



## ORIGINAL ARTICLE

## SOCIAL RESEARCH, PLANNING AND PRACTICE

# Change in long-term care service usage in Japan following the COVID-19 pandemic: A survey using a nationwide statistical summary in 2018–2021

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**Aim:** Social restrictions due to the coronavirus disease (COVID-19) pandemic forced many long-term care (LTC) service-users to refrain from using services. We aimed to evaluate the degree of change in the use of LTC services.

**Methods:** We retrospectively analyzed data from the publicly distributed nationwide statistics summarizing the monthly number of public LTC insurance users in Japan between April 2018 and March 2021. The degree of decline was quantified as a ratio, where the ratio of a certain month to the reference month was divided by the ratio in the previous year.

**Results:** The use of LTC services started to decline in March 2020 and reached its largest decline in May 2020. Thereafter, it recovered but insufficiently, even as of late 2020. The degree of decline was particularly large for services provided in facilities for community-dwelling elderly individuals [Ratio to the previous year = 0.717 (95% CI: 0.645–0.796) in short-stay services, and Ratio = 0.876 (95% CI: 0.802–0.957) in outpatient services], but was non-significant in other types of services, including those provided for elderly individuals living in nursing homes.

**Conclusions:** Community-dwelling elderly individuals who had used outpatient or short-stay services were especially affected by the COVID-19 pandemic in 2020. This underlines the need for further investigation of the medium- or long-term influence of the decline in service usage on the mental and physical health of the LTC service-users and their caregivers. *Geriatr Gerontol Int* 2022; 22: 803–809.

**Keywords:** COVID-19, long-term care, long-term care insurance.

## Introduction

The coronavirus disease (COVID-19) pandemic had a major impact on the lives of citizens and on their social and economic activities.<sup>1</sup> Individuals were forced to adapt by changing their lifestyles and behaviors to reduce the risk of infection.<sup>2,3</sup> These changes included social-distancing, wearing masks, refraining from unnecessary outings, and working from home.

Elderly individuals are known to have a higher risk of severe illness or mortality from COVID-19,<sup>4</sup> which might have made them more likely than younger individuals to accept social restrictions.<sup>5</sup> However, prolonged social restrictions are concerning owing to their negative impact on mental and physical health.<sup>6,7</sup> Previous studies have reported the unfavorable consequences of the pandemic,<sup>8</sup> such as a decline in physical activity<sup>9–12</sup> due to the elderly refraining from going out, and increased social isolation<sup>13</sup> due to decreased opportunities for face-to-face connections with

relatives and friends, restricted family visits at long-term care (LTC) facilities, or the isolation of residents in their private rooms.<sup>14–16</sup> Moreover, the pandemic also resulted in increased anxiety and depression during social isolation,<sup>8</sup> loneliness,<sup>17</sup> and decreased well-being.<sup>10</sup> Loneliness, social isolation, and decreased social participation are generally associated with a risk of dementia and cognitive deterioration.<sup>18–20</sup> Indeed, a progressive cognitive deterioration due to social isolation<sup>21</sup> or a decline in cognitive fitness during the period of the nationwide state of emergency (SoE)<sup>22</sup> have been reported.

The provision system of LTC services, which plays a critical role in maintaining the daily lives and functions of elderly individuals,<sup>23</sup> was also severely affected by the COVID-19 pandemic. In Japan, LTC services are provided to individual users according to the needs of their daily lives by taking into account their physical and cognitive functioning.<sup>23</sup> Thus, the decline in the use of LTC services during the pandemic represents one aspect of the above-mentioned decrease in physical activity and

social participation. In other words, examining in detail the degree and characteristics of change in the use of LTC services could be an alternative measure for better understanding the impact of the COVID-19 pandemic on the mental and physical health of elderly people. In addition, because the decline in use of LTC services probably increased the caregiving burden of family members,<sup>24</sup> examining the change in LTC service use by elderly individuals following this pandemic would also be helpful for understanding the actual change in caregiving burdens for their family members.<sup>25-27</sup>

In this study, we aimed to evaluate the degree of decline in the use of LTC services by older individuals in Japan following the pandemic, using nationwide statistics that are available to the public every year.

