Decision be made to increase LTC fee schedule by 0.7% next year").

Table 1 Evolution of average LTC fee schedule and wage increases by subsidies
(%, monthly wage)

FY	Average Changes of LTC Service Fee Schedule (%)	Average Increases of Wages by Subsidies (Monthly, thousands yen)
2003	-2.30	
2006	-2.40	
2009	3.00	24
2012	1.20	6
2014	0.63	
2015	-2.27	13
2017	1.14	14
2018	0.54	

Sources: Subcommittee on LTC Benefits (2018), (2020a).

Notes: The change in the LTC service fee schedule in FY2006 includes the change in October FY2005. The increase in fee schedule in FY 2014 corresponds to the consumption tax hike from 5% to 8%. Conversion rate of Japanese Yen to 1US\$ is 113 Yen in 2017.

Currently, the wage-to-cost ratio as a percentage of LTC fee revenues ranges from 60% to 80%, depending on the type of LTC service provided, but this ratio has gradually increased (Ministry of Health, Labor and Welfare 2019). The negative revision of fee schedule may have had a negative impact on the wages of LTC workers, as wages account for the majority of LTC fee revenues.

To mitigate this negative impact and improve the wages of LTC workers, the government introduced subsidies in 2009.³ These subsidies were paid in 2012, 2015, and 2017, and made it possible to raise wages by an average of 57,000 yen per month in total (Table 1). However, during this period, the average length of service of LTC workers also increased. Considering that wages generally increase with tenure, the monthly wage improvement of 57,000 yen may not be sufficient for LTC workers who have been working since 2000.

In addition, to adjust for regional differences in labor costs, different regional LTC unit price rates are applied in each of eight regions. However, *prima facie*, these regional rates are intended to adjust the *allocation* of LTC finance between the eight regions, in line with their different labor costs. In other words, the Ministry applies the rates based on the principle of *fiscal neutrality* (Long-Term Care Insurance Benefit Cost Subcommittee 2019:1), and the net financial effect of any changes to regional LTC unit price rates is always set to be zero.

The regions for setting unit price rates numbered five before FY2012, then seven and, since FY2015, eight, to more closely reflect regional differences in labor costs. The current LTC unit price

³ The “grant for improving the treatment of LTC workers” (*Kaigo Shokuin Shogu Kaizen Kofukin*), introduced in 2009, was abolished and replaced by the “the addition for improving the treatment of LTC workers” (*Kaigo Shokuin Shogu Kaizen Kasan*) in 2012. In 2019, the “the additional allowance for improving the treatment of LTC workers” (*Kaigo Shokuin Tou Tokutei Shogu Kaizen Kasan*) was also introduced for experienced and skilled workers.

rates for the eight regions are 0%, 3%, 6%, 10%, 12%, 15%, 16%, and 20%. The highest rate of 20% is for the Tokyo metropolitan area. These rates are set in accordance with the regional allowances for civil servants, which reflect the wage levels of private sector workers in each region (Subcommittee on LTC Benefits 2019:1–4).

3. Related literature and research questions

The short tenure and low wages of LTC workers are problems that are not unique to Japan. A recent comprehensive international study pointed out that LTC workers in most OECD member countries face lower wages, more part-time employment, fewer promotion prospects, and greater physical and mental stress than workers in similar occupations in hospitals. The study also pointed out that the tenure of LTC workers is relatively short (OECD 2020: 94–114).

A series of empirical studies in Japan have repeatedly found that low wage levels have increased the turnover rate of LTC workers. Kishida and Tanigaki (2008), Kohiyama (2009), and Yamada and Ishii (2009) have shown that the relatively low wage levels of LTC workers increase their intention to leave the LTC sector. Jang and Kuroda (2008), Hanaoka (2009, 2011), Suzuki (2011), and Ueno and Hamaaki (2017) also found that a low relative wage level for LTC workers increased the average turnover rate.

As explained in the previous section, the government has been trying to improve the wages of LTC workers by several measures, such as the reforms of regional LTC unit prices for regions with high labor costs, and wage subsidies to help develop career paths, while restraining the average LTC fee schedule.

A series of studies have shown that these measures have had an impact on the wages of LTC workers. Zhou (2009) and Yamada and Ishii (2009) showed that the negative revisions of the LTC fee schedule in FY2003 and FY2006 may have caused wages of LTC workers to fall. Ueno and Hamaaki (2017) and Kondo (2019) concluded that the FY2009 and FY2012 revisions, which raised LTC unit prices in urban areas, did not affect the scheduled cash earnings of LTC workers, and increased only their lump-sum payments and bonuses. However, Kobayashi (2019) found that the FY2015 increase in LTC unit price increased the scheduled cash earnings of new job applicants.

More importantly, though, Shimono (2009), Suzuki (2010), Ueno and Hamaaki (2017), and Kondo (2019) pointed out that even if increases in wages for LTC workers reduce turnover, they do not necessarily increase the supply of LTC workers. Suzuki (2010) and Ueno and Hamaaki (2017) showed that an increase in the wage rate reduces working hours, and Kondo (2019) showed that an increase in the wage rate does not increase the number of LTC workers.

This means that, to identify the factors behind the undersupply of LTC workers, it is necessary to identify those sectors from which, or to which, LTC workers are flowing. If there is significant

labor mobility from or to other sectors, in which wages are higher than for LTC workers, then the current regional LTC unit price may be insufficiently high to assure a continued supply of LTC workers. It would then be possible to argue that the wage level of LTC workers should be set more appropriately, by referring to wage levels in those sectors.

However, to the best of our knowledge, there are few studies of the inter-sectoral labor mobility of LTC workers in Japan. Kishida and Tanigaki (2008) found that wage levels alone had no effect on workers' desire to quit LTC job and move to other occupations. Yamada and Ishii (2009) showed that the influx of new LTC workers and those entering the LTC sector from other industries was relatively large compared to the average influx into other industries; however, the influx of such workers decreased sharply between 2002 and 2007. Suzuki (2011) observed, based on a small-scale Internet survey, that many of those who left their jobs were re-employed in the health and welfare industry, which includes the LTC sector, and higher relative wage level reduces inter-sectoral outflow of LTC workers.

In this paper, we aim to shed light on two aspects of the LTC labor supply, based on analyses of large-scale, nationally representative, datasets. First, in section 5, we investigate changes in the basic attributes of LTC workers, the reasons for leaving their jobs compared to other occupations and industries, and labor mobility. Second, in section 6, we identify the level of wages for LTC workers, at the regional level, that would be adequate, in comparison with other occupations and industries, after controlling for individual attributes such as gender, education level, length of service, and so on.

4. Data and empirical framework

4.1 Data

In this paper, we use nationally representative data from the national “Employment Status Survey (2002, 2007, 2012, and 2017)” (hereafter, ESS) conducted by the Statistics Bureau of Japan. This survey covers household members aged 15 and over (approximately 1 million people) in approximately 500,000 households, randomly sampled from across Japan.

There are four advantages of using this large-scale survey. First, as its name suggests, it provides us with a wide range of information about the current and past structure of employment, which makes it possible to analyze the dynamics of labor inflow/outflow to some extent. Second, it includes various other variables, including personal attributes such as gender and educational level, wage, and people's intention to leave their current jobs. Third, because it is a large-scale survey, it is possible to obtain a sufficiently large sample size of industries, occupations, and regions. Fourth, comparisons of personal attributes, wages, and working conditions between occupations such as nurses and childcare workers as well as other industries, at the same level, make it possible to identify the specific characteristics of LTC workers.

4.2 Number of workers

As far as we know, there are few studies of LTC workers that have used the ESS. Therefore, we first examine whether the number of LTC workers identified in the ESS based on the three-digit code, along with other occupations in the healthcare and welfare industries, is consistent with the numbers obtained from National Census.

Table 2 shows comparisons of worker numbers from the census for physicians, nurses, child care workers, and LTC workers (facility and home visit LTC workers). The first column shows the population by the occupations identified by the census, the second column shows the number of workers by applying weights to the ESS samples (weighted), the third column shows the number of observations (unweighted) in the ESS, and the fourth column shows the ratio between the number of workers identified by the census (a) and the number of workers identified by the ESS (weighted).

Table 2 Sample size of Health/Child/LTC workers in the ESS, compared with National Census

	2002				2007			
	Population (a)	ESS (wgted.)	ESS (unwgted.)	difference (wgted./a)	Population (a)	ESS (wgted.)	ESS (unwgted.)	difference (wgted./a)
Doctor	238,142	229,363	1,900	96%	251,108	242,894	1,865	97%
Nurse	976,214	1,045,393	9,742	107%	1,106,795	1,177,570	10,757	106%
Childcare worker	361,488	450,409	4,246	125%	419,296	433,127	4,226	103%
Facility LTC worker	358,305	406,256	4,265	113%	544,918	652,309	6,569	120%
Home visit LTC worker	138,164	177,821	1,491	129%	233,767	211,643	1,657	91%

	2012				2017			
	Population (a)	ESS (wgted.)	ESS (unwgted.)	difference (wgted./a)	Population (a)	ESS (wgted.)	ESS (unwgted.)	difference (wgted./a)
Doctor	262,630	255,802	1,962	97%	275,250	313,152	2,144	114%
Nurse	1,204,220	1,305,371	12,262	108%	1,300,060	1,468,610	12,901	113%
Childcare worker	474,900	538,918	5,051	113%	542,600	609,996	5,140	112%
Facility LTC worker	797,500	938,686	9,225	118%	1,042,370	1,207,192	10,943	116%
Home visit LTC worker	229,710	366,569	2,882	160%	230,100	243,284	1,905	106%

Source: Authors' calculations based on ESS.

Notes: Caution should be made for the comparisons as there are two-year discrepancies between "National Census (2000, 2005, 2010, 2015)" and ESS (2002, 2007, 2012, 2017).

For doctors and nurses, the figures in the ESS and the census are almost identical, and range from -4% to 14%. However, the numbers of facility LTC workers range from 13% to 21%, higher in the ESS. The largest discrepancies are for home visit LTC workers, with differences ranging from -30% to +60%. Nevertheless, in the most recent data, the discrepancy is only 6%. When looking at trends in terms of the number of people, care should be taken with regard to home-visit LTC workers.

