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Rural and urban disparities in access and quality of healthcare in the Japanese healthcare system: a scoping review

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Abstract

Background The rural-urban disparity in healthcare quality is a global issue. Compared with living in urban areas, living in rural areas is associated with poorer healthcare outcomes. Moreover, the shortage of healthcare providers in rural areas is a worldwide concern. This scoping review aims to map existing evidence regarding rural-urban disparities in access and quality of healthcare in Japan using the Donabedian model as a theoretical framework and to identify conceptual and measurement gaps.

Methods This review targeted published articles and gray literature. We included documents that (1) were based on Japanese populations and (2) compared the quality of care between defined rural and urban areas. We excluded articles if they (1) were published during or before 2005 since the Japanese government amended the Medical Care Law in 2006; (2) focused exclusively on urban or rural areas; or (3) were not published in English or Japanese. This study employed PubMed, EMBASE, Web of Science, the Japanese medical literature database, ICHUSHI, and CiNii Research. We extracted quality indicators (structure, process, and outcomes) based on the Donabedian model. We recorded the definitions or indicators of rurality described by the studies.

Results Out of 5,020 articles, 15 were included. Only one study was conducted in a primary care setting. Moreover, no study evaluated the "outcomes" of the Donabedian model in a primary care setting. Regarding the definitions or indices of rurality, the most commonly used indicator of rurality was population size, followed by population density. The cutoff values or descriptions of rurality using these indicators differed across studies.

Conclusion This study mapped rural-urban disparities in access and quality of healthcare in Japan. These findings highlight the need to evaluate rural-urban disparities in the "outcomes" of care in primary care settings in Japan and the lack of common indicators of rurality.

Keywords Healthcare, Japanese, Rurality index, Rural-urban, Scoping review

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Introduction

Less than 1% of Japan's total population lives on one of its 6800 islands [1], and another 11 million people reside in "depopulated areas." Japan has a total population of 123 million [2]; thus the 11 million residents of depopulated areas represent 8.9% of all inhabitants. In addition, approximately 130,000 people live in "districts without a doctor" and have poor access to health care [1]. Rural-urban disparities in health status, healthy behaviors, and access to care are well documented worldwide [3–11]. Compared with their urban counterparts, rural residents are more likely to have obesity-related chronic diseases and have poorer physical and social functioning, mental health, self-reported health status [9], cancer survival [10], and overall quality of life [11]. They are less likely to report healthy behaviors than urban residents [3–5, 6] and have fewer visits to family physicians and specialists than urban residents [7, 8]. Rural communities also face challenges recruiting and retaining healthcare providers [12].

Rural-urban disparities in healthcare quality are a global issue, and healthcare providers, policymakers, and rural residents have attempted to address these challenges [13, 14]. An essential first step in addressing rural-urban healthcare disparities is developing a rurality index for healthcare research [1]. A previous scoping review of global literature reported rurality indices in healthcare research mainly measure access to healthcare, such as travel distance, time and cost to healthcare facility [1]. Thus, access and quality of healthcare is essential to assess rural-urban healthcare disparity.

Aims

This scoping review aims to map existing evidence regarding rural-urban disparities in access and quality of healthcare and to identify conceptual and measurement gaps in Japan. We classified these disparities using the Donabedian model, which is a framework for assessing quality of care comprising structure, process, and outcomes [15]. We opted for a scoping review given the limited number of anticipated studies, variances in research designs and methods, and the exploratory nature of the research question.

Methods

Study design

We designed this scoping review based on the framework described by Levac et al. and Arksey & O'Malley [16, 17]. We selected a scoping-review design because it systematically maps existing evidence and highlights gaps in the literature [16, 17]. The findings are reported following the Preferred Reporting Items for Systematic Reviews and Meta-analysis Protocols for Scoping Reviews framework [18]. This review targeted published peer-reviewed articles and gray literature, including government reports. We registered the protocol in the Open Science Framework a priori: https://osf.io/af9vp/.

Setting

The Japanese healthcare system

The Ministry of Labor, Health, and Welfare is responsible for overall healthcare administration in Japan [19]. Under central governance, local governments are responsible for the delivery of primary, secondary, and tertiary care [19]. Local governments comprise 47 prefectures and approximately 1,700 municipalities (e.g., cities, towns, and villages). Prefectures are responsible for secondary and tertiary care service areas and comprise 344 secondary and 52 tertiary medical regions [20]. Each municipality provides primary care services. Primary care is mainly offered in clinics, and secondary care is generally provided in hospitals.

Eligibility criteria

We developed inclusion and exclusion criteria to identify relevant articles from an initial database search. We included studies that (1) were based on primary quantitative, qualitative, mixed-methods research, or gray literature; (2) were based on a Japanese population; and (3) compared the quality of care between defined rural and urban areas. Since the study focused on recent findings, we excluded studies published during or before 2005 or if they used data from before 2005 because the Japanese government amended the Medical Care Law in 2006, including prefectural governments being responsible for providing medical care in rural areas [21]. Additionally, we excluded studies that focused exclusively on urban or rural areas since our objective was to compare healthcare quality in urban and rural areas. Finally, we excluded studies targeting a country or region other than Japan and articles not written in English or Japanese. We resolved ambiguous information through discussion and consensus, with these decisions being documented. We developed the eligibility criteria a priori and shared the criteria and their interpretation and application to the search with all team members.

