Original article

Verification of the geographical convenience of intensive care homes for the elderly in Niigata Prefecture from the viewpoint of the community-based integrated care system

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Abstract

The core concept of the community-based integrated care system (CBICS) is that all people from each generation can use hospitals and welfare facilities within a 30-minutes one-way trip, across all municipalities.

In this study, the authors developed three programs using Visual Basic for Applications (VBA). First, The authors developed a program to calculate the population center of gravity aged 65 years or older (PCG65) of 37 municipalities, divided into more than 100 subareas, in Niigata Prefecture. The second program was used to estimate the travel time at a given time between PCG65s of each municipality and 202 intensive care homes for the elderly (ICHEs). The third calculated the transfer time of patients from ICHE to hospitals with long-term care beds or psychiatric beds and applied this outcome to the land price calculation method, published by the Ministry of Land, Infrastructure, Transport and Tourism. The program was designed to score convenience when residents of ICHE developed acute diseases, such as bone fracture or mental diseases like PTSD.

The establishments of ICHE has not yet reached complete success in municipalities with a large number of elderly people aged 75 or over. In addition, we detected one city, one town and one village where a long-term care support hospital was not within 30 minutes from ICHEs. From the perspective of CBICS, these municipalities were judged to have high priority for improvement.

It is thought that geographical analyses by prefecture level and nationwide level is effective as a method for highlighting the current situation and issues of CBICS for each municipality.

Introduction

In response to the rapid aging of the Japanese population, already considered the world's oldest

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society, the Long-Term Care Insurance Act (LT-CIA) came into effect in 2000. An amendment introduced 2005 announced its "conversion into a preventive-focused system", as well as newly created preventive benefits separate from nursing care benefits, for care recipients [1]. As a result, care management for those who requested preventive benefits was implemented at the community general support center. In addition, municipalities began implementing regional support projects such as the Preventive Long-term Care Support Business and comprehensive support projects.

The 2011 amendment of LTCIA announced the comprehensive provision of medical care, nursing care, preventive care, housing, and living support services to enable independent living among elderly adults, to be realized through a regional care system, namely the Community-based Integrated Care System (CBICS) [1]. Local governments were "obligated to promote CBICS", and municipalities were mandated to construct CBICS facilities.

The revision of CBICS in 2015 promoted cooperation between home-based medical care and nursing for the development of CBICS, promotion of community care conferences, and establishment of a new comprehensive project to deliver nursing care aimed at prevention and daily living support [1]. CBICS comprises five components: nursing care, medical care, and prevention, in conjunction with basic services such as housing and lifestyle support or welfare services [2]. For the system to function optimally, these five components should be mutually related.

The Ministry of Health, Labor and Welfare (MHLW) established regulations to ensure the geographical convenience of CBICS. Specifically, as part of CBICS, necessary services should be provided within a 30-minute travel time of daily life zones (determined by junior high school district) [2].

The purpose of this study was to verify the accessibility of the population center of gravity aged 65 years or older (PGC65) from 37 municipalities in Niigata Prefecture [3], to the intensive care homes for the elderly (ICHEs) and neighboring hospitals with long-term care beds paid by medical insurance (LTC_bed1) or long-term care insurance (LTC_bed2) and psychiatric hospital beds (PH_bed) for persons who have developed behavioral and psychological symptoms of dementia (BPSD) [4]. We considered these aspects from a demographic dynamics and geographical point of view.

Elderly adults' contiguity to ICHEs is an index for evaluating mainly daily accessibility for elderly adults using the day care services of ICHEs in each municipality (long-term nursing care level, NCL ≤ 3). On the other hand, contiguity to a hospital with LTC_bed1s, LTC_bed2s, or PH_beds is an index for medical emergency convenience among elderly adults receiving high-level long-term nursing care (long-term NCL ≥ 3). Long-term nursing care levels (long-term NCLs) are classified into five levels, corresponding to the conditions of the user. Assessment of the level is officially performed in each municipality based on the Long-Term Care Insurance Act (LTCIA) since 2000.

