Aging in the Tohoku District, Japan

Katsuo KUWAJIMA*

Abstract Recently there has been a remarkable increase in the aged population of Japan. Especially, the aged population of the entire Tohoku District has rapidly increased in the decade 1975-1985 and is now higher than the national average. In order to assess this regional trend, the areal distribution of the aged population rate by municipalities were analyzed. The results can be summarized as follows: 1 in the Tohoku District since 1970, municipalities, towns, and villages having high aged population percentages have greatly increased; 2 in each prefecture, such places are largely located in remote areas in and along mountains; 3 there is a negative correlation between the aged population rate and the rate of population increase; and 4 such five factors as the natural increase rate, net-migration rate, population density, nuclear family ratio, and farm family ratio, have negative correlations to the aged population rate in each prefecture, with the exception of the nuclear family ratio and the farm family ratio in Fukushima Prefecture.

Key Word aging, Tohoku District, multiple regression analysis

I. Introduction

In recent years, there has been a remarkable increase in the aged population of Japan. The percentage of the aged (65 years old and above after the Census of Population) in the Japanese population has rapidly grown and the rate in this country was 10.3% in 1985; it is expected that this rate will continue of increase, eventually, approaching to the level of the advanced nations of Western Europe, sometime in the 20th century. In response to this “aging of society”, a number of geographical studies on the problem of aging in Japan have appeared. Regarding areal distribution of the aged, for example, we have studies of urban districts by Ishimizu (1981), Ueno (1984, 1988) and Kagawa (1987); there are studies of the aged in the West Kanto District by Yamashita (1988), and a study of regional trends of aging by Kaneyasu (1987).

In this paper, areal distribution of aged populations in the Tohoku District is discussed, and areal characteristics of the aging phenomena in this locality are described. This is the first geographical study of aging in terms of the municipalities, cities, towns and villages of the Tohoku District.

II. The Aging Phenomena in the Tohoku District in Recent Years

As shown in Table 1, the aged population rate in the Tohoku District has risen remarkably since 1970s. Prior to 1965, the population of aged in the Tohoku District was 6.2%, a value 0.1% lower than the national average. Thereafter, however, it gradually increased and by 1985, being actually

* Tohoku Fukushi University
Table 1  Changes in the percentage of the aged populations, 1930-1985.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>All Japan</td>
<td>4.8</td>
<td>4.9</td>
<td>5.7</td>
<td>6.3</td>
<td>7.1</td>
<td>7.9</td>
<td>9.1</td>
<td>10.3</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
<td>0.8</td>
<td>0.6</td>
<td>0.8</td>
<td>0.8</td>
<td>1.2</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>Aomori</td>
<td>3.7</td>
<td>3.7</td>
<td>4.5</td>
<td>5.3</td>
<td>6.3</td>
<td>7.5</td>
<td>8.8</td>
<td>10.4</td>
</tr>
<tr>
<td></td>
<td>0.0</td>
<td>0.8</td>
<td>0.8</td>
<td>1.0</td>
<td>1.2</td>
<td>1.3</td>
<td>1.6</td>
<td></td>
</tr>
<tr>
<td>Iwate</td>
<td>5.0</td>
<td>-0.6</td>
<td>0.9</td>
<td>0.8</td>
<td>1.2</td>
<td>1.2</td>
<td>1.6</td>
<td>1.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Akita</td>
<td>3.2</td>
<td>3.3</td>
<td>4.6</td>
<td>5.8</td>
<td>7.3</td>
<td>8.9</td>
<td>10.5</td>
<td>12.6</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
<td>1.3</td>
<td>1.2</td>
<td>1.5</td>
<td>1.6</td>
<td>1.6</td>
<td>2.1</td>
<td></td>
</tr>
<tr>
<td>Yamagata</td>
<td>3.9</td>
<td>4.3</td>
<td>5.8</td>
<td>6.9</td>
<td>8.5</td>
<td>10.1</td>
<td>11.7</td>
<td>13.4</td>
</tr>
<tr>
<td></td>
<td>0.4</td>
<td>1.5</td>
<td>1.1</td>
<td>1.6</td>
<td>1.6</td>
<td>1.6</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td>Miyagi</td>
<td>4.0</td>
<td>4.1</td>
<td>5.4</td>
<td>6.1</td>
<td>6.9</td>
<td>7.7</td>
<td>8.7</td>
<td>9.9</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
<td>1.3</td>
<td>0.7</td>
<td>0.8</td>
<td>0.8</td>
<td>1.0</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>Fukushima</td>
<td>4.4</td>
<td>4.6</td>
<td>5.9</td>
<td>6.8</td>
<td>7.9</td>
<td>9.2</td>
<td>10.5</td>
<td>11.9</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
<td>1.3</td>
<td>0.9</td>
<td>1.1</td>
<td>1.3</td>
<td>1.3</td>
<td>1.4</td>
<td></td>
</tr>
<tr>
<td>Tohoku</td>
<td>4.1</td>
<td>4.1</td>
<td>5.3</td>
<td>6.2</td>
<td>7.4</td>
<td>8.6</td>
<td>9.9</td>
<td>11.5</td>
</tr>
<tr>
<td></td>
<td>0.0</td>
<td>1.2</td>
<td>0.9</td>
<td>1.2</td>
<td>1.2</td>
<td>1.3</td>
<td>1.6</td>
<td></td>
</tr>
</tbody>
</table>