4.3 Estimation of wage function

Since the LTC labor market has developed rapidly over the past two decades, it is important to control

for attributes such as short tenure when comparing the wages of LTC workers with those of workers in other industries and occupations. Specifically, we estimate the following Mincer-type wage function:

$$\ln(W_i) = \alpha + \beta_1 \cdot Age_i + \beta_2 \cdot Age_i^2 + \beta_3 \cdot Tenure_i + \beta_4 \cdot Tenure_i^2 + \beta_5 \cdot Education_i + \beta_6 \cdot Firm_Size_i + \beta_7 \cdot Industry_i + \beta_8 \cdot Occupation_i + \beta_9 \cdot Region_i + \varepsilon_i$$

where W_i is the hourly wage rate.⁴ In the case of samples of people with irregular working hours or those who work only during certain seasons, hourly wages cannot be calculated, owing to the design of the questionnaire⁵. Therefore, we excluded these samples from our analysis. In addition, for the wage function, the sample in the analysis is limited to those aged 59 or younger, to exclude the effect of the complicated effects of the income test for those approaching retirement, which apply to those who are working beyond age 60 and receiving old-age pensions. In addition, self-employed and company executives are also excluded, because the determinants of their income may be different from those of employees. $Education_i$, $Firm_Size_i$, $Industry_i$, and $Occupation_i$ are categorical variables. We use both one-digit codes and three-digit codes to create $Industry_i$ and $Occupation_i$ dummy variables. Three-digit codes are mainly used to identify Health/Child/Long-term care workers and competing jobs for LTC workers (described in section 5). Depending on the estimation, the reference category is set to clerical workers in manufacturing, or to production process workers in manufacturing. The latter reference category is used for the analysis of labor mobility and wage difference among competing jobs for LTC workers. $Region_i$ is the prefecture, or one of the eight regions in which different LTC unit prices are applied to adjust the labor cost. ε_i is the error term.

By estimating this wage function, it is possible to identify the relative wages of LTC workers at the regional level in comparison with other industries and occupations, while controlling for individual attributes.

4.4 Estimation of labor mobility

The ESS can also identify past employment history. Specifically, information such as the industry and occupation of a worker's previous job, the time when the previous job was quit, and the reason for quitting are available. This allows us to analyze the inflow into, and outflow from, LTC sector. However, since there is no information on the wages and working hours of a worker's previous job, it is difficult to analyze how the wage rate affects the duration of continuous employment. In addition,

⁴ Since Annual Earnings, working hours, and working days are categorical variables, we calculated the hourly wage rate from the median of each category.

⁵ In the 2017 ESS data, hourly wage cannot be calculated for 6 percent of all workers and 7 percent of LTC workers for this reason. However, for all figures except the wage function estimates, we include the samples of people with irregular working hours or those who work only during certain seasons in the calculations.

it should be noted that only two-digit, not three-digit codes for the industry and occupation classifications of previous jobs, are available.

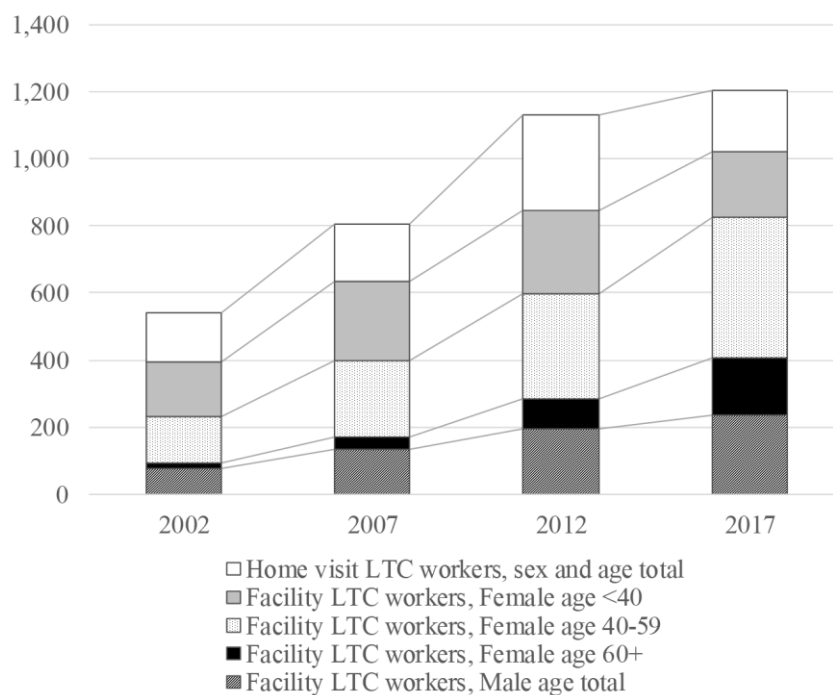
5. Labor mobility of LTC workers

5.1 Composition of LTC workers

Generally, the proportion of male LTC workers is quite low in OECD member countries, averaging less than 10 percent; in Japan, however, the proportion of male care workers in Japan is the highest of the OECD countries, at over 20% (OECD 2020: 43–44). Figure 1 shows the composition of care workers by sex and age as captured by the ESS: between 2002 and 2017 the overall number of care workers doubled, while the number of male care workers tripled over the same period.

More interestingly, the number of female facility LTC workers aged 60 and older increased 12-fold over the same period; as of 2017, female facility LTC workers aged 60 and older accounted for 15% of all care workers. In contrast, the number of female facility LTC workers under the age of 40 declined from 2012 to 2017. This is because many middle-aged and older women, whose labor force participation rates was relatively low at the time of the establishment of long-term care insurance, became LTC workers (Yamada and Ishii 2009), and these women are now aging.

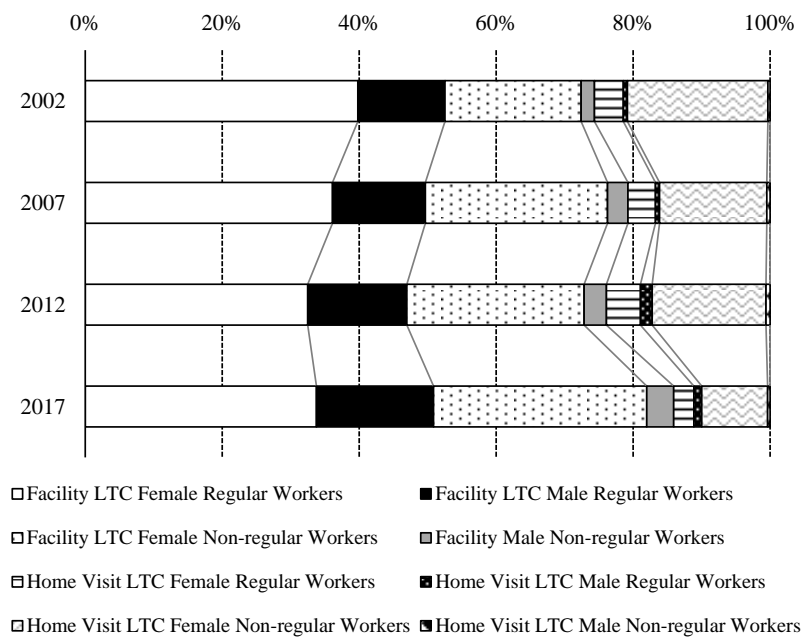
Figure 1 Composition of LTC workers by age, services, and sex
(thousand persons, 2002–2017)



Source: Authors' calculations based on ESS.

Figure 2 shows the composition of care workers by sex, employment status, and service type as of 2017. Facility LTC workers account for 86% of all care workers; male non-regular workers account for only 4% of all LTC workers. Most male care workers are *regular* facility LTC workers, and their number increased by 4 percentage points over 15 years to account for 17% of all LTC workers in 2017. By contrast, over the same period, the share of female facility LTC workers declined by 6 percentage points, from 40% to 34%.

Figure 2 Composition of LTC workers by employment status, services, and sex (%)



Source: Authors' calculations based on ESS.

In summary, we observe that between 2002 and 2017, the female facility LTC workers have aged, and the number of male facility LTC workers has increased. This has two consequences. First, the shortage in the supply of LTC workers may become more serious as the aging female LTC workers retire. Second, male workers are key to the supply of LTC workers.

5.2 Reasons for quitting

We now turn to the issue of whether the reasons for workers quitting, or wishing to quit, LTC jobs are different from those of workers in other industries. For example, we examine whether low wages are the main reason for quitting or wishing to quit. We also investigate whether gender differences were relevant in 2017. Yamada and Ishii (2009) found that the different genders of LTC workers gave different reasons as to why they wished to change jobs in 2002; the main reason cited by women was “physical strain,” while for men it was “low wages.”

Table 3 shows the main reasons for quitting previous jobs given by people who left their jobs in the three years prior to the survey, for all those who left their jobs and for only those who left LTC work, broken down by gender. The most common reason given was “unsatisfactory working conditions,” which was cited by almost the same proportion of all leavers and LTC workers.

Table 3 Main reasons for quitting previous job cited by people who quit their job in previous three years

	People who quit their job in last 3 years (%)							
					of which, previously working as LTC workers			
	Female		Male		Female		Male	
	2007	2017	2007	2017	2007	2017	2007	2017
Company bankruptcy/business closed down	6	6	6	5	2	3	3	1
Personnel retrenchment/compensated early retirement	3	2	5	4	2	1	2	2
Business slump/ insecurity about the future	4	3	9	8	2	3	5	4
Mandatory retirement	0	0	1	1	0	0	0	0
Termination of employment contract	7	9	3	5	3	4	3	1
Low income	11	12	12	14	7	10	15	19
Unsatisfactory working conditions	16	17	18	20	15	15	17	23
Marriage	3	2	0	1	8	4	0	1
Childbearing/Childcare	3	4	0	0	10	8	1	0
Caring for an aged/sick family member	2	2	1	1	5	5	2	1
Illness/Old age	3	3	2	3	9	8	5	10
Did not like	9	7	8	7	5	5	10	7
Temporary job	8	5	8	5	4	3	4	4
A family member's finding or changing a job/transfer or relocation of the establishment, etc.	2	3	1	1	3	2	0	1
Other	23	25	25	26	25	28	32	27
Total (%)	100	100	100	100	100	100	100	100
Total (N)	32,180	23,197	27,342	16,561	3,585	2,917	500	528

Source: Authors' calculations based on ESS.

