

Original article

Relationship between healthy elderly individual social capital and health according to ward level in Tomi City, Nagano Prefecture: an ecological study

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Abstract

Objectives: The aims of this study were 1) to elucidate the relationship between social capital and health by ward in Tomi City, Nagano Prefecture, in order to clarify the regional social resources available to support long-term care prevention utilizing self- and mutual support of regional residents and 2) to comprehensively investigate the activation of regional networks.

Materials and Methods: We analyzed elderly (aged 65 years or older) individual survey data from 7,199 residents from all wards within Tomi City in 2014 (number of valid responses: 5,546; valid response rate: 77.0%). The social capital indicators used for the analysis included participation in community activities, regional managerial position experience, and general trust. The health indicators included self-rated mental health, activities of daily living, and depression. Standards for a “good” result for each indicator were established, and the percentages of each were tallied up by ward. Spearman’s rank correlation coefficient and principal component analysis were used to investigate correlations between social capital and health.

Results: The results for overall respondents indicated correlations between participation in sports and hobbies and activities of daily living ($p<0.01$) and self-rated mental health ($p<0.05$). Participation in nonprofit organizations/volunteer activities and participation in community center workshops exhibited correlations with activities of daily living (both $p<0.05$). In respondents aged 65–74 years, par-

ticipation in community center workshops and general trust were found to be correlated with activities of daily living (both $p<0.05$). Meanwhile, in respondents aged 75 years or older, correlations were noted between participation in sports and hobbies and participation in nonprofit organizations/volunteer activities and activities of daily living ($p<0.05$ and $p<0.01$, respectively). By creating a distribution map using principal component analysis, we were able to grasp the characteristics of the distribution of “community participation/connections with people” and “health” in each ward.

Conclusions: Our results point the way forward for future long-term care prevention support in Tomi City by clarifying the correlation between social capital and health by ward.

Keywords: long-term care prevention, social capital, health, principal component analysis

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Introduction

Further efforts to prevent long-term care from being required urgently need to be made in order to respond to the rapidly increasing latter-stage elderly population in Japan. In 2006, reforming the long-term care system into a preventive-focused system was cited as an important countermeasure. In particular, regional support activities were established to promote long-term care prevention to enable anyone in the community to engage in an independent lifestyle¹⁾. Enhancing such regional support activities would create the basis for comprehensively securing medical, long-term care, residential, preventive, and lifestyle support services in the familiar environment of individuals²⁾, thereby contributing to the construction of the regionally comprehensive care system that the national government is rushing to implement by 2025.

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To promote this regionally comprehensive care system, municipalities and prefectures need to contribute to its construction in accordance with regional characteristics based on community autonomy and independence^{3, 4}. Since the lifestyle support and long-term care prevention in this framework will apply to all regional residents, a system that utilizes the strengths of self- (private sector vitality) and mutual (volunteer) support of regional residents is required³. However, it remains a fact that while reciprocal support by means of self- and mutual support by regional residents is emphasized, there is still a lot of room for the investigation of the required regional and human resources, and for determining and evaluating community resources, such as resident mutual aid. Therefore, this field needs to be continuously investigated to enable the deployment of support in accordance with regional circumstances and characteristics.

In recent years, much research has investigated the characteristics (one aspect of social determinants) of regional organizations inside and outside of Japan using the concept of social capital (SC). In Japan, the SC elements (trust, norms, and networks) demonstrated by Putnam⁵ have been used to identify the characteristics of latent social resources in communities at the population^{6, 7} and individual levels^{8, 9}, and many studies have clarified the relationships between these characteristics and health. There have also been studies that divided communities into their smallest elements of administrative policies (ward) and reported on the correlations between community resources and health^{10, 11}. Thus, many studies conducted both inside and outside of Japan have used the SC concept, which reflects the social elements of communities, indicating that it is being effectively utilized to determine correlations between community resources (regional resources, human resources, and resident mutual aid) and health. Of course, findings related to grasping community resources according to the SC concept are still attracting much debate. However, taking an approach to understanding regional societies based on this concept appears to be an important means of determining circumstances and issues that differ by region, and deploying countermeasures for elderly individuals utilizing the self- and mutual support of regional residents.

