Analysis of Regional Populations:

A Case Study of Five Areas of the Toyama Prefecture

Takashi AOKI

1.　Introduction

The declining population in Japan has become a big issue in recent years. The problem is especially profound in regional areas. The continued and escalating lack of appropriate balance of generations is likely to exacerbate this problem. Furthermore, regional population disparities have led to increasing social and economic disparities. Therefore, there is an urgent need to solve the population problem in Japan.

The main solution that has been proposed is to increase the birth rate , but many feel that the choice to have children is a private matter in which local and national governments should not intervene. Increased immigration could also solve the problem, but this is not a popular policy in Japan. Thus, increasing birth rates remains the chosen solution. To encourage this, the Japanese government has introduced policies that will encourage people to have more children. These include subsidies for those raising children, the construction of more preschools, and more free medical treatment for families.

This study conducted a time-series analysis of the rates of population change in regions of Japan. This will help to inform regional policies. Fifteen municipalities in the Toyama prefecture were subjected to this analysis.[1]

2.　Population Issues in Five Areas of the Toyama Prefecture

First, the current state of the population of the Toyama prefecture and its municipalities were checked using the population census of Japan's Ministry of Internal Affairs and Communications (MIC). This census is conducted every five years, and the most recent took place in October 2020. However, the figures from the 2020 census are not yet available (as of July 2021), so some numbers from 2020 used in this paper were originally gathered by the Toyama prefecture.[2]

A population census of the Toyama prefecture has been conducted twelve times between 1965 and 2020. In this period, the overall population was highest in 1995, when it was 112.3 million. Since that time, it has steadily decreased. The population of the Toyama prefecture in 2020 was 103.6 million (Fig. 1). When the natural population was increasing, there was a corresponding social decrease in the population, but the natural population increase was greater than the social decrease and this difference manifested as population growth at that time. However, there is currently a simultaneous social and natural decrease in the population, with the natural decrease being greater than the social decrease. Therefore, a rapid population decrease has been seen in recent years.
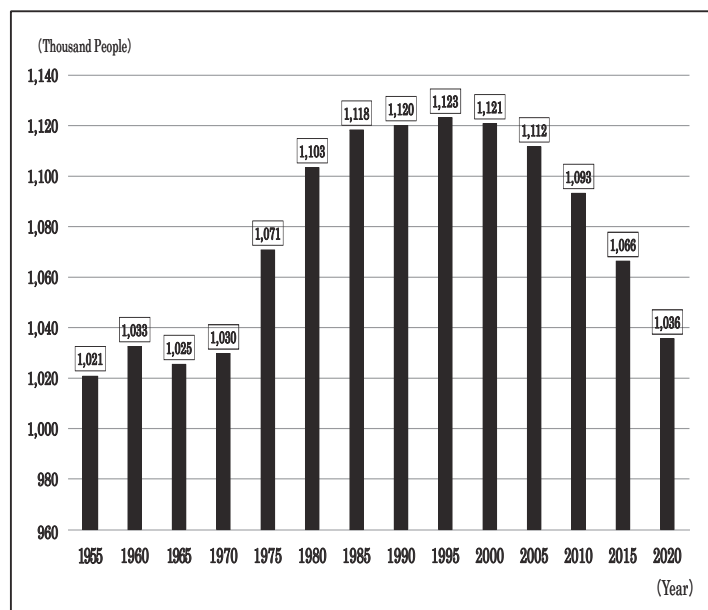
The populations of four of the municipalities in the Toyama prefecture (Table 1) peaked in 2005

(Namerikawa city, Tonami city, Imizu city, and Tateyama town). Another, that of Toyama city, peaked in 2010. The population of Funahashi village was highest in the 2020 census and continues to rise. The populations of the other nine municipalities have peaked at different times but have all been decreasing since 1995 when the overall population of the Toyama prefecture was at its highest.