Information sources and search strategy

We conducted a comprehensive literature search using PubMed, EMBASE, and Web of Science for articles published from January 1, 2006, to April 15, 2024. Moreover, we queried the Japanese medical literature databases ICHUSHI (https://www.jamas.or.jp/english/) and CiNii Research (https://cir.nii.ac.jp/?lang=en), as well as gover nment websites [22–24].

The search terms for PubMed, EMBASE, and Web of Science were derived from the research questions and are listed in Table 1. The librarian at Yokohama City

Table 1 Search terms used in the scoping review

Database	Search strategy
PubMed	((("Rural Health Services"[MeSH Terms] OR ("rural"[Title/Abstract] AND "Health"[Title/Abstract]) OR "Rural Population"[MeSH Terms]) AND ("Urban Health Services"[MeSH Terms] OR ("urban"[Title/Abstract] AND "Health"[Title/Abstract]))) OR ("Healthcare Disparities"[MeSH Terms] OR "regional difference*"[Title/Abstract] OR "regional disparit*"[Title/Abstract] OR "regional variation*"[Title/Abstract] OR "regional gap"[Title/Abstract])) AND ("Japan"[MeSH Terms] OR "Japan"[Title/Abstract] OR "Japanese"[Title/Abstract])
EMBASE	((('Rural Health Services'/exp OR (rural: ti, ab AND Health: ti, ab) OR 'Rural Population'/exp) AND ('Urban Health Services'/exp OR (urban: ti, ab AND Health: ti, ab))) OR ('Healthcare Disparities'/exp OR 'regional difference*':ti, ab OR 'regional disparit*':ti, ab OR 'regional variation*':ti, ab OR 'regional gap':ti, ab)) AND (Japan/exp OR Japan: ti, ab OR Japanese[Title/de)
Web of Science	((TI=(rural AND health) OR AB=(rural AND health)) AND (TI=(urban AND health) OR AB=(urban AND health)) OR (TI=(regional AND (Disparit* OR difference* OR variation* OR gap) AND Health) OR AB=(regional AND (Disparit* OR difference* OR variation* OR gap) AND Health))) AND (TI=(japan) OR AB=(japan)) AND (PY=(2006–2024))

University participated in determining the search terms. We used Rayyan software to manage the references [25].

Study selection/screening

In the first stage, two investigators (MK and RO) independently screened the titles and abstracts of the retrieved literature, with discrepancies being resolved through discussion. Rayyan software was used for the first stage [25]. In the second stage, the same investigators reviewed the full texts to identify the final list of studies. Discrepancies were resolved through discussion. There was no need to contact the authors of the included studies, as no information required clarification.

Data charting/collection/extraction

The review extracted the following data from each source: year of publication, language, study design, setting (community/clinic/secondary hospital/tertiary hospital/long-term care), data source, sample size, definition/indices of rurality, indicators of healthcare quality (structure, process, and outcomes) based on Donabedian model [15], study outcome, covariates, and an overview of the results. The rules for data extraction and an example were shared with the research team. Two investigators (MK and RO) independently extracted the data, with discrepancies being resolved through discussion.

To situate our work within established quality-of-care theory, we adopted the Donabedian model [15]. In the model, "Structure" refers to the attributes of the service and provider, including physician-to-patient ratios and service times. "Process" reflects the work processes used to achieve the desired outcome, including whether patients receive standard care and staff wash their hands [15]. The "outcomes" include mortality, length of hospital stay, cost of care, and patient experience. The structure–process–outcome triad remains the most widely cited model in comparative health-services research [26, 27] and aligns with recent WHO quality taxonomies [28]. Moreover, it accommodates access-related indicators, which are central to rural–urban analyses. Alternative frameworks such as the Institute for Healthcare Improvement's "Triple Aim [29]" were considered; however, they emphasize population-level goal-setting rather than the indicator-level mapping required for this scoping review. We operationalized the three domains as follows: (i) Structure = provider, facility, or system attributes (e.g., physician-to-population ratio); (ii) Process = care activities including adherence to guidelines or timeliness (e.g., door-to-balloon time); (iii) Outcome = patient-level or population-level results (e.g., mortality, life expectancy). One investigator (MK) assigned each study's indicators to ≥ 1 domain and the remaining investigators checked the results.

Synthesis and presentation of results

We used a PRISMA flow diagram to describe the inclusion and exclusion of studies. We described the number and proportion of each category, such as the definition of rurality or types of indicators. The included studies were classified based on Donabedian's model, and the results are summarized in Table 2. In this scoping review, the results of each source were not synthesized.

