

Original Research

Regional disparities in the provision of advanced services by community pharmacies in Japan

Kazuya Nonomura , Kazuya Toyama, Hirofumi Tamaki , Arihiro Osanai, Mitsuhiro Nakamura , Kazuhiro Iguchi 

Received (first version): 15-Apr-2026

Accepted: 04-Jun-2026

Published online: 20-Aug-2026

Abstract

Objective: In Japan, each prefecture formulates a “Medical Care Plan” according to the basic policies established by the national government; however, this has led to inter-prefectural disparities and concerns about unequal access to medical care. In Japan’s super-aged society, demand has increased for home-healthcare and aseptic preparation services provided by community pharmacies. This study aimed to analyze the current situation in each prefecture using NDB Open Data and identify disparities between the actual number of service provisions and the estimated demand, thereby supporting the development of regional healthcare systems to meet the rising need for home-healthcare and aseptic preparation services. **Methods:** The number of service provisions was determined using NDB Open Data, and the demand for each service was estimated based on population and medical-expenditure data. Gini coefficients were calculated to evaluate the regional disparities. **Results:** Gini coefficients for the provision of home-healthcare and aseptic preparation services per estimated unit demand were 0.3052 and 0.2882, respectively, indicating substantial disparities across prefectures.

Conclusion: This study revealed notable inter-prefectural disparities in the provision of advanced pharmacy services when evaluated based on estimated demand. These findings provide evidence that can inform policy measures aimed at reducing disparities to advanced pharmacy services.

Keywords: community pharmacy, home healthcare service, aseptic preparation service, medical demand, service provision.

Kazuya Nonomura. Laboratory of Community Pharmacy, Gifu Pharmaceutical University, 1–25–4 Daigaku-nishi, Gifu 501–1196, Japan; Mamiya Dispensing Pharmacy, 2–15 Kiyozumi-cho, Gifu 500–8178. 2312008@gifu-pu.ac.jp

Kazuya Toyama. Laboratory of Community Pharmacy, Gifu Pharmaceutical University, 1–25–4 Daigaku-nishi, Gifu 501–1196, Japan

Hirofumi Tamaki. Laboratory of Community Pharmacy, Gifu Pharmaceutical University, 1–25–4 Daigaku-nishi, Gifu 501–1196, Japan. tamaki-hi@gifu-pu.ac.jp

Arihiro Osanai. Laboratory of Community Pharmacy, Gifu Pharmaceutical University, 1–25–4 Daigaku-nishi, Gifu 501–1196, Japan. osanai-a@gifu-pu.ac.jp

Mitsuhiro Nakamura. Professor, Laboratory of Drug Informatics, Gifu Pharmaceutical University, 1–25–4 Daigaku-nishi, Gifu 501–1196, Japan. mnakamura@gifu-pu.ac.jp

Kazuhiro Iguchi*. Professor, Laboratory of Community Pharmacy, Gifu Pharmaceutical University, 1–25–4 Daigaku-nishi, Gifu 501–1196, Japan. iguchi@gifu-pu.ac.jp

INTRODUCTION

Japan’s healthcare environment is undergoing rapid changes owing to factors such as population aging and advances in medical technology. To respond to these changes, each prefecture formulates a “Medical Care Plan” according to the basic policies established by the national government^{1–3}. The plan is designed to establish a healthcare system that meets each prefecture’s needs. Consequently, the content of the plan varies across prefectures, and it has been pointed out that such variations may lead to inter-prefectural disparities in access to healthcare services^{4–6}.

One of the targets of the Sustainable Development Goals is universal health coverage,⁷ aiming to ensure that all citizens can access appropriate healthcare services without financial hardship. In Japan, a universal health-insurance system has been established^{8,9} and enrollment in public health-insurance programs is required for all citizens; therefore, everyone can receive medical services by paying only a portion of the total cost. This scheme was based on the premise of no regional disparities in healthcare access.

In Japan’s super-aged society, regional medical-care visits have led to efforts to optimize the number of hospital beds. Consequently, it is expected that the number of patients discharged from hospitals will increase, and more patients will receive medical care at home^{10,11}. This shift would lead to increased demand for home-healthcare services provided by community pharmacies. The number of patients discharged to home healthcare who continue to receive injectable medications is expected to increase. This trend likely resulted in increased demand for aseptic preparation services provided by community pharmacies. To meet these needs, it is essential to promptly establish a healthcare-provision system in which community pharmacies providing advanced services are appropriately distributed within communities and capable of delivering the necessary services.