Because the generational disparity has been expanding alongside population decrease in the Toyama prefecture and its municipalities, the populations of each generation are very different between 1970 and 2020, even when the overall populations are similar. For example, the number of births in the Toyama prefecture in 1970 was 17,493, the highest since 1965, but 6,491 in 2020, which is about 37.1% of the 1970 figure (Fig. 2). In the case of the municipalities in Toyama prefecture, the birth rates in 2020 compared with those in 1970 vary, but all have dropped considerably. In Asahi town, the birth rate in 2020 was only 10.5% that in 1970. Even in the municipality where the birth rate has dropped the least (Funahashi village), the rate in 2020 was still only 58.1% of the 1970 figure. Because it can take several decades to resolve a generation imbalance, it is important to resolve these population problems as promptly as possible. Sweeping reforms are needed to achieve this.

Throughout the rest of this paper, the Toyama prefecture will be analyzed in terms of five major regions. The Toyama prefecture is sometimes divided into two areas: the Goto area, on the east side, which includes Toyama city, and the Gosei area on the west side. The five regions in this paper are the following: the Goto area, excluding Toyama city, which consists of eight municipalities (Uozu city, Namerikawa city, Kurobe city, Funahashi village, Kamiichi town, Tateyama town, Nyuzen town, and Asahi town); Toyama city, which is the capital and the largest city in the Toyama prefecture; Takaoka city, the second largest by population; Imizu city, which is the third largest and located between Toyama city and Takaoka city; and the Gosei area, excluding Takaoka city and Imizu city, which consists of four municipalities (Himi city, Tonami city, Oyabe city, and Nanto city).

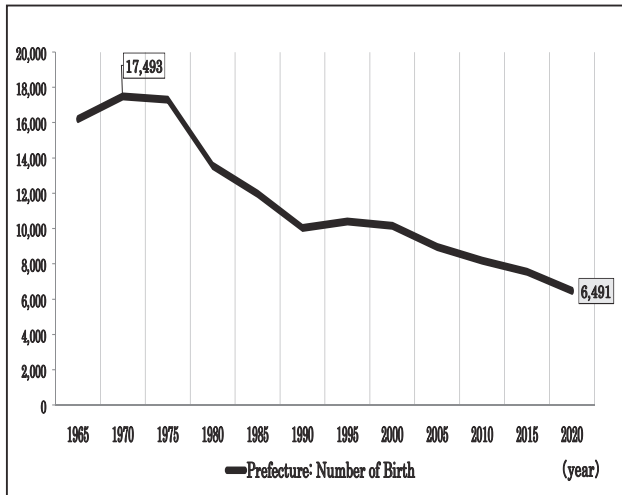**Figure 1. The Population of the Toyama Prefecture**

Source: Statistics Bureau, MIC [1]

Table 1. Populations of the Municipalities of Toyama Prefecture

	2020	95-20 rate of change	15-20 rate of change
Toyama city	414,171	-0.8%	-1.1%
Takaoka city	166,513	-10.9%	-3.3%
Uozu city	40,585	-16.0%	-5.5%
Himi city	43,995	-25.2%	-8.3%
Namerikawa city	32,379	1.7%	-1.1%
Kurobe city	39,647	-8.7%	-3.3%
Tonami city	48,191	5.0%	-1.7%
Oyabe city	29,018	-18.9%	-4.5%
Nanto city	47,976	-23.8%	-6.5%
Imizu city	90,807	-2.3%	-1.6%
Funahashi village	3,133	89.0%	5.1%
Kamiichi town	19,367	-18.2%	-7.5%
Tateyama town	24,862	-9.4%	-5.5%
Nyuzen town	23,875	-17.3%	-5.8%
Asahi town	11,093	-34.8%	-9.4%
Prefecture: Total	1,035,612	-7.8%	-2.9%

Source: Statistics Bureau, MIC [1], Toyama Pref. [2]

Figure 2. Number of Births in the Toyama Prefecture

*95:1995, 15:2015, and 20:2020
Source: Statistics Bureau, MIC [1]