Ethics approval and consent to participate

An ethics committee did not assess the study since we only used published literature or websites and did not handle personal information or human biological samples.

Results

Among the 5,020 initially selected papers, 798 duplications were deleted. After screening the titles and abstracts, 4230 of the 4,262 studies were excluded. Among the remaining 32 papers, 14 were retained, and one paper was added following a review of reference lists. Finally, we included 15 studies [30–44]. The flow diagram is shown in Fig. 1. Figure 2 presents a Sankey diagram that visually maps each of the 15 included studies to the Donabedian domains they address.

The extracted data are described in Table 2. Regarding study design, all included studies were observational studies, and nine (60.0%) [30–35, 40, 42–44] were cross-sectional studies. Furthermore, 12 (80.0%) studies [31, 32, 34–37, 39–44] targeted all of Japan, whereas the other

Table 2 Scoping review studies investigating urban-rural disparities in the quality of healthcare in Japan

Title	Year of publication	Language	Study design	Study setting: Level of care	Study setting: national/prefecture/city, town, village	Data source	Sample size
A regional difference in care burden feelings of family caregivers with frail elderly using visiting nurse [30]	2007	Japanese	Cross-sectional	Home-visit nursing service	One prefecture	Questionnaire	167 families
Current situations and issues in respiratory medicine in Japan [31]	2010	English	Cross-sectional	Hospital	National	Questionnaire	1251 hospitals
Geographic distribution of radiologists and utilization of teleradiology in Japan: A longitudinal analysis based on national census data [32]	2015	English	Cross-sectional	Municipality	National	Questionnaire	1811 municipalities
Rural-urban disparity in emergency care for acute myocardial infarction in Japan [33]	2018	English	Prospective cohort	hospital	Prefecture	Registry	Rural: 1313 individuals、Metropolitan: 2,075 individuals
Geographical distribution of family physicians in Japan: a nationwide cross-sectional study [34]	2019	English	Cross-sectional	Prefecture	National	Database of academic society	527 family physicians
Geography of suicide in Japan: spatial patterning and rural-urban differences [35]	2021	English	Cross-sectional	Municipality	National	Suicide database	240673 individuals
Regional and facility disparities in androgen deprivation therapy for prostate cancer from a multi-institutional Japan-wide database [36]	2021	English	Prospective cohort	Hospital	National	Japan Study Group of Prostate Cancer (J-CaP)	19162 individuals
Differences in treatment and survival between elderly patients with thoracic esophageal cancer in metropolitan areas and other areas [37]	2021	English	Retrospective cohort	Prefecture	National	The national database of hospital-based cancer registries	5066 individuals
Regional disparities in adherence to guidelines for the treatment of chronic heart failure [38]	2021	English	Prospective cohort	Hospital	Prefecture	Acute Decompensated Heart Failure Syndromes (ATTEND)	387 individuals
Urban-rural inequalities in care and outcomes of severe traumatic brain injury: A nationwide inpatient database analysis in Japan [39]	2022	English	Retrospective cohort	Hospital	National	Diagnosis Procedure Combination(DPC)	48910 individuals
Regional variation in national healthcare expenditure and health system performance in central cities and suburbs in Japan [40]	2022	English	Cross-sectional	Municipality	National	Open data	23 urban municipalities and 27 rural municipalities
Disparity of performance measure by door-to-balloon time between a rural and urban area for management of patients with ST-segment elevation myocardial infarction - insights from the Nationwide Japan Acute Myocardial Infarction Registry [41]	2023	English	Retrospective cohort	Hospital	National	The Japan Acute Myocardial Infarction Registry (JAMIR)	17167 individuals
The inter-prefectural regional disparity of healthcare resources and representative surgical procedures in orthopedics and general surgery: a nationwide study in Japan during 2015–2019 [42]	2023	English	Cross-sectional	Prefecture	National	Nippon Data Base (NDB) Open data	47 prefectures
Development and validation of a rurality index for healthcare research in Japan: a modified Delphi study [43]	2023	English	Cross-sectional	Municipality	National	Open data	335 secondary medical areas and 1713 municipalities
Primary care physicians working in rural areas provide a broader scope of practice: a cross-sectional study [44]	2024	English	Cross-sectional	Primary care clinic and hospital	National	Questionnaire	299 primary care physicians

Table 2 (continued)

