Comparative Study on Nuclear Perception of Local Residents based on Distance

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1. Introduction

The Korean government established the『ACT ON ASSISTANCE TO ELECTRIC POWER PLANTS-NEIGHBORING AREAS』 in 1989 to contribute to developing neighboring areas of nuclear power plants (NPPs), promoting a smooth operation and enhancing the residents' acceptance of NPPs. It has implemented the act since 1990. The government defined administrative districts, namely, *eup*, *myeon*, and *dong*, within 5 km from a generator, and has implemented various aid programs such as income increase, business attraction, public facilities, scholarship, electric bills subsidy, and resident welfare programs. Particularly in the case of nuclear power, after it amended the law in 2005, KHNP, a utility, has operated aid programs by itself with its own budget [1]. The goals of the aid programs are to give a positive perception of nuclear energy to residents, and create the development of districts. Therefore, based on the relation with the aid program and perception, we analyzed the perception of NPPs of neighboring residents based on distance.

2. Methods and Results

This research conducted a survey for residents in districts where NPPs have operated. In addition, we compared the residents' perceptions by district, and compared the results with the general public using the same survey conducted during the same period.

2.1 Procedure of Survey

The data of this research are the results of the survey for residents near NPPs conducted in August 2016. We surveyed 1,500 residents aged 19 and over in 4 areas of Gijang-gun, Uljin-gun, Yeonggwang-gun and Gyeongju-si. In addition, we surveyed Samcheok-si and Yeongdeok-gun where nuclear plants will be constructed. In addition, a national survey for general public was conducted for 1,000 people. This survey for local residents has a 95% of confidence level with an error of plus or minus 2.5%.

2.2 Classification of District Group

We defined a "5 km group" as those who live in areas within 5 km from NPPs in Gijang-gun, Uljin-gun, Yeonggwang-gun and Gyeongju-si, regardless of whether the district is subject to the act or not. Other areas in each city are classified as "outside of 5 km". In addition, we labeled Samcheok-si and Yeongduk-gun as "potential area" because these districts are designated as proposed sites for new NPPs. In addition, we provided national survey results as a comparison group.

2.3 Measurement Index

This survey used 5 indexes, namely, the necessity of NPPs, safety of NPPs, safety of radioactive waste management, the pros and cons regarding NPP construction in their district, and opinions in using nuclear power for electricity generation. We suggested 4 options that respondents could choose: *absolutely not*, *not really*, *somewhat*, and *very likely*. Current research translated each response from a score of 1 to 4 and analyzed them.

2.4 Results

1) Necessity and Acceptance of NPP

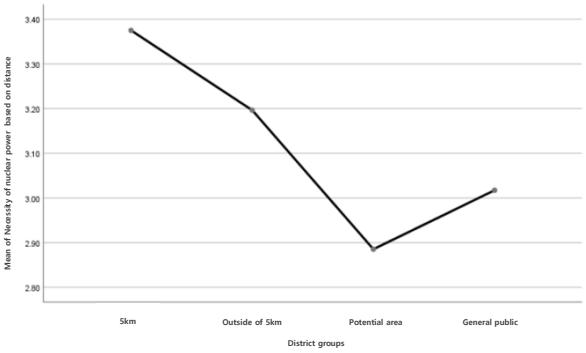

Fig. 1. Necessity of nuclear power by district group

Table Ⅰ: Mean difference analysis on necessity of nuclear power by district group

group		Mean difference	Standardized errors	p-value
5km	Outside of 5km	.17859*	.05761	.022
	Potential area	.48981*	.07279	.000
	General public	.35774*	.05689	.000
Outside of 5km	5km	-.17859*	.05761	.022
	Potential area	.31122*	.06084	.000
	General public	.17915*	.04049	.000
Potential area	5km	-.48981*	.07279	.000
	Outside of 5km	-.31122*	.06084	.000
	General public	-.13207	.06016	.186
General public	5km	-.35774*	.05689	.000
	Outside of 5km	-.17915*	.04049	.000
	Potential area	.13207	.06016	.186

Table Ⅰ and Fig. 1 show that the perception of mean residents who live within 5 km is 3.3750. This is higher than the general public, at 3.0173, and the highest score among all groups. It is statistically significant from the score in areas of 'outside of 5 km' and 'potential area' groups.

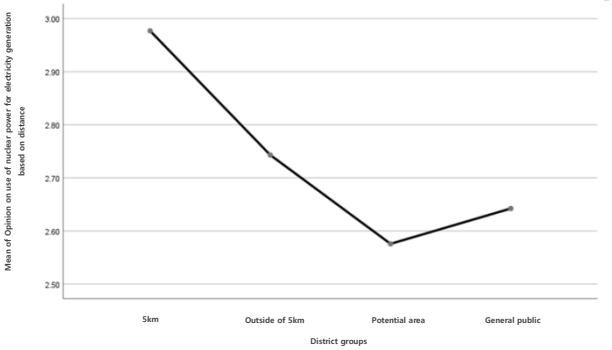

Fig. 2. Opinion on use of nuclear power for electricity generation based on distance

Fig. 2 shows a comparison graph in using nuclear power for electricity generation based on distance. The mean of the 5 km group is the highest, and its tendency is similar to Fig. 1.