Materials and Methods

This study is a geographical analysis, not a study of humans or animals, and a study that does not handle personal information.

1. Calculation of PGC65 of each municipality (Calculation method of population center of gravity of specific age category) [5]

We developed a Visual Basic for Applications (VBA), running on Microsoft Excel, using the Visual Basic Editor. PGC65 of each of the 37 municipalities in Niigata Prefecture was automatically calculated using the VBA. The Ministry of Land, Infrastructure, Transport and Tourism (MLIT) and the Ministry of Internal Affairs and Communications (MIC) have publicly disclosed

the calculation method of Japan's population center of gravity on the Internet [5,6]. The Census Regional Classification Table is divided into five levels, and the minimum division unit (Basic Unit Division) is 20 to 30 households [7]. In 2010, 1,728 municipalities were divided into 1,890,000 nationwide. In this survey, the PGC65 was calculated using 220,000 units combining basic unit wards. In the present study, the population centers of gravity were calculated using the small area unit as each municipality was divided into 100 or more.

2. Calculation of the actual distance between PGC65s and given points

The actual traveling times, fluctuating according to the day of the week and time zone, can be manually obtained from Google Maps, using Global Positioning System (GPS) data to determine the latitudes and longitudes of two given points. In the present study, manual calculation would be time-consuming and inefficient since more than 5,000 calculations are performed [8]. Therefore, we developed the Distance-Matrix Application Programming Interface (API) externally to automate this function of Google Maps, and the distances and travel times between all point pairs were automatically calculated [9]. We extracted population and coordinate data from e-stat census data and sub-regional boundary data [10].

3. Accessibility from each local government to ICHEs

The accessibility from each municipality to ICHEs were divided into the minimum shortest travel time from each PGC65 to neighboring prefectures' ICHEs (shortest-TT-P&I: one-way shortest travel time by car, using general roads, or ocean ferry from each PGC65 to ICHEs). The shortest-TTs by car were automatically calculated with the VBA discussed in 1-2) [11]. Each shortest-TT-P&I using only general roads and excluding highways and toll roads were calculated on

the condition of the start time of use as 8:00 AM on Monday. In the case of Awashima-Ura Village, which is a detached island, shortest-TT-P&I was calculated on the condition that a high-speed ferry to the other side was used. The shortest-TT from each PGC65 to ICHEs located in the directly contiguous municipality or neighboring prefecture (dc-MNP) were calculated. For example, Jouetsu City is located in the southwest of Niigata Prefecture, with direct links to Kashiwazaki City, Myokou City, Toukamachi City, and Itoigawa City, all in Niigata Prefecture, and Iiyama City located in the adjoining Nagano Prefecture. The shortest-TT-P&Is of all ICHEs located in both Niigata Prefecture were calculated.

4. Shortest-TT-P&Is: distribution of general road one-way travel time (within one hour)

Because the geographical standard of care and medical facilities indispensable for CBICS is within 30 minutes, shortest-TT-P&Is were obtained as in 2) in two stages: within 30 minutes and less than one hour. Multiple linear regression analysis of the factors of disparities in municipalities among the elderly population ratio of ICHE numbers in the shortest-TT-P & I Number of ICHE per 100 elderly fulfills one way distance within 30 minutes (30-min-ICHEs/elderly) and less than one hour (60 min-ICHEs/elderly) from each PGC65 of 37 municipalities of Niigata Prefecture to neighboring ICHEs and the nine socioeconomic indices were selected as the objective variable and explanatory factors for stepwise multiple linear regression analysis (st-MLRA) respectively. Explanatory variables were as follows: total population, the population of 65 (and 75) years old and over, the population rate (%) of 65 (and 75) years old and over, the highest price of land, and the primary, secondary, and tertiary industry workers rate (%) in each municipality. The st-MLRA, using the nine variables described above, was performed with Pin = Pout = 0.15 for decision to adopt or reject of the MLRA model

coefficients [12].