Table 2. Populations of Five Areas of the Toyama Prefecture

	1970	1995	2020	95-20 rate of change
Toyama city	350,085	417,595	414,171	-0.8%
Takaoka city	170,841	186,827	166,513	-10.9%
Imizu city	83,631	92,981	90,807	-2.3%
Goto area	218,506	222,268	194,941	-12.3%
Gosei area	206,632	203,454	169,180	-16.8%
Prefecture: Total	1,029,695	1,123,125	1,035,612	-7.8%

Goto area includes Uozu city, Namerikawa city, Kurobe city, Funahashi vilagge, Kamiichi town, Tateyama town, Nyuzen town and Asahi town
Gosei area includes Himi city, Tonami city, Oyabe city and Nanto city
*95:1995 and 20:2020
Source: Statistics Bureau, MIC [1]

The populations of the five areas in 2020 are shown in Table 2. Toyama city has the largest population. Compared with the populations in 1995, when the prefectural population was highest, all five regions have seen a population decrease, with the greatest decrease in the Gosei area (16.8%).

3. Features of Population Change in Five Areas of the Toyama Prefecture
3.1 Natural and Social Demographic Trends in Five Areas of the Toyama Prefecture
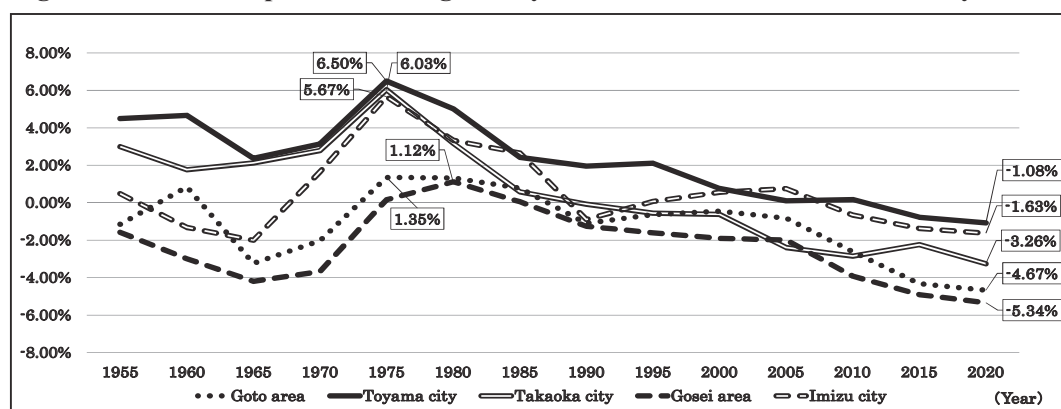
In this section, we shall first consider the rates of population change in the five areas of the Toyama prefecture. In Takaoka city, the Goto area, and the Gosei area, the populations have been decreasing since the 1990s. In Toyama city and Imizu city, the populations have been decreasing since 2010 and 2005, respectively. As shown in Fig. 3, the greatest decrease in population between 2015 and 2020 was in the Gosei area, where the population decreased by 5.34%. The smallest decrease in this period was 1.08%, in Toyama city.

Next, we will review the changes in population trends and demographic factors over time in the five regions. In the Toyama prefecture, when the overall population increased, the natural increase exceeded the social decrease. However, since the 1980s, the rate of natural increase has gradually diminished. The 2005 census showed a natural decrease in the populations of all five areas, although this was not the largest natural decrease seen in the period surveyed (1955–2020). The social decrease in population has diminished over the past few decades, but the general trend toward social decrease has continued. The natural population changes have shown similar trends in all five areas since 1955, with increasingly large decreases in every region. However, the social population changes differed considerably between areas from the 1960s to the 1980s. After this time, every area showed lower rates of social population change. This was true even in the Goto and Gosei areas, which showed a larger overall population decrease than did the other three regions (Figs. 4 and 5).