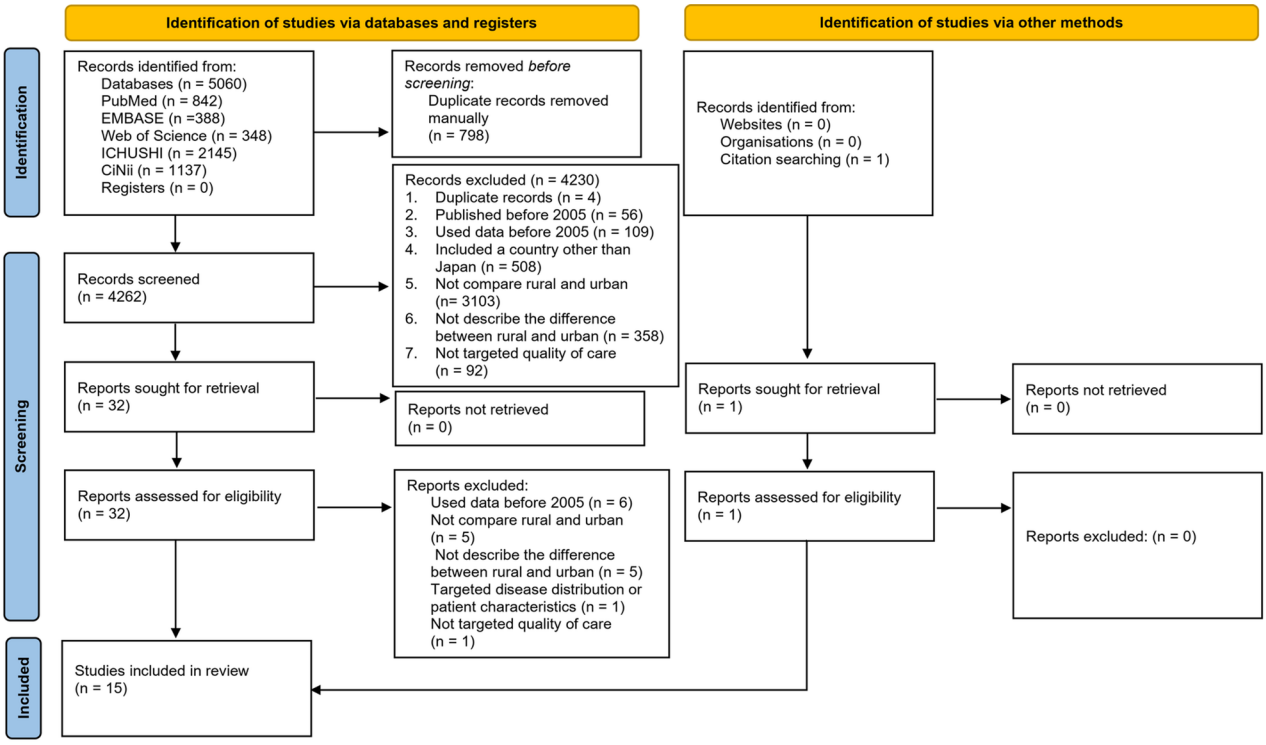
Title	Index or definition of rurality	Details of the index or definition of rurality: population size/density	Donabedian's model (structure, process, outcomes)	Study outcome	Covariates	Overview of results
A regional difference in care burden feelings of family caregivers with frail elderly using visiting nurse [30]	Urban: ordinance, designated cityRural: depopulated area	Not applicable	Outcomes	Care burden of family caregivers	Caregiver's age Caregiver's gender Duration of care Welfare services used Certification for long-term care/support needs, Activities of daily living	No difference in care burden of family caregivers
Current situations and issues in respiratory medicine in Japan [31]	Population size	Metropolitan areas (population ≥500000) Urban areas (200000 to 500000)Provincial areas (50000 to 200000)Rural areas (<50000)	Structure, process	Numbers of internists, respiratory physicians, respiratory specialistsScope of practice	Not applicable	Fewer respiratory specialists in rural areas than the Japanese average. Lower self-containment level (Scope of Practice) in rural areas than in urban areas.
Geographic distribution of radiologists and utilization of teleradiology in Japan: A longitudinal analysis based on national census data [32]	Ordinance designated city/special ward/city/town	Not applicable	Structure	Numbers of radiologists, computed tomography and magnetic resonance imaging	Not applicable	Fewer radiologists in rural areas than in urban areas.
Rural-urban disparity in emergency care for acute myocardial infarction in Japan [33]	Population size	Rural areas: prefecture with population <2 million	Process	Direct ambulance transport, onset-to-balloon time	Age, sex, mode of transport, hypertension, diabetes mellitus, dyslipidemia, current smoker, previous percutaneous coronary intervention, previous myocardial infarction, Killip classification at presentation, ST elevation myocardial infarction, multivessel disease and left anterior descending coronary artery lesion as the culprit	Less direct ambulance transportation in rural areas than in urban areas. Onset-to-balloon time in rural areas is longer than in urban areas.
Geographical distribution of family physicians in Japan: a nationwide cross-sectional study [34]	Population densityOrdinance designated City/special ward/town	Municipalities divided into quintiles by population density	Structure	Number of family physicians per 100000 population	Not applicable	More family physicians in rural areas than any other specialists.
Geography of suicide in Japan: spatial patterning and rural-urban differences [35]	Population density	Municipalities divided into deciles sorted by population density	Outcomes	Number of suicides	Single-person households Unmarried adultsUnemployment rateEducational attainment	Men aged 0–39 and 40–59 years: rural residents had a higher suicide risk than urban residents.
Regional and facility disparities in androgen deprivation therapy for prostate cancer from a multi-institutional Japan-wide database [36]	Population density	Urban areas: prefectures with a population density >1000 persons/km2	Outcomes	Cancer mortality All-cause mortality	Age, initial Prostate-Specific Antigen (PSA) value at pretreatmentGleason scoreClinical TNM-stageTherapeutic modality Regional area or facility type	Geographical regions (rural or urban) do not affect outcomes
Differences in treatment and survival between elderly patients with thoracic esophageal cancer in metropolitan areas and other areas [37]	Population size	Urban areas: a prefecture with >6 million population	Process, outcomes	Treatment strategy, mortality	Age, sex, first-line treatments	cStage I thoracic esophageal cancer mortality in rural areas is worse than in urban areas.

