



## Awareