



3-2021

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Recommended Citation

Inoue, Takeshi (2021) "Population Trends in the Area Where Nuclear Power Plants are Located Before and After the Fukushima Accident and Their Impact on the Estimated Population," *Japanese Society and Culture*: Vol. 3 , Article 12.

Available at: <https://gensoken.toyo.ac.jp/japanese-society-and-culture/vol3/iss1/12>

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[Received 30 September 2020 / Revised 30 October 2020 / Accepted 30 November 2020]

Population Trends in the Area Where Nuclear Power Plants are Located Before and After the Fukushima Accident and Their Impact on the Estimated Population

Takeshi Inoue[※]

Abstract

Comparing the population trends in the areas where nuclear power plants are located with those in the neighborhood reveals it is declining and more so in the former than in the neighborhood. The cause is thought to be that the nuclear power plant was shut down for a long time after the earthquake and the Fukushima accident. However, such a decline is not necessarily due to the decrease in employment opportunities of the electric industry itself, but from electric-related industries. Regarding the estimated future population, the percentage of nuclear-located areas with the possibility of disappearing as defined by the Regional Revitalization Council is higher than the national average. Furthermore, the population decline has already accelerated more than expected, and this will continue to increase in the future. It is feared that the long-term shutdown of nuclear power plants will have a serious impact on the sustainability of the region through the acceleration of population decline. To curb such decline, it is necessary to take immediate action.

Keywords: Nuclear Power Plant, Population, Census, Estimated Future Population, Areas with The Possibility of Disappearing

Following the Great East Japan Earthquake that occurred on March 11, 2011 and the accompanying accident at the Fukushima Daiichi Nuclear Power Station of Tokyo Electric Power Company, all nuclear power stations in Japan were shut down. Although some are currently restarting, the area where the nuclear power plant is located has been greatly affected economically by the continued shutdown and decommissioning due to the 40-year operation restriction.

These areas are located in rural areas, and efforts for regional revitalization are underway to stop the rapid population decline. Since the focus is on securing employment opportunities, the shutdown and decommissioning of nuclear power plants can be expected to have a negative impact. Moreover, as these areas have evolved with the construction and operation of nuclear power plants, it is feared that a shift in the opposite direction will accelerate their decline.

This study clarifies the population trends in the area where the nuclear power plant is located by comparing with neighboring areas¹. By comparing the population according to the census between 2010 (before the earthquake) and 2015 (after the earthquake), we consider how the impact of the earthquake

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¹ Neighboring areas refer to cities, towns, and villages within its prefecture.

has affected the population of these areas.

In addition, the estimated future population is also shown based on the trends before and after the earthquake. Comparison of this data clarifies how the population of the area where the nuclear power plant is located has been affected by the earthquake and what kind of impact it is expected to have in the future.

Figure 1 shows the population in each location between 2010 and 2015. To clarify the characteristics of the location area, it is compared with the total of cities (when the location area is a city) and towns and villages (when the location area is a town/village) in the same prefecture. In other words, if the “comparison within prefectures” in the figure is positive, the population increase/decrease rate is higher/lower than the total of cities or towns and villages in the prefecture, and if it is negative, it is lower/higher. It should also be noted that the four towns of Fukushima Prefecture are not shown in the table as the populations are now near zero due to the earthquake and nuclear accident.