Table 2 (continued)

Title	Index or definition of rurality	Details of the index or definition of rurality: population size/density	Donabedian's model (structure, process, outcomes)	Study outcome	Covariates	Overview of results
Regional disparities in adherence to guidelines for the treatment of chronic heart failure [38]	Authors-defined rural and urban areas		Process	Treatment rates for heart failure with reduced ejection fraction (HFrEF) as recommended by guidelines	Not applicable	Treatment rates for HFrEF following guidelines were lower in rural areas than in urban areas.
Urban-rural inequalities in care and outcomes of severe traumatic brain injury: A nationwide inpatient database analysis in Japan [39]	Population size	Urban areas (population ≥50000)Rural areas (10000 to 50000)	Outcomes	In-hospital mortality	Age, sex, fiscal year, and season of admission, admission on weekends or at night, referral from other institutions, ambulance use, smoking history, body mass index, comorbidities, Charlson comorbidity index, Japan Coma Scale score at admission, details of head injury (diffuse axonal injury, acute epidural hemorrhage, acute subdural hemorrhage, traumatic subarachnoid hemorrhage, contusion, skull fracture, penetrating injury), and injury severity score	Mortality by brain traumatic injury in rural areas is greater than that in urban areas.
Regional variation in national healthcare expenditure and health system performance in central cities and suburbs in Japan [40]	Population size	Metropolitan areas (population ≥500000) Suburb areas: three categories (100000 to 500000, 30000 to 100000, <30000)	Structure, process, outcomes	Total medical expenses of national healthcare experience: medical expenses of inpatients, medical expenses of outpatients, and consultation rates of inpatients and outpatients	Number of doctors, number of nurses, number of beds, income, number of people employed in primary industries, percentage of completely unemployed, percentage of population aged 65–74, number of household members, percentage of singles, percentage of households with own houses	The factors affecting medical care costs in suburban areas differ from those in metropolitan areas.
Disparity of performance measure by door-to-balloon time between a rural and urban area for management of patients with ST-segment elevation myocardial infarction - Insights from the Nationwide Japan Acute Myocardial Infarction Registry [41]	Population density	Municipalities divided by the median of population density	Process, outcomes	In-hospital death, door-to-balloon time		Both in-hospital death and door-to-balloon time are worse in rural areas than in urban areas.

Table 2 (continued)

Title	Index or definition of rurality	Details of the index or definition of rurality: population size/density	Donabedian's model (structure, process, outcomes)	Study outcome	Covariates	Overview of results
The inter-prefectural regional disparity of healthcare resources and representative surgical procedures in orthopedics and general surgery: a nationwide study in Japan during 2015–2019 [42]	Population size and density	Urban areas: large cities with a population >500000 and top seven prefectures with a high population density >1000 persons/km2.	Structure, process	Numbers of physicians and surgeries	Not applicable	Nonlarge cities had significantly more femur fracture surgeries, lower leg fracture surgeries, total knee arthroplasties, cholecystectomies, and hospitals than in large cities. Sparsely populated areas had significantly more femur fracture surgeries, lower leg fracture surgeries, total knee arthroplasties, cholecystectomies, orthopedic surgeon specialists, hospitals, and higher aging rates than densely populated areas.
Development and validation of a rurality index for healthcare research in Japan: a modified Delphi study [43]	Rurality index for Japan		Structure, outcomes	Indices for physician distribution and average life expectancy	Not applicable	The indices for physician distribution and average life expectancy are negatively correlated with rurality.
Primary care physicians working in rural areas provide a broader scope of practice: a cross-sectional study [44]	Rurality index for Japan		Process	Scope of practice	Sex, years of clinical experience, clinical setting (clinic or hospital), certification status, and experience of practice in rural areas	The scope of practice is broader in rural areas than in urban areas.



*Consider, if feasible to do so, reporting the number of records identified from each database or register searched (rather than the total number across all databases/registers).
**If automation tools were used, indicate how many records were excluded by a human and how many were excluded by automation tools.

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71. For more information, visit: http://www.prisma-statement.org/

Fig. 1 PRISMA flow diagram for the selection of studies in the scoping review

three (20%) articles [30, 33, 38] focused on one or several prefectures and compared outcomes among these areas. Only one study [44] targeted clinic-level primary care, with the others focusing on secondary or tertiary hospital care. Although urban areas are usually associated with better quality, some outcomes, such as the number of family physicians per 100,000 persons [34] or the scope of practice in primary care [44], were better in rural areas.