However, there are three reasons that are specific to those who left the LTC work. First, in 2017, 19% of male LTC leavers cited “Low income” as their reason for leaving, which is 5 percent points higher than the average for all leavers. This represents an increase of 4 percent points from 2007 to 2017. Second, nearly 10 percent of both male and female LTC leavers cited “Illness/Old age” as their reason for leaving in 2017, while the average for all leavers was only 3 percent. Third, one in seven female care leavers cited informal care, such as “Caring for an aged/sick family member” or “Childbearing/Childcare” as their reason for leaving, while the corresponding proportion for all female leavers was only one in 20. Excluding “Childbearing/Childcare,” the main reason cited by female LTC workers for leaving their jobs was aging-related factors, while low income was the main

reason for male LTC workers leaving their jobs.

Table 4 shows the reasons for wanting to change jobs given by those working in LTC in both 2007 and 2017. Compared to the average for all industries, significantly more male LTC workers cited “low wage or salary” as their reason for wanting to change jobs—the most common reason. This was 32 percentage points higher than the all-industry average in 2007, and 15 percentage points higher than, and nearly twice as high as, that of female LTC workers in 2017.

Forty-four percent of female care workers cited “long working hours or heavy physical strain” as a reason for wanting to change jobs, nearly twice as many as the average for all industries in both 2007 and 2017. The reason for this is not only that LTC work is especially physically demanding for women, but also that female LTC workers are aging. For male workers, the difference between the all-industry average and the LTC average is not so large but, between 2007 and 2017, the percentage of those who wanted to change jobs because of “low wages” dropped by 19 percent points possibly reflecting the wage increases led by the recent changes in the LTC fee schedule (Ueno and Hamaaki 2017; Kondo 2019) or the introduction of wage subsidies (See section 2), whereas the percentage of those who wanted to change jobs because of “long working hours or heavy physical strain” doubled to 32%.

Table 4 Main reasons cited by those wishing to quit current job

	People wishing to switch to another job (%)							
					of which, facility care workers			
	Female		Male		Female		Male	
	2007	2017	2007	2017	2007	2017	2007	2017
Temporary job	11	8	10	7	3	4	1	4
Low wage or salary	30	28	33	31	31	25	65	46
Slump in business and insecure future	6	6	13	12	2	3	5	4
To prepare for mandatory retirement, or termination of employment contract	2	3	2	3	0	1	0	0
Long working hours or heavy physical strain	21	27	19	25	44	44	16	32
To make better use of own knowledge and skills	10	6	10	7	8	7	4	5
To increase leisure time	3	3	3	4	3	2	0	2
Not having enough time to do housework	4	4	1	1	2	3	0	0
Other	13	16	9	11	6	11	9	6
Total (%)	100	100	100	100	100	100	100	100
Total (N)	25,224	18,860	28,428	17,714	708	807	265	246

Source: Authors’ calculations based on ESS.

Table 5 shows that the length of service of LTC workers has increased for both men and women, and for all employment statuses and service types. The proportion of care workers with more than 10 years of service is increasing, accounting for about 20–30% or more. While this is certainly lower

than the all-industry average of 40 percent, the median length of tenure of LTC workers rose by about one year over every five years. The median length of service among facility regular LTC workers was five years as of 2017.

Table 5 Distribution of tenure

	Female Facility LTC Regular Workers				Male Facility LTC Regular Workers				Female Facility LTC Non-regular Workers			
	2002	2007	2012	2017	2002	2007	2012	2017	2002	2007	2012	2017
<2years	30	30	27	18	32	27	31	21	57	43	37	27
2-4 years	29	29	26	24	31	34	25	26	30	30	28	28
5-9 years	24	24	26	28	23	25	28	28	9	19	23	23
10-19 years	13	14	18	24	11	13	15	21	3	7	10	18
20 years>	4	2	3	6	4	1	1	3	1	1	2	3
Total (%)	100	100	100	100	100	100	100	100	100	100	100	100
Median	3	3	4	5	3	3	4	5	1	2	3	4
N	2,108	2,844	3,828	4,454	674	1,068	1,710	2,251	1,055	2,095	3,050	4,110

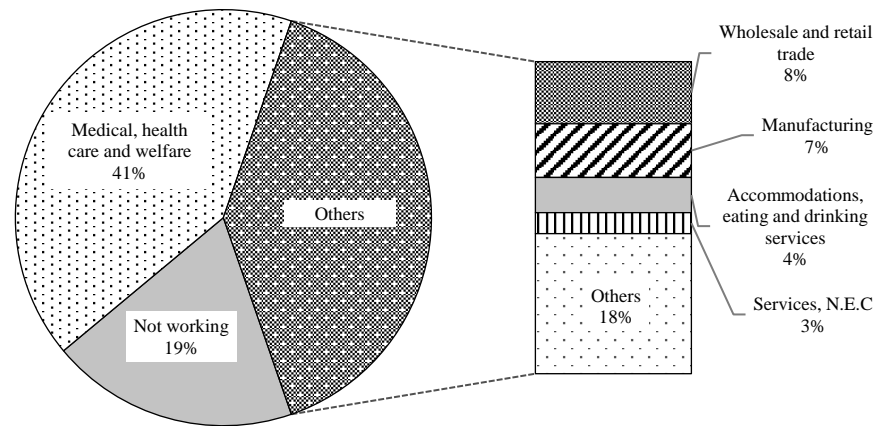
	Female Home visit LTC Workers				Male Home visit LTC Workers				All industries/occupations			
	2002	2007	2012	2017	2002	2007	2012	2017	2002	2007	2012	2017
<2years	42	24	26	15	50	21	41	38	24	23	21	20
2-4 years	29	37	27	23	32	57	28	28	18	18	18	19
5-9 years	15	29	26	27	15	19	21	19	17	17	19	18
10-19 years	11	10	18	31	3	1	8	14	21	21	20	21
20 years>	3	0	3	4	0	2	1	2	20	20	21	21
Total (%)	100	100	100	100	100	100	100	100	100	100	100	100
Median	2	4	4	6	1	2	2	3	7	7	7	7
N	223	315	583	388	33	48	202	156	404,800	414,219	426,821	446,442

Source: Authors' calculations based on ESS.

5.3 In/outflow of LTC workers

From which sectors are workers flowing into LTC, and to which sectors are they flowing out? Figure 3 shows the industries from which LTC workers with less than three years of service as of 2017 entered the LTC sector. Owing to data limitations, it is not possible to identify the specific type of job they held before at the three-digit code level, but we can observe that 41% came from “Medical, health care and welfare” category—the same industry as LTC. The remaining 40% came from the “Others” category, including “Wholesale and retail trade,” “Manufacturing,” and “Accommodation, eating and drinking services,” which together accounted for 19% of the total labor inflow to the LTC sector.

Figure 3 Source of labor inflow to LTC sector

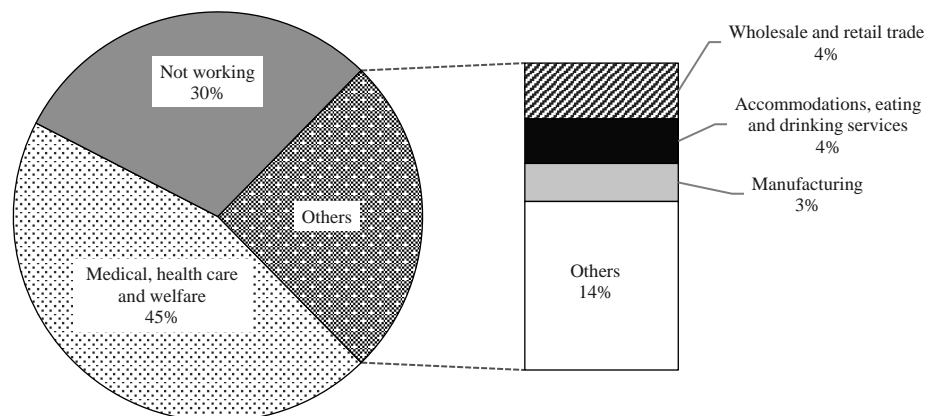


Source: Authors' calculations based on ESS 2017.

Notes: Previous industry categories of those who started working LTC in the three years prior to 2017.

Figure 4 shows those industries into which workers who left LTC in the three years prior to 2017 flowed. To exclude those who left the workforce as a result of old age or retirement, we consider only those who left the workforce when under the age of 60. The same data limitations given above prevent us from identifying the specific types of job at the three-digit code level, but we can observe that 45% go to “Medical, health care and welfare,” the same industry as LTC; while 25% went to “Others” including 11% who went to the “Wholesale and retail trade,” “Manufacturing,” and “Accommodations, eating and drinking” sectors.

Figure 4 Destination of labor outflow from LTC sector



Source: Authors' calculations based on ESS 2017.

Notes: Destinations of care workers who switched their jobs in the three years prior to 2017.

To summarize the labor mobility of LTC workers: First, most LTC workers move back and forth within the same industry, that is, “Medical, health care and welfare.” Second, “Wholesale and retail trade,” “Manufacturing,” and “Accommodations, eating and drinking services” are the main sectors into which care workers move, and we can therefore regard these as the main *competing industries* for LTC workers.

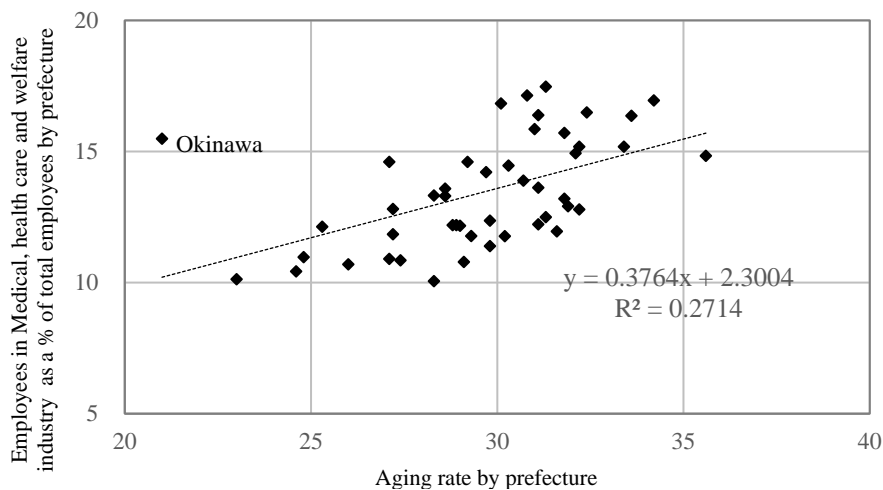
In the next section, we will examine the level of wages that would be adequate for LTC workers, taking into account the wage levels in *competing industries*.