We focused on community pharmacies providing advanced services; specifically, those providing home-healthcare services and aseptic preparation services. We analyzed the geographical distribution of these pharmacies and found that they were unevenly distributed among the population¹². This disparity was based on the per capita number of community pharmacies rather than actual medical demand. To accurately assess the current situation, it is necessary to evaluate the actual provision volume



relative to the demand volume. Although accurately calculating the volume of medical demand is difficult, estimation formulas based on factors such as age-specific disease incidence rates are used. For instance, the Japan Medical Association has presented estimation formulas for medical and long-term care demand based on expenses by age groups¹³, which are used to evaluate the regional distribution of physicians. Hara et al. applied medical-demand estimates based on these estimation formulas¹⁴.

Several studies have utilized NDB Open Data to evaluate the provision volumes of various services by community pharmacies in Japan^{15,16}. NDB Open Data is a publicly available medical database published by the Ministry of Health, Labour and Welfare, and contains aggregated data on all medical services conducted under the universal health-insurance system. This dataset includes information on the number of home-healthcare services and aseptic preparation services provided.

In this study, to support the development of a regional healthcare system that can meet the growing demand for home-healthcare services and aseptic preparation services, we first analyzed the current situation in each prefecture and identified disparities in the actual number of services provided relative to the estimated demand volume.

METHODS

Dataset

Universal health insurance has been established in Japan. All pharmacy services based on prescriptions from physicians are covered under this insurance system, referred to as “insurance dispensing.” To provide insurance-dispensing services, pharmacies must be registered as “insurance pharmacies” by the Bureau of Health and Welfare. Community pharmacies in Japan offer home-healthcare services and aseptic preparation services. To receive fees for these services, pharmacies must register with the Bureau of Health and Welfare. In this study, a pharmacy registered to provide home-healthcare services and aseptic preparation services was defined as a “community pharmacy providing home-healthcare services and aseptic preparation services.” Data on community pharmacies were obtained in February 2023 by downloading the “List of Medical Institutions Receiving Notifications” published on each Regional Bureau of Health and Welfare website (the eight regional block offices of Hokkaido, Tohoku, Kanto-Shinetsu, Tokai-Hokuriku, Kinki, Chugoku-Shikoku, Shikoku, and Kyushu).

The number of claims for home-healthcare services, aseptic preparation services, and medication-preparation and community-based support fees were extracted from the 9th NDB Open Data (based on Japanese claims data from 2022). In accordance with privacy policies, values lower than 10 cases were disclosed in the NDB Open Data. In this study, such missing values were treated as zero. The number of

prescriptions for FY2022 was obtained from data published on the Japan Pharmaceutical Association website. Population data were sourced from the “2023 Basic Resident Register” available on the e-Stat website (<https://www.e-stat.go.jp/>) maintained by the National Statistics Center of Japan, a comprehensive government statistics portal. National medical expenses and healthcare benefits for FY2022 were available on the e-Stat website.

Estimation of medical, long-term care, and aseptic preparation demand

Medical demand was calculated as the sum of the products of the population size in each age group and the corresponding age-specific coefficient. The coefficient for each age group was derived as the ratio of the total medical expenses for that age group to the total medical expenses for the age group 40–64 years, which was set as the reference value of 1 (Table 1A)^{13,14}. Similarly, the demand for long-term care and aseptic preparation services was calculated by applying age-specific coefficients derived from the expenses for the respective service fees (Tables 1B and 1C). Following the established approach,^{13,14} the 40–64 age group was selected as the reference because it is generally considered a relatively stable population before the significant increase in healthcare needs observed in older groups. Furthermore, since eligibility for long-term care insurance in Japan begins at age 40, this group may serve as a consistent baseline for evaluating demand. These expenditure-based indicators were used as pragmatic proxies for demand, as they are thought to reflect variations in disease burden and the utilization intensity of services in accordance with these estimation formulas^{13,14}.

Gini coefficient

The Gini coefficient, commonly used as an indicator of income inequality, has been widely applied to assess disparities in the distribution of healthcare resources. We used the Gini coefficient to evaluate disparities in various services provided by community pharmacies across prefectures. The per capita Gini coefficients and estimated demand were calculated as previously described¹².

The bootstrap method was used to assess the reliability of the Gini coefficients^{17,18}. From the original dataset with n observations, n bootstrap samples were drawn with replacement. A Gini coefficient was calculated for each resample and this procedure was repeated X times, yielding a distribution of bootstrap estimates. We conducted 1000 bootstrap replications, based on previous studies^{19,20}. All data processing and statistical analyses were performed using the R Studio statistical software (version 2024.12.1+563).