Therefore, as few studies have reported on the correlations between community resources and health based on the concept of SC in municipalities in Nagano Prefecture, this study used the SC concept to investigate such correlations with the aim of promoting long-term care prevention support utilizing the self- and mutual support of regional residents going forward. We will also report the results of our investigation of ward typification based on regional characteristics.

Materials and Methods

Survey targets

We conducted a self-administered questionnaire survey of all elderly individuals aged 65 years or older who had not been certified as requiring long-term care and were living in 1 of the 67 wards in Tomi City, Nagano Prefecture. Tomi City, which was the targeted region, was formed in 2004 by combining two municipalities. As of March 2014, when the survey was conducted, the population was 30,841, including 8,540 elderly individuals aged 65 years or older (27.69%) and 4,297 latter-stage elderly individuals aged 75 years or older (aging rate: 13.93%).

Survey methods

The questionnaire was distributed to 7,199 residents of Tomi City aged 65 years or older in June 2014 after excluding individuals certified as requiring long-term care. By July of that year, responses had been received from 5,546 residents (response rate: 77.0%). Of those responses, 3 were excluded from the analysis because of age/gender not being filled out, leaving us with 5,543 valid responses. Valid responses were received from 2,491 men (65–74 years: 1,429, 75 years or older: 1,062) and 3,052 women (65–74 years: 1,585, 75 years or older: 1,467). The survey items were 16 indicators related to SC (community activity evaluation, participation in community activities, regional managerial position experience, social support, general trust, etc.) and 4 indicators related to health (self-rated health, activities of daily living (ADL) from the “Tokyo Metropolitan Institute of Gerontology Index of Competence”¹²), self-rated mental health from “K6”¹³), and depression from the “GDS5”¹⁴), lifestyle habits, and general characteristics.

Of the SC indicators, community activity evaluation, general trust, and trust when traveling were used as cognitive SC indicators, with community activity evaluation being scored on a scale of 1 through 5 and general trust and trust while traveling scored on scales of 1 through 9. Next, participation in community activities, participation in sports and hobbies, participation in nonprofit organizations (NPOs) and volunteer activities, participation in other activities, participation in health and long-term care workshops, participation in community center workshops, participation in elderly respect meetings and societies, participation in regular health checkups, regional managerial position experience, extent of interactions with neighbors, number of neighborhood acquaintances, interactions with health guidance leaders, and social support were used as structural SC indicators. Participation in community activities, participation in sports and hobbies, participation in NPOs and volunteer activities, and participation in other activities (po-

litical, industrial, religious, etc.) were scored on a scale of 1 through 7, while participation in health and long-term care workshops, participation in community center workshops, participation in elderly respect meetings and societies, and participation in regular health checkups were scored on a scale of 1 through 3. Regional managerial position experience was defined as selecting at least 2 of the 15 positions described, the extent of interaction with neighbors was scored on a scale of 1 through 4, the number of neighborhood acquaintances and interactions with health guidance leaders were scored on scales of 1 through 5, and social support was evaluated according to a scale of 1 through 2 with 5 items. For the health indicators, self-rated health was scored on a scale of 1 through 5, ADL on a score of 1 through 2 with 13 items, depression on a scale of 1 through 2 with 5 items, and self-rated mental health on a scale of 1 through 5 with 6 items.

Statistical analysis

Standards for “good” (cutoff values) were established for all of the indicators used for the analysis. The number of “good” responses and percentages were then tallied up for each ward. We used a survey conducted in Kurihara City, Miyagi Prefecture¹¹⁾, as a reference when setting the survey items and cutoff values. The indicators and cutoff values are shown below:

- Cognitive SC indicators: Community activities (scale of 1 through 5, “very lively–somewhat lively”), general trust, trust when traveling (scales of 1 through 9, “1–4”).
- Structural SC indicators: Participation in community activities, participation in sports and hobbies, participation in NPO and volunteer activities, participation in other activities (scales of 1 through 7, “at least several times per year”), participation in health and long-term care workshops, participation in community center workshops, participation in elderly respect meetings and societies, participation in regular health checkups (scales of 1 through 3, “participated”), regional managerial position experience (of 15 positions, “at least 2”), extent of interaction with neighbors (scale of 1 through 4, “I cooperate with some people in my daily lifestyle–I regularly chat with some neighbors”), number of neighborhood acquaintances (scale of 1 through 5, “I am acquainted with a very large amount of people (roughly 20 or more)–I am acquainted with a large amount of people (roughly 10–19 people)”), and interactions with health guidance leaders (scale of 1 through 5, “normally talk to them–talk to them during events”).
- Health indicators: Self-rated health (scale of 1 through 5, “very good–somewhat good”), ADL (score of at least 11 out of 13), depression (score of 1 or lower out of 5), and

self-rated mental health (score of 8 or lower out of 24).

The percentages of respondents who answered “good” to the above indicators were calculated for each ward, and correlation coefficients were determined between each indicator by age (respondents overall, 65–74 years, and 75 years or older). Since normality could not be confirmed for some indicators using the Shapiro-Wilk test, the Spearman rank correlation coefficient was calculated.

In this study, to visualize the correlations between SC indicators and health indicators among wards, a principal component analysis was performed on 16 indicators related to SC and 4 indicators related to health (calculated as principal factor solutions for factor analysis). By means of this analysis, multivariate data were summarized into a small number of characteristic values (synthesis of differing values and generation of new values) to enable the relatively simple and objective observation of the distribution of SC and health between wards. Next, the scores of the first principal component for the SC indicators and the first principal component for the health indicators were used to create a scatter diagram in order to visualize the distribution characteristics of SC and health in each ward based on the positional relationships on the scatter diagram. Wards located adjacently on the scatter diagram appeared to be in a close relationship according to the principal component characteristics, and they were subsequently typified. IBM SPSS Statistics Version 22 was used to perform all statistical analyses.

In terms of the ethical considerations for this study, it was authorized by the institutional review board of the Physical Education and Medicine Research Foundation (27-02).

Results

Descriptive statistics for each indicator

The 5,543 subjects identified as valid responders (out of 7,199 subjects following the exclusion of individuals certified as requiring long-term care; valid response rate: 77.0%) were targeted for descriptive statistics. The valid responders included 2,491 men (44.9%) and 3,052 women (55.1%). Divided by age and gender, the 3,014 respondents aged 65–74 years (54.4%) comprised 1,429 men (47.4%) and 1,585 women (52.6%), while the 2,529 respondents aged 75 years or older comprised 1,062 men (42.0%) and 1,467 women (58.0%). The mean values and standard deviations for the percentage of respondents who answered “good” for the SC indicators and health indicators in all 67 wards in the city were divided into results for all respondents, results for those aged 65–74 years, and results for those aged 75 years or older. These results are summarized in Table 1. When the