## Methods

### Data acquisition

We retrospectively analyzed nationwide statistics summarizing the monthly number of public LTC insurance users in Japan between April 2018 and March 2021. This information is made available to the public by the Ministry of Health, Labour and Welfare (MHLW), Japan. The annual summary statistics are available on the website <https://www.mhlw.go.jp/toukei/list/45-1b.html>, and they include the monthly count of the users of each service across

Japan without distinguishing the prefecture of residence. The authors obtained the data on December 3, 2021.

### About the Japanese LTC insurance system

The public LTC insurance system in Japan provides various types of services to community-dwelling people and residents in nursing homes. In general, all community-dwelling people aged 65 years or older, or those aged 40–64 with a disability due to specific diseases, can use several types of LTC services simultaneously with an arbitrary combination as per their certified need for support/care. The upper limit of the monthly amount of available services is regulated based on the degree of care required, which is determined by the municipal judging committee based mainly on two axes of disability in individual users, namely physical disability and cognitive decline. Certification needs to be updated regularly (e.g., every 6–36 months), although the user is not always required to use any services. In 2019, more than 6 million people in Japan received such certification.

### LTC services

LTC services for community-dwelling people and individuals living in nursing facilities are categorized into different types of service depending on their features, including the site of service provision, as follows (Table 1): home-visit services, where staff visit the user's house and provide services including care, nursing, or rehabilitation; outpatient services, where the user visits

**Table 1** Name of services analyzed and their type

Type	Code	Name of service	Preventive
Home-visit	11	Home-visit care	
	12	Home-visit bathing	
	13	Home-visit nursing	
	14	Home-visit rehabilitation	
	63	Home-visit nursing [preventive]	✓
	64	Home-visit rehabilitation [preventive]	✓
Outpatient	15	Outpatient care (day-service)	
	16	Outpatient rehabilitation (day-care)	
	66	Outpatient rehabilitation [preventive]	✓
Rental	17	Rental of welfare equipment	
	67	Rental of welfare equipment [preventive]	✓
Short-stay	21	Short-stay for daily care	
	22	Short-stay for recuperation (at care facility)	
Guidance	31	Management guidance for in-home care	
	34	Management guidance for in-home care [preventive]	✓
Designated facility	33	Daily life care at designated facilities	
	35	Daily life care at designated facilities [preventive]	✓
Community-based	76	Periodic visits and occasional home-visit care/nursing	
	78	Community-based outpatient care	
	72	Outpatient care for dementia patients	
	73	Multifunctional in-home care	
	32	Group home care for dementia patients	
	54	Community-based special nursing homes	
	75	Multifunctional in-home care [preventive]	✓
Facility	51	Welfare facility (special nursing homes)	
	52	Healthcare facility	

Service-type categorizations are based on the annual summary statistics (FY 2018–2020), which are distributed by the Ministry of Health, Labour and Welfare (MHLW) on the website <https://www.mhlw.go.jp/toukei/list/45-1b.html>. Service names in English are based on the MHLW website (<https://www.mhlw.go.jp/english/topics/elderly/care/>).

service-provider facilities and receives LTC services including care (so-called day-service) or rehabilitation (so-called day-care); rental services, where LTC users can rent specific equipment for their welfare, such as walking sticks, walkers, or wheelchairs; short-stay services, which offer users admission to facilities for short-term recuperation; guidance services, which provide users with specialized management or guidance (but not including medical treatment) by home-visiting doctors, dentists, pharmacists, nurses, or dietitians; designated facility services, which provide daily life care for individuals living at designated facilities; facility services, which are provided for those living in care facilities or nursing homes; and community-based services, where the combination of various kinds of services are provided as a one-stop service. The original service names in Japanese are provided in Supplemental Table 1.