6. Aging, and the adequate wage level for LTC workers

Aging and regional wage premiums

The share of workers in the “Medical, health care and welfare” industry, as a proportion of all workers, is higher in prefectures with an older population. Figure 5 shows the relationship, based on 2017 prefecture-level cross-section data. Even including Okinawa prefecture, which seems to be an outlier, a 1% increase in the aging rate associated with a 0.4% increase in the ratio of workers in the “Medical, health care, and welfare” industries to all workers.

Figure 5 Aging and share of workers in “Medical, health care and welfare” in 2017

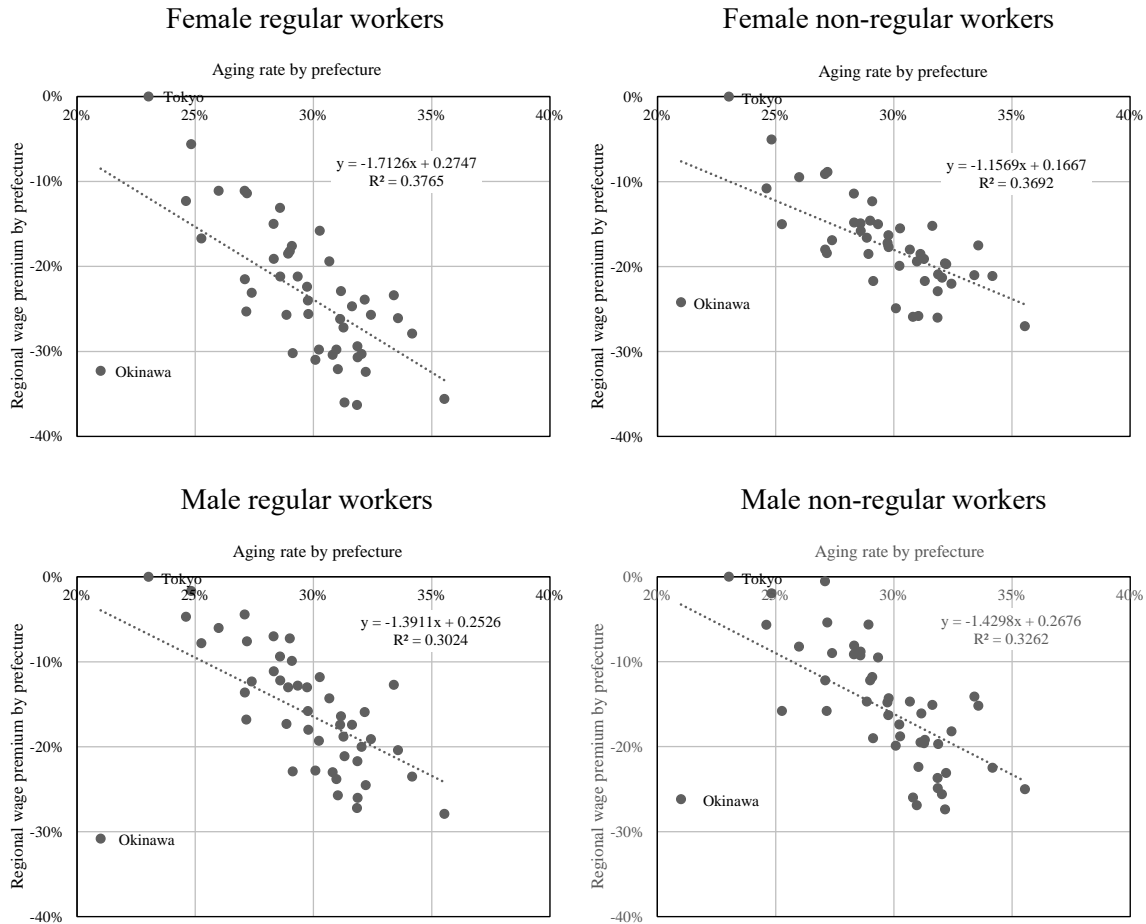


Source: Authors' estimations based on ESS 2017.

Notes: “Aging rate” is population aged 65 and over as a % of total population.

The price of each medical, health care, and welfare service under the social security system, including LTC, is set by the official fee schedule. An increase in the aging rate means that more workers will be engaged in sectors whose prices are set on an official basis. In 2007, the largest share of workers in the “Medical, health care and welfare” industry was 18% (in Nagasaki prefecture).

Figure 6 Aging and wage premium by prefecture



Source: Authors' estimations based on ESS 2017.

Notes: The wage premiums are coefficients of the prefecture dummy estimated by the Mincer-type wage function, which controls for age, tenure, education, firm size, industry, and occupation. The reference prefecture is Tokyo. "Aging rate" is population aged 65 and over as a % of total population. Coefficients of the other variables are shown in appendix 2.

Interestingly, the coefficients of the prefectural dummies in the Mincer-type wage function (see section 3.3) estimated by employment status and by sex—that is, the regional wage premiums—tend to be lower in regions with higher aging rates. Figure 6 shows that wage rates are 1–2% lower in regions with 1% higher aging rates.

The regional LTC unit price adjusts for differences in labor costs between the eight regions (see section 2). In fact, the regions with lower unit premiums have an older population. The seven regional wage premiums (i.e., the coefficients of the regional dummies) shown in Table 6 are calculated using the Mincer-type wage function (see section 3.2) based on the region for which the premium is set as zero. The first column shows the actual regional LTC unit price premiums: for example, the unit price and therefore the fee for the same LTC service, has a 20% (=0.20) premium in region 1.

Table 6 Regional LTC unit premiums and estimated real wage premiums in 2017

	Institutional Regional LTC unit price premiums	Facility LTC workers				Home visit LTC workers			
		Regular employment		Non-regular employment		Regular employment		Non-regular employment	
		Coef.	[95% Conf. Interval]	Coef.	[95% Conf. Interval]	Coef.	[95% Conf. Interval]	Coef.	[95% Conf. Interval]
Region 1	0.20	0.16 **	0.04 0.29	0.21 ***	0.07 0.36	0.50 **	0.05 0.94	0.28 ***	0.08 0.49
Region 2	0.16	0.21 ***	0.13 0.28	0.09 **	0.00 0.18	-0.02	-0.25 0.21	0.16 **	0.03 0.30
Region 3	0.15	0.19 ***	0.12 0.26	0.08 **	0.00 0.16	0.32 ***	0.11 0.54	0.19 ***	0.06 0.33
Region 4	0.12	0.12 ***	0.05 0.20	0.09 *	0.00 0.18	0.12	-0.07 0.31	-0.01	-0.15 0.12
Region 5	0.10	0.11 ***	0.07 0.15	0.08 ***	0.03 0.13	0.14 **	0.01 0.28	0.02	-0.07 0.12
Region 6	0.06	0.12 ***	0.09 0.16	0.06 ***	0.01 0.10	0.07	-0.04 0.17	0.07	-0.01 0.15
Region 7	0.03	0.08 ***	0.05 0.11	0.06 ***	0.02 0.10	0.05	-0.04 0.15	0.05	-0.04 0.13
	<i>N</i>	3,982		2,113		378		541	

Source: Authors' estimations based on ESS 2017.

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The estimated real premiums are coefficients of the regional dummy estimated by the Mincer-type wage function, which controls for age, tenure, education, firm size, industry, and occupation. The regions correspond to the eight regions for which LTC unit premiums are set, and the reference category is "other region," for which there is no unit premium. Coefficients of the other variables are shown in appendix 3.

The 95% confidence intervals for most of the statistically significant coefficients of the region dummies (i.e., regional wage premiums) include the actual value of the regional LTC unit price, indicating that the regional LTC unit price for each region is set at about an adequate level with respect to the wage level of LTC workers in each region. However, the coefficients of Regions 6 and 7 for facility LTC workers are higher than the regional LTC unit price. Two interpretations are possible. One is that the higher regional LTC unit premiums in these two regions mean that the LTC service providers tend to enjoy higher profits, resulting in higher wages for facility LTC workers in these regions. The other interpretation is that, on the contrary, the premiums are set too low in the two regions. One way to determine which interpretation is correct is to examine whether the wages of facility LTC workers are lower than wages in the industries and occupations with which they compete. In our analysis of the labor mobility of LTC workers (section 4.3), we showed that "Wholesale and retail trade," "Manufacturing," and "Accommodations, eating and drinking services" are competing industries. We test this by estimating the occupational wage premiums, including LTC workers and workers in competing industries, based on a Mincer-type wage function, by gender, by formal and informal jobs, and by the eight regions.

Table 7 shows the occupational premiums for each category, with "manual workers in the manufacturing sector" as the reference category. Since the majority of male care workers are regular workers, we omit the analysis of male informal workers.⁶ For female regular workers, occupational wage premiums are higher for LTC workers in Regions 6 and 7. In particular, they enjoy a higher wage premium than competing occupations in these two regions. Similarly, among female non-regular workers, LTC workers enjoy a higher wage premium than competing occupations. However, it should be noted that this higher wage premium may be compensating for "heavy physical strain"

⁶ See footnote 7 for more details.

(section 4.2).