upper: percentage of the aged population, lower: rate of change

1985: Populatio Sensus of Japan

1.2% above the national average.

In order to measure the degree of the continual aging of society, the number of aged in the municipalities, cities, towns and villages of the Tohoku District were compared to the national average (10.3% in 1985). The author is interested in the change of the percentage of the aged among CTVs (city, town and village) in the Tohoku.

Table 2  Changes of municipality numbers above and below the aged population ratio

<table>
<thead>
<tr>
<th></th>
<th>Total number of municipalities</th>
<th>1975</th>
<th>1985</th>
<th>Increase Index of &quot;lower&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>City</td>
<td>Town and village</td>
<td>Total (%)</td>
<td>City</td>
</tr>
<tr>
<td>Aomori</td>
<td>67</td>
<td>8 31</td>
<td>59 (88.0)</td>
<td>5 3</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>8</td>
<td>8 (12.0)</td>
<td>0 8</td>
</tr>
<tr>
<td>Iwate</td>
<td>62</td>
<td>11 30</td>
<td>41 (67.7)</td>
<td>1 1</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>9</td>
<td>31 (45.9)</td>
<td>2 1</td>
</tr>
<tr>
<td>Akita</td>
<td>69</td>
<td>9 37</td>
<td>46 (66.6)</td>
<td>1 2</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>23</td>
<td>33 (44.7)</td>
<td>8 2</td>
</tr>
<tr>
<td>Yamagata</td>
<td>44</td>
<td>7 7 24</td>
<td>30 (68.1)</td>
<td>0 0 13</td>
</tr>
<tr>
<td>Miyagi</td>
<td>74</td>
<td>10 33</td>
<td>43 (58.1)</td>
<td>9 0</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>30</td>
<td>31 (41.9)</td>
<td>2 8</td>
</tr>
<tr>
<td>Fukushima</td>
<td>90</td>
<td>9 18</td>
<td>27 (30.0)</td>
<td>2 3</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>62</td>
<td>63 (70.0)</td>
<td>8 77</td>
</tr>
</tbody>
</table>

upper: municipality numbers below the national average (10.3% in 1985)
lower: municipality numbers above the national average (10.3% in 1985)

region. Table 2 shows the results calculated municipality numbers above or below the national average for each prefecture in 1975 and 1985 respectively. In northern Tohoku, the ratio in Aomori Prefecture increased from 12% in 1975 to 86.6% in 1985, in Iwate Prefecture from 33.9% to 91.9%, and in Akita Prefecture from 33.4% to 95.7%. In the three southern prefectures (Yamagata, Miyagi and Fukushima) the percentages in each prefecture ranged from 41%-70% in 1975 and from 79%-100% in 1985. The ratio in northern Tohoku increased by two-and-a-half times but the relative increase in southern Tohoku was smaller, less than double.

That is to say, the aging phenomena was first notable in the cities, towns and villages of warmer southern Tohoku is now also apparent in the colder northern prefectures.