**Quantifying the change in service usage**

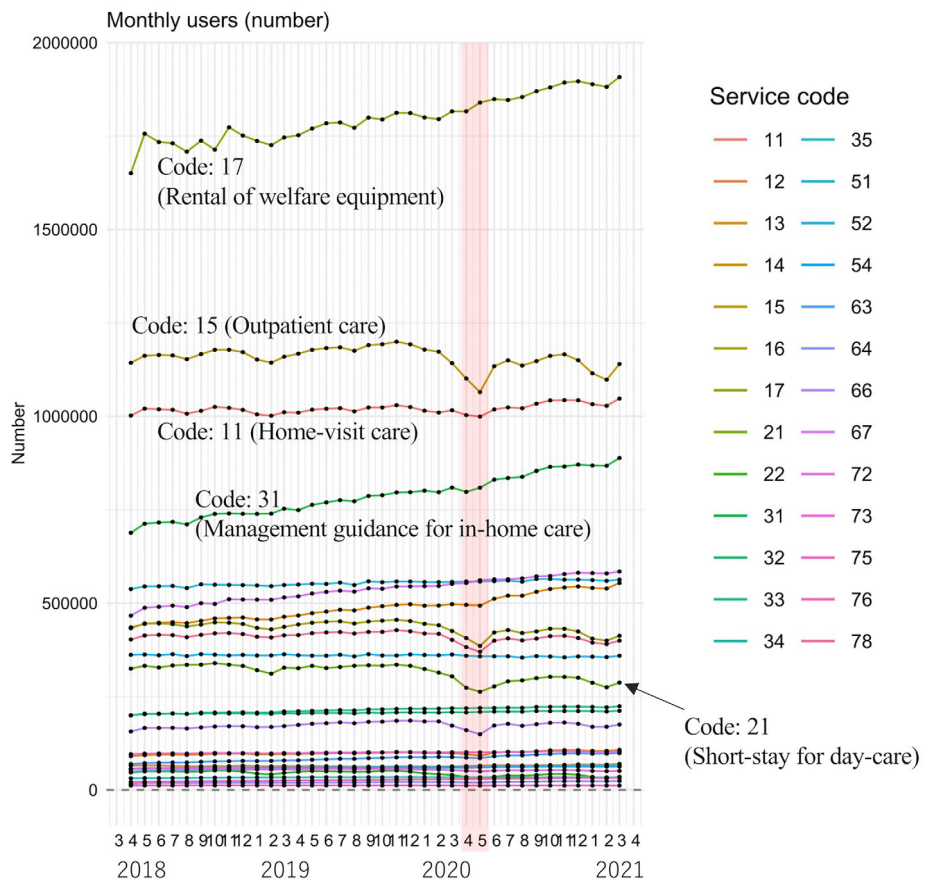
Data processing and statistical analyses were conducted using R version 3.6.3 (R Foundation for Statistical Computing, Vienna, Austria) and its packages. Because the use of the services may be influenced by seasonal fluctuations as well as by an increasing trend in the last few years, we quantified the degree of use per month *M* as the ratio to the previous year by the following formula ( $a, b, c, d \in \mathbb{N}$ ):

$$Ratio_M = \frac{Count\ in\ M,\ 2020\ (a) / Count\ in\ Dec,\ 2019\ (b)}{Count\ in\ M,\ 2019\ (c) / Count\ in\ Dec,\ 2018\ (d)}$$