Table 7 Relative occupational premiums by LTC unit premium region in 2017

Y=ln(wage_rate)		Female regular workers							
Ref: Manual workers in manufacturing sector	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
	Region1	Region2	Region3	Region4	Region5	Region6	Region7	Others	
Facility LTC workers	0.0218 (0.129)	-0.0369 (0.0938)	0.0826 (0.0789)	-0.0318 (0.0961)	-0.0281 (0.0499)	0.0219 (0.0346)	0.114*** (0.0245)	0.202*** (0.0105)	
Home visit LTC workers	0.148 (0.364)	-0.217 (0.189)	0.226 (0.157)	-0.0404 (0.146)	0.0498 (0.0923)	0.0135 (0.0650)	0.0435 (0.0553)	0.230*** (0.0271)	
Nurses	0.318*** (0.103)	0.252*** (0.0910)	0.354*** (0.0719)	0.234*** (0.0839)	0.269*** (0.0451)	0.289*** (0.0310)	0.356*** (0.0214)	0.396*** (0.00967)	
Child care workers	0.0861 (0.109)	-0.0116 (0.0968)	0.225*** (0.0788)	-0.0644 (0.0952)	0.134** (0.0588)	0.0271 (0.0389)	0.127*** (0.0314)	0.214*** (0.0133)	
Sales workers in Wholesale and Retail trade sector	0.0619 (0.101)	-0.102 (0.0901)	0.105 (0.0724)	-0.0400 (0.0851)	0.0207 (0.0486)	-0.0295 (0.0342)	-0.00707 (0.0245)	0.0611*** (0.0121)	
Service workers in Accommodations, eating and drinking services sector	-0.225 (0.181)	-0.211* (0.122)	-0.0510 (0.124)	-0.191 (0.157)	-0.167** (0.0680)	-0.211*** (0.0473)	-0.0509 (0.0341)	0.00492 (0.0161)	
N	1,048	1,148	1,234	994	2,812	4,701	7,772	31,991	

Y=ln(wage_rate)		Female non-regular workers							
Ref: Manual workers in manufacturing sector	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	
	Region1	Region2	Region3	Region4	Region5	Region6	Region7	Others	
Facility LTC workers	0.167 (0.131)	0.0756 (0.0670)	0.149*** (0.0568)	0.143** (0.0618)	0.106*** (0.0349)	0.109*** (0.0263)	0.151*** (0.0212)	0.152*** (0.0112)	
Home visit LTC workers	0.0537 (0.161)	0.230*** (0.0844)	0.274*** (0.0765)	0.0429 (0.0783)	0.112** (0.0512)	0.183*** (0.0419)	0.184*** (0.0411)	0.216*** (0.0212)	
Nurses	0.436*** (0.117)	0.521*** (0.104)	0.394*** (0.0632)	0.507*** (0.0677)	0.401*** (0.0399)	0.385*** (0.0310)	0.406*** (0.0249)	0.367*** (0.0146)	
Child care workers	-0.0779 (0.136)	0.174** (0.0839)	0.0868 (0.0717)	0.183** (0.0743)	0.101** (0.0408)	0.0540* (0.0301)	0.101*** (0.0233)	0.124*** (0.0125)	
Sales workers in Wholesale and Retail trade sector	0.0299 (0.0937)	0.0376 (0.0495)	0.0320 (0.0419)	0.0625 (0.0436)	-0.00291 (0.0243)	-0.00898 (0.0168)	0.0349*** (0.0129)	0.0401*** (0.00717)	
Service workers in Accommodations, eating and drinking services sector	-0.0478 (0.0956)	-0.0147 (0.0533)	-0.0146 (0.0445)	0.0343 (0.0466)	-0.0447* (0.0269)	-0.0451** (0.0190)	-0.0115 (0.0151)	0.0168** (0.00841)	
N	1,017	1,639	1,872	1,584	4,293	7,383	10,634	34,109	

Y=ln(wage_rate)		Male regular workers							
Ref: Manual workers in manufacturing sector	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	
	Region1	Region2	Region3	Region4	Region5	Region6	Region7	Others	
Facility LTC workers	-0.232* (0.136)	-0.197*** (0.0734)	-0.0865 (0.0744)	-0.201*** (0.0661)	-0.109*** (0.0402)	-0.104*** (0.0331)	-0.150*** (0.0246)	-0.112*** (0.0121)	
Home visit LTC workers	0.312 (0.346)	-0.159 (0.172)	0.0225 (0.166)	-0.163 (0.174)	-0.188 (0.130)	-0.419*** (0.122)	-0.103 (0.0852)	-0.166*** (0.0474)	
Nurses	-0.407* (0.245)	0.0927 (0.198)	0.264** (0.119)	0.183 (0.174)	0.189** (0.0756)	0.101** (0.0512)	0.0666 (0.0419)	0.0779*** (0.0183)	
Child care workers	0.207 (0.247)	-0.0852 (0.154)	0.146 (0.191)	-0.116 (0.245)	-0.106 (0.140)	-0.00124 (0.141)	0.00403 (0.152)	0.0182 (0.0579)	
Sales workers in Wholesale and Retail trade sector	-0.0305 (0.0490)	-0.0938*** (0.0312)	-0.0821*** (0.0280)	-0.00393 (0.0319)	-0.0742*** (0.0177)	-0.0645*** (0.0135)	-0.0606*** (0.0109)	-0.0612*** (0.00645)	
Service workers in Accommodations, eating and drinking services sector	-0.305*** (0.0664)	-0.244*** (0.0476)	-0.240*** (0.0466)	-0.324*** (0.0589)	-0.296*** (0.0322)	-0.271*** (0.0276)	-0.236*** (0.0210)	-0.243*** (0.0116)	
N	2,163	3,010	3,371	2,774	7,682	12,952	19,278	63,589	

Source: Authors' estimations based on ESS 2017.

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The estimated occupational premiums are coefficients of the occupational dummy estimated by the Mincer-type wage function, which controls for age, tenure, education, firm size, industry, and occupation. Reference occupation is “manual workers in manufacturing sector.” Coefficients of the other variables are shown in appendix 4.

By contrast, among male regular workers, the wages of LTC workers are lower than those of “manual workers in the manufacturing sector” and “sales workers in the wholesale and retail trade

sector,” and higher than those of “service workers in the accommodations, eating, and drinking services sector.” Based on the difference in coefficients, to guarantee the same level of wages as the competing “sales workers in the wholesale and retail trade sector,” it would be necessary to raise the wages of LTC workers by 10–20% in Regions 1–4, and by 3–9% in the other regions with more elderly people.⁷

7. Concluding remarks

Based on individual data from the Employment Status Surveys conducted 2002, 2007, 2012, and 2017, which covered approximately one million people in each survey year, this study identifies long-term changes in the basic attributes of LTC workers in Japan, the reasons for leaving their job, and labor mobility from and into other occupations and industries. Four main findings are as follows.

First, the proportion of male LTC workers has been increasing over the past 15 years, especially among facility regular LTC workers and, at 20%, is the highest of the OECD member countries. The median length of tenure of LTC workers rose by about one year over every five years. However, the number of female LTC workers over the age of 60 has also been increasing rapidly. This is because many middle-aged and older women, whose labor force participation rates were relatively low at the time of the establishment of long-term care insurance, accounted for the largest share of LTC workers (Yamada and Ishii 2009), and these women are now aging.

Second, the reasons given by LTC workers for leaving their jobs differ according to gender. The main reason cited by men is “low wages,” and by women is “old age,” which includes the effects of physical strain and the need to supply informal care to family members. The proportion of men who cite physical strain as a reason for wanting to change jobs is also on the rise. In the near future, middle-aged and older women who entered the workforce after the introduction of LTC insurance are likely to retire *en masse* and, as the population ages, the shortage of LTC workers may become more serious. Reducing the physical burden of LTC work by introducing new technologies such as robots or sensors is especially important for current female middle-aged and older workers, but this is also an important issue for securing the future labor supply of young and prime-age workers. Another important challenge is to increase the number of male LTC workers and to reduce the turnover rate, which requires raising their wages.

Third, while most LTC workers move back and forth within the same industry, “Medical, healthcare, and welfare,” some workers move from/into other industries, such as “Wholesale and retail trade,” “Manufacturing,” and “Accommodations, eating, and drinking services.” This means

⁷ Male non-regular workers are not estimated due to small sample size. For example, the sample size of male non-regular workers in Regions 1 to 4 is only around 300 each even after all industries were combined. However, in Region 8 (“Others”), for example, where a sample size of nearly 7,000 is available, we observe the wages of institutional LTC male non-regular workers are 8% lower than male non-regular “manual workers in the manufacturing sector,” although the wage premiums for home visit LTC male non-regular workers are statistically insignificant.

that these are the main competing industries for LTC workers. Therefore, it is important to prevent the outflow of potential LTC workers to these industries by improving relative wages and other working conditions (especially reducing the physical strain) in the LTC sector to secure the labor supply.

Related to the third point, the negative economic impact of Covid-19 can be found mainly in the “Manufacturing” and “Accommodations, eating, and drinking services” industries, and 200,000 jobs were lost in each industry compared to the same month last year (Statistics Bureau, “Labor Force Survey,” November 2020). Helping labor migration to the LTC sector through subsidized vocational training for workers in these industries who face the risk of unemployment may be one way to secure future labor supply of LTC workers. The new policy seems to go in this direction.⁸

Finally, regions with aging populations tend to have a higher ratio of healthcare and welfare industry workers to workers in other industries, and lower wage rates for workers generally, even after controlling for industry, occupation, age, tenure, and education level. In fact, the wages of female non-regular LTC workers are higher than those of workers in competing occupations in most regions, while, in urban areas with less aged population, there is no significant difference from other competing occupations with respect to the wages of female regular LTC workers. This suggests the possibility of an outflow to other occupations in urban areas. Moreover, in most regions, the wages of male regular LTC workers are significantly lower than those of other competing occupations, suggesting the possibility of an outflow to other occupations. To guarantee the same level of wages as competing occupations in less aged regions, such as urban areas, and to maintain an assured supply of LTC workers, it is necessary to raise their wages by 10–20% in Regions 1–4. In other regions, with a higher proportion of aged people, the necessary increases in LTC wages fall into the range of 3–9%.