![Areal distribution of aged populations by municipalities](image)

**Fig. 1** Areal distribution of aged populations by municipalities
A: Aomori City  M: Morioka City  Ak: Akita city  S: Sendai City  Y: Yamagata City  F: Fukushima City
III. Areal Distribution of the Proportion of Aged Population and its Regional Arrangement by Municipalities

As can be seen in Fig. 1-A, in 1975 in the Tohoku District there were only two towns with an aged population of 15% or more\(^2\). By 1985 (Fig. 1-B), however, this number had zoomed to 107 towns and villages; the percentage of them reached 26% of the total number. In general, the towns and villages which showed the highest percentages (15% or more) of aged populations in Tohoku District were distributed in remote places in and around the mountains of each prefecture. These are non-industrial areas. The trend of the aging phenomenon in non-industrial area is found in the southern coastal countries of England (Warnes, 1983).

The main concentrations (the highest percentages of aged populations) are: (1) remote areas in the Kitakami Mountains, which front the Pacific Ocean in Iwate Prefecture; (2) hill and upland areas on the west and east sides of the Ohu Mountain Range which runs in a north-south alignment through the center of Tohoku; (3) the northern and southern areas along the Sea of Japan coast, with the exception of the Akita and Shonai plains.

Most of these regions are sparsely populated areas, containing many depopulated towns and villages, a result of constant out-migration of young population to seek work and better living conditions in big cities. Conversely, areas showing the lowest percentage (7.5% and under) of aged populations were mainly located in regional center of prefectural government seats, and of certain dormitory towns surrounding regional centers. The dormitory towns northwest of the cities of Morioka and Sendai have especially low rates. Those towns have been rapidly urbanized in the Kitakami Mountains, which front the Pacific Ocean in Iwate Prefecture; (2) hill and upland areas on the west and east sides of the Ohu Mountain Range which runs in a north-south alignment through the center of Tohoku; (3) the northern and southern areas along the Sea of Japan coast, with the exception of the Akita and Shonai plains.

### Table 3 Changes in population composition coefficient by age

<table>
<thead>
<tr>
<th>Age Class</th>
<th>1975</th>
<th>1985</th>
<th>Change 1975-1985</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-14</td>
<td>380,218</td>
<td>338,554</td>
<td>-41.7</td>
</tr>
<tr>
<td>15-64</td>
<td>977,541</td>
<td>1,027,329</td>
<td>50.1</td>
</tr>
<tr>
<td>65-</td>
<td>110,752</td>
<td>158,547</td>
<td>44.4</td>
</tr>
<tr>
<td>All</td>
<td>1,668,411</td>
<td>1,524,430</td>
<td>-8.9</td>
</tr>
</tbody>
</table>

Upper: numbers of population in each age class
Lower: composition coefficient

Sources: Statistics Bureau, Management and Coordination Agency (1975, 1985); Population of the Tohoku District
and transformed into residential zones where young family is dominant and thus have comparatively few old people.

IV. Some Other Factors Related to the Aging Phenomenon

It has long been recognized that the aging of population was brought about by a decrease in the young (0-14 years old) population due to falling fertility rates and longer life expectancies after World War II (Ueda, 1987). This general trend appears as well in the entire Tohoku District. As can be clearly seen in Table 3—listing the age composition coefficients in each prefecture for 1975 and 1985—the percentage of populations aged 0-14 years are on the decrease while the percentages of aged populations of 65 or over are on the increase. Again, the decrease in the ratio of the young population to the old population was most salient in the three prefectures of northern Tohoku.

Since other factors are thought to be related to the aging phenomenon, changes in the population of the municipalities were also considered. Areal distribution of the rate of population increase by municipalities is mapped out in Fig. 2. When compared to the distribution map of ratios of aged population (Fig. 1-B), it can be noted that areas with low rate of population percentage increases correspond to areas showing a high proportion of aged population, suggesting that the correlation coefficients between the proportion of aged population has a close relationship (Fig. 3). The correlation coefficient values of Aomori, Akita, Miyagi and Fukushima are −0.70 or more, while those of Iwate and Yamagata Prefectures are −0.65 or over. These values indicate a close negative relationship between two factors.

Five factors were selected as likely influencing the percentage of the aged population: the natural increase rate\(^2\), net-migration rate\(^3\), population density\(^4\), nuclear family ratio\(^5\) and farm family ratio\(^6\). Former two factors are thought to be important among researchers of aging studies and the latter three factors are picked up by the author. In order to clarify the relationship
between these five variables and the rate of aged population, a multiple regression was applied. The results are shown in Table 4.