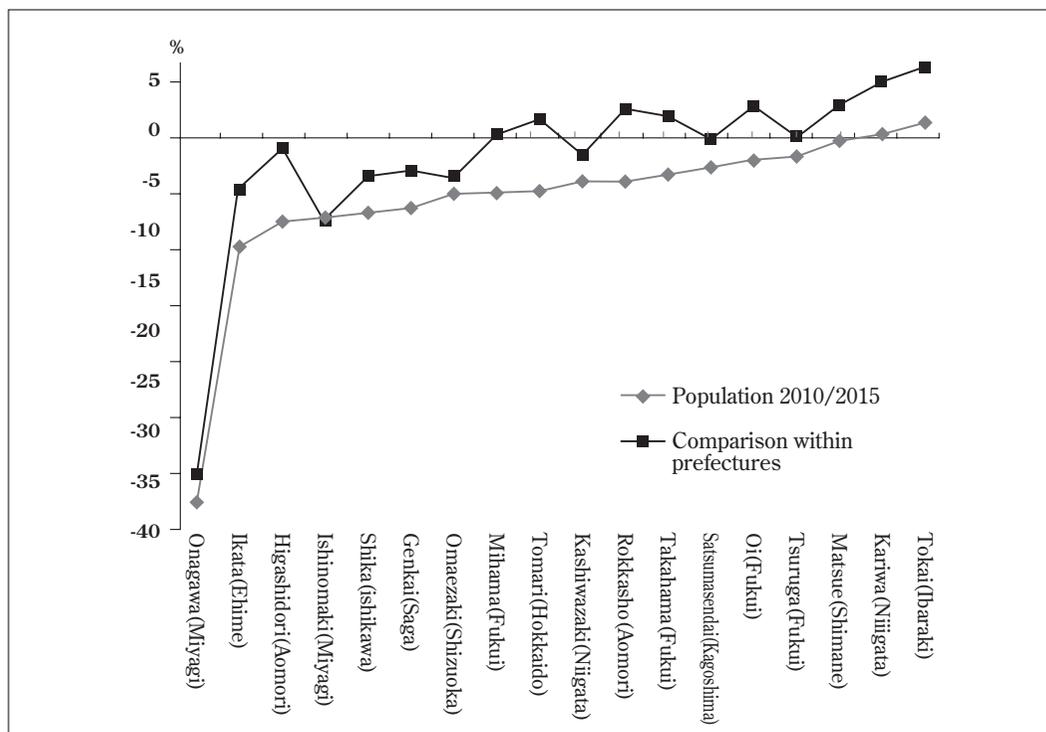


Figure 1 Population increase and decrease

Source: Census

According to Figure 1, population decline is progressing nationally, and the population is decreasing in all areas located near a nuclear power plant except for Tokai-mura, Ibaraki Prefecture. It can be seen that rate of population decline is greater in specific locations than in the prefecture as a whole (the population

decline rate is larger in the location area than in the prefecture). A total of 11 out of 18 municipalities have a negative population rate compared with the prefecture. It is thought that because the nuclear power plant has been shut down for a long time since the earthquake and the nuclear accident, the population of the location area is declining more than in the neighborhood.

However, the situation varies depending on the location area, and the population decline rate is slightly higher than in the prefecture such as Onagawa in Miyagi Prefecture, where the population has decreased significantly to two-thirds. Although it is large, there are cases where the population decline rate is medium but positive in comparison within the prefecture, such as Rokkasho village in Aomori prefecture.

However, the cause of the population decline is not necessarily the decrease in employment opportunities from the electric power industry. Figure 2 is a representation of the total change rate of workers, electricity, gas, heat supply, and water in the same period.

Figure 2 shows a greater decrease in the number of workers as a proportion of the overall population reduction. However, this has little to do with the decline in electricity, gas, heat supply, and water. Rather, it became clear that the number of workers in these industries is increasing in many regions.

