

介護保険サービス費に影響する個人及び地域の要因
～全国介護レセプトからのエビデンス～

研究協力者	金雪瑩	筑波大学医学医療系ヘルスサービスリサーチ分野	助教
研究代表者	田宮菜奈子	筑波大学医学医療系ヘルスサービスリサーチ分野	教授
		筑波大学ヘルスサービス開発研究センター	センター長
研究分担者	森隆浩	千葉大学大学院医学研究院	特任准教授
研究分担者	岩上将夫	筑波大学医学医療系ヘルスサービスリサーチ分野	助教
研究協力者	渡邊多永子	筑波大学ヘルスサービス開発研究センター	客員研究員
研究協力者	佐藤幹也	筑波大学医学医療系ヘルスサービスリサーチ分野	客員准教授

研究要旨

高齢化の更なる進展とともに医療費、介護保険サービス費（以下、介護費）は増大し、国・地方の財政の大きな部分を占めています。今後の介護費の伸び率は医療費の伸び率より大きいと見込まれる中、介護費に影響する要因を明らかにすることは重要な課題である。本研究では、全国介護レセプトデータ（2016年4月～2017年3月）と統計でみる市区町村のすがた2016のデータを突合し、65歳以上の介護保険サービス利用者（介護予防サービス利用者は除外）の年間介護費に関連する個人及び地域の要因を明らかにすることを目的とした。多変量分析の結果、自己負担率が1割である介護保険サービス利用者は2割負担の利用者より年間介護保険サービス費が高いことが明らかになった。また介護保険サービス費が高額な地域の特徴は、都市部に位置している、高齢者10万当たりの介護福祉施設数が多い、高齢者単身世代の割合が高いという結果が得られた。

A. 研究目的

As a consequence of population ageing, the rapid increase in health-related expenditures, including medical and long-term care (LTC), has become a critical issue for most governments in developed countries¹. LTC expenditure covered by government and compulsory insurance schemes has increased more rapidly than medical expenditure over the last decade.²

In Japan, the number of LTCI users has increased rapidly, and, consequently, corresponding LTC expenditure has also

increased every year. Thus, this is threatening the financial sustainability of the LTCI system³

This study's objective is, therefore, to clarify both individual and regional characteristics associated with LTC expenditure using national level claims data.

B. 研究方法

対象者

We analyzed anonymous national LTCI claims data from April 2016 to March 2017 (i.e. fiscal year (FY) 2016).

Notably, the dataset covers all LTCI users in all 47 prefectures in Japan and provides detailed information on the types of LTC services used, amount of care granted and the associated payments, living areas, and the demographics of the LTCI subscribers. Subsequently, we linked LTCI claims data with municipality data on an individual level. The municipality level data are collected annually from the Statistic Bureau, Ministry of Internal Affairs and Communications in Japan and include regional information about population structure, economic status, and population health care status. Our inclusion criteria require that individuals are 65 years or older, have had a care need of level 1 to 5, and have used LTC services at least once in FY 2016.

(倫理面への配慮)

本研究で用いるデータは、筆者らが受領する以前に個人を特定できる情報は削除されており、個人情報保護されている。また本研究は筑波大学医学医療系倫理委員会の承認（承認日：2018年10月19日、承認番号：1324）を得て実施した。

Dependent variables

The annual LTC expenditures for individuals who satisfied the inclusion criteria were calculated by summing monthly reimbursements from LTCI claims and out-of-pocket payments. In Japan, the government unifies unit amounts according to type of LTC service at the national level (i.e. one unit equates to 10 Japanese yen). The differences across regions are related to

extra charges for LTC expenses. Eight regional levels have been determined by the government according to the labour costs of local government employees; the extra rates in specific regions are as follows: level 1 (20%), level 2 (16%), level 3 (15%), level 4 (12%), level 5 (10%), level 6 (6%), level 7 (3%), and level 8 (0%)⁴. To gain a better understanding of LTC expenditure in terms of the amount of LTC service utilization, we calculated price-adjusted (i.e. adjusted for regional extra charges) annual LTCI expenditure for each person. Thus, higher LTC expenditures represent higher amounts of LTC service utilization.

Independent variable

We selected the variables reported as predictors of LTC expenditure in previous research. Individual characteristics were included such as age, sex, LTC need levels 1 to 5, and service types (facility service versus home and community services)^{3,5} and co-payments.