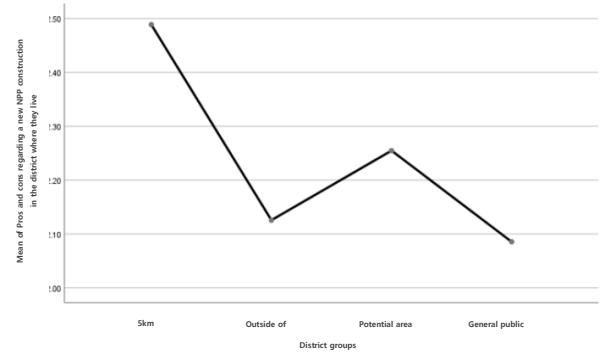

Fig. 3. Pros and cons on NPP construction in the district where they live

Table Ⅱ: Mean difference regarding pros and cons on NPP construction in the district where they live

group		Mean difference	Standardized errors	p-value
5km	Outside of 5km	.36310*	.06977	.000
	Potential area	.23399	.08811	.071
	General public	.40319*	.06888	.000
Outside of 5km	5km	-.36310*	.06977	.000
	Potential area	-.12911	.07372	.382
	General public	.04009	.04914	.881
Potential area	5km	-.23399	.08811	.071
	Outside of 5km	.12911	.07372	.382
	General public	.16920	.07287	.146
General public	5km	-.40319*	.06888	.000
	Outside of 5km	-.04009	.04914	.881
	Potential area	-.16920	.07287	.146

Next, Fig. 3 shows the pros and cons regarding whether a new NPP is constructed where they live. As a result, the mean of 5 km, 2.4887, is higher than outside of 5 km (2.1256) and the general public (2.0855). In table Ⅱ, we can verify that the 5 km group shows a statically significant difference in 'outside of 5 km' and the general public group, but not in the 'potential area'.

2) Safety related to nuclear power

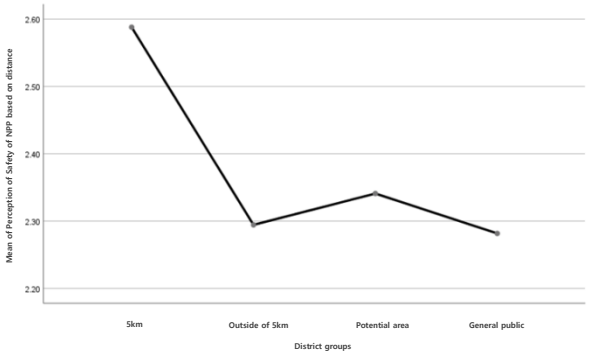

Fig 4. Perception regarding safety of NPP based on distance

Fig. 4 shows the results of a safety perception analysis of NPP based on distance. The mean of the responses indicating they think an NPP is safe is 2.5880. This is clearly the highest among the 4 groups. Meanwhile, the differences between 'outside of 5 km', 'potential area' and the general public are not statically significant.

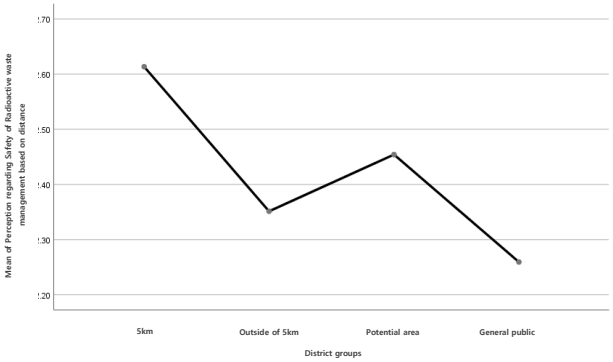

Fig. 5. Perception regarding safety of radioactive waste management based on distance

Fig. 5 shows the perception on the safety of radioactive waste management based on distance. The 5 km group shows the highest score, and is statically significantly different from the general public, but not the other groups.

As we mentioned above, the null hypothesis in that the perceptions of residents living within 5 km from an NPP are not different with other areas is rejected. In other words, we can say that residents living in an *eup*, *myeon*, or *dong* within 5 km from an NPP are more positive regarding the necessity and safety of an NPP.

3. Conclusions

This study analyzed whether neighbors who live within 5 km of an NPP have a different perception with people of other districts. The results show that the perception of neighboring residents within 5 km is more positive regarding the necessity and safety of nuclear power plants. We suppose the reason for this is that a perceived benefit is stronger than a perceived risk [2]. First, residents know that an NPP provides them economic benefit such as aid programs. They have received electricity bill subsidies and experienced the establishment of infrastructure such as cultural events, scholarships, and welfare facilities provided by nuclear power plants. In addition, they have recognized additional benefits, for example, the employment of residents, and the revival of commercial supremacy during NPP construction and operation periods.

Second, the relatively low risk perception comes from the fact that there have been no severe nuclear accidents in Korea, and residents know more than others regarding NPPs. Although neighboring residents could be affected by an incident because they live in the closest district from an NPP, they may think the risk is not high based on their experience. Thus, their perception on NPPs is relatively higher than other districts. In addition, residents know that the budget of the aid program is calculated depending proportionately on the electricity generation. Therefore, their benefit recognition is stronger than their risk recognition, and they know a symbiotic relation with NPPs exists [3].

This conclusion provides implications regarding a nuclear power policy and acceptance of local communities because the statements and experience of residents can have a significant amount of clout on other local communities. Thus, the government should plan effective programs and continue conducting neighboring- area aid programs.

In this research, the attempts to analyze the perception of local residents were limited to an indirect survey. It will also be necessary to check the effectiveness of the aid program through surveys and to suggest effective aid programs in the future.

REFERENCES

[1] ACT ON ASSISTANCE TO ELECTRIC POWER PLANTS-NEIGHBORING AREAS (Article 2)
[2] Jun Seop Shim, Trust in Nuclear Power Plant, Perceived Risk and Benefit, and Acceptance, The Korean Policy Studies Review, Vol.18 No.4, p.93-123, 2009.
[3] “Fund by Kori NPPs is cut in half… Residents rap out a complaint about decreasing fund”, Yonhapnews, 2018.2.4