Types of quality of care

Figure 3 shows the breakdown of the domains of Donabedian's model applied in the included studies. Four studies (26.7%) [30, 35, 36, 39] assessed the "outcomes" of the model. Five studies (33.3%) [31, 33, 34, 41, 42] evaluated two domains: "structure" and "outcomes" or "process" and "outcomes." One study (6.7%) targeted all three domains [40]. However, no studies evaluated "outcomes" in primary care settings. For example, some studies compared the numbers of internists and respiratory specialists or radiologists ("structure"), revealing fewer of these physicians in rural areas than in urban areas [31, 32]. Other studies targeted "processes," such as onset-to-balloon time in acute myocardial infarction or the rates of those who received guideline-recommended treatments for heart failure [33, 38, 41]. These processes were better in urban areas [33, 38, 41]. In terms of "outcomes," the number of suicides among specific populations and average life expectancy tended to be worse in rural areas [35, 43]. In-hospital mortality from severe traumatic injury and acute myocardial infarction is also higher in rural areas [35, 43]. Although 9 of 15 studies reported poorer healthcare quality in rural areas and three reported no difference, three studies reported better healthcare quality in rural areas, such as more family physicians ("structure"), more general and orthopedic surgeries ("process"), and a broader scope of practice ("process") in rural areas [34, 42, 43].

Index or definition of rurality

Population size was the most commonly used indicator of rurality in the included studies (six studies: 40%) [31, 33, 37, 39, 40, 42], followed by population density (five studies: 33.3%) [34–36, 41, 42]. Figure 4 shows the number of indicators of rurality used in the included studies. Some studies employed multiple indicators, such as population size and population density [42] or population density and administrative division (city/town/village) [34]. Furthermore, each study used population size/density differently to define rurality. The rurality index for Japan (RIJ), published in 2023, was used in two studies (13.3%) [43, 44]. One study defined rurality without using existing