Because the relative social decrease has not influenced the overall population decrease in recent decades, it is apparent that the number of births has had the greatest influence on population decrease. Increasing the population
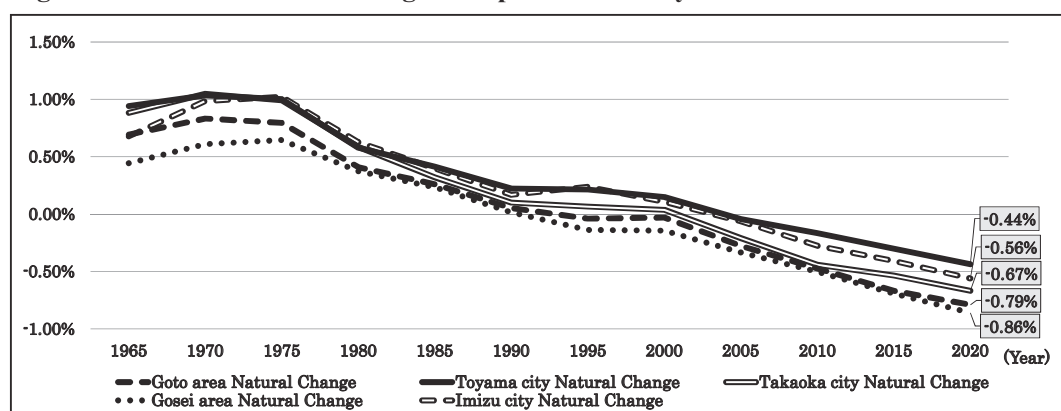
of people of child-bearing age is necessary to increase birth rates in an area since the number of people aged 15 to 49 (both genders) and the number of births in each area is largely equivalent (Figs. 6–11). That is to say, the correlations between the number of the younger generation and the number of births are high (R^2 = 0.72–0.91) in all five areas, and the reductions in both numbers year by year have been striking. So the analysis of social changes to the population of people in this age group is particularly important for the five areas to increase birth rates and, thereby, the population, for the sake of the areas' sustainable development.

Figure 3. Rates of Population Change Every Five Years in Five Areas of the Toyama Prefecture

Source: Statistics Bureau, MIC [1]

Figure 4. Rates of Natural Change in Populations Every Five Years in Five Areas of the Toyama Prefecture
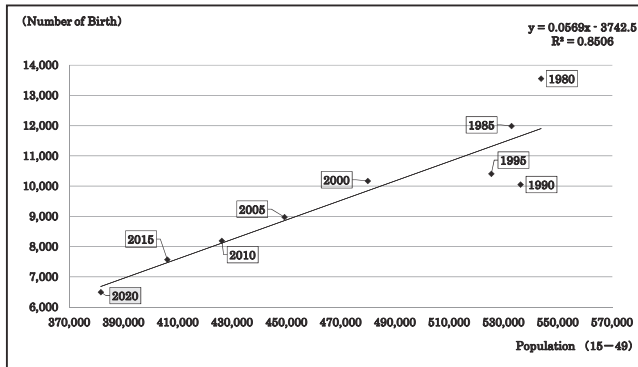

Source: Statistics Bureau, MIC [1], Toyama Pref. [2]

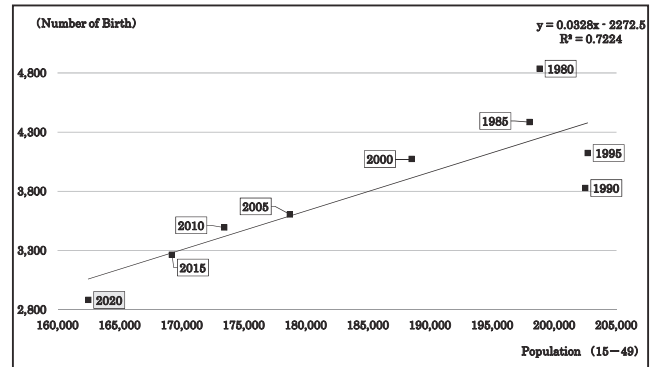**Figure 5. Rates of Social Change in Populations Every Five Years in Five Areas of the Toyama Prefecture**