Ethical considerations

Ethical approval was waived for this study because it involved database-related observations, with no research participants



Table 1. Adjustment coefficients for each demand by age group based on each expenditure

(A) Medical demand		
Age group (years)	Total medical expenditure per capita (thousand yen)	Adjustment coefficient
0–14	124.031	0.67
15–39	86.82	0.47
40–64	186.651	1
65–74	417.783	2.24
≥ 75	751.382	4.03
(B) Long-term care demand		
Age group (years)	Expense for long-term care services per capita (thousand yen)	Adjustment coefficient
40–64	5.043	1
65–74	52.829	10.48
≥ 75	526.842	104.46
(C) Aseptic preparation demand		
Age group (years)	Expense for aseptic preparation services per capita (yen)	Adjustment coefficient
0–14	0.499	2.7
15–39	0.0942	0.51
40–64	0.186	1
65–74	0.384	2.07
≥ 75	0.557	3.01

directly involved. All results were obtained based on openly available website data.

RESULTS

Number of pharmacies and provisions of service by prefecture

In 2022, 61 122 insurance community pharmacies operated in Japan. Among these, 23 287 (38.1 %) provided home-healthcare services and 4857 (7.9 %) provided aseptic preparation services (Table S1).

Figure 1 shows the relative number of pharmacies or provisions of service per unit demand for each prefecture. All values are normalized, with the median prefecture set to 100. Specifically, the indicators include the number of pharmacies or prescriptions per unit medical demand; the number of pharmacies providing home-healthcare services or the number of provisions of home-healthcare service per long-term care unit demand; and the number of pharmacies providing aseptic preparation services or number of provisions of aseptic preparation service per unit demand for aseptic preparation.

The results revealed that inter-prefectural disparities were greater for the number of service provisions per unit demand than for the number of pharmacies per unit demand. In addition, the disparities in home-healthcare service and aseptic preparation service provisions per unit demand were significantly larger than those observed in the number of prescriptions per unit medical demand.

Gini coefficient for pharmacy services

We analyzed inter-prefectural disparities in the number of pharmacies and service provisions using the Gini coefficient, a commonly used measure of inequality. The Gini coefficient for the number of pharmacies per unit medical demand was 0.0553. The coefficients were higher for pharmacies providing advanced services: 0.1370 for those providing home-healthcare services per long-term care unit demand and 0.1800 for those providing aseptic preparation services per unit demand for aseptic preparation, indicating greater disparities in the availability of these services (Table 2).

Furthermore, the Gini coefficients for the number of service provisions were even higher: 0.3052 for home-healthcare services per long-term care unit demand and 0.2882 for aseptic preparation services per unit demand for aseptic preparation. These values were substantially higher than the corresponding Gini coefficients for the number of pharmacies providing each service (Table 2). This finding is consistent with results based on relative-value, as shown in Figure 1.

DISCUSSION

In this study, we examined regional disparities in the number of pharmacies providing advanced services and actual provisions of these services, adjusted for the estimated service demand. Evaluating service access based on demand rather than population size allows for a more accurate assessment of disparities and supply-demand mismatches that may be overlooked in population-based evaluations. This demand-