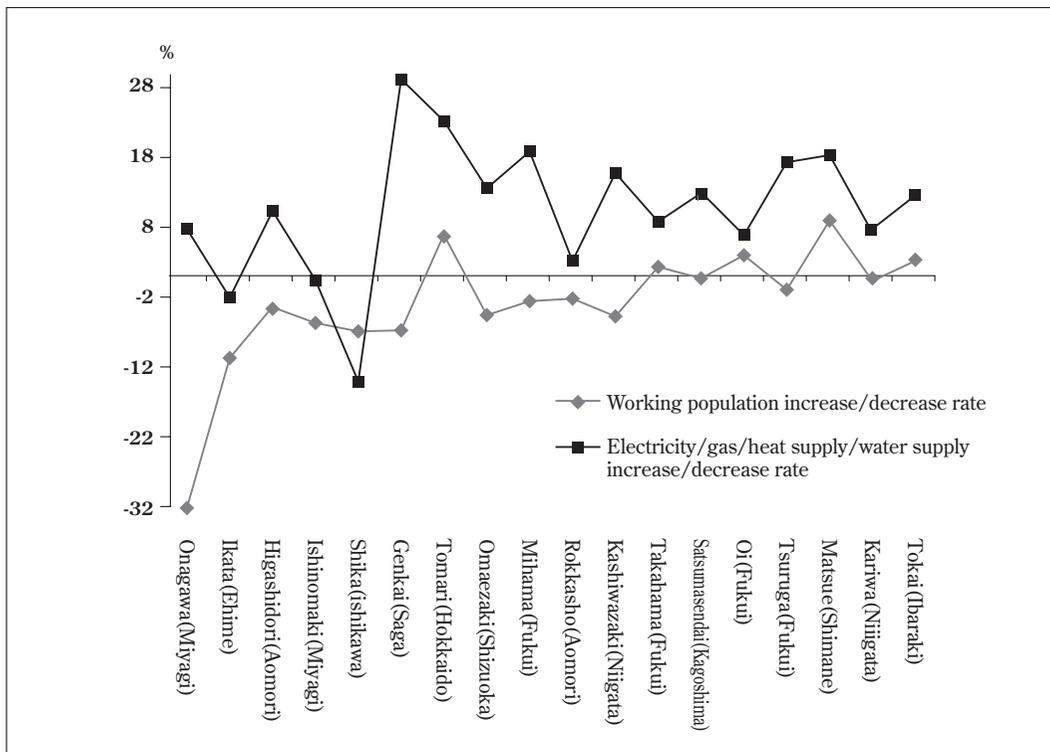


Figure 2 Increase/decrease in the working population and electricity/gas/heat supply/water supply
Source: Census

Table 1 shows the reduction in the number of workers by industry in the same period. The electricity, gas, heat supply, and water industries do not show a significant decrease in the number of workers in any of the locations. The most common industries are wholesale and retail (13 municipalities), followed by agriculture, forestry, and services (not classified elsewhere) (10 municipalities each), fisheries, construction, and manufacturing (9 municipalities each). Transportation industry and postal industry (8 municipalities).

	Onagawa(Miyagi)	Ikata(Ehime)	Higashidori(Aomori)
1st	Manufacturing	Agriculture, forestry	Construction
2nd	Fishery	Fishery	Academic research, professional/technical service
3rd	Wholesale, retail	Wholesale, retail	Wholesale, retail
4th	Accommodation, restaurant	Service industry (not classified elsewhere)	Agriculture, forestry
5th	Transportation, postal	Manufacturing	Manufacturing
total	-1,545	-559	-133

	Ishinomaki(Miyagi)	Shika(ishikawa)	Genkai(Saga)
1st	Manufacturing	Manufacturing	Service industry (not classified elsewhere)
2nd	Wholesale, retail	Wholesale, retail	Agriculture, forestry
3rd	Fishery	Agriculture, forestry	Wholesale, retail
4th	Transportation, postal	Construction	Fishery
5th	Life-related service, entertainment	Transportation, postal	Life-related service, entertainment
total	-4,166	-733	-248

	Tomari(Hokkaido)	Mihama(Fukui)	Omaezaki(Shizuoka)
1st	Construction	Construction	Manufacturing
2nd	Accommodation, restaurant	Service industry (not classified elsewhere)	Agriculture, forestry
3rd	Public affairs (excluding those classified elsewhere)	Agriculture, forestry	Wholesale, retail
4th	Transportation, postal	Transportation, postal	Unclassifiable industry
5th	Real estate, goods leasing	Fishery	Fishery
total	50	-163	-957

	Rokkasho(Aomori)	Kashiwazaki(Niigata)	Takahama(Fukui)
1st	Construction	Wholesale, retail	Service industry (not classified elsewhere)
2nd	Service industry (not classified elsewhere)	Construction	Manufacturing
3rd	Fishery	Manufacturing	Fishery
4th	Agriculture, forestry	Academic research, professional/technical service	Accommodation, restaurant
5th	Wholesale, retail	Service industry (not classified elsewhere)	Life-related service, entertainment
total	-155	-2,308	100

	Satsumasendai(Kagoshima)	Oi(Fukui)	Tsuruga(Fukui)
1st	Unclassifiable industry	Wholesale, retail Construction	Construction
2nd	Agriculture, forestry	Service industry (not classified elsewhere)	Wholesale, retail
3rd	Wholesale, retail	Finance and insurance	Service industry (not classified elsewhere)
4th	Public affairs (excluding those classified elsewhere)	Life-related service, entertainment	Agriculture, forestry
5th	Transportation, postal	Public affairs (excluding those classified elsewhere)	Transportation, postal
total	6	141	-557

	Matsue(Shimane)	Kariwa(Niigata)	Tokai(Ibaraki)
1st	Wholesale, retail	Construction	Service industry (not classified elsewhere)
2nd	Construction	Manufacturing	Unclassifiable industry
3rd	Agriculture, forestry	Service industry (not classified elsewhere)	Academic research, professional/technical service
4th	Accommodation, restaurant	Accommodation, restaurant	Wholesale, retail
5th	Manufacturing	Transportation, postal	Information and communication
		Life-related service, entertainment	
total	115	-2	143

Table 1 Industries with a large decrease in the working population (2010–2015)

Source: Census

What does this mean? Even if a nuclear power plant is shut down, it does not mean that the personnel engaged in the electric power company are no longer needed, and there is no significant loss of employment. It is probable that a certain amount of employment was secured to comply with the new regulatory standards for nuclear power plants, to continue operations and make decisions, preparations, and procedures for decommissioning. On the other hand, the wholesale, retail, and construction industries, which were significantly impacted, can be considered industries directly or indirectly related to nuclear power generation or peripheral industries. Therefore, it can be said that the shutdown of the nuclear power plant has not only affected the power generation sector itself, but also a wide range of related industries.