$Ratio_M$  is the degree of change in the user count in month *M* of 2020 compared with the same month in the previous year ( $M = \text{January–November}$ ), and the reference month (December) in the previous year. We incorporated the reference month because of the potential involvement of yearly trend in the number of monthly users. In order to obtain 95% confidence intervals (CIs) of  $Ratio_M$ , we considered this formula as being equal to the equation of odds ratio (OR), although it is different from its original definition: we applied the equation that was originally used to calculate the 95% CI of OR for convenience, as shown in Supplemental Table 2. A lower 95% CI >1 indicates increased usage, and an upper 95% CI <1 indicates decreased usage of the service. The  $Ratio$  of service *s* across the country is specified as  $Ratio_{s,M}$ . In total, Ratios of 26 services were obtained for each month (January–November 2020). To evaluate the log-normal distribution of the  $Ratio$ , which is the prerequisite for applying the OR-based 95% CI equation, we created a Q-Q plot of  $\log(Ratio)$  by each service type (Supplemental Figure 1).

**Meta-regression**

Next, in order to understand the broad change in the usage by service type, we conducted a multiple meta-regression analysis. In this analysis, the degrees of change in usage, depending on the service type or the feature of service (i.e., prevention service or not), were input simultaneously. Thus we can extract the degree of serial change in each service type with reference to that of the home-visit service. In addition, the analysis provides data regarding the degree of serial



**Figure 1** Serial change in monthly users in each of the 26 long-term care services from April 2018 to March 2021. The red band denotes April–May 2020, when the nationwide state of emergency was declared. Top-4 services and the short-stay service are annotated.

change in preventive services compared with that in the non-preventive services. For all  $Ratio_s$  in a fixed month  $M$ , we evaluated whether factors related to the type of service may bring heterogeneity, as evaluated by the  $I^2$  value and  $p$ -value in the Q-test. We conducted a multiple meta-regression analysis, the equation of which is as follows:

$$\hat{\theta}_s = \beta_0 + \beta_1 D_{s,type} + \beta_2 D_{s,preventive} + \epsilon_s + \zeta_s.$$

The effect size  $\hat{\theta}_s$  of subgroup  $s$ , which corresponds to the name of the service, is regressed by the subgroups' covariates.  $D_{s,type}$  is the dummy variable for the type of service to which the service  $s$  belongs (Table 1, left-most column), and  $D_{s,preventive}$  is the dummy variable for whether the service  $s$  is a preventive service (Table 1, right-most column).  $\epsilon_s$  is the sampling error, and  $\zeta_s$  is the random effect. The  $\beta_1$  and  $\beta_2$  obtained for each month  $M$  are summarized as the adjusted  $Ratios$  to provide an overview of the serial changes of each feature.

**Ethics**

This study was approved by the University of Tokyo, Graduate School of Medicine's Institutional Ethics Committee (ID: 11628-(3)). The need for informed consent was waived as the study used retrospective data from a publicly available database. This study was conducted in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its amendments.