The following municipality variables were used to characterize healthcare demand and supply. The variables capturing demand for population healthcare included (a) proportion of elderly single households among all households, and (b) annual mortality rate. The variables capturing healthcare supply were (a) number of LTC welfare facilities per 100,000 LTCI users (care-need levels 1-5) and (b) number of doctors per 1,000 citizens.

Three variables related to regional economic status were included: taxable income per taxpayer, regional differences

in the extra charges for LTC expenses (regional levels 1-8), and location (metropolitan versus non-metropolitan) Finally, the variables capturing medical spending⁶ were included.

Statistical analysis

We conducted a descriptive analysis to review the distributions of dependent and independent variables. We developed generalized linear models (GLM) to determine the effects of the factors associated with LTC expenditures on facility care, home and community care, and total care (the sum of both). Box-Cox tests were performed to select appropriate link functions and modified Park tests were conducted for the distribution family⁷. The preferred GLM specification was the square root link with Gaussian family in total care and home and community care expenditures; whereas, facility expenditure preferred Gama family with no transformation. The robust standard variance estimator that accounts for clustering within regions was also applied⁸.

C. 研究結果

Table 1 presents the factors associated with annual LTC expenditure. Individuals who are older, are female, with a higher care-need level, were associated with higher LTC expenditure. Facility service users spent 851 thousand yen more than home–community care service users. The highest income individuals with 20% co-payments were associated significantly with less expenditure compared with others only in terms of total care and facility expenditure. Municipalities with more doctors per 1,000 citizens and a

higher proportion of single elderly households or being located in metropolitan areas, were associated with higher LTC expenditure. The number of nursing home facilities per 100,000 LTCI users was strongly associated with higher total LTC and home and community care, but not with facility care expenditures. The annual mortality rate was negatively associated with LTC expenditure.

D. 考察

We examined individual and municipality characteristics associated with LTC expenditure using national LTC claims data. At the individual level, a higher care-need level and facility service use are associated strongly with higher expenditure. At the municipality level, municipalities in metropolitan areas, having more nursing homes per 100,000 LTCI users, are associated strongly with higher expenditure.

E. 結論

In conclusion, this national level study identified several individual and municipality characteristics associated with higher LTC expenditure. The findings of this study will be useful to deal with the rapidly growing LTC expenditure in Japan and to further advance the LTCI policy.

F. 研究発表

1. 論文発表

Jin X, Mori T, Sato M, Watanabe T, Tamiya N. Individual and regional determinants of long-term care expenditure in Japan: Evidence from national long-term care claims. *European journal of public health*. Accepted in March 2020.

2. 学会発表

Jin X, Mori T, Sato M, Watanabe T, Tamiya N. Individual and regional determinants of long-term care expenditure in Japan: Evidence from national long-term care claims. the 11th Health Services and Policy Research Conference, Newzealand, Auckland 2019/12/4-6(Oral)

G. 知的財産権の出願・登録状況（予定を含む）

1. 特許取得

なし

2. 実用新案登録

なし

3. その他

なし

参考文献

[1] Gianino MM, Lenzi J, Martorana M, et al. Trajectories of long-term care in 28 EU countries: evidence from a time series analysis. *European Journal of Public Health* 2017; **27**: 948-54.

[2] OECD (2017) "Long-term care expenditure", in Health at a Glance 2017: OECD Indicators, OECD Publishing, Paris, https://doi.org/10.1787/health_glance-2017-81-en.

[3] Olivares-Tirado P, Tamiya N, Kashiwagi M, Kashiwagi K. Predictors of the highest long-term care expenditures in Japan. *BMC health services research* 2011; **11**: 103.

[4] Ministry of Health, Labour and Welfare. 2015. Regional division in Long-term care insurance system.(In Japanese) https://www.mhlw.go.jp/file/05-Shingikai-12601000-Seisakutoukatsukan-Sanjikanshitsu_Shakaihoshoutantou/0000143081.pdf.

[5] Lin H-R, Otsubo T, Sasaki N, Imanaka Y. The determinants of long-term care expenditure and their interactions. *International Journal of Healthcare Management* 2016; **9**:

269-79.