Table 1 The description statistics of each indicator; by age

	Indicators	Cutoff values	All respondents (n=5,543)		Aged 65–74 years (n=3,014)		Aged 75– years (n=2,529)	
			mean	SD	mean	SD	mean	SD
Health	Self-rated health	very good-good	65.3%	8.7	72.2%	11.3	58.5%	19.4
	ADL (out of 13 score)	at least 11	75.1%	9.4	84.9%	10.5	64.7%	15.7
	Depression (GDS5: out of 5 score)	1 or lower	76.2%	8.3	80.2%	11.0	62.5%	21.2
	Mental health (K6: out of 24 score)	8 or lower	87.5%	7.4	90.7%	7.2	80.8%	18.7
	Hospitalization within the past year	no	84.4%	7.1	87.4%	9.0	78.0%	17.1
	History of serious illness		52.5%	11.2	59.4%	13.0	36.1%	15.5
	History of hypertension		49.1%	11.6	53.7%	11.2	43.1%	18.3
Lifestyle Habit	Habit of exercising (per week)	one hour or longer	57.9%	12.8	62.8%	14.2	55.2%	20.4
	Smoking habit	not smoking	87.6%	13.2	87.9%	9.0	92.5%	13.9
	Drinking habit	not drinking	60.4%	11.3	53.8%	13.7	67.8%	17.8
Social Capital: Structural	Community activities	participated (at least	59.4%	17.6	61.8%	18.9	57.6%	22.4
	Sports and Hobbies	several times per year)	55.8%	11.9	62.0%	14.2	57.0%	47.1
	NPO and Volunteer activities		30.3%	11.9	36.2%	17.0	36.7%	25.8
	Other activities		18.8%	8.9	21.8%	13.4	18.6%	17.9
	Health and Long-term care workshops	participated	25.9%	14.2	22.9%	12.8	30.0%	20.4
	Community center workshops		29.8%	13.2	34.3%	31.8	29.0%	18.5
	Elderly respect meetings and societies		37.7%	17.4	31.4%	17.8	46.5%	22.4
	Regular health checkups		46.0%	12.6	50.2%	13.1	38.8%	17.7
	Regional managerial position experience (out of 15 positions)	at least 2	67.4%	22.9	68.0%	18.0	60.7%	22.7
	Extent of interaction with neighbors	living cooperation- everyday relation	86.6%	12.1	86.8%	8.1	84.6%	18.2
	Number of neighborhood acquaintances	a very large-a large (amount of people)	48.8%	15.9	51.4%	18.1	44.6%	21.0
Interaction with health guidance leaders	normally talk-talk to them during events	28.6%	14.4	29.0%	16.9	24.7%	14.4	
Social support (5 questions)	yes to all questions	64.0%	9.9	72.5%	17.6	51.3%	18.0	
Social Capital: Cognitive	Community activity evaluation	very lively-lively	83.6%	20.6	85.2%	20.0	84.1%	19.0
	General trust	strong trust (1–4;	32.2%	11.8	33.9%	12.4	27.2%	16.9
	Trust when traveling	9 stage evaluation)	19.9%	9.3	21.6%	10.5	16.3%	14.0

ADL: Activities of Daily Living (Tokyo Metropolitan Institute of Gerontology Index of Competence). Participation in other activity includes activity of a political, industrial, religious etc. SD: standard deviation.

percentages for “good” responses for SC indicators by all respondents were analyzed, results of over 80% were noted for the extent of interaction with neighbors and community activity evaluation (86.6% and 83.6%, respectively). The lowest percentage was observed for participation in other activities (18.8%) and the highest for participation in community activities (59.4%). Among the indicators related to trust, the results exceeded 30% for general trust (32.2%), while the result for trust while traveling was close to 20% (19.9%). The results on the “good” percentages for health indicators revealed over 70% for ADL and depression, and close to 90% for self-rated mental health (75.1%, 76.2%, and

87.5%, respectively). In terms of lifestyle/habit-related indicators, we found that close to 60% (57.9%) of respondents had a habit of exercising for one hour or longer per week and that close to 90% (87.6%) were non-smokers.

Regional correlation analysis

Relationships with a correlation coefficient of ± 0.3 or greater were observed for SC and health indicators, as shown below.

First, the results for all respondents indicated correlations between participation in sports and hobbies with ADL (correlation coefficient $r=0.43$, same below) and self-rated