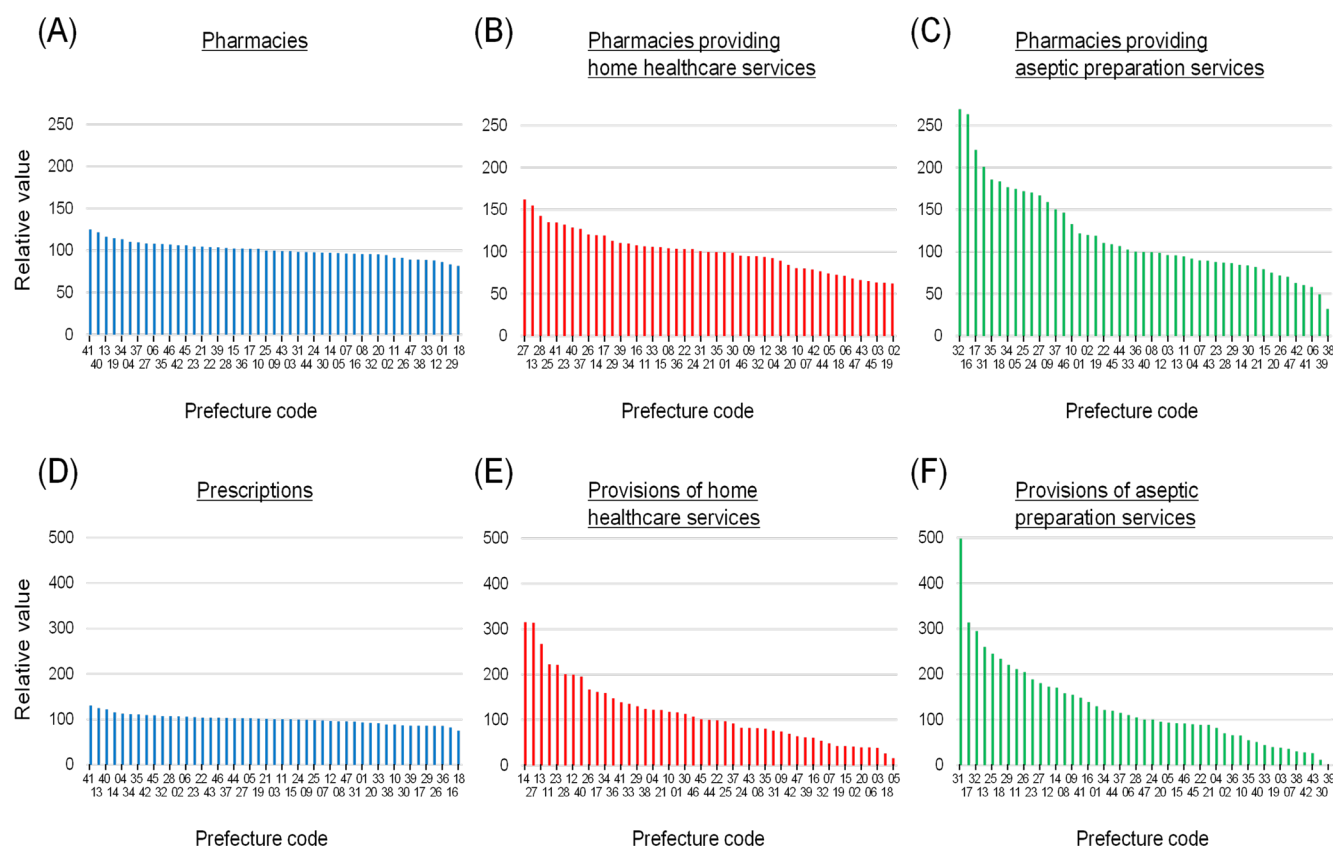


Figure 1. Comparison of the number of pharmacies (A–C) and provisions of services (D–F) per unit demand. The y-axis is the relative number of pharmacies or provisions of service per unit demand for each prefecture. All values are normalized, with the median prefecture set to 100. The prefectures are arranged in descending order along the x-axis based on their relative values. (A, D) medical demand; (B, E) long-term care demand; (C, F) aseptic preparation demand.

Table 2. Gini coefficient for the number of pharmacies or service provisions.		
(A) Number of community pharmacies per capita	Gini coefficient	95% CI
Community pharmacies	0.0537	0.0411:0.0675
Community pharmacies providing home-healthcare services	0.1075	0.0813:0.1404
Community pharmacies providing aseptic preparation services	0.1852	0.1466:0.2252
(B) Number of community pharmacies per unit demand	Gini coefficient	95% CI
Community pharmacies	0.0553	0.0453:0.0714
Community pharmacies providing home-healthcare services	0.137	0.1130:0.1756
Community pharmacies providing aseptic preparation services	0.18	0.1381:0.2206
(C) Number of service provisions per capita	Gini coefficient	95% CI
Dispensing and pharmaceutical care services (number of prescriptions)	0.0505	0.0425:0.0631
Home-healthcare services	0.259	0.2015:0.3193
Aseptic preparation services	0.2716	0.2184:0.3436
(D) Number of service provisions per unit demand	Gini coefficient	95% CI
Dispensing and pharmaceutical care services (number of prescriptions)	0.0611	0.0466:0.0781
Home-healthcare services	0.3052	0.2575:0.3700
Aseptic preparation services	0.2882	0.2354:0.3575

adjusted approach enables more effective policy planning and resource allocation. Our findings revealed notable inter-prefectural disparities in the number of pharmacies providing home-healthcare services and aseptic preparation services, with even greater disparities observed in service provision rates.