5. Accessibility of special hospitals

The highest nursing care levels for elderly adults in ICHEs are III or more, therefore LTC_bed1s or LTC_bed2s is necessary when relatively long-term hospitalization is required [13]. Furthermore, it is important that the emergency PH_beds corresponding to BPSD unique to the elderly are in the vicinity and accessible.

In terms of doing the calculations, the VBA program was developed to find actual distance and traveling time [11], using 8:00 AM on Mondays as the time when traffic congestion is most likely to occur, using the latitude and longitude information of the national insurance medical institutions as

per the 2017 list provided by the Institute of Health Economics and Policy and the position information of each ICHE described in 2) [14].

The medical fee payment system differs between LTC_bed1s and LTC_bed2s; the former receives payment from medical care insurance, while the latter is paid from the long-term care insurance system. However, their functions are almost identical, so they were treated as equivalent without distinction in this study. According to the manual of the National Institute for Land and Infrastructure Management and MLIT, official evaluation of Japanese land prices in Japan can be evaluated using the method of converting the true travel time to major facilities into points and using the aggregate score as accessibility score [15].
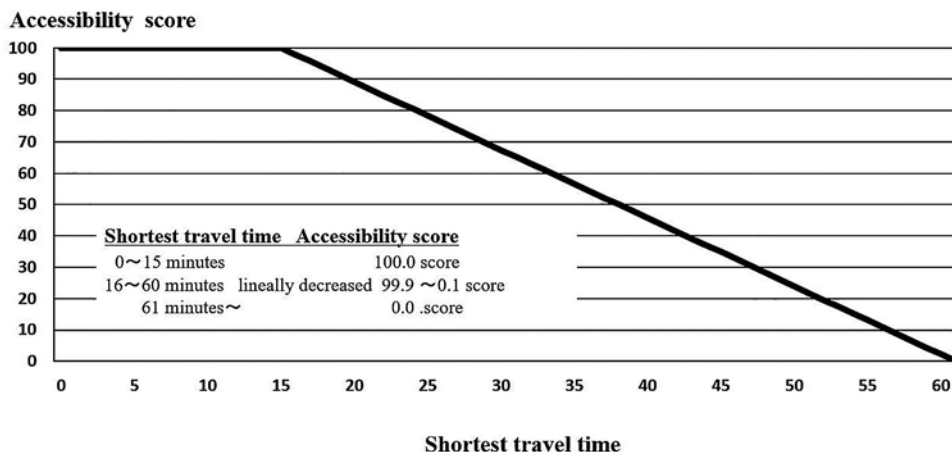

Figure 1. Formula for calculating the accessibility indices from the intensive care homes for the elderly to the hospitals having special beds for elderlies developed serious diseases requiring relatively long-term hospitalization.

In the original method by MLIT, evaluation of the real-time accessibility index (RTAI) between 0 to 15 minutes is a constant value as 100 score, and RTAI equal to 46 or more minutes is a constant value as 0 score, whereas RTAI between 16 and 45 minutes is calculated by the downward sloping linear function formula. On the other hand, in this method, RTAI between 0 to 15 minutes is the same as the constant value as 100 score, but RTAI between 16 and 60 minutes is calculated by a downward sloping linear function formula, and RTAI is a constant value of 0 score after 61 minutes. The Medical Care Act strictly regulates the total number of beds within the service area for each secondary medical area, therefore the evaluation of RTAI between 46 and 60 minutes was slightly relaxed.
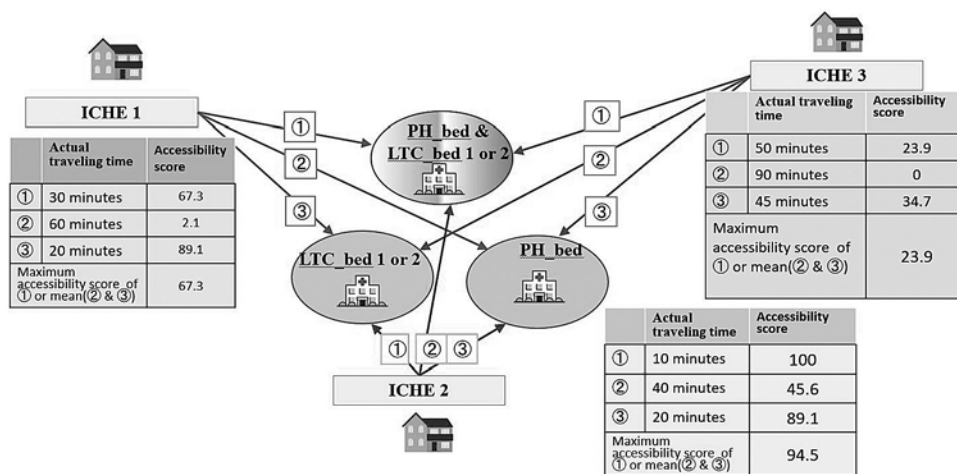
Figure 2. Method of calculating the accessibility scores using the actual traveling times between the intensive care homes for the elderly and neighboring specific hospitals having the long-term care beds or psychiatric hospital beds.