Table 2 The coefficient of correlation of each indicator; by age

Indicators	All respondents (n=5,543)				Aged 65–74 years (n=3,014)				Aged 75+ years (n=2,529)			
	Self-rated health	ADL	Depression	Mental health	Self-rated health	ADL	Depression	Mental health	Self-rated health	ADL	Depression	Mental health
Community activities	-0.18	0.18	-0.11	-0.11	-0.21	0.13	0.03	-0.07	0.03	0.20	-0.05	-0.09
Sports and Hobbies	0.11	0.43**	0.13	0.30*	-0.05	0.25	0.02	-0.04	0.15	0.32*	-0.02	0.18
NPO and Volunteer activities	0.13	0.34*	-0.01	0.04	0.14	0.30*	0.14	0.05	0.07	0.43**	0.23	0.17
Other activities	0.20	0.29*	0.14	0.05	0.16	0.33*	0.03	0.19	0.10	0.09	-0.12	-0.06
Health and Long-term care workshops	0.04	0.15	0.08	0.07	0.07	0.28	0.33*	0.06	0.09	0.13	0.10	0.07
Community center workshops	0.09	0.31*	0.09	-0.03	0.18	0.37*	0.25	-0.17	0.12	0.19	0.09	0.15
Elderly respect meetings and societies	-0.12	-0.03	-0.18	-0.15	-0.13	0.12	0.10	-0.15	0.02	-0.08	0.13	-0.04
Participation in regular health checkups	0.05	0.26	0.17	0.13	0.15	0.11	0.22	-0.04	0.19	0.12	0.28	0.13
Regional managerial position experience	-0.34	-0.03	-0.29	-0.12	-0.11	0.13	-0.10	-0.19	-0.43	-0.06	-0.05	-0.01
Extent of interaction with neighbors	-0.18	0.09	-0.07	-0.05	0.04	0.21	0.07	-0.16	-0.18	0.22	-0.11	0.10
Number of neighborhood acquaintances	0.11	-0.10	-0.19	-0.05	0.26	0.22	0.19	-0.04	-0.11	0.03	-0.06	0.10
Interaction with health guidance leaders	-0.08	0.12	-0.06	-0.05	0.03	0.25	0.21	-0.25	0.06	0.04	0.16	0.13
Social support	0.42**	0.46**	0.43**	0.32*	0.09	0.11	0.13	0.21	0.25	0.26	0.19	0.37*
Community activity evaluation	-0.02	0.20	-0.11	0.05	0.12	0.16	0.02	0.04	0.13	0.20	0.10	0.06
General trust	0.52**	0.35*	0.45**	0.37*	0.48**	0.33*	0.11	0.21	0.16	0.01	0.08	0.38**
Trust when traveling	0.58**	0.45**	0.42**	0.34*	0.43**	0.14	0.15	0.19	0.22	0.21	-0.02	0.24**

Spearman's rank correlation coefficient. * $p < 0.05$, ** $p < 0.01$ indicates a significant difference. 16 indicators related to Social Capital and four indicators were used by this analysis (A lifestyle habit and general characteristic are excluded).

mental health (0.30). Participation in NPOs/volunteer activities and participation in community center workshops exhibited correlations with ADL (0.34 and 0.31, respectively). Social support, general trust, and trust while traveling exhibited correlations with all health indicators (self-rated health: 0.42, 0.52, and 0.58, respectively; ADL: 0.46, 0.35, and 0.45, respectively; depression: 0.43, 0.45, and 0.42, respectively; and self-rated mental health: 0.32, 0.37, and 0.34, respectively). A negative correlation was observed between regional managerial position experience and self-rated health (-0.34). When the results were divided into those for respondents aged 65–74 years and those for respondents aged 75 years or older, differences in correlated indicators were observed.

In respondents aged 65–74 years, participation in other activities, participation in community center workshops, and general trust were found to be correlated with ADL (0.38, 0.37, and 0.33, respectively). Correlations were observed between general trust and trust while traveling with self-rated mental health (0.48 and 0.43, respectively). Participation in health and long-term care workshops was also found to correlate with depression (0.33).

Meanwhile, in respondents aged 75 years or older, correlations were noted between participation in sports and hobbies and participation in NPOs/volunteer activities with ADL (0.32 and 0.43, respectively). Correlations were noted between social support and general trust with self-rated mental health (0.37 and 0.38, respectively). As was observed

for all respondents, regional managerial position experience exhibited a negative correlation with self-rated health (-0.34) (Table 2).