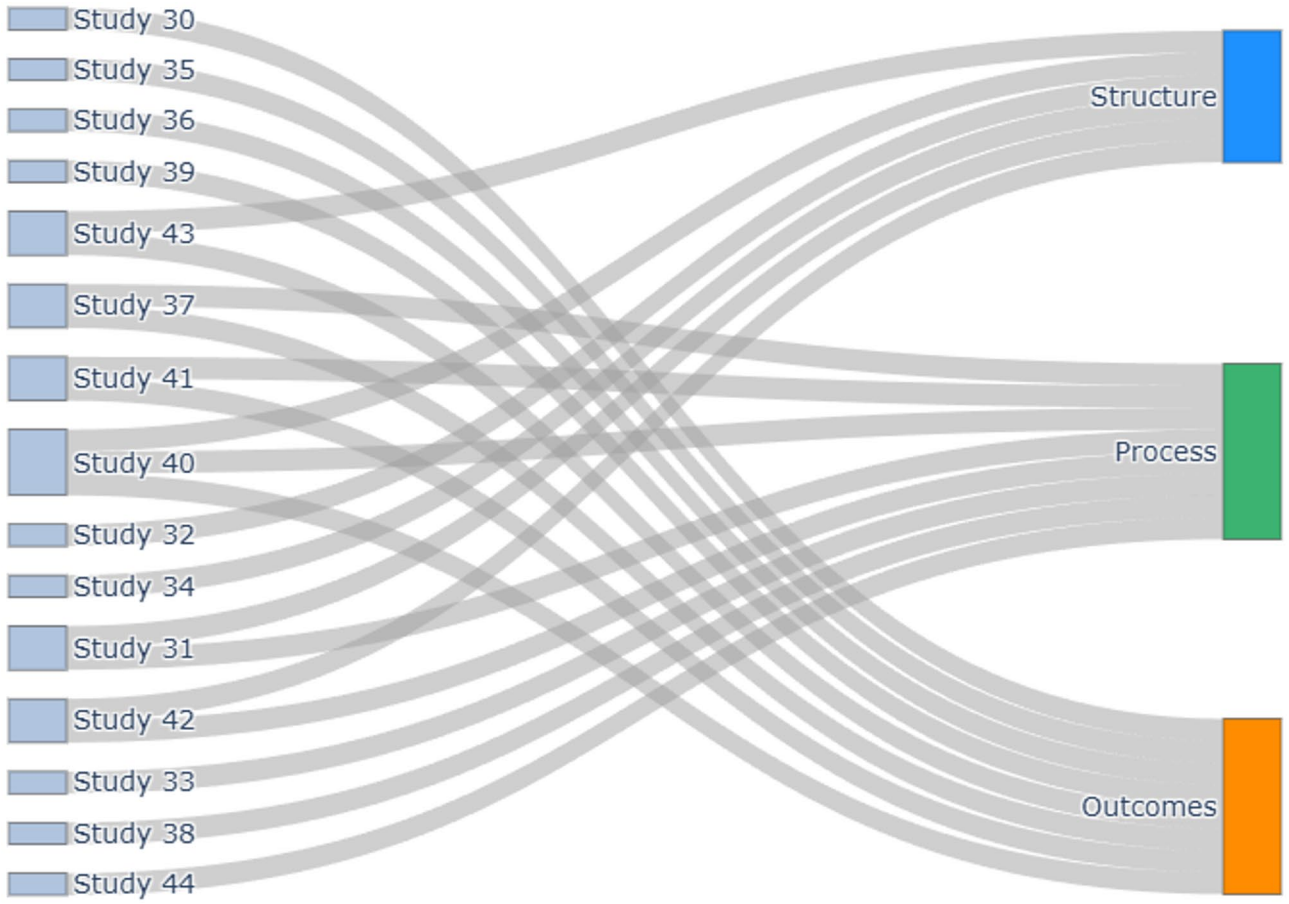


Fig. 2 Sankey diagram of the included studies and the Donabedian domains they address. blue: structure, green: process, orange: outcomes

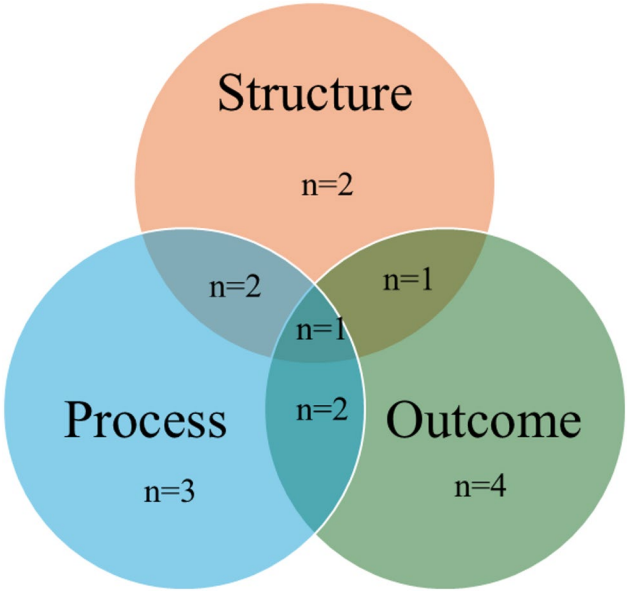


Fig. 3 Definitions or indices of rurality used in the included studies

indicators or describing any rationale for the definitions used [38].

Discussion

This review aims to map recent evidence about rural-urban disparities in terms of access and quality of care and to identify conceptual and measurement gaps in Japan. Only one study was conducted in a primary care setting [43]. Moreover, no study has evaluated the "outcomes" domain of the Donabedian model in primary care settings. Although population size was the most commonly used indicator of rurality in this scoping review, the extracted indicators varied and diverse cutoff values were used. The lack of a shared and well-defined rural indicator in the Japanese setting is an important finding of the scoping review.

Regarding the domains of the Donabedian model, two studies [32, 34] assessed "structure", three [33, 38, 43] evaluated "process", and four [30, 35, 36, 39] targeted "outcomes". In addition, five studies [31, 33, 34, 41, 42] assessed two domains, and one examined all three domains [40]. Since the three domains interact, assessing rural-urban disparity from multiple perspectives is vital