LTC_bed 1or2 : hospital having the long-term care beds paid by the medical insurance or the Long-Term Care Insurance.

PH_bed : hospital having psychiatric hospital beds.

PH_bed&LTC_bed1or2 : hospital having both psychiatric hospital beds and the long-term care beds.

ICHE : the intensive care homes for the elderly.

In this study, the same method was applied to evaluate the accessibility from the municipal area to a hospital equipped with LTC_bed1s, LTC_bed2s, or PH_beds.

Figure 1 shows the linear complementary equation for calculating whether the accessibility index from the required time between ICHE and hospital fulfilled the requirements.

The calculation examples are shown in the punch picture of Figure 2. The accessibility indices as 0 to 100 score from the required time between three ICHEs and three hospitals fulfilled the requirements and were calculated by the modified linear complementary equation shown in Figure 1. Nine routes were calculated in total (Figure 2) and three types of shortest-TT-IH to the different typed of beds. These were obtained by calculating the average maximum accessibility indices of LTC_bed1s, LTC_bed2s and PH_beds.

Results

Table 1 contains the basic statistics of the number of ICHEs with the actual distance time less than 30 minutes and over 30 to within 60 minutes from the 37 municipalities' PGC65s in Niigata Prefecture. Mean number of ICHEs per group was 0.22 and 0.77; the minimum number was 0 for both groups, while maximum was 1.10 and 3.87 ICHEs respectively.

Figure 3 shows 30-min-ICHEs / elderly and 60min-ICHEs / elderly from each PGC65 of 37 municipalities of Niigata Prefecture. In addition, the target ICHEs is not only located in the municipalities of Niigata Prefecture, but also those of neighboring prefectures. The top five municipalities for 30-min-ICHEs / elderly was Yahiko_mura,

Table 1. Basic statistics on the number of ICHE per 100 elderlies fulfills one way distance within 30 minutes and less than one hour from each PGC65 of 37 municipalities of Niigata Prefecture to the neighboring ICHEs.

Statistics	Number of ICHE per 100 elderlies	
	within 30 minutes	less than 60 minutes
number of municipalities	37	37
mean of ICHEs / 100 elderlies	0.2199	0.7710
SD: standard deviation	0.2599	1.0283
maximum	1.1004	3.8732
75th percentile	0.2449	0.7347
median	0.1274	0.4488
25th percentile	0.0558	0.2074
minimum	0.0000	0.0000

Definition of abbreviations and special compound words:
1) ICHE : the intensive care home for elderly
2) neighboring ICHEs : Including ICHES located in the adjacent prefectures
3) PGC65 : population gravity center of elderly persons aged 65 years and more in each municipality

Table 2. Basic statistics on objective variable and explanatory variables for the stepwise Multiple Linear Regression Analysis.