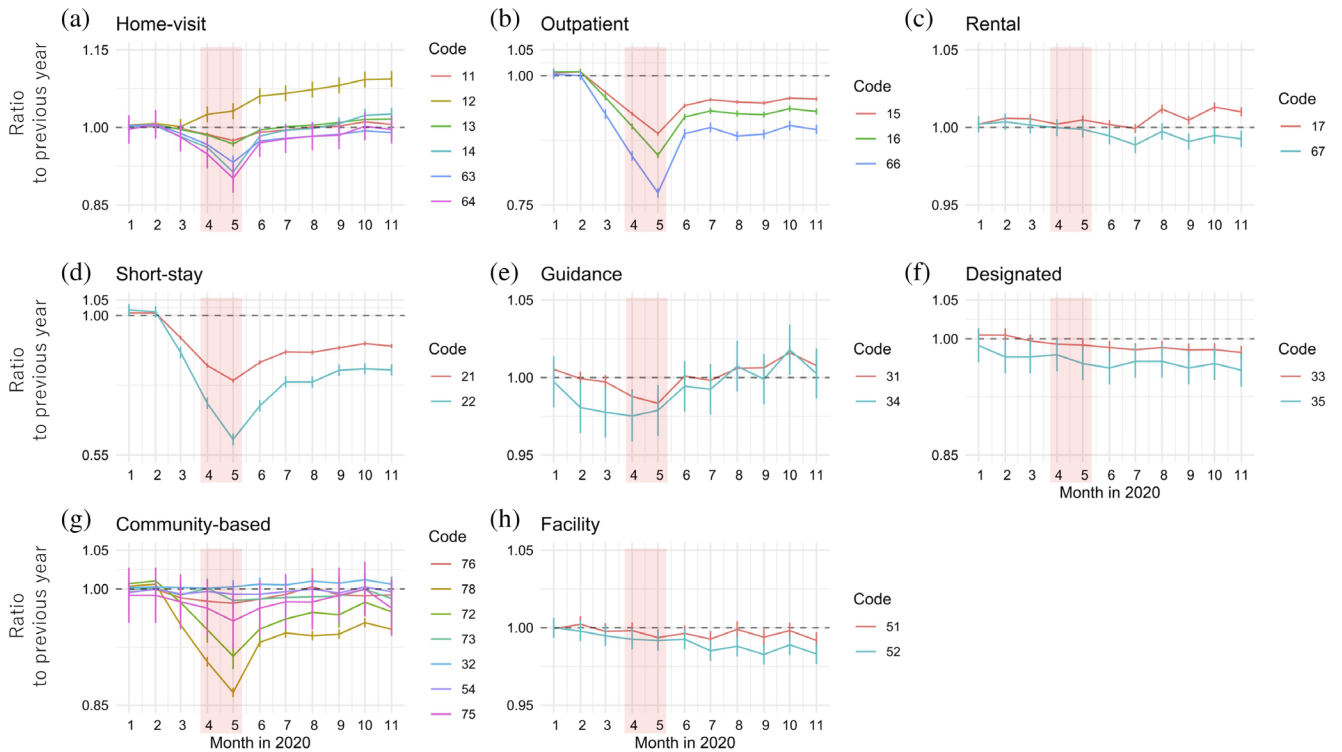
**Results**

**Serial trend: Overview**

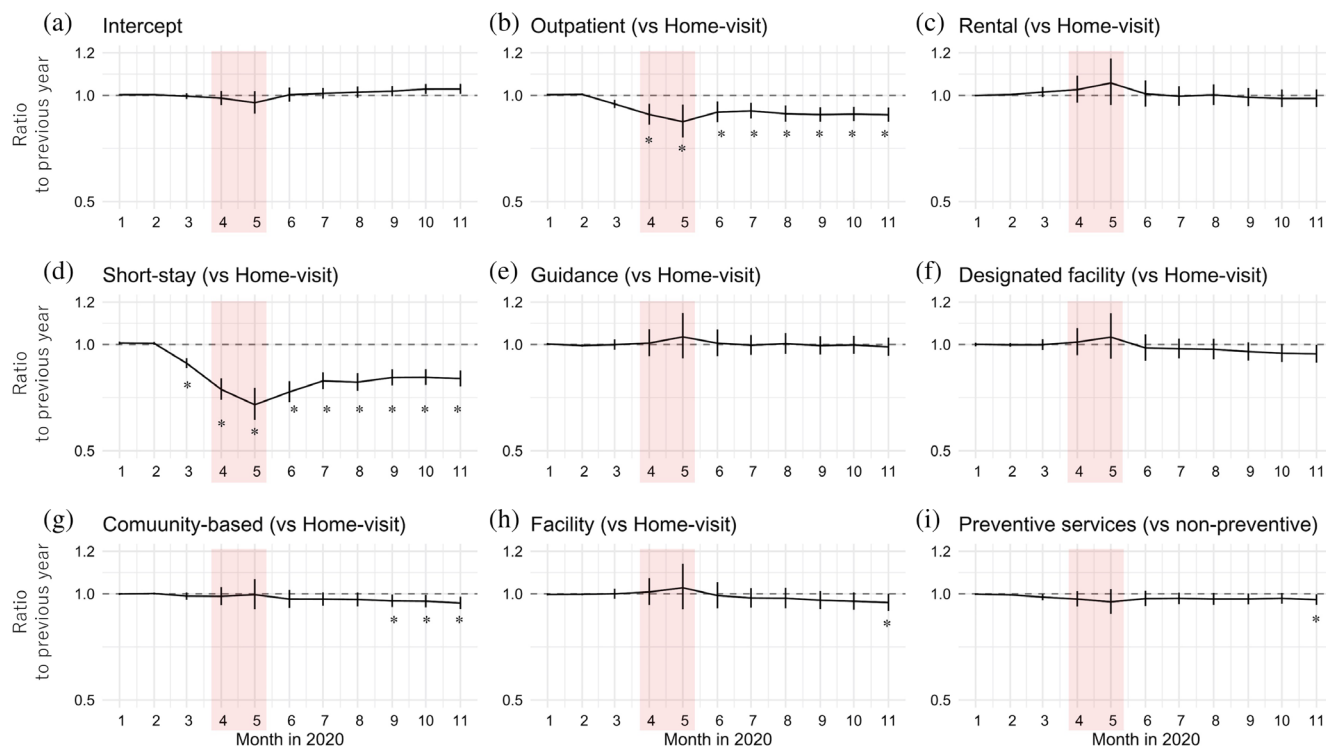
The serial change in the actual number of monthly users in each of the 26 services is plotted in Figure 1. Visually, we can see that some of the series started to decline 1–2 months before April–May 2020, as marked by the vertical red band in the figure, and then significantly decreased in April and May 2020, during which the first nationwide SoE was declared.