The Gini coefficients for the number of pharmacies providing home-healthcare services and aseptic preparation services per unit demand were 0.1370 and 0.1800, respectively. In contrast, the Gini coefficients for the actual provisions of these services per unit demand were substantially higher, at 0.3052 and 0.2882, respectively. Generally, a Gini coefficient exceeding around 0.3 indicates a high inequality level. In Japan, the geographic distribution of physicians is known to be uneven; for example, the Gini coefficients for physician-to-population ratios at the municipal and secondary medical-care area levels have been reported as 0.34 and 0.21, respectively²¹. This study is the first to demonstrate significant regional disparities in the provision of home-healthcare services and aseptic preparation services at pharmacies, even after adjusting for the estimated service demand. Although the number of home-healthcare services provided by pharmacists has been increasing annually, previous studies have noted regional differences in their provision²². Notably, comparable trends in regional disparities were observed in both per capita and per unit demand evaluations (Table 2). This consistency may indicate that the observed inequalities are relatively stable across different denominators and are unlikely to be solely dependent on the specific parameters of the demand estimation model. By conducting a demand-based evaluation, our study substantiates and quantitatively confirms these disparities.

Compared with the Gini coefficients for the number of pharmacies and number of prescriptions per unit medical demand, those for home-healthcare services and aseptic preparation services were significantly higher. These findings suggest that, under current conditions, prescription dispensing at pharmacies exhibits minimal inter-prefectural disparities when standardized by demand – indicating adequate pharmacy supply relative to population and a demand-driven limitation. While pharmacies providing basic services such as outpatient dispensing have become more evenly distributed, the diffusion of advanced services tends to lag because of factors such as higher costs, operational complexity, and limited visibility of benefits. This pattern aligns with the diffusion of innovations theory²³. Currently, the expansion of pharmacies providing home-healthcare services and aseptic preparation services appears to be in the “Introduction” phase of this diffusion process. However, because the benefits of these services are not always visible to patients or stakeholders, increasing their visibility may help accelerate broader adoption.

Interestingly, disparities in the actual provision of services were greater than those in the number of pharmacies. What factors might explain this gap? For example, in China, although community care facilities have been developed, their utilization

remains limited because of factors such as supply-demand mismatches, economic and cultural barriers, service-quality concerns, and lack of public awareness.²⁴ A similar pattern is observed in Japan, where the number of aseptic preparation services at pharmacies is increasing but the services remain concentrated in a limited number of pharmacies²⁵. Simply increasing the number of pharmacies is insufficient; enhancing service provision within existing pharmacies – that is, providing a wider range of services per pharmacy – is crucial. Technical and financial barriers to providing aseptic preparation services have been previously reported. To address these challenges, initiatives such as training programs organized by local pharmaceutical associations are critical. However, the availability of such programs varies across regions, likely contributing to the observed regional disparities^{26,27}. Developing standardized training programs across prefectures could help reduce these gaps. Furthermore, targeted financial support for underserved or resource-limited regions may represent another potential strategy to mitigate these inequities. Additionally, workforce planning for community pharmacies could benefit from incorporating demand-adjusted indicators—such as age structure or projected home-care needs—rather than relying solely on population size or the number of pharmacies. Integrating these metrics could better align service capacity with actual population needs and potentially reduce regional disparities. Another potential issue is insufficient awareness of home-healthcare services and aseptic preparation services at community pharmacies among residents and healthcare providers. Promoting broader awareness could be a critical strategy to reduce regional disparities in service provision.

Limitations

This study estimated the demand for medical and long-term care and aseptic preparation based on publicly insured healthcare expenditures. While actual demand should ideally be measured using patient numbers and case severity, such detailed data are generally unavailable at prefecture level. The indicators used in this study were calculated from reimbursed unit costs and the number of service claims. Because unit costs reflect service complexity and claim counts approximate service volume, these indicators are considered to reasonably reflect patient needs. Therefore, despite these limitations, we believe they provide a valid proxy for healthcare demand.