No.	Variables	Number of municipalities	mean	SD	minimum	maximum	CV [2]
Objective variable	Number of ICHE [1] per 100 elderlies fulfills one-way distance within 30 minutes	37	0.22	0.26	0.00	1.10	1.18
1	Total population	37	62,277	60,940	370	275,133	0.98
2	Population of elderly persons aged 65 years and over	37	18,516	16,886	150	79,166	0.91
3	Population of elderly persons aged 75 years and over	37	9711.54	8676.52	99.00	41383.00	0.89
4	Aging rate (population rate 65 years old and over)	37	31.95	4.96	24.27	45.29	0.16
5	Aging rate (population rate 75 years old and over)	37	17.44	4.21	12.41	28.65	0.24
6	The highest land price of the municipality	37	21.38	30.05	4.30	180.20	1.41
7	The proportion (%) of first industry workers	37	8.51	6.00	0.58	27.00	0.70
8	The proportion (%) of secondary industry workers	37	29.78	7.69	6.84	41.60	0.26
9	The proportion (%) of tertiary industry workers	37	61.71	8.10	50.55	84.46	0.13

Definition of abbreviations and special compound words:
1) ICHE: the intensive care home for elderly
2) CV: Coefficient of Variance was caluculated by SD/mean to compare the relative standard deviation (RSD) of each variable
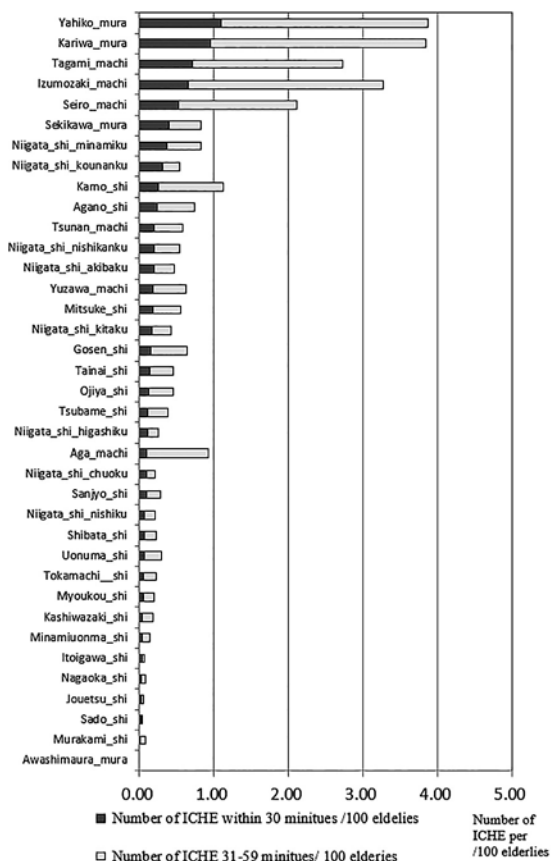
Figure 3. Number of ICHE per 100 elderly fulfills one way distance within 30 minutes and less than one hour from each PGC65 of 37 municipalities of Niigata Prefecture to ICHEs.

Note 1 : The meaning of the word attached at the end of each municipality name indicates the administrative division of the municipality shown below: ku: award, shi: city, machi: town, mura: village.

Note 2 : Definition of abbreviations:

1) ICHE: the intensive care homes for elderly.

2) PGC65 : population gravity center of elderly persons aged 65 years and more.

3) ICHE/100elderlies : the intensive care homes for the elderly per thousand elderly persons aged 65 years and over.
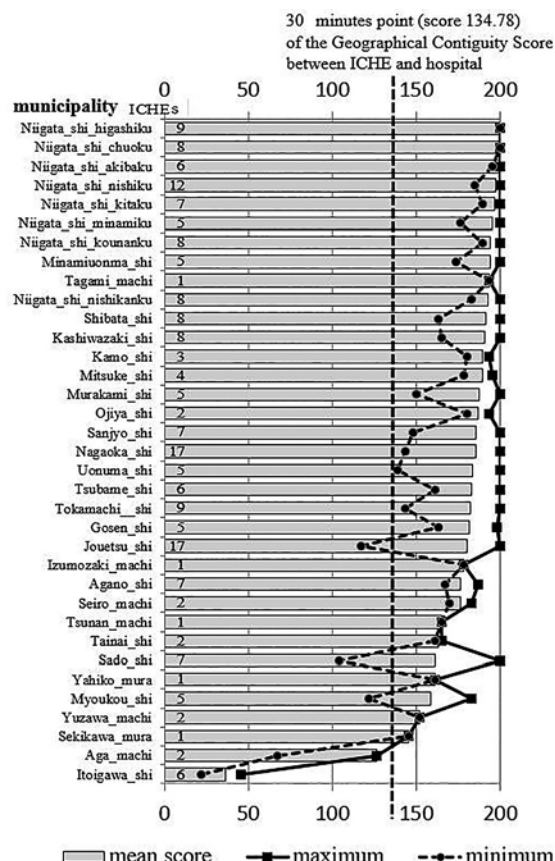
Figure 4. Evaluation of accessibility to hospitals with LTC_bed1 or 2 and PH_bed corresponding to the hospitalization from ICHEs' in-home persons in municipalities, Niigata prefecture (geographical accessibility indices between ICHEs and hospitals).