Source: Statistics Bureau, MIC [1], Toyama Pref. [2]

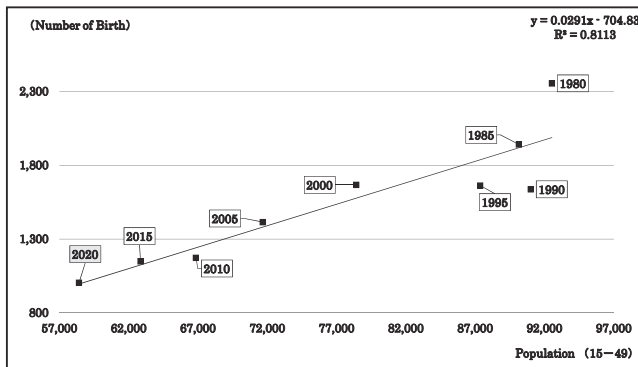**Figure 6. Population of People Aged 15–49 and Number of Births in the Toyama Prefecture**

Source: Statistics Bureau, MIC [1], Toyama Pref. [2]

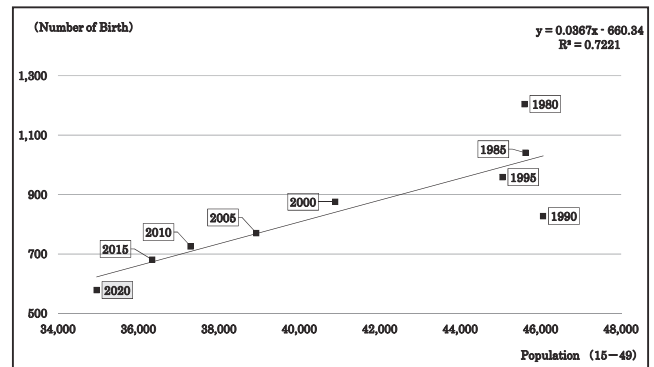**Figure 7. Population of People Aged 15–49 and Number of Births in Toyama City**

Source: Statistics Bureau, MIC [1], Toyama Pref. [2]

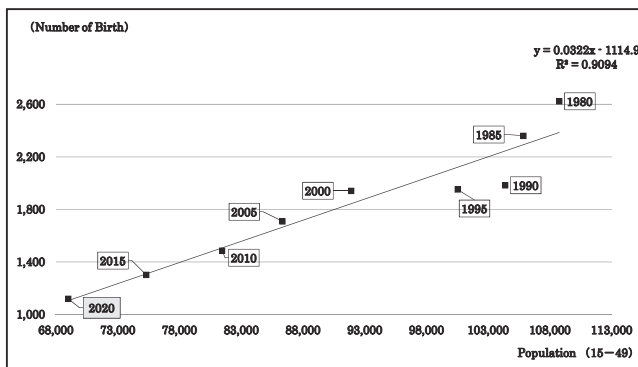**Figure 8. Population of People Aged 15–49 and Number of Births in Takaoka City**

Source: Statistics Bureau, MIC [1], Toyama Pref. [2]

Figure 9. Population of People Aged 15–49 and Number of Births in Imizu City
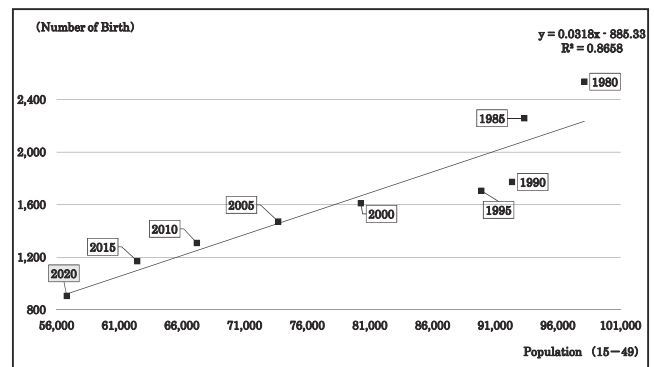