Another limitation concerns the use of NDB Open Data, which suppresses data for cells with fewer than 10 cases. Notably, such suppression occurred only for aseptic preparation services, which were examined across five categories in 47 prefectures (235 cells in total), of which 20 cells (8.5%) were suppressed. These suppressed cells were distributed across 18 prefectures, with no prefecture having more than three suppressed cells, and no apparent geographic clustering was observed. In our primary evaluation, these suppressed values were treated as zero, which inevitably introduces some degree of error. To assess the potential impact of this assumption, we calculated the Gini coefficient under two scenarios: assuming all

suppressed cells contained 0 cases and assuming all contained 9 cases. The resulting difference in the Gini coefficient was approximately 0.7 %. Specifically, the Gini coefficient for aseptic preparation services only varied from 0.2882 (assuming zero) to 0.2862 (assuming nine). This marginal difference suggests that the choice of handling suppressed data does not alter the fundamental finding of substantial regional disparity, thereby supporting the robustness of our results. Consequently, we consider that while this data suppression represents a limitation, its influence on our overall findings is likely minimal

this study revealed significant inter-prefectural disparities. As the demand for home-healthcare services and aseptic preparation services continues to grow, pharmacies must play a greater role in supporting community health through the provision of high-quality services. Regional disparities in healthcare resources have been shown to affect health outcomes in other fields—for instance, studies have reported that an uneven distribution of cancer specialists among prefectures can influence cancer mortality rates²⁸. Similarly, disparities in the availability of advanced pharmacy services may contribute to health inequities. Our findings highlight the need to address such disparities, and we hope that this study contributes to efforts to promote more equitable healthcare delivery across prefectures.

CONCLUSION

By evaluating both the number and provisions of advanced pharmacy services based on demand rather than population,

CONFLICT OF INTEREST

The authors report no potential conflicts of interest relevant to this study.

References

1. Ministry of Health, Labour and Welfare. [Medical Plan]. Japanese. 2023 Jun 15 [cited 2025 Jul 7]. Available from: <https://www.mhlw.go.jp/content/001108169.pdf>.
2. Ministry of Health, Labour and Welfare. [The 545th Central Social Insurance Medical Council (Chuikyo) General Meeting materials. Medical Plan]. Japanese. 2023 May 17 [cited 2025 Jul 7]. Available from: <https://www.mhlw.go.jp/content/12404000/001097778.pdf>.
3. Kakinuma T. The 8th medical care plan. *J Natl Inst Public Health*. 2024;73(2):112–117. doi: 10.20683/jniph.73.2_112
4. Saragai A. [Disparities in medical expenses within and across prefectures in metropolitan areas]. *J Health Welf Stat*. 2018;65(11):31–38. Japanese.
5. Shirakura Y, Shobugawa Y, Saito R. Geographic variation in inpatient medical expenditure among older adults aged 75 years and above in Japan: a three-level multilevel analysis of nationwide data. *Front Public Health*. 2024;12:1306013. doi: 10.3389/fpubh.2024.1306013
6. Niga T, Mori M, Kawahara K. Relationship between regional population and healthcare delivery in Japan. *J Med Dent Sci*. 2016;63(1):9–18. doi: 10.11480/jmds.630102
7. World Health Organization. Universal Health Coverage [Internet]. [cited 2025 Jul 7]. Available from: https://www.who.int/health-topics/universal-health-coverage#tab=tab_1.
8. Ministry of Health, Labour and Welfare. Overview of Medical Service Regime in Japan. [cited 2025 Jul 7]. Available from: https://www.mhlw.go.jp/bunya/iryouhoken/iryouhoken01/dl/01_eng.pdf.
9. Ministry of Health, Labour and Welfare. Health and Medical Services. [cited 2025 Jul 7]. Available from: <https://www.mhlw.go.jp/english/wp/wp-hw5/dl/23010201e.pdf>.
10. Matsuda S. [Policy research on enhancing home medical care based on regional medical care plans]. Japanese. Health and Labour Sciences Research Grant Report. 2021 May [cited 2025 Jul 7]. Available from: <https://mhlw-grants.niph.go.jp/project/148884>.
11. Suzuki S, Kato N, Kondo M. [Prospects for regional medical care vision in the post-COVID-19 era] *J Jpn Soc Healthcare Admin*. 2024;61(1):17–24. Japanese. doi: 10.11303/jsha.61.17
12. Nonomura K, Toyama K, Kondo Y, Tamaki H, Osanai A, Ino Y, Nakamura M, Iguchi K. Geographical Disparities in the Distribution of Community Pharmacies Providing Aseptic Preparation Services in Japan. *Integr Pharm Res Pract*. 2024;13:181–190. doi: 10.2147/IPRP.S479164
13. Japan Medical Association Research Institute. [Working paper No. 323, current and future health care delivery systems in the region]. Japanese. 2014 Jun 24 [cited 2025 May 6]. Available from: https://www.jmari.med.or.jp/download/wp323_data/intro.pdf.
14. Hara K, Otsubo T, Kunisawa S, Imanaka Y. Examining sufficiency and equity in the geographic distribution of physicians in Japan: a longitudinal study. *BMJ Open*. 2017;7(3):e013922. doi: 10.1136/bmjopen-2016-013922
15. Iwata M, Maezawa M, Miyasaka K, Hirofujii S, Suzuki T, Nakao S, Tamaki H, Ichihara N, Nokura Y, Masuta M, Uranishi H, Nishibata Y, Iguchi K, Nakamura M. Survey of community and hospital pharmacist involvement in outpatient chemotherapy using Japanese health information data. *J Pharm Policy Pract*. 2024;17(1):2286350. doi: 10.1080/20523211.2023.2286350
16. Kurosaki H, Yoshimura K. Nihon Kosshu Eisei Zasshi [Medical expenses for diabetes care in Japan: analysis of inter-prefecture