Note 1: The meaning of the word attached at the end of each municipality name indicates the administrative division of the municipality shown below: ku: award, shi: city, machi: town, mura: village

Note 2: Both Kariwa_mura and Awashimaura_mura are not included in this figure because they do not have the intensive care homes for the elderly (ICHEs)

Note 3: Adjacency evaluation of specific hospitals having the long-term care beds paid by the medical insurance (LTC_bed1) or the long-term care insurance (LTC_bed2) and psychiatric hospital beds (PH_bed) are based on the accessibility indices developed by the land evaluation method of the Ministry of Land, Infrastructure, Transport and Tourism.

Kariwa_mura, tagami_machi, Izumozaki_machi, and Seiro_machi, while municipalities of lowest five ranks were Awashimaura_mura, Murakami_shi, Sado_shi, Jouetsu_shi and Nagaoka_shi. About the rank of the eight wards of Niigata City as the government designated city, the Minami_ku was highest as 0.37, and the Nishi_ku was lowest as 0.07. Here, 11 (57.9%) in 19 cities are lower than the value of Nishi_ku, whereas only one village (10.0%) lower than that out of 10 towns or villages.

Table 2 shows basic statistics of the objective variable and the nine explanatory variables used in st-MLRA. The coefficient of variance (CV) showed that land price was the largest at 1.41, followed by the objective variable 1.18; the minimum was 0.13 at the tertiary industry rate. Both aging rates (65 or 75 years and over) were small when comparing rates (0.16, 0.24), but larger when compared with real numbers (0.91, 0.89) [10].

Table 3 shows the results of st-MLRA using 30-min-ICHEs / elderly as a target variable. Among the nine explanatory variables shown in Table 2, the population over 75 years old (real number) was selected at the significance level of p < 0.001 and the population ratio over 65 years old at p < 0.05. The VIFs of two variables satisfied the condition of less than 4 – an indication of linear collinearity that destabilizes the multiple regression model [16]. Since all signs of the standardization coefficient (β) are negative, 30-min-ICHEs/elderly decrease depending on both increment of real numbers in the 75-year-old elderly population and aging rate in municipalities. These results indicated that the speed of installation of ICHE in municipalities under the many elderly adults aged 75 years or older, and had not caught up.

Figure 4 shows the functional combination of the hospitals' expertise and contiguity in response to the need for admission to ICHEs' residents. The figure shows each municipality's statistics for one-way real-time travel from each ICHE to each hospital with LTC_bed1s LTC_bed2s and PH_beds. In the figure, the maximum value, or 200 points, indicates the highest geographical accessibility between the ICHE and the hospital, as within an actual distance of 15 minutes. The numbers 1-17 on the right side of each municipality's name shows the number of ICHE facilities located in each municipality. The bar graph shows the mean of each municipality, the line graph connecting small rectangular markers with solid lines shows the maximum score, and the line graph connect-

Table 3. Stepwise multiple linear regression analysis (st-MLRA) on the relationships between vital statistics, socioeconomic factors and number of the intensive care home for the elderly (ICHE) per 100 elderlies fulfills one way distance within 30 minutes in 37 municipalities, Niigata Prefecture.