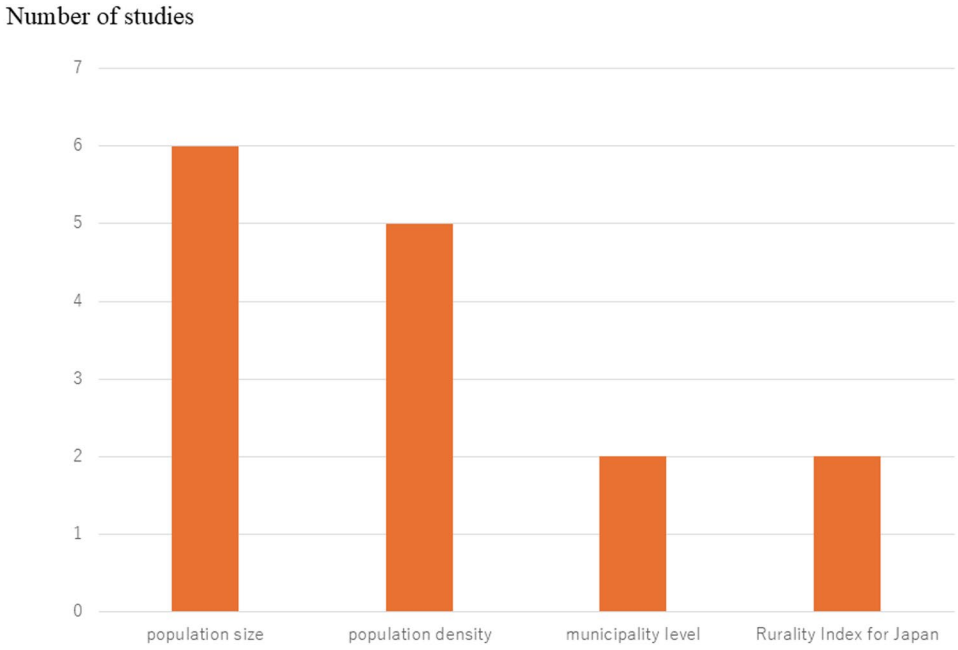


Fig. 4 Breakdown of domains of the Donabedian model

for improving the access and quality of care. Although the Donabedian model provides a structured lens for analysis, the absence of harmonized definitions and standardized indicators across studies prevents meaningful comparison and limits the generalizability of findings. This gap highlights a critical need for developing consensus measures tailored to the Japanese health system. Moreover, in this scoping review, only one paper investigated a clinic in a primary care setting [44]. This may be partly attributed to the limited number and impact of clinical studies on Japanese primary care [45, 46]. Nonetheless, research evidence is critical for building strong primary health care [47]. For example, the access and quality of primary care should be assessed in rural and urban areas as an essential first step in reducing inequality.

The studies in this scoping review varied in their definitions of rurality. Although population size and density were commonly used as definitions or indices of rurality, studies used different cutoff values or descriptions of rurality. There were no studies that used the same definition or cutoff. For example, although four studies defined "urban" or "metropolitan" areas similarly (500,000 population in one municipality) [31, 38, 40, 42], they used different definitions of "rural." Moreover, in terms of population density, one study used quintiles [34], and another study employed deciles [35]. Others set their cutoff as >1000 persons/km^2 [36]. Some studies have used the RIJ to highlight differences at the secondary healthcare level (life expectancy, physician distribution) [43] and at the primary-care level (scope of practice) [44]. The RIJ encompasses the population density of the location's zip code, the direct distance to the nearest secondary or tertiary hospital, whether the location is a remote island, and whether heavy snow affects access to the nearest medical facility [43].

Defining and measuring rurality presents a significant methodological challenge internationally, as it is influenced by multiple context-dependent factors—such as commuting patterns, social context and access to essential services including internet connectivity and advanced medical care—which may vary according to the specific objectives of a given study [48]. Among them, access to healthcare facilities is a critical concern in health services research and utilized in rurality indices in many countries [1, 49]. In Japan, the RIJ was developed in 2023 as a composite indicator for healthcare research incorporating access factors such as distance to the nearest hospital and degree of geographical isolation [43]. The included variables were selected through a modified Delphi process, and both convergent and criterion-related validity were established by examining correlations with physician distribution and average life expectancy [43]. The RIJ has been increasingly applied in Japanese healthcare research—for example, in studies assessing rurality in relation to functional outcomes following acute stroke after the study period covered by this scoping review [50]. Similar to rurality indices developed in Australia [51] and Ontario, Canada [52], the RIJ considers local context-related healthcare access and is well-suited for health-related studies. While the RIJ includes geographic isolation and hospital distance, additional access-based

indicators—such as travel time, transportation modes, or availability of specific services—may complement the RIJ in future refinements, as seen in frameworks like regional classifications in Australia [51] or Canada's RIO-2008 [52].

Strengths of the study

This study maps rural-urban disparities in the access and quality of care in Japan. This is a comprehensive and reproducible literature review, including gray literature. Focusing on the access and quality of care and the definition or index of rurality used in the included studies may facilitate future research. Based on our previous scoping review that summarized rurality indices used in healthcare research across countries, such as Australia, Canada, and the United States, we acknowledge that the definitional challenges we identified in the Japanese context reflect a broader international issue [1]. In addition, by applying the Donabedian model to classify existing healthcare research, this study identified a notable lack of evidence on outcomes within the primary care setting. This approach may be applicable to other countries facing similar challenges, such as poorer health outcomes and workforce shortages in rural areas.

Limitations of the study

This study has several limitations. First, owing to the nature of a scoping review, we did not assess the quality of each study, which may influence the interpretation of the results. Second, although we focused on studies that defined and compared rural and urban areas, we may have missed descriptive studies that did not define rurality and urbanity.

Conclusions

This study mapped recent evidence about rural-urban disparities in the access and quality of care in Japan. Only one study targeted primary care settings, and no study evaluated the "outcome" domain of the Donabedian model in primary care settings. Although population size and density were the most frequently used indicators for defining and comparing rural and urban areas, there is no common indicators or cut-off of rurality. Further studies using consistent and reproducible indices for urbanity and rurality are warranted to assess rural-urban disparities in primary care settings in Japan.

Abbreviation

RIJ Rurality index for Japan

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Authors' contributions

M.K. wrote the main manuscript and prepared Figures 1-4. All authors reviewed the manuscript.

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Data availability

All data is available from the published articles.

Declarations

Ethics approval and consent to participate

An ethics committee did not assess the study since we only used published literature or websites and did not handle personal information or human biological samples.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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