**Serial change by the type of service**

Thereafter, we obtained the  $Ratio$  of users at each month to the same month in the previous year for the individual services, as shown in Figure 2. In Figure 2, each plot shows the serial  $Ratios$  from January to November 2020. Figure 2(a) shows the serial change of home-visit services, with most of them, except for home-visit bathing, showing a mild to moderate decline in May 2020 (e.g.,  $Ratio$  to the previous year: 0.913 [95% CI: 0.901 ~ 0.926] in 'Home-visit rehabilitation' [service code: 14]). Figure 2(b) shows the serial change of outpatient services, which showed a moderate decline in May 2020 (e.g.,  $Ratio$  to the previous year: 0.888 (95% CI: 0.884 ~ 0.892) in 'Outpatient care' [service code: 15]). Figure 2(c), (e), (f), and (h) show serial changes of rental, guidance, designated, and facility services, respectively; they showed no significant or only slight changes in May 2020. Figure 2(d) shows the serial change of short-stay services, which showed the largest decline in May



**Figure 2** Serial changes in the  $Ratio$  to the previous year of the various long-term care services from January to November 2020. Vertical bars denote 95% confidence intervals. Red bands denote April–May 2020, when the nationwide state of emergency was declared. Note that the scale on the vertical axis is different in each graph (a)–(h).



**Figure 3** Serial change in the coefficients obtained in the meta-regression. Vertical bars denote 95% confidence intervals. Red bands denote April–May 2020, when the nationwide state of emergency was declared. Asterisks (\*) mean that the *Ratio* in the month showed significant decline (upper 95% < 1).

2020 (e.g., *Ratio* to the previous year: 0.600 (95% CI: 0.581 ~ 0.619) in ‘Short-stay for recuperation’ [service code: 22]). Figure 2(g) shows the serial change of community-based services, with many of them showing no significant changes. In addition, outpatient services and short-stay services had insufficient recovery, even in late 2020.

### Meta-regression

Figure 3 shows the serial trend in the coefficients obtained from the meta-regression analysis from January to November 2020. The changes in the home-visit services were insignificant, as partly represented by the series of the intercept term (Fig. 3a): that is, adjusted *Ratio* in May = 0.965 (95% CI: 0.913 ~ 1.020). Compared with the series of home-visit services, outpatient services (Fig. 3b) showed a mild to moderate level of significant change in April–May [i.e., adjusted *Ratio* in May = 0.876 (95% CI: 0.802 ~ 0.957)], while short-stay services (Fig. 3d) showed the largest change in April–May [i.e., adjusted *Ratio* in May = 0.717 (95% CI: 0.645 ~ 0.796)]. No other types of services showed a significant decline in April–May. In addition, no significant change was observed in the case of preventive services in April–May (Fig. 3i).

### Discussion

In this study, we found that the use of LTC services across Japan showed a unimodal serial change; use started to decline in March 2020 and reached its largest decline in May 2020. Thereafter, it recovered insufficiently, even as of late 2020. Community-dwelling

elderly individuals who had previously used outpatient or short-stay services were the segment of LTC users who were most affected by the COVID-19 pandemic. There was no significant change in the use of home-visit services or services for residents in nursing homes. Service use started to recover after its largest decline in May 2020, and has not sufficiently recovered, even as of November 2020. Although the database we used was equipped only with the total number of monthly users of each service, the data still has an advantage in terms of its high accessibility and analyzability, thereby providing an overview of the changes in LTC service use following the pandemic. Our results provide a basis for further research on the medium- and long-term influence of these changes on the mental health of these LTC service-users and their family caregivers.

The use of outpatient or short-stay services significantly declined, while the use of home-visiting service hardly declined, but we do not know precisely why. We can suggest various scenarios in which individual community-dwelling LTC service-users did not receive LTC services similar to their pre-pandemic levels, as follows. Some LTC facilities providing services were temporarily closed due to a nosocomial outbreak (or ‘cluster’ outbreak)<sup>28</sup> or concerns about infection; that is, 2.55% of facilities in Japan were reported to have closed in April 2020 (<https://www.mhlw.go.jp/content/000625055.pdf>: article in Japanese). Or, to secure adequate physical distances between service users, some facilities might have had to reduce the upper limit of users at any one time. Furthermore, LTC users were required to self-isolate in their homes because they were considered close contacts when family members were COVID-19-positive. Some LTC users stopped using LTC services because of excessive concerns or anxieties over infection, and some had a reduced need to

continue with LTC services because they had been relatively independent previously.<sup>29</sup> These are acceptable as reasons that led to the decreased use of outpatient or short-stay services. Although the reason for the decline in usage should thus include factors attributable to the demand side and supply side of services, it would be difficult to distinguish between these factors using a database approach, even if we had used a comprehensive nationwide claims database.

The switches from facility-based services to home-based services that were made during the pandemic might be key for interpreting the current results in detail. Several exceptional measures were made in the operational policy of the LTC insurance system in response to the COVID-19 pandemic to lower the risk of infection and to facilitate the process for users and providers of LTC services. For example, to prevent crowding in service facilities, home-visit services were temporarily permitted as a substitute for outpatient services (office correspondence from MHLW: <https://www.mhlw.go.jp/content/000605436.pdf>). This is supported by an earlier study, which reported reduced usage in outpatient services but maintained usage in home-visit services.<sup>30</sup> The current study has shown that the above attempt to maintain the provision of home-visit services for community-dwelling elderly people was sustained to a considerable degree. The lack of a significant change in the number of users of home-visiting services has two possible explanations: either a proportion of the decreased use of outpatient or short-stay services was transferred to the use of home-visiting services, which showed a limited decrease; or the use of outpatient or short-stay services simply declined without a decrease in the use of home-visit services. Regarding the home-bathing service, which showed an exceptional increase after the first SoE, its increased usage may be a result of a switch from outpatient care where a similar bathing service is provided. The proportion of monthly new users will be key to distinguishing these possible patterns, and needs to be evaluated in future research. Currently, it is unclear whether people who had been using outpatient or short-stay services switched to home-visit services as a temporary alternative. This point is consistent with the previous literature,<sup>24</sup> which suggested that the replacement of outpatient services with home-visit services was insufficient.