Principal component analysis

A principal component analysis was performed using SC and health/lifestyle habit indicators. We calculated components accounting for a cumulative contribution ratio. The main indicators creating the first principal component for SC in all respondents were participation in community activities, participation in elderly respect meetings and societies, participation in community center workshops, interaction with health guidance leaders, participation in NPOs/volunteer activities, regional managerial position experience, participation in health and long-term care workshops, number of neighborhood acquaintances, and participation in sports and hobbies. Since the extent of interaction with neighbors and community activity evaluation were also moderately involved, these appeared to be components of “community participation and connections with people” with elements of community activity participation and interaction (reflecting 27.4% overall). The main indicators creating the first principal component in health and lifestyle habits were ADL, depression, hospitalization within the past year, and a history of serious illness. Since self-rated mental health, history of hypertension, and smoking were moderately involved, they appeared to be components of “health” with health-related elements (reflecting 30.0% overall).

Table 3 The first principal component contribution ratios for Social Capital indicators as well as health/lifestyle habit; by age

Indicators		All respondents (n=5,543)	Aged 65–74 years (n=3,014)	Aged 75– years (n=2,529)
Health	Health & Lifestyle Habit	the first principal component (component loading)		
	ADL	0.836	0.727	0.569
	Depression	0.793	0.814	
	Hospitalization within the past year	0.631		
	History of serious illness	0.600	0.430	0.584
	History of hypertension	0.418		
	Smoking habit	0.463	0.486	–0.532
	Mental health	0.543		0.477
	Self-rated health		0.747	0.646
	Eigenvalue	3.3	2.4	2.1
Proportion	30.1	22.0	19.4	
Community participation and connections with people	Social Capital	the first principal component (component loading)		
	Community activities	0.848	0.848	0.780
	Elderly respect meetings and societies	0.758	0.790	0.707
	Community center workshops	0.741		0.711
	Interaction with health guidance leaders	0.703	0.634	0.675
	NPO and Volunteer activities	0.678	0.664	0.626
	Regional managerial position experience	0.636	0.736	
	Health and Long-term care workshops	0.604	0.659	0.637
	Number of neighborhood acquaintances	0.558	0.641	0.468
	Sports and Hobbies	0.510	0.453	0.691
	Community activity evaluation	0.548	0.415	0.681
	Extent of interaction with neighbors	0.464		0.401
	Regular health checkups			0.488
	Eigenvalue	6.9	6.2	7.1
Proportion	27.4	24.8	28.3	

Factor extraction method; Principal component analysis (component loading of the first principal component, eigenvalue, proportion). The principal component is indicated at this table (The second principal component is excluded).

Next, the main indicators creating the first principal component for SC in respondents aged 65–74 years were participation in community activities, participation in elderly respect meetings and societies, regional managerial position experience, participation in NPOs/volunteer activities, participation in health and long-term care workshops, number of neighborhood acquaintances, and interactions with health guidance leaders. Since participation in sports and hobbies and community activity evaluation were also moderately involved, it appeared that these were components of “community participation and connections with people” with elements of community activity participation and interaction (reflecting 24.8% overall). The main indicators creating the first principal component for health and lifestyle habits were depression, self-rated health, ADL, and smoking. Since a history of serious illness was also moderately involved, these appeared to be components of “health” with health-related elements (reflecting 21.9% overall).

The main indicators creating the first principal com-

ponent for SC in respondents aged 75 years or older were participation in community activities, participation in community center workshops, participation in elderly respect meetings and societies, participation in sports and hobbies, evaluation of community activities, interactions with health guidance leaders, participation in health and long-term care workshops, participation in NPOs/volunteer activities, and participation in regular health checkups. Since the number of neighborhood acquaintances and the extent of interactions with neighbors were also moderately involved, it appeared that these were components of “community participation and connections with people” with elements of community activity participation and interaction (reflecting 28.3% overall). The main indicators creating the first principal component for health and lifestyle habits were self-rated health, history of serious illness, smoking, and ADL. Since self-rated mental health was also moderately involved, these appeared to be components of “health” with health-related elements (reflecting 19.3% overall). The first principal com-