Source: Statistics Bureau, MIC [1], Toyama Pref. [2]

Figure10. Population of People Aged 15–49 and Number of Births in the Goto Area

Source: Statistics Bureau, MIC [1], Toyama Pref. [2]

Figure 11. Population of People Aged 15–49 and Number of Births in the Gosei Area

Source: Statistics Bureau, MIC [1], Toyama Pref. [2]

3.2 Cohort Analysis of the Five Areas of the Toyama Prefecture

To determine changes in the generational population trends of the five areas, a cohort analysis was used. Figs. 12 through 17 show the results of the cohort analysis of the five areas and the prefecture (more than 70 age group is omitted from the figures). In this analysis, three periods were examined: the 1980–1985 period, during which there was still population increase; the 1995–2000 period, when the population count was at its peak, and the 2015–2020 period, which is the most recent.[3]

In the 1980–1985 period and 1995–2000 period, the basic trends were similar for the whole prefecture. The
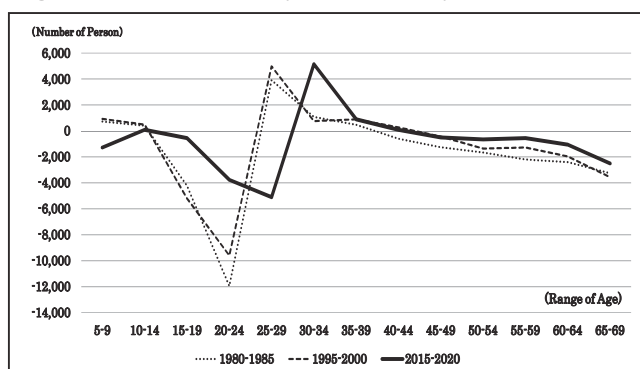
populations of the 15–19 and 20–24 age groups decreased. The main reason for this is thought to be that people in these age groups moved to other areas of Japan, especially big cities like Tokyo and Osaka, to go to university and find employment. In contrast, there was some influx to the area of people from the 25–29 age group. Many of these are likely to have been returning to their hometown having originally come from the Toyama prefecture. In the age groups above this, little fluctuation is apparent. Since the number of people leaving the Toyama prefecture was greater than the number moving into it, one might expect the total population to decrease during those periods. However, the overall population increased, indicating that the natural increase in the population exceeded the social decrease. On the other hand, the current levels of social decrease to the population in the area is now lower, while the total population decrease is higher, suggesting that the reduced number of births, the primary cause of the natural decrease, is not being mitigated by the reduced social decrease.[4]

While the figures for the five areas of the Toyama prefecture before 2015 differ, the general trend shows roughly the same pattern. However, apart from some parts of Takaoka city, this trend changed between 2015 and 2020. First of all, the decrease in the younger population diminished. The significant rise in the population of 20- to 24-year-olds seen in the two earlier periods did not occur between 2015 and 2020. Conversely, the decrease in the population of the 30–34 age group in the earlier two periods contrasted with an increase in this age group in the most recent period. This reflected the age line's shift to the right in recent years (Figs. 12–17).