In Aomori and Fukushima Prefectures, the natural increase rate was the factor with the highest value. In Iwate, Yamagata and Miyagi Prefectures, the nuclear family ratio factor had the highest value. In Akita Prefecture, the nuclear family ratio and the natural increase rate had higher values than the other variables. That is, in each prefecture (except Fukushima), the higher the values of these variables rise, the lower the proportions of aged populations. In Tohoku as a whole, the natural increase rate and the highest coefficient values.

V. Summary

(1) The advance of the aging phenomena in the Tohoku District was initially slower than in the Kansai and Kanto Regions but after 1970 the
aged population rate in each prefecture remarkably increased and by 1985 the rate exceeded the national average (with the exception of Miyagi Prefecture).

(2) Prior to 1970, the aging phenomena in the Tohoku District was first evident in the towns and villages of the southern prefectures (Yamagata, Miyagi and Fukushima), but after 1970 the same phenomena was observed in the northern prefectures (Akita, Iwate and Aomori).

(3) Areal distribution of the aged population rates by municipalities in the Tohoku District indicates that towns and villages having the highest aged populations are primarily located in remote areas near the mountains in each prefecture.

(4) It was recognized that there is a negative correlation between the aged population rate and the population increase rate, and that there is a general trend that the aged population rate falls when the population rate rises.

(5) Five other factors were surmised to have an effect on the aged population rate: natural increase rate, net-migration rate, population density, nuclear family ratio, and farm family ratio. Moreover, these are all negative factors when correlated to aged population rate in each prefecture, with the exception of the nuclear family ratio and farm family ratio factors in Fukushima Prefecture. In the Tohoku District as a whole, the aged population rate has a negative correlation to the national increase rate and the nuclear family ratio.

Acknowledgement
I wish to thank Mr. John Stevens, Professor of Tohoku Fukushi University, who kindly looked over my manuscript. I also want to express my gratitude to Mr. Kazuya Horike, Professor of Tohoku Fukushi University, who helped compute some of the data in this paper.

(accepted Feb. 21, 1989)

Note
1) The author chose 15% as level of the aged population compared with several European countries such as U.K. (15.0% in 1984), Austria (14.3% in 1985), West Germany (14.7% in 1984), and Denmark (14.9% in 1984). Source: Yano-kouta Kinenkai ed. (1987) : Sekai Kokusei-zue, Kokuseisha, Tokyo.
5) Source : Statistics Bureau, Mangement and Coordination Agency (1985) ; Population Census of Japan, Volume 2
6) Source : Norinsuisan-sho (1985) ; Agriculture Census, statistical and information, No. 1

References
——— (1987) : Chikō Shō-toshi ni okeru
Katsuo Kuwajima: Aging in the Tohoku District, Japan

Rounen-jinko no Bunpu (Areal Distribution of Aged Populations in Certain Regional Cities)
Nippon Chiri-gakkai Yokoshu, 33, 294–295


Nippon Chiri-gakkai Yokoshu, 33, 290–291

1984.


Nippon Chiri-gakkai Yokoshu, 33, 290–291

東北地方における高齢化の地域的特徴

桑島勝雄

近年における日本の老齢人口の増加は著しい。そして、一般に、西日本の方が東日本より高齢化率は高いといわれている。つまり、西高東低型である。しかし、ここ10年間（1975-1985）には、東北地方全体の老人人口比率は年々増加しており、全国平均を超えてきている。このような地域的傾向において、筆者は、市町村別老人人口比率の地域的分布をベースとして、そこに見出されるいくつかの地理的事象の分析を試みた。その結果を要約すると、次の通りである。

1）東北地方では、特に、1970年代以後、市町村単位でみると、老人人口比率において高率を示す町村が著しく増加している。

2）これらの町村の殆どは、各県の山間部に位置している。

3）老人人口比率と人口増加率との間に、負の相関関係が存在している。

4）また、人口の自然増加率、社会増加率、人口密度、核家族化率、農家率も老人人口比率の増減に影響を与えている。これらは、福島県の核家族化率、農家率を除いて、いずれも老人人口比率と負の相関関係を有している。

* 東北福祉大