- differences]. *Jpn J Public Health*. 2020;67(8):501–508. Japanese. doi: 10.11236/jph.67.8_501
17. Mackinnon DP, Lockwood CM, Williams J. Confidence limits for the indirect effect: distribution of the product and resampling methods. *Multivariate Behav Res*. 2004;39(1):99. doi: 10.1207/s15327906mbr3901_4
 18. Gsteiger S, Low N, Sonnenberg P, Mercer CH, Althaus CL. Gini coefficients for measuring the distribution of sexually transmitted infections among individuals with different levels of sexual activity. *PeerJ*. 2020;8:e8434. doi: 10.7717/peerj.8434
 19. Efron B, Halloran E, Holmes S. Bootstrap confidence levels for phylogenetic trees. *Proc Natl Acad Sci U S A*. 1996;93(23):13429–13434. doi: 10.1073/pnas.93.23.13429
 20. Jean-Richard-Dit-Bressel P, Clifford CWG, McNally GP. Analyzing event-related transients: confidence intervals, permutation tests, and consecutive thresholds. *Front Mol Neurosci*. 2020;13:14. doi: 10.3389/fnmol.2020.00014
 21. Ministry of Health, Labour and Welfare. [Basic data on the supply and demand of physicians]. Japanese. 2017 Jun 15 [cited 2025 Jul 7]. Available from: <https://www.mhlw.go.jp/file/05-Shingikai-10801000-Iseikyoku-Soumuka/0000167964.pdf>.
 22. Kimura M. [Consideration of advanced pharmaceutical control functions through pharmacy-provided home pharmaceutical care]. *Yakugaku Zasshi*. 2020;140(7):841–850. Japanese. doi: 10.1248/yakushi.19-00237-1
 23. Dearing JW, Cox JG. Diffusion of innovations theory, principles, and practice. *Health Aff (Millwood)*. 2018;37(2):183–190. doi: 10.1377/hlthaff.2017.1104
 24. Zhang H, Zhang S. Reasons for underutilization of community care facilities for the elderly in China. *BMC Geriatr*. 2024;24(1):791. doi: 10.1186/s12877-024-05398-z
 25. Kushida K, Hirohara M. [Advanced pharmaceutical management functions in home pharmaceutical care]. *Yakugaku Zasshi*. 2020;140:877–884. Japanese. doi: 10.1248/yakushi.19-00237-5
 26. Kagawa Y, Noguchi H, Namiki N, Hayashi H, Kosuge K. [Recurrent education for pharmacists to support regional medicine]. *Yakugaku Zasshi*. 2011;131(1):41–44. Japanese. doi: 10.1248/yakushi.131.41. PMID: 21212612
 27. Yamada K. [Clinical training of pharmacists after licensure and career paths in medical institutions]. *Yakugaku Zasshi*. 2022;142(9):965–969. Japanese. doi: 10.1248/yakushi.22-00089-5
 28. Foundation for Promotion of Cancer Research. Cancer Statistics in Japan 2024 [Internet]. [cited 2025 Jul 7]. Available from: https://ganjoho.jp/public/qa_links/report/statistics/2024_jp.html.