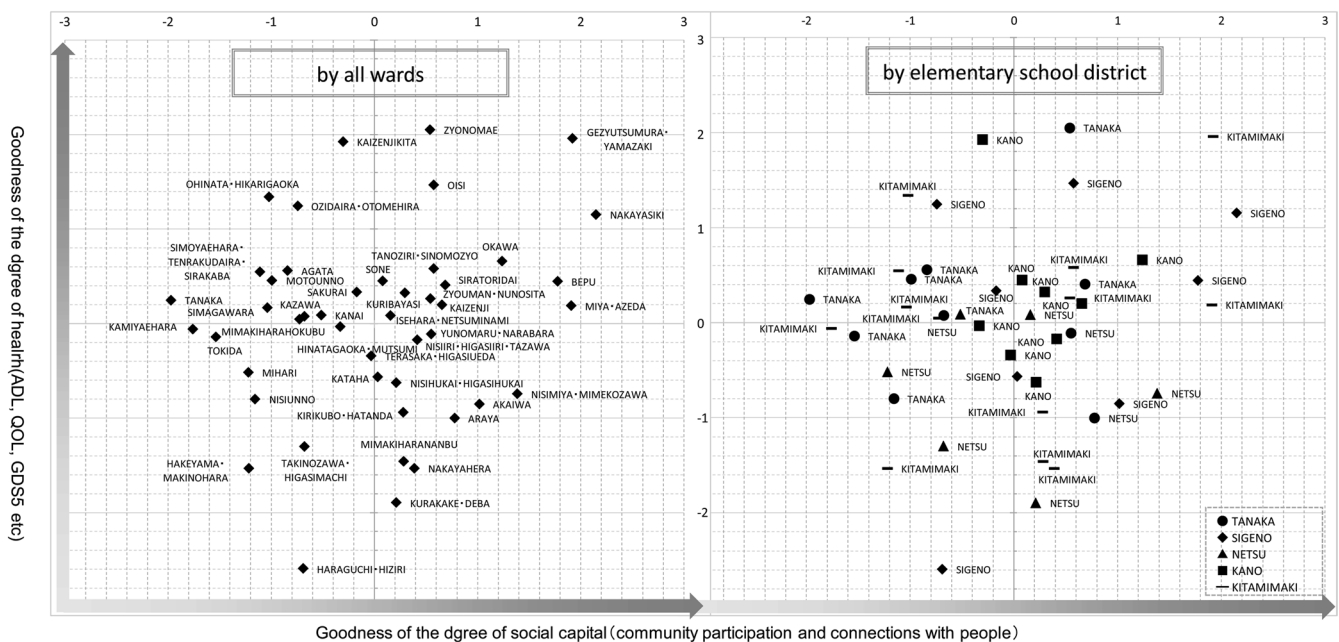


Figure 1 The political jurisdiction and each elementary school district typification based on regional characteristics by the first principal component contribution ratios (All respondents; $n=5,543$: Age-adjusted). Each respondent in the political jurisdiction: ●TANAKA ($n=1,037$): KAZAWA 236, AGATA 146, ZYONOMAE 96, TOKITA 328, NISIUNNO 108, TANAKA 324, SIRATORIDAI 99, MOTOUNNO 220 ●SIGENO ($n=1,009$): OZIDAIIRA • OTOMEDAIIRA 248, HARAKGUCHI • HIZIRI 109, SAKURAI 192, KATAHA 105 ●NETSU ($n=820$): KURAKAKE • DEBA 64, ISEHARA • NETSUMINAMI 52, KANAI 107, ARAYA 84, MIHARI 148, MISIMIYA • MIMEMOZAWA 152, TAKINOSAWA • HIGASIMACHI 169, YUNOMARU • NARABARA 44 ●KANO ($n=1,119$): KAIZENZI 99, KAIZENZI KITA 120, KURIBAYASI 90, TERASAKA • HIGASIUEDA 214, NISIHUKAI • HIGASHIHUKAI 81, NISIIRI • HIGASHIIRI • TAZAWA 148, SONE 144, OKAWA 76, HINATAGAOKA • MUTSUMI 147 ●KITAMIMAKI ($n=1,038$): HAKEYAMA • MAKINOHARA 70, SIMOYAEHARA • TENRAKUDAIRA • SIRAKABA 179, MIYA • AZEDA 81, GEZYUTSUMURA • YAMAZAKI 64, MIMAKIHARANANBU 59, MIMAKIHARAHOKUBU 74, KAMIYAEHARA 97, ZYOUMAN • NUNOSITA 86, KIRIKUBO • HATANDA 84, OHINATA • HIKARIGAOKA 53, NAKAYAEHARA 71, TANOZIRI • SINOMOZYO 59, SIMAGAWARA 61.

ponent contribution ratios for the SC indicators as well as for the health/lifestyle habit indicators are shown in Table 3.