Next, this study describes the estimated future population. The Japan Policy Council raised issues ranging from accelerating population decline in rural areas to the possibility of “regional disappearance.” In other words, in terms of the “reproductive power” of the population, as long as the population of young women aged 20 to 39 continues to decline, its reproductive power will continue to decline, and the decline in the total population will not be stopped. Areas with particularly rapid declines, specifically municipalities that will decrease to less than 50% in the 30 years from 2010 to 2040 (Reiwa 22), are considered “city at risk of disappearing” Moreover, municipalities with less than 10,000 people in 2040 are positioned as “city at high risk of disappearing.”

According to the Japan Policy Council, the number of cities at risk of disappearing is 896, amounting to 49.8% of the total. Of these, 523 are cities at high risk, amounting to 29.1% of the total. The Council warned that half of the cities, wards, towns, and villages in the whole country will eventually disappear, and it was announced that a little less than one-third will fall into a more serious situation together with the name of the corresponding city, ward, town, and village, and this had a significant impact on each place.

The warning from the Japan Policy Council was an important opportunity for regional revitalization, which is said to be the trend of new regional policies. It was also an opportunity for the population to change from a “premise of regional policy” to a “maximum goal.” From the warning from the Council to the development of regional revitalization, long-term population forecasting has become extremely important.

Going forward, what is the situation for areas in which a nuclear power plant is located? Table 2 shows the estimated future population of these location areas. First, Fukushima Prefecture is not estimated because it is difficult to predict the population trends and future trends by municipality, and only estimates for the prefecture as a whole are provided. Therefore, the results are shown for 18 municipalities excluding four towns in Fukushima Prefecture. A total of 12 cities are under threat of disappearing, accounting for two-thirds of the total. In addition, 9 have a high risk of disappearing, which equals to half. Both percentages are higher than the national average which are respectively 49.8% and 29.1% as I already referred . In other words, the area where the nuclear power plant is located is facing

the danger of regional disappearance.

	Young female population change rate	2040 Young female population	2040 Total population	2010 young female population	2010 total population	possibility of disappearance
Tomari (Hokkaido)	-53.4	69	1,113	149	1,883	◎
Rokkasho (Aomori)	-43.7	627	7,698	1,113	11,095	
Higashidori (Aomori)	-67.4	186	3,935	571	7,252	◎
Ishinomaki (Miyagi)	-52.8	7,870	102,441	16,687	160,826	○
Onagawa (Miyagi)	-59.0	371	5,632	904	10,051	◎
Naraha (Fukushima)	Not Shown					
Tomiooka (Fukushima)						
Okuma (Fukushima)						
Futaba (Fukushima)						
Tokai (Ibaraki)	-14.1	3,922	39,044	4,568	37,438	
Kashiwazaki (Niigata)	-51.3	4,355	62,925	8,935	91,451	○
Kariwa (Niigata)	-51.6	196	3,399	405	4,800	◎
Shika (Ishikawa)	-54.8	743	12,079	1,644	22,216	○
Tsuruga (Fukui)	-42.6	4,374	52,063	7,625	67,760	
Mihama (Fukui)	-59.2	377	6,699	925	10,563	◎
Takahama (Fukui)	-62.1	397	7,032	1,047	11,062	◎
Oi (Fukui)	-52.5	358	4,817	754	8,580	◎
Omaezaki (Shizuoka)	-47.9	2,009	26,622	3,856	34,700	
Matsue (Shimane)	-43.9	13,232	163,474	23,588	208,613	
Ikata (Ehime)	-68.5	212	5,029	673	10,882	◎
Genkai (Saga)	-59.1	233	3,969	571	6,379	◎
Satsumasendai (Kagoshima)	-41.2	6,083	73,536	10,337	99,589	

(Note) ○ is a city with a possibility of disappearing, and ◎ is a city with a high possibility of disappearing.

Table 2 Future Estimated Population of Nuclear Power Plant Location Area (Japan Policy Council Estimate)

Source: Japan Policy Council

Moreover, the judgment of the possibility of disappearance does not take the shutdown of nuclear power plants after the earthquake and the nuclear accident into account. The effects of these incidents are directly taken into consideration in affected areas. In short, it was expected that the area where nuclear power plants would be located would experience accelerated population decline even if they were not shut down due to the earthquake and the nuclear accident.