Selected variables	Scandalized coefficients (β)	t	p	Collinearity statistics VIF
Population of elderly persons aged 75 years and over	-0.63	-4.32	0.0001	1.15
Aging rate (population rate 65 years old and over)	-0.40	-2.71	0.0106	1.15
Constant		4.01	0.0003	

R = 0.6054 (p < 0.001 by F test)

1) Objective variable: Number of the intensive care homes for the elderly (ICHE) per 100 elderlies fulfills one way distance within 30 minutes.
2) Explanatory 9 variables: see Table 2 for details.
3) Methods of stepwise multiple linear regression analysis: Pin = Pout = 0.15 by Excel statistics (v3.10).
4) VIF: Variance Inflation Factors for detecting multicollinearity.

ing small circular markers with dashed lines shows the minimum value. In addition, the score when both are at just 30 minutes is indicated by a vertical broken line at 134.78 score. Kariwa_mura and Awashimaura_mura are not included in Figure 4 because ICHE is not located in either municipality.

The nine ICHEs in Higashi_ku and eight ICHEs in Chuo_ku of Niigata City were all 200 points, or less than 15 minutes, for all facilities. The mean value of each municipality is 94% (33/35) when there are LTC_bed1s, LTC_bed2s and PH_beds less than 30 minutes away, and Aga_machi and Itoigawa_shi have more than 30 minutes is there. As the locational conditions differ among ICHEs, the minimum scored of Jouetsu_shi, Sado_shi, Myoukou_shi, Aga_machi, and Itoigawa_shi are beyond 30 minutes. Among these, Aga_machi and Itoigawa_shi did not meet the standard of 30 minutes for all ICHEs.

Discussion

1. Significance of the purpose and method of the research

As mentioned previously, the aim for CBICS in 2011 was to establish medical and welfare facilities within 30 minutes of each resident. In the previous research by Ehara A on the geographical convenience of facilities in 2016, the straight line distance from PGC65 to the hospital was calculated for each population using the latitude and longitude [17]. To determine the shortest distance to the core pediatric hospital and regional pediatric center, we used population centers of all ages, not the population centers of gravity of children who are targeted. Ehara A's study investigated the child population within a 60-minute reach by car to pediatric facilities and regional pediatric centers of core hospitals, nationwide [18].

Our research introduces two technical novelties. The first was the development of a VBA program for automatically calculating the PGC65 in each of the 37 municipalities in Niigata Pre-

fecture. The second is our use of Google Maps in combination with another VBA-based automatic calculation system to ascertain the actual distance and required travel time, mindful of highway division.

Here, the difference in the method from Ehara A's most recent research is that their method examined the area within a 60-minute range of hospitals by car, while our study was interested in calculating the time by car from each ICHEs to hospitals with specific beds.

Using these two technological developments, we obtained short-TT between 37 local governments in Niigata Prefecture, including 300 ICHEs outside the prefecture, and further evaluated geographical convenience from each ICHE to a hospital with LTC_bed1s or LTC_bed2s, and PH_beds.

2. Verification of geographical convenience of ICHEs from the concept of CBICS

It is envisioned that by 2025, when the baby boomer generation is aged 75 years and above, CBICS would have established comprehensive provision of health care, nursing care, preventive care, housing, and livelihood supports.

According to the revised LTCIA in 2006, "CBICS is conceived in units of everyday living areas (specifically equivalent to district divisions for junior high schools), in which necessary services can be provided within approximately 30 minutes."

In Japan, elderly adults in need of long-term care have access to long-term-NCL 1-5; except for those who have been hospitalized or are under full family care, elderly adults receiving care at long-term-NCL 1 and 2 utilize visiting care at home, as well as day care, where they are transported and utilize day services at ICHEs, and short stay, or a temporary stay at ICHEs for a few days. Those at long-term-NCL 3 or higher have been admitted to ICHEs. Figure 3 depicts the number of ICHEs (30-min-ICHEs / elderly adult)

located within 30 minutes per 100 elderly adults, starting from PGC 65 of the local government. Day care is considered to be a convenience evaluation. The evaluation of convenience of nursing care and psychiatric beds with ICHEs as the starting points, is shown in Figure 4. Evaluation of accessibility to hospitals with LTC_bed1s or LTC_bed2s and PH_beds provides an index for residents of ICHEs.