Table S1. List of various data by prefecture

Prefecture code	Prefecture	Total number of pharmacies	Number of prescriptions	Number of pharmacies notified to claim for the home visit dispensing fee	Number of home healthcare service provisions	Number of pharmacies notified to claim for the aseptic preparation fee	Number of aseptic preparation service provisions	Total population	Medical demand	Long-term care demand	Aseptic preparation demand
	Total	61122	799873743	23287	11909087	4891	47792	125416877	2022	2022	2022
1	Hokkaido	2272	31417053	950	385522	229	1796	5139913	7960493	99889317	8116182
2	Aomori	612	8857600	147	34231	55	237	1225497	1957306	24780328	1979980
3	Iwate	628	8094295	150	31182	43	125	1189670	1909166	24801664	1935399
4	Miyagi	1186	15438992	333	152013	73	480	2257472	3243610	37677295	3429075
5	Akita	517	7014603	155	11223	64	252	941021	1610364	21875254	1581478
6	Yamagata	599	7507530	148	28601	23	320	1042396	1671900	21723692	1700648
7	Fukushima	888	11548565	262	54723	60	173	1818581	2786174	34172452	2879430
8	Ibaraki	1337	16995689	496	134716	102	1196	2879808	4213370	49922093	4421782
9	Tochigi	927	11738604	293	79773	109	782	1929434	2799301	32399417	2954640
10	Gunma	972	10729657	268	135067	92	334	1930976	2868166	34816610	2993826
11	Saitama	3113	43530212	1192	860959	240	3965	7381035	10274118	117336970	10957404
12	Chiba	2605	36416784	929	684623	216	2786	6310075	8909555	103902698	9436901
13	Tokyo	6900	95023599	2879	1718701	429	8625	13841665	17921222	194722122	19369847
14	Kanagawa	4062	61438689	1630	1487796	264	3938	9212003	12609948	143015721	13498737
15	Niigata	1154	14356140	435	60565	64	545	2163908	3395055	43160967	3476036
16	Toyama	509	5585204	210	41062	100	388	1028440	1600149	20443578	1638667
17	Ishikawa	560	6045413	228	106852	89	933	1117303	1652169	20027017	1739239
18	Fukui	308	3618251	97	12007	51	480	759777	1139496	13965226	1199216
19	Yamanashi	467	5276719	92	21713	35	86	812615	1228930	15295980	1271684
20	Nagano	1001	12377465	330	54097	57	533	2043798	3169808	41020346	3270909
21	Gifu	1029	12707519	348	146642	59	470	1982294	2966958	36510938	3109293
22	Shizuoka	1869	23894194	655	216375	145	861	3633773	5419113	66361155	5669384
23	Aichi	3535	45286521	1449	839459	226	3582	7512703	10187760	114814316	11115834
24	Mie	856	11090010	320	88839	109	472	1772427	2637788	32480355	2762108
25	Shiga	646	8095521	284	70842	85	894	1413989	1948272	22020201	2133606
26	Kyoto	1116	13359287	522	249689	64	1348	2501269	3688035	45378858	3855317
27	Osaka	4454	54039360	2274	1521773	508	4053	8784421	12396359	146819573	13137546
28	Hyogo	2719	36188050	1303	633963	170	1510	5459867	7960212	95703426	8420805
29	Nara	562	7398915	276	109648	42	793	1325385	2031675	25543172	2100698



30	Wakayama	473	5396237	179		71145	29	29	924469	1463705	18990889	1494412
31	Tottori	276	3399019	103		26948	41	752	546558	846186	10692497	881720
32	Shimane	336	4832885	127		25235	68	550	658809	1061002	14067525	1090623
33	Okayama	823	10845546	354		157020	70	223	1865478	2795541	35099500	2939442
34	Hiroshima	1540	19297925	526		263935	177	896	2770623	4091331	50185274	4328601
35	Yamaguchi	765	10061603	271		75601	94	203	1326218	2146361	28477212	2182769
36	Tokushima	386	4113654	143		70613	27	131	718879	1137013	14469196	1162199
37	Kagawa	530	6381005	221		55495	53	299	956787	1458169	18199771	1520668
38	Ehime	617	7818034	229		109563	16	109	1327185	2089345	26805600	2146823
39	Kochi	388	4130045	160		31187	13	0	684964	1128236	15178332	1133569
40	Fukuoka	2906	37008384	1025		538540	180	670	5104921	7193056	83339217	7780823
41	Saga	499	6655526	188		66907	18	325	806877	1202446	14603389	1283617
42	Nagasaki	722	9522585	196		59357	31	100	1306060	2050192	25939806	2132610
43	Kumamoto	871	11620299	210		90603	58	125	1737946	2642562	33134116	2792931
44	Oita	574	7685364	167		74954	45	372	1123525	1762886	22706287	1821431
45	Miyazaki	583	7663087	130		69966	44	268	1068838	1658384	20866447	1743557
46	Kagoshima	874	10802569	282		109916	88	405	1591699	2461703	30947578	2593730
47	Okinawa	556	7559535	121		39446	36	378	1485526	1877112	18554570	2208993