[6] Mori T, Tamiya N, Jin X, et al. Estimated expenditures for hip fractures using merged healthcare insurance data for individuals aged ≥ 75 years and long-term care insurance claims data in Japan. *Archives of osteoporosis* 2018; **13**: 37.

[7] Deb P, Norton EC, Manning WG. *Health econometrics using Stata*: Stata Press College Station, TX, 2017.

[8] Manning WG, Mullahy J. Estimating log models: to transform or not to transform? *Journal of health economics* 2001; **20**: 461-94.

Table 1. Marginal effects of individual and municipality characteristics on annual per capita LTC expenditure (thousand yen)

	LTC services (sum of facility, home and community care services)			Facility services			Home and community services		
	dy/dx	95%CI	P-value	dy/dx	95%CI	P-value	dy/dx	95%CI	P-value
Individual characteristics									
Age	70.1	(67.6-72.5)	<0.001	24.4	(19.2-29.7)	<0.001	59.5	(56.8-62.3)	<0.001
Age ²	-0.4	(-0.4--0.4)	<0.001	-0.2	(-0.2--0.1)	<0.001	-0.3	(-0.3--0.3)	<0.001
Female (ref.: male)	272.9	(270.4-275.5)	<0.001	273.5	(267.5-279.5)	<0.001	260.5	(257.9-263.2)	<0.001
Care-need level (ref.: care-need level 1)									
care-need level 2	425.9	(423.4-428.4)	<0.001	206.5	(196.3-216.7)	<0.001	377.3	(374.9-379.7)	<0.001
care-need level 3	922	(918.9-925.1)	<0.001	401.5	(392.2-410.7)	<0.001	889.6	(886.3-893)	<0.001
care-need level 4	1058.5	(1054.9-1062.1)	<0.001	472.8	(463.7-481.8)	<0.001	1084.3	(1080-1088.5)	<0.001
care-need level 5	1232	(1227.5-1236.5)	<0.001	530.1	(520.8-539.4)	<0.001	1416.5	(1410.5-1422.4)	<0.001
Service type (ref.: only facility services)									
Only home and community services	-851	(-854.3--847.8)	<0.001	-	-	-	-	-	-
Both facility and home and community services	-51.7	(-56.1--47.4)	<0.001	-	-	-	-	-	-
Co-payments (ref.: 0%)									
10%	3.3	(-13.5-20)	0.700	-25.3	(-58.6-8)	0.100	16.1	(-3.8-36.1)	0.112
20%	-22.9	(-40.1--5.7)	<0.001	-93	(-128.2--57.9)	<0.001	-0.002	(-20.3-20.3)	1.000
Municipality characteristics									
Metropolitan (ref.: non-metropolitan)	13.3	(9.7-16.9)	<0.001	22.5	(15-30)	<0.001	9.6	(5.5-13.8)	<0.001
Number of long-term care welfare facilities	81.8	(67.5-96.2)	<0.001	3.2	(-29-35.3)	0.800	101.3	(85.4-117.1)	<0.001

per 100,000 LTCI users (care-need levels 1 to 5)

Taxable income per taxpayer (million yen)	11.2	(8.8-13.6)	<0.001	-5.8	(-11.4--0.2)	<0.001	16.6	(14-19.2)	<0.001
Proportion of single elderly households (%)	2.6	(1.8-3.4)	<0.001	0.6	(-1.1-2.2)	0.500	3.2	(2.2-4.1)	<0.001
Number of doctors per 1,000 citizens	2.8	(2.1-3.5)	<0.001	3.0	(1.4-4.7)	<0.001	2.3	(1.5-3.1)	<0.001
Outpatient medical spending per citizen ≥75 years old (thousand yen)	0.7	(0.7-0.8)	<0.001	0.04	(-0.1-0.1)	0.400	1.0	(1-1.1)	<0.001
Medical expenditure per capita (thousand yen)	-0.3	(-0.3--0.3)	<0.001	0.02	(0.0-0.1)	0.500	-0.4	(-0.4--0.4)	<0.001
Annual mortality rate (per 1,000 people)	-11	(-12--10)	<0.001	-6.3	(-8.4--4.3)	<0.001	-13.1	(-14.3--11.9)	<0.001

Note: The model additionally adjusted for eight regional levels. The government defined eight levels with different extra charges for long-term care expenses (i.e. 0-20%) to adjust for their regional labour costs among local government employees.