The population decrease itself might be responsible for the reduced number of people moving in and out of the area. However, these changes between 2015 and 2020 could be explained by the big change in Toyama prefecture during this period, which was the launch of the Hokuriku Shinkansen bullet train. This dramatically shortened the time it takes to travel between Toyama and Tokyo. Indeed, some Tokyo-based companies decided to move some of their facilities and jobs to the Toyama prefecture. It also increased opportunities for students to attend universities in the Toyama prefecture and provided opportunities for individuals who had left the area to return and work in the Toyama prefecture. This may explain the trend changes in 2015–2020 to some extent.
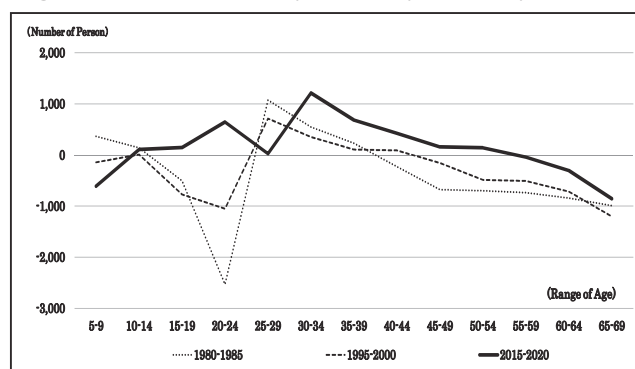
While increasing the number of births is the best way to increase the population of a given area, decreasing the number of people leaving the area and increasing the number moving to the area are also effective strategies. Therefore, it is important to effectively maximize the merits of the Hokuriku Shinkansen.
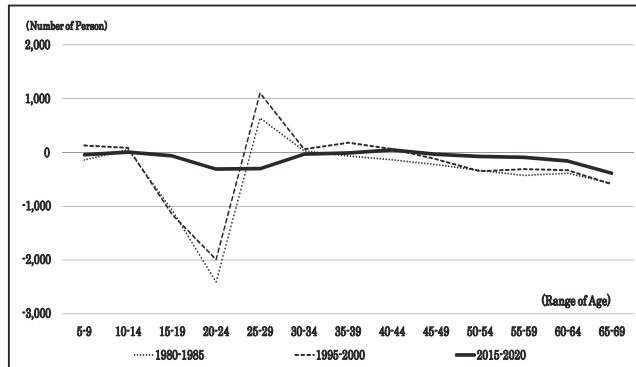
Figure12. Cohort Analysis of the Toyama Pref.

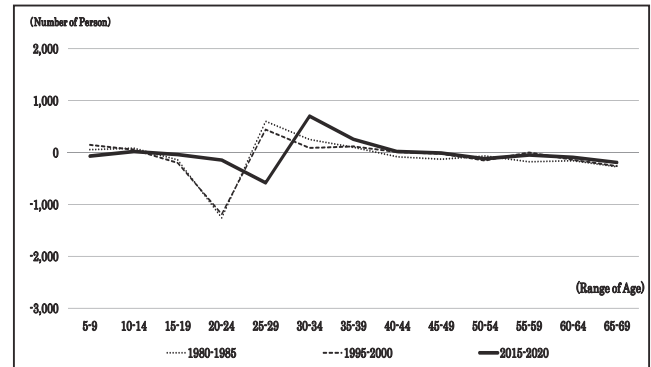Source: Statistics Bureau, MIC [1], Toyama Pref. [2]

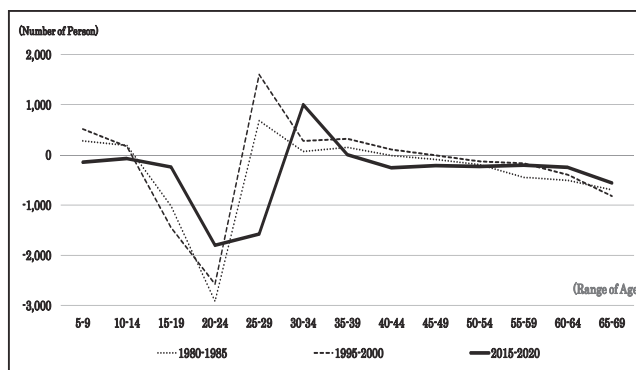**Figure 13. Cohort Analysis of Toyama City**

Source: Statistics Bureau, MIC [1], Toyama Pref. [2]