To mention a limitation of our study, analyses on foreign LTC workers are outside the scope of this paper. The issue is relatively new for Japan; as of 2020, the number of foreigners working in the LTC sector was approximately 23,000, including candidates for certified LTC worker and technical interns (the Meeting Governing Board for Specified Skills in the LTC Sector 2020: 2). In 2019, a new status of residence, “specified skills,” was established, and the number of foreign LTC workers under this status is expected to increase to 60,000 in the next five years. This is equivalent to 2% of the total number of LTC workers needed in 2025, and is said to be equal to the shortage of supply that cannot be covered by productivity improvement and securing domestic human resources (Minister of Justice et al. 2018: 2). Based on the results of this study and the basic labor economics framework, increasing foreign LTC workers may lower the relative wages of domestic LTC workers and

⁸ In fact, the Ministry of Health, Labour and Welfare will introduce a new system in April 2021 to support people from other sectors to work in the care sectors. The system will provide living expenses for training until the qualification for working in the care sectors is obtained, as well as a loan of 200,000 yen that will be exempt from repayment on the condition that the person works in the care sector for two years (*The Nikkei*, 5th Jan 2021, “Supporting people with loans to change their careers to LTC workers”).

promote an outflow from the LTC sector to competing industries. Consequently, it may only exacerbate the LTC labor shortage problem unless the LTC fee schedule or wage subsidies for LTC workers appropriately raise their relative wage to mitigate this downward wage pressure. Measuring these effects would be a topic for future research.

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Data appendix

Appendix 1 Summary statistics

	Female		Male	
	Regular employment	Non-regular employment	Regular employment	Non-regular employment
Wage rate	1596.8	890.1	2056.4	1121.2
Age	43.8	45.4	44.3	43.2
Firm size				
Less than 50 people	29%	33%	27%	29%
50-100 people	10%	9%	9%	10%
Over 100 people	45%	48%	51%	56%
Public sector	16%	9%	13%	5%
Tenure	14.1	6.5	16.4	6.0
Education level				
High-school graduate and less	35%	50%	46%	57%
Vocational school	21%	16%	13%	15%
Technical college and junior college	19%	21%	4%	3%
University and graduate school	25%	13%	37%	25%
Occupation				
Facility LTC workers	5.0%	3.1%	1.2%	1.4%
Home visit LTC workers	0.5%	0.8%	0.1%	0.1%
Doctors	0.2%	0.05%	0.3%	0.2%
Nurses	9.4%	2.0%	0.5%	0.1%
Child care workers	3.0%	2.5%	0.1%	0.1%
Manual workers in manufacturing sector	7.3%	10.0%	17.0%	20.0%
Sales workers in Whole sale and retail trade sector	3.8%	13.7%	6.9%	9.3%
Service workers in Accommodations, eating and drinking services sector	1.6%	7.7%	1.6%	4.9%
Administrative and managerial workers in Manufacturing sector	5.9%	2.1%	4.0%	0.8%
Others	63.3%	58.1%	68.4%	63.1%
Total (N)	51,700	62,531	114,819	12,123

Source: Authors' calculations based on ESS 2017.

Appendix 2 Estimated wage functions for figure 6

Y= ln(wage rate)	Regular workers		Non-regular workers	
	Female	Male	Female	Male
Age	0.0270*** (0.00171)	0.0416*** (0.00128)	0.00196 (0.00147)	0.0252*** (0.00295)
Age squared	-0.000268*** (1.98e-05)	-0.000395*** (1.47e-05)	-2.14e-05 (1.66e-05)	-0.000235*** (3.45e-05)
Firm size (ref: under 50 people)				
50-100 people	0.0876*** (0.00550)	0.0947*** (0.00382)	0.0364*** (0.00482)	0.0842*** (0.0130)
Over 100 people	0.195*** (0.00379)	0.265*** (0.00264)	0.0965*** (0.00305)	0.175*** (0.00861)
Public sector	0.310*** (0.00675)	0.290*** (0.00640)	0.0992*** (0.00639)	0.199*** (0.0234)
Tenure	0.0153*** (0.000518)	0.0143*** (0.000369)	0.0112*** (0.000511)	0.00816*** (0.00129)
Tenure squared	-7.27e-05*** (1.49e-05)	-8.18e-05*** (1.03e-05)	-0.000258*** (2.06e-05)	-5.30e-05 (4.55e-05)
Education level (ref: High-school graduate and less)				
Vocational school	0.0574*** (0.00471)	0.00157 (0.00326)	0.0165*** (0.00393)	-0.00763 (0.0105)
Technical college and junior college	0.0819*** (0.00449)	0.0599*** (0.00529)	0.00850** (0.00360)	0.0241 (0.0202)
University and Graduate school	0.174*** (0.00472)	0.109*** (0.00261)	0.0888*** (0.00447)	0.0480*** (0.00944)
Occupational category (ref: Clerical workers)				
Administrative and managerial workers	0.212*** (0.0338)	0.126*** (0.00937)	-0.00621 (0.187)	0.583*** (0.147)
Professional and engineering workers	0.0670*** (0.00551)	-0.00635 (0.00388)	0.207*** (0.00601)	0.252*** (0.0185)
Sales workers	-0.102*** (0.00679)	-0.0623*** (0.00405)	-0.0452*** (0.00525)	-0.0147 (0.0180)
Service workers	-0.114*** (0.00733)	-0.187*** (0.00842)	-0.0292*** (0.00544)	-0.0250 (0.0216)
Security workers	-0.0704*** (0.0233)	-0.112*** (0.00655)	-0.0536 (0.0389)	-0.179*** (0.0253)
Agriculture, forestry and fishery workers	-0.151** (0.0715)	-0.0995*** (0.0203)	-0.110*** (0.0424)	-0.134*** (0.0486)
Manufacturing process workers	-0.218*** (0.00690)	-0.149*** (0.00373)	-0.0893*** (0.00574)	-0.0472*** (0.0166)
Transport and machine operation	-0.0965*** (0.0298)	-0.193*** (0.00542)	0.0463 (0.0310)	-0.00795 (0.0193)
Construction and mining workers	-0.170*** (0.0324)	-0.134*** (0.00582)	-0.0475 (0.0464)	-0.0444 (0.0299)
Carrying, cleaning, packaging, and related workers	-0.196*** (0.0120)	-0.169*** (0.00542)	-0.0867*** (0.00518)	-0.126*** (0.0144)

(continue to next page)

Source: Authors' estimations based on ESS 2017.

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Appendix 2 Estimated wage functions for figure 6 (continued)

(continue from previous page.)	Regular workers		Non-regular workers	
	Female	Male	Female	Male
Facility LTC workers	-0.0553*** (0.00862)	-0.262*** (0.00960)	0.0535*** (0.00925)	-0.105*** (0.0343)
Home visit LTC workers	-0.0460** (0.0208)	-0.300*** (0.0337)	0.108*** (0.0152)	0.0626 (0.0987)
Doctors	0.505*** (0.0382)	0.361*** (0.0186)	0.862*** (0.0586)	0.598*** (0.0770)
Nurses	0.190*** (0.00782)	-0.0195 (0.0149)	0.325*** (0.0111)	0.0437 (0.148)
Child care workers	-0.00654 (0.0105)	-0.0991** (0.0413)	0.0529*** (0.0103)	0.0533 (0.131)
Industrial category (ref: Manufacturing)				
Mining and quarrying of stone and gravel	0.0902 (0.0866)	0.0847*** (0.0324)	0.128 (0.132)	0.229 (0.389)
Construction	-0.00445 (0.00978)	-0.0213*** (0.00500)	0.00342 (0.0116)	0.0801*** (0.0270)
Electricity, Gas, Heat supply and	0.214*** (0.0267)	0.190*** (0.00915)	0.0721** (0.0287)	0.0495 (0.0580)
Information and communications	0.0893*** (0.0128)	0.0167*** (0.00626)	0.0815*** (0.0134)	0.0405 (0.0273)
Transport and postal activities	-0.0637*** (0.0124)	-0.123*** (0.00520)	-0.0251*** (0.00916)	-0.0264 (0.0172)
Wholesale and Retail trade	-0.0356*** (0.00701)	-0.106*** (0.00392)	-0.00668 (0.00568)	-0.120*** (0.0154)
Finance and Insurance	0.0728*** (0.00908)	0.0905*** (0.00712)	0.0623*** (0.00976)	0.228*** (0.0416)
Real estate and goods rental and leasing	0.0277* (0.0153)	-0.00220 (0.00931)	0.0180 (0.0133)	-0.0398 (0.0326)
Scientific research, professional and technical services	0.123*** (0.0104)	0.0640*** (0.00614)	0.0713*** (0.0107)	0.107*** (0.0278)
Accommodations, eating and drinking services	-0.136*** (0.0123)	-0.214*** (0.0100)	-0.0525*** (0.00777)	-0.124*** (0.0247)
Living-related and personal services and amusement services	-0.134*** (0.0119)	-0.143*** (0.00936)	-0.0224*** (0.00844)	-0.116*** (0.0239)
Education, learning support	-0.00658 (0.00926)	-0.106*** (0.00706)	-0.0470*** (0.00854)	-0.0815*** (0.0258)
Medical, health care and welfare	0.0396*** (0.00706)	-0.0327*** (0.00597)	0.0392*** (0.00695)	-0.191*** (0.0223)
Compound services	0.0503*** (0.0134)	-0.0739*** (0.00779)	0.0149 (0.0128)	-0.00679 (0.0255)
Services, N.E.C	-0.0182* (0.00936)	-0.0831*** (0.00504)	-0.00752 (0.00733)	-0.0464*** (0.0169)
Government service	0.157*** (0.0108)	0.0655*** (0.00784)	0.0138 (0.0115)	-0.0172 (0.0389)
Constant	6.448*** (0.0372)	6.326*** (0.0275)	6.731*** (0.0335)	6.336*** (0.0659)
46 prefecture dummies	yes	yes	yes	yes
N	51,700	114,819	62,531	12,123
R-squared	0.446	0.465	0.155	0.208

Source: Authors' estimations based on ESS 2017.