The first principal component scores for all respondents were used to create a distribution diagram. Visualization of the distribution of “community participation and connections with people” and “health” in each ward revealed typification for all wards and regional differences between elementary school districts (Figure 1). The distribution map made it possible to objectively compare and evaluate the regional characteristics of each elementary school district.

Discussion

In order to reduce the need for long-term care by utilizing the self- and mutual support of regional residents in Tomi City, Nagano Prefecture, we determined the relationship between SC and health in each ward of the city and grouped wards based on regional characteristics to clarify the regional social resources and investigate the activation

of regional networks.

In terms of the correlations between SC and health by ward, we were able to confirm correlation coefficients (of 0.3 or greater) for SC indicators and multiple health indicators for both respondents overall and when divided by age range. In particular, SC⁽¹⁵⁾ with structural elements, such as sports and hobbies, NPO/volunteer activities, and other activities, appeared to affect regional residents’ physical activities as environmental factors and could therefore have been effective in contributing to health maintenance. Since correlations with multiple health indicators were also observed for general trust and trust while traveling, which have cognitive elements, the results of this study appear to be consistent with those of previous studies⁽¹⁰⁾. In terms of this point, many studies have indicated the importance of trust, with Nieminen *et al.* reporting that trust, which has cognitive SC elements, correlates with good self-rated health and self-rated mental health⁽¹⁶⁾, and another report stating that having strong trust in others correlates with a decreased risk for

depression¹⁷⁾.

We also successfully created distribution maps for “community participation and connections with people” and “health,” and the fact that the characteristics of wards located adjacently on the distribution map were able to be determined could be useful for elderly support that takes regional characteristics into account. Visualization of the regional characteristics of elementary school districts according to the distribution map could enable objective evaluations of communities when considering joint community-building by regional residents and governments going forward, and could be utilized as reference material when implementing initiatives. Although previous experimental studies used principal component analysis to attempt to measure regional economic characteristics¹⁸⁾, the fact that few studies have investigated this from the viewpoint of SC and health suggests that the present study, which verified regional characteristics using principal component analysis from a new viewpoint, could also contribute to research into SC.

This study has some limitations. First, the results derived from the survey showed that an investigation pertaining to the geographical features was not performed. Therefore, geographical factors arising from differences in the slopes and plains of mountainous areas that cannot be simply represented by SC elements are likely to have affected the results of this study. Next, this is an ecological study that examined the correlation between the health and SC of each region. Therefore, ecological fallacy is also a concern because of the presence of confounding factors. This needs to be taken into consideration when interpreting the findings. Finally, even the interpretation of the results on the correlation needs to be done with great caution, taking into account the participation in sports- and hobby-related activities, and the possibility of factors such as those seen in relation to ADL.

Conclusion

The present study, which verified the regional characteristics of 67 wards based on regional characteristics, produced valuable data that could be utilized in the deployment of long-term care prevention support in local communities. The fact that we were able to identify wards with low SC and health by age range by means of a principal component analysis could be very useful when considering the course of action for related activities, such as selecting regions targeted for support and investigating the support to be offered. The results of this study could aid in deepening understanding of the circumstances and local culture of each region. It is anticipated that this could enable governments and related bodies to break away from conventional mechanical

and uniform support, and engage in the construction of a support framework (utilization of regional capital, human resources, and resident mutual aid) that respects regional characteristics and is suited to regional needs. Going forward, community surveys need to be conducted to determine common factors latent in specific wards that affect SC and health (landscape, topographical factors, regional culture, locality, etc.). Gathering the data required for long-term care prevention support through surveys and determining common factors between specific wards could make it possible to create concrete action plans suited to the circumstances of each region.

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