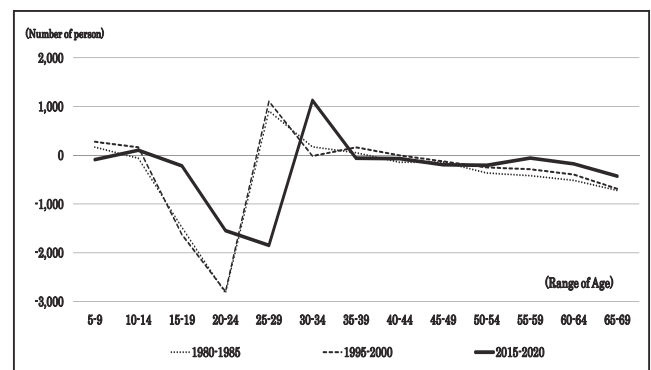**Figure14. Cohort Analysis of Takaoka City**

Source: Statistics Bureau, MIC [1], Toyama Pref. [2]

Figure 15. Cohort Analysis of Imizu City

Source: Statistics Bureau, MIC [1], Toyama Pref. [2]

Figure16. Cohort Analysis of the Goto Area

Source: Statistics Bureau, MIC [1], Toyama Pref. [2]

Figure 17. Cohort Analysis of the Gosei Area

Source: Statistics Bureau, MIC [1], Toyama Pref. [2]

4. Conclusion

This paper has highlighted the serious demographic issues of population decrease and generational imbalance currently occurring in many areas of Japan. The characteristics of these population changes were analyzed, using the five areas of the Toyama prefecture as a case study. The main findings were as follows.

(1) The total population of the Toyama prefecture has been decreasing since 1995, and the trends seen in the five areas of the Toyama prefecture show some similarities and some differences.

(2) A time-series analysis of the populations of the five areas has shown that, in the past, natural population increase overshadowed social population decrease, leading to an overall increase. More recently, however, reduced social decreases have been insufficient to mitigate the large natural decreases.

(3) In all five areas, there was a correlation between the population of 15- to 49-year-olds and the number of births. It is therefore important to analyze the trends among this age group causing the population fluctuations.

(4) The cohort analysis of the five areas demonstrated a reduction in the number of people in the 15–24 age group leaving the areas. It is thought that this is because the introduction of the Hokuriku Shinkansen bullet train has reduced the need among this generation to move to big cities for employment and education. There has also been a recent increase in the population of the 30–34 age group in all five areas. This is a social increase that may reflect the start of a new pattern of population change in these areas.

The most effective means of generating population increase is to increase the birth rate, but policies that address the generational changes in the population are also important as it is necessary to ensure proper age distribution among the population. This will also enhance the birth rate. This paper has considered the features of regional populations from a macro perspective. The next step should be to deliberate upon and evaluate concrete policies.

Notes

(1) Because of mergers of municipalities between 2000 and 2005, there are now 15 municipalities in the Toyama prefecture (there were previously 35 municipalities). This is the lowest number of municipalities of any Japanese prefecture. The populations of cities and areas have been modified in our analysis to allow for these changes. For example, Toyama city merged six municipalities in 2005, so the populations given for Toyama city before 2005 include the populations of these six municipalities even though they were not part of Toyama city at that time.

(2) When the original population data for the Toyama prefecture is compared with the national population census, the population of the Toyama prefecture is slightly smaller than that shown in the national census (99.91%), but this was judged to be an insignificant difference.

(3) Full population census data is only currently available up to 2015 as detailed information from the 2020 census is not yet available. Therefore, when calculating the changes between the 2015 and 2020 figures, the 2015 figures obtained by the Toyama prefecture were incorporated into the calculation.

(4) The social decrease is not necessarily caused only by the younger generation, but the data suggest that the younger generation are the predominant contributors.

References

[1] Ministry of Internal Affairs and Communications, *the Population Census*, 1965, 1970, 1975, 1980, 1985, 1990, 1995, 2000, 2005, 2010, 2015 and 2020 (https://www.stat.go.jp/data/kokusei/2020/index.html, checked by 2021.7.7)

[2] Toyama Prefecture, *Toyama Statistics World; Toyama Jinko Data,* 2015 and 2020 (https://www.pref.toyama.jp/sections/1015/lib/jinko/index.html, checked by 2021.7.7)