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Appendix 3 Estimated wage functions for table 6

Y=ln(wage rate)	Facility LTC workers		Home visit LTC workers	
	Regular	Non-regular	Regular	Non-regular
Age	0.00934* (0.00519)	0.0135 (0.00854)	0.00844 (0.0185)	0.00912 (0.0207)
Age squared	-7.31e-05 (5.99e-05)	-0.000116 (9.53e-05)	-4.89e-05 (0.000212)	-6.51e-05 (0.000223)
Firm size (ref: under 50 people)				
50-100 people	0.108*** (0.0138)	0.0383** (0.0189)	0.0121 (0.0476)	-0.00177 (0.0418)
Over 100 people	0.147*** (0.0121)	0.0695*** (0.0158)	0.123*** (0.0360)	0.0940*** (0.0296)
Public sector	0.449*** (0.0476)	0.151** (0.0716)	-0.351 (0.316)	0.175 (0.314)
Tenure	0.0151*** (0.00196)	0.00637* (0.00384)	0.00169 (0.00738)	0.0217*** (0.00772)
Tenure squared	-8.95e-05 (7.90e-05)	0.000160 (0.000214)	0.000185 (0.000308)	-0.000914** (0.000412)
Education level (ref: High-school graduate and less)				
Vocational school	0.0717*** (0.0118)	0.0529*** (0.0180)	0.145*** (0.0432)	-0.101*** (0.0377)
Technical college and junior college	0.0569*** (0.0147)	0.0226 (0.0203)	0.0471 (0.0513)	-0.00646 (0.0359)
University and Graduate school	0.158*** (0.0148)	0.0809*** (0.0248)	0.116** (0.0566)	-0.110** (0.0529)
Regions for LTCI unit price premiums (ref: regions without premiums)				
Region1	0.161** (0.0634)	0.214*** (0.0749)	0.496** (0.225)	0.285*** (0.103)
Region2	0.207*** (0.0372)	0.0898** (0.0443)	-0.0197 (0.118)	0.162** (0.0686)
Region3	0.190*** (0.0380)	0.0847** (0.0409)	0.324*** (0.108)	0.194*** (0.0674)
Region4	0.123*** (0.0393)	0.0887* (0.0465)	0.121 (0.0979)	-0.0129 (0.0698)
Region5	0.111*** (0.0224)	0.0799*** (0.0274)	0.142** (0.0690)	0.0233 (0.0481)
Region6	0.123*** (0.0179)	0.0598*** (0.0230)	0.0663 (0.0550)	0.0671 (0.0418)
Region7	0.0782*** (0.0141)	0.0572*** (0.0197)	0.0526 (0.0477)	0.0453 (0.0427)
Constant	6.564*** (0.110)	6.277*** (0.187)	6.631*** (0.398)	6.428*** (0.472)
N	3,982	2,113	378	541
R-squared	0.195	0.064	0.154	0.114

Source: Authors' estimations based on ESS 2017.

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Appendix 4 Estimated wage functions for table 7

Female, Regular workers								
Y=ln(wage rate)	(1) Region1	(2) Region2	(3) Region3	(4) Region4	(5) Region5	(6) Region6	(7) Region7	(8) Others
Age	0.0523*** (0.0128)	0.0524*** (0.0112)	0.0399*** (0.0101)	0.0334*** (0.0124)	0.0341*** (0.00772)	0.0347*** (0.00565)	0.0288*** (0.00451)	0.0240*** (0.00227)
Age squared	-0.000548*** (0.000152)	-0.000543*** (0.000132)	-0.000362*** (0.000119)	-0.000348** (0.000145)	-0.000330*** (9.02e-05)	-0.000344*** (6.62e-05)	-0.000290*** (5.21e-05)	-0.000240*** (2.59e-05)
Firm size (ref: under 50 people)								
50-100 people	0.110** (0.0447)	0.0379 (0.0446)	0.197*** (0.0376)	0.105** (0.0411)	0.0889*** (0.0262)	0.113*** (0.0191)	0.0578*** (0.0145)	0.0923*** (0.00697)
Over 100 people	0.196*** (0.0280)	0.169*** (0.0258)	0.245*** (0.0249)	0.132*** (0.0303)	0.211*** (0.0163)	0.190*** (0.0126)	0.188*** (0.00938)	0.209*** (0.00472)
Public sector	0.304*** (0.0428)	0.281*** (0.0383)	0.418*** (0.0350)	0.292*** (0.0407)	0.333*** (0.0239)	0.326*** (0.0178)	0.341*** (0.0137)	0.404*** (0.00660)
Tenure	0.0123*** (0.00408)	0.0195*** (0.00364)	0.0184*** (0.00340)	0.0149*** (0.00393)	0.0155*** (0.00233)	0.0132*** (0.00177)	0.0166*** (0.00135)	0.0151*** (0.000671)
Tenure squared	1.78e-05 (0.000124)	-0.000123 (0.000110)	-0.000207** (9.86e-05)	-4.97e-05 (0.000114)	-0.000106 (6.93e-05)	-4.51e-06 (5.21e-05)	-0.000106*** (3.94e-05)	-5.33e-05*** (1.92e-05)
Education level (ref: High-school graduate and less)								
Vocational school	0.0253 (0.0410)	0.0636* (0.0344)	0.0930*** (0.0320)	0.0721* (0.0377)	0.0903*** (0.0210)	0.0866*** (0.0159)	0.0635*** (0.0122)	0.0854*** (0.00576)
Technical college and junior college	0.145*** (0.0380)	0.0610* (0.0329)	0.0992*** (0.0298)	0.0751** (0.0340)	0.127*** (0.0202)	0.0908*** (0.0151)	0.100*** (0.0112)	0.111*** (0.00573)
University and Graduate school	0.278*** (0.0326)	0.222*** (0.0290)	0.205*** (0.0272)	0.247*** (0.0322)	0.251*** (0.0192)	0.203*** (0.0143)	0.197*** (0.0114)	0.209*** (0.00604)
Occupation (ref: Manual workers in manufacturing sector)								
Facility LTC workers	0.0218 (0.129)	-0.0369 (0.0938)	0.0826 (0.0789)	-0.0318 (0.0961)	-0.0281 (0.0499)	0.0219 (0.0346)	0.114*** (0.0245)	0.202*** (0.0105)
Home visit LTC workers	0.148 (0.364)	-0.217 (0.189)	0.226 (0.157)	-0.0404 (0.146)	0.0498 (0.0923)	0.0135 (0.0650)	0.0435 (0.0553)	0.230*** (0.0271)
Doctors	0.463* (0.268)	0.474* (0.254)	0.572*** (0.124)	0.483*** (0.156)	0.525*** (0.137)	0.459*** (0.123)	0.474*** (0.115)	0.784*** (0.0579)
Nurses	0.318*** (0.103)	0.257*** (0.0910)	0.354*** (0.0719)	0.234*** (0.0839)	0.269*** (0.0451)	0.289*** (0.0310)	0.356*** (0.0214)	0.396*** (0.00967)
Child care workers	0.0861 (0.109)	-0.0116 (0.0968)	0.225*** (0.0788)	-0.0644 (0.0952)	0.134** (0.0558)	0.0271 (0.0389)	0.127*** (0.0314)	0.214*** (0.0133)
Sales workers in Wholesale and retail trade sector	0.0619 (0.101)	-0.102 (0.0901)	0.105 (0.0724)	-0.0400 (0.0851)	0.0207 (0.0486)	-0.0295 (0.0342)	-0.00707 (0.0245)	0.0611*** (0.0121)
Service workers in Accommodations, eating and drinking services sector	-0.225 (0.181)	-0.211* (0.122)	-0.0510 (0.124)	-0.191 (0.157)	-0.167** (0.0680)	-0.211*** (0.0473)	-0.0509 (0.0341)	0.00492 (0.0161)
Administrative and managerial workers in manufacturing sector	0.237** (0.0964)	-0.0141 (0.0849)	0.201*** (0.0688)	0.106 (0.0794)	0.166*** (0.0444)	0.157*** (0.0302)	0.164*** (0.0210)	0.232*** (0.0106)
Other occupations	0.188** (0.0877)	0.000259 (0.0776)	0.194*** (0.0600)	0.0864 (0.0706)	0.102*** (0.0373)	0.116*** (0.0251)	0.150*** (0.0161)	0.242*** (0.00721)
Constant	5.719*** (0.274)	5.816*** (0.241)	5.744*** (0.211)	6.185*** (0.268)	5.992*** (0.163)	5.993*** (0.117)	6.048*** (0.0944)	5.972*** (0.0478)
N	1,048	1,148	1,234	994	2,812	4,701	7,772	31,991
R-squared	0.320	0.359	0.401	0.330	0.334	0.361	0.361	0.417

Source: Authors' estimations based on ESS 2017.

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Aging and Wages of Long-term Care Workers: A Case Study of Japan, 2002–2017

Appendix 4 Estimated wage functions for table 7 (continued)