Additional considerations can be deduced from the serial changes in the use of services. The degree of decline was not steep in response to the declaration of the SoE, because usage decline had already started in March. This means that the SoE was not the primary factor that induced the decrease in usage, but rather an additional factor supporting the decline in usage, in our experience. In addition, the recovery in the number of short-stay and outpatient service-users remained insufficient as of November, possibly because many service users continued to stay away to reduce their risk of infection. Meanwhile, we are uncertain whether the burden of care resulting from the decline of service use in late 2020 was shifted to the use of other types of LTC services or to the caregiving family members.

This study has some limitations. First, it is based on summary statistics across the country, without distinguishing the difference in each prefecture in terms of the baseline service usage or the degree of disruption by the COVID-19 pandemic. Therefore, the degree of decline reported in this study is more likely to reflect the changes in metropolitan areas with larger populations, such as Tokyo or Osaka, and the changes in prefectures with smaller populations are at risk of being masked. Second, we referred to the monthly count of users in the period from December 2018 to December 2020 in order to quantify the degree of change, which means that the serial trend over a longer time period (e.g., 3–5 years or so) cannot be incorporated, leading to the risk of an

inaccurate estimation of change. Using interrupted time-series analysis may help to address this point, although this approach may also have some disadvantages because the emergence of the decline was not sudden. Third, it is unclear from this data alone whether the change in users is truly related to the COVID-19 pandemic or whether it is just a pseudo-correlation that was caused by another event.

It might be helpful to use the nationwide LTC claims database to examine changes following the pandemic in further detail. Specifically, it is important to incorporate differences by municipality. In addition to the difference in the baseline populations by prefecture, the difference in the number of COVID-19 patients per population by prefecture should be considered. The government of Japan specified 12 prefectures that had a large number of COVID-19 cases or whose COVID-19 cases increased rapidly as “designated prefectures under specific cautions,” and social restrictions were slightly stricter there than in other prefectures. Although the provision of LTC services was not directly restricted in the prefectures under specific precautions, provision and usage may have been indirectly affected to an extent; therefore, we would also need to incorporate the factor of ‘designated prefectures’ into the analysis.

## Conclusion

The use of LTC services in Japan declined during the COVID-19 pandemic. Community-dwelling elderly individuals who had previously used outpatient or short-stay services were the most affected segment. Future research is warranted to study the medium- or long-term influence of this decline on the mental and physical health of LTC service-users and their family caregivers.

## Acknowledgements

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## Conflict of interest

The authors declare no conflicts of interest.

## Data availability statement

Data used for this study is available from the website of Ministry of Health, Labour and Welfare of Japan (<https://www.mhlw.go.jp/toukei/list/45-1b.html>).

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## Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's website:

**Supplemental Table 1.** Name of services analyzed and their types. Service names in Japanese and their service-type categorization are based on the annual summary statistics (FY 2018–2020), which are available on the MHLW website (<https://www.mhlw.go.jp/toukei/list/45-1b.html>). Service names in English are based on the MHLW website (<https://www.mhlw.go.jp/english/topics/elderly/care/>).

**Supplemental Table 2.** Calculation of  $Ratio_M$  and its confidence intervals

**Supplemental Figure 1.** Q-Q plot of  $\log(Ratio)$  by each service type.

Because the 95% CI of the odds ratio is calculated by approximation based on the assumption that the odds ratio is log-normally distributed, here we examine whether  $Ratio$  is also distributed log-normally: all services except for (a) 'Home-visit' and (g) 'Community-based' services are approximately log-normally distributed, as visually confirmed from the Q-Q plots. Regarding these two services types, we did not confirm that the distribution of 'Home-visit' service was different from log-normal (Kolmogorov–Smirnov test,  $p > 0.05$ ).

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