The major gap between local governments shown in Figure 3 is not the problem of land value or industrial structure, from the results of the st-MLRA shown in Table 3 and also the absolute number is the largest factor, not the population rate over the age of 75 years old. It was shown that it was done. As the number of certified people required for nursing care by the MHLW requires 18.61% of the population aged 65 years or older [21]. In 2015 the required degree of care at level 3 or higher was 6.51%, while the required care levels 1 and 2 are 12.10%. Figure 3 shows that one ICHE can be available per eight elderly adults with long-term-NCL 1 or 2 at Yahiko_mura and Kariwa_mura.

According to Sato H, there are large disparities in the demand and supply of nursing care services among 47 prefectures, but it is not known which criteria would be satisfied when the demand and supply balance is appropriate [22]. From this study, it is not possible to determine the maximum appropriate value of 30-min-ICHEs / elderly in consideration of demand and supply between day services or day care of older people and capacities of ICHSs.

There are 20 government-designated cities, including Niigata City, in Japan with a population of more than 500,000. The law permits setting up a zone for tax exemptions and administrative efficiency to cover the administrative demand of this large city appropriately.

From this point of view, the minimum ration (0.0696) of 30-min-ICHEs / elderly adults in the eight wards was used as the temporary standard

value. About 60% of the cities and 10% of the towns and villages were lower than this value; at the very least this implies that the current supply situations of these 12 municipalities (mainly cities) need improvement.

3. Verification of geographical convenience of LTC_bed1s or LTC_bed2s and PH_beds

ICHEs exist in the context of criteria for the facilities and operation of ICHEs specified by the MHLW's Ordinance [23]. Medical professionals such as doctors and nurses at ICHES are obligated to take appropriate measures when necessary to maintain residents' health. There are many causes [24]. for hospitalization among ICHEs' residents, generally requiring an LTC_bed1, LTC_bed2, or PH_bed for receiving medical treatment with special long-term care. It is important that there is PH_bed available for elderly adults with BPSD.

In the case of dementia, the rate of hospitalization is not as high, but increases with age. About 80 % of patients suffering from dementia or BPSD were admitted often with delusions and aggressive behavior in many cases; long-term hospitalization and frequent admissions and discharges are unavoidable, considering the burden of family members' mental and physical services [25].

According to MHLW [24], 74% of in-patients from ICHES returned to the original ICHEs within one year (2016), whereas 15% died at the hospitalization destination. Repeated re-hospitalization or long-term hospitalization is also likely to occur. The receipt survey by Ning L et al [26]. in Fukuoka Prefecture showed that the length of hospitalizations of patients with dementia were generally very long, with a mean and median length of 1,441 days and 738 days respectively.

There is no argument about the importance of collaboration between ICHEs and long-term care support hospitals, specifically with regards to elderly adults who require long-term care.

From the perspective of CBICS, it was determined that one city, one town, and one village

(without ICHE) in Niigata Prefecture had problems with proximity to the nursing care support hospital and that priority improvement was necessary.

4. Limits of research and future issues

Whether the care recipient receives care at home or in the care center, geographical convenience is an important factor for the person and their family. In this study, one-and-a-half-hour one-way guidance for community-based comprehensive care is required for elderly people with special care levels 1 and 2 and special care beds.

We only conducted a convenience evaluation based on the location of appropriate medical facilities; other characteristics of geographical convenience were not determined.

According to Maui H, "As regional disparities become more apparent in Japanese society, the prospect of maintaining a nationwide, uniform service system needs to be examined, and the concept of 'equity,' revisited." [1] With this in mind, it is of immediate importance to expand and verify the present conditions related to convenience and other issues to other prefectures and districts.

Conflicts of Interest

There are no conflicts of interest to declare.

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