Female, Non-regular workers								
Y=ln(wage rate)	(9) Region1	(10) Region2	(11) Region3	(12) Region4	(13) Region5	(14) Region6	(15) Region7	(16) Others
Age	0.0202 (0.0133)	-0.00288 (0.00857)	-0.00104 (0.00879)	0.0204** (0.00837)	0.00323 (0.00560)	0.00830* (0.00439)	-0.00235 (0.00364)	0.00390* (0.00206)
Age squared	-0.000282* (0.000152)	2.68e-05 (9.83e-05)	-2.43e-06 (9.89e-05)	-0.000242** (9.66e-05)	-4.75e-05 (6.36e-05)	-9.23e-05* (4.96e-05)	1.91e-05 (4.10e-05)	-4.35e-05* (2.32e-05)
Firm size (ref: under 50 people)								
50-100 people	0.101* (0.0570)	0.0661* (0.0352)	0.0465 (0.0325)	0.0657** (0.0328)	0.0536*** (0.0198)	0.0202 (0.0143)	0.0133 (0.0115)	0.0305*** (0.00651)
Over 100 people	0.103*** (0.0273)	0.106*** (0.0192)	0.122*** (0.0176)	0.131*** (0.0193)	0.0981*** (0.0118)	0.0994*** (0.00886)	0.0658*** (0.00723)	0.0827*** (0.00409)
Public sector	0.0576 (0.0589)	0.204*** (0.0466)	0.317*** (0.0355)	0.179*** (0.0392)	0.132*** (0.0225)	0.155*** (0.0162)	0.0914*** (0.0130)	0.110*** (0.00650)
Tenure	0.0233*** (0.00520)	0.0141*** (0.00394)	0.0165*** (0.00349)	0.0142*** (0.00350)	0.0110*** (0.00216)	0.00977*** (0.00162)	0.0127*** (0.00127)	0.0107*** (0.000683)
Tenure squared	-0.000660*** (0.000241)	-0.000181 (0.000186)	-0.000498*** (0.000159)	-0.000335** (0.000153)	-0.000156* (9.30e-05)	-0.000181*** (7.01e-05)	-0.000286*** (5.22e-05)	-0.000223*** (2.66e-05)
Education level (ref: High-school graduate and less)								
Vocational school	0.100*** (0.0358)	0.0584** (0.0257)	0.0455* (0.0239)	0.0507** (0.0257)	0.0506*** (0.0154)	0.0556*** (0.0115)	0.0176* (0.00955)	0.0553*** (0.00530)
Technical college and junior college	0.0671* (0.0350)	0.0386* (0.0228)	0.00638 (0.0205)	0.00346 (0.0217)	0.0402*** (0.0136)	0.0354*** (0.0102)	0.0214*** (0.00830)	0.0379*** (0.00502)
University and Graduate school	0.123*** (0.0330)	0.129*** (0.0237)	0.0930*** (0.0214)	0.105*** (0.0240)	0.119*** (0.0155)	0.153*** (0.0118)	0.121*** (0.0104)	0.146*** (0.00649)
Occupation (ref: Manual workers in manufacturing sector)								
Facility LTC workers	0.167 (0.131)	0.0756 (0.0670)	0.149*** (0.0568)	0.143** (0.0618)	0.106*** (0.0349)	0.109*** (0.0263)	0.151*** (0.0212)	0.152*** (0.0112)
Home visit LTC workers	0.0537 (0.161)	0.230*** (0.0844)	0.274*** (0.0765)	0.0429 (0.0783)	0.112** (0.0512)	0.183*** (0.0419)	0.184*** (0.0411)	0.216*** (0.0212)
Doctors	0.669*** (0.211)		1.379*** (0.334)	1.397*** (0.239)	1.045*** (0.172)	0.678*** (0.166)	0.854*** (0.0991)	0.901*** (0.148)
Nurses	0.436*** (0.117)	0.521*** (0.104)	0.394*** (0.0632)	0.507*** (0.0677)	0.401*** (0.0399)	0.385*** (0.0310)	0.406*** (0.0249)	0.367*** (0.0146)
Child care workers	-0.0779 (0.136)	0.174** (0.0839)	0.0868 (0.0717)	0.183** (0.0743)	0.101** (0.0408)	0.0540* (0.0301)	0.101*** (0.0233)	0.124*** (0.0125)
Sales workers in Wholesale and retail trade sector	0.0299 (0.0937)	0.0376 (0.0495)	0.0320 (0.0419)	0.0625 (0.0436)	-0.00291 (0.0243)	-0.00898 (0.0168)	0.0349*** (0.0129)	0.0401*** (0.00717)
Service workers in Accommodations, eating and drinking services sector	-0.0478 (0.0956)	-0.0147 (0.0533)	-0.0146 (0.0445)	0.0343 (0.0466)	-0.0447* (0.0269)	-0.0451** (0.0190)	-0.0115 (0.0151)	0.0168** (0.00841)
Administrative and managerial workers in manufacturing sector	0.230* (0.119)	0.157* (0.0808)	0.192*** (0.0651)	0.306*** (0.0662)	0.112*** (0.0382)	0.101*** (0.0294)	0.115*** (0.0221)	0.0997*** (0.0142)
Other occupations	0.177** (0.0872)	0.118*** (0.0449)	0.117*** (0.0370)	0.126*** (0.0379)	0.0658*** (0.0209)	0.0585*** (0.0142)	0.0770*** (0.0106)	0.0859*** (0.00596)
Constant	6.272*** (0.294)	6.655*** (0.190)	6.619*** (0.195)	6.134*** (0.183)	6.532*** (0.123)	6.381*** (0.0967)	6.609*** (0.0794)	6.388*** (0.0450)
N	1,017	1,639	1,872	1,584	4,293	7,383	10,634	34,109
R-squared	0.125	0.105	0.125	0.135	0.097	0.098	0.084	0.079

Source: Authors' estimations based on ESS 2017.

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Appendix 4 Estimated wage functions for table 7 (continued)

Male, Regular workers								
Y=ln(wage rate)	(17) Region1	(18) Region2	(19) Region3	(20) Region4	(21) Region5	(22) Region6	(23) Region7	(24) Others
Age	0.0735*** (0.00999)	0.0568*** (0.00833)	0.0567*** (0.00745)	0.0587*** (0.00904)	0.0498*** (0.00505)	0.0518*** (0.00401)	0.0496*** (0.00317)	0.0380*** (0.00180)
Age squared	-0.000752*** (0.000115)	-0.000549*** (9.71e-05)	-0.000554*** (8.57e-05)	-0.000578*** (0.000104)	-0.000499*** (5.85e-05)	-0.000514*** (4.62e-05)	-0.000504*** (3.67e-05)	-0.000374*** (2.06e-05)
Firm size (ref: under 50 people)								
50-100 people	0.0779** (0.0319)	0.140*** (0.0268)	0.0288 (0.0236)	0.114*** (0.0288)	0.0878*** (0.0163)	0.0983*** (0.0123)	0.0879*** (0.00954)	0.103*** (0.00513)
Over 100 people	0.274*** (0.0196)	0.288*** (0.0170)	0.251*** (0.0153)	0.244*** (0.0183)	0.282*** (0.0103)	0.282*** (0.00790)	0.263*** (0.00632)	0.287*** (0.00346)
Public sector	0.327*** (0.0307)	0.367*** (0.0283)	0.324*** (0.0242)	0.317*** (0.0269)	0.336*** (0.0157)	0.333*** (0.0122)	0.338*** (0.00954)	0.408*** (0.00492)
Tenure	0.00850*** (0.00289)	0.0148*** (0.00247)	0.0119*** (0.00222)	0.0156*** (0.00253)	0.0161*** (0.00149)	0.0155*** (0.00117)	0.0145*** (0.000932)	0.0144*** (0.000512)
Tenure squared	-1.30e-05 (8.58e-05)	-0.000124* (7.14e-05)	-1.22e-05 (6.29e-05)	-9.79e-05 (7.35e-05)	-7.76e-05* (4.25e-05)	-7.65e-05** (3.29e-05)	-2.10e-05 (2.61e-05)	-2.28e-05 (1.41e-05)
Education level (ref: High-school graduate and less)								
Vocational school	0.0316 (0.0272)	0.0387* (0.0213)	0.0474** (0.0194)	0.00397 (0.0219)	0.0223* (0.0129)	0.0133 (0.00980)	0.0173** (0.00799)	0.0318*** (0.00445)
Technical college and junior college	0.151*** (0.0512)	0.0857** (0.0367)	0.107*** (0.0368)	0.0713* (0.0397)	0.0916*** (0.0215)	0.0634*** (0.0168)	0.0861*** (0.0128)	0.103*** (0.00720)
University and Graduate school	0.252*** (0.0194)	0.216*** (0.0152)	0.225*** (0.0136)	0.190*** (0.0157)	0.185*** (0.00930)	0.167*** (0.00717)	0.159*** (0.00581)	0.167*** (0.00344)
Occupation (ref: Manual workers in manufacturing sector)								
Facility LTC workers	-0.232* (0.136)	-0.197*** (0.0734)	-0.0865 (0.0744)	-0.201*** (0.0661)	-0.109*** (0.0402)	-0.104*** (0.0331)	-0.150*** (0.0246)	-0.112*** (0.0121)
Home visit LTC workers	0.312 (0.346)	-0.159 (0.172)	0.0225 (0.166)	-0.163 (0.174)	-0.188 (0.130)	-0.419*** (0.122)	-0.103 (0.0852)	-0.166*** (0.0474)
Doctors	0.0516 (0.0928)	0.0555 (0.154)	0.348*** (0.0875)	0.456*** (0.0871)	0.265*** (0.0682)	0.344*** (0.0592)	0.388*** (0.0417)	0.521*** (0.0285)
Nurses	-0.407* (0.245)	0.0927 (0.198)	0.264** (0.119)	0.183 (0.174)	0.189** (0.0756)	0.101** (0.0512)	0.0666 (0.0419)	0.0779*** (0.0183)
Child care workers	0.207 (0.247)	-0.0852 (0.154)	0.146 (0.191)	-0.116 (0.245)	-0.106 (0.140)	-0.00124 (0.141)	0.00403 (0.152)	0.0182 (0.0579)
Sales workers in Wholesale and retail trade sector	-0.0305 (0.0490)	-0.0938*** (0.0312)	-0.0821*** (0.0280)	-0.00393 (0.0319)	-0.0742*** (0.0177)	-0.0645*** (0.0135)	-0.0606*** (0.0109)	-0.0612*** (0.00645)
Service workers in Accommodations, eating and drinking services sector	-0.305*** (0.0664)	-0.244*** (0.0476)	-0.240*** (0.0466)	-0.324*** (0.0589)	-0.296*** (0.0322)	-0.271*** (0.0276)	-0.236*** (0.0210)	-0.243*** (0.0116)
Administrative and managerial workers in manufacturing sector	0.117** (0.0513)	0.108*** (0.0356)	0.0807** (0.0318)	0.187*** (0.0362)	0.108*** (0.0207)	0.0896*** (0.0154)	0.0925*** (0.0127)	0.129*** (0.00854)
Other occupations	0.0322 (0.0408)	0.0142 (0.0227)	-0.00244 (0.0207)	0.0857*** (0.0232)	0.00356 (0.0117)	-0.00624 (0.00875)	-0.00244 (0.00667)	0.0130*** (0.00387)
Constant	5.516*** (0.210)	5.768*** (0.171)	5.813*** (0.156)	5.694*** (0.189)	5.915*** (0.104)	5.872*** (0.0827)	5.904*** (0.0655)	6.037*** (0.0375)
N	2,163	3,010	3,371	2,774	7,682	12,952	19,278	63,589
R-squared	0.349	0.386	0.397	0.375	0.387	0.377	0.386	0.409

Source: Authors' estimations based on ESS 2017.

Notes: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.