Therefore, as a short-term impact of these incidents, I would like to compare the estimated population in 2015 as determined by the National Institute of Population and Social Security Research with the actual population in 2015. Then, as a long-term impact, I would like to clarify the estimated population in 2040 by comparing the situation before and after the earthquake and nuclear accident.

The “difference in population decline rate” in Figure 3 shows the short-term impact. In other words,

the difference in the rate of population decline is the difference between the actual population in 2010 compared to that in 2015 and the actual population in 2010 compared to the estimated population in 2015. This reveals how the 2015 population was different from what was expected. In many areas where nuclear power plants are located, the difference in population decline is negative. In other words, the actual population decline from 2010 to 2015 is larger than estimated, indicating that the decline is already accelerating at a higher rate than expected.

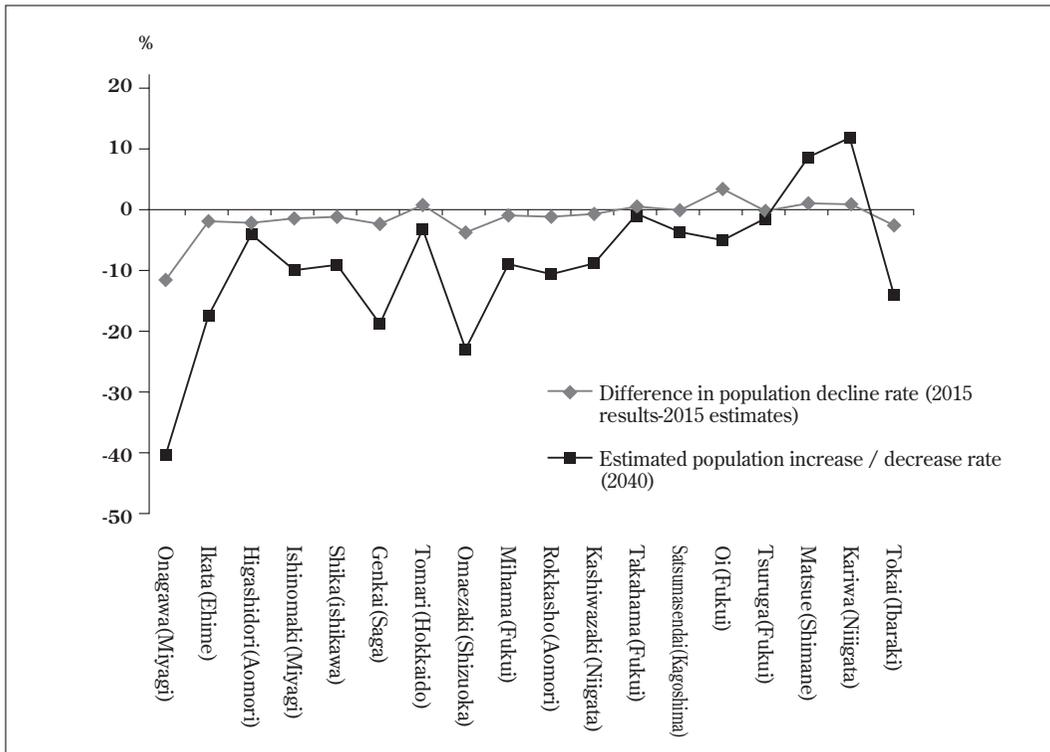


Figure 3 Estimated future population of the area where the nuclear power plant is located

Source: National Institute of Population and Social Security Research

In addition, the “estimated population increase/decrease rate” represents the long-term impact. We compared the figures published in 2013 with those in 2018 for the estimated future population in 2040. As a general trend, the greater the population decline from 2010 to 2015, the greater the rate of decline in the estimated future population. Moreover the larger the difference in the population decline rate, the larger the estimated population decline rate. In other words, since the actual population decline from 2010 to 2015 was larger than the estimated population, not only is the population decline already accelerating, but such a tendency will become stronger in the future estimated population.

Therefore, to curb the population decline in the area where the nuclear power plant is located, municipalities where the decline is progressing need to take immediate action.

In this way, the population decline in the location area was expected to be more severe than the neighboring areas before the earthquake and the nuclear accident, but there are many areas in which it has become even more severe due to these events. Not only is the actual population in 2015 already below the estimated population, but new estimates indicate that the population in 2040 will be lower than the previous estimate. It is feared that shutdown and decommissioning of nuclear power plants will have a serious impact on the sustainability of the region through the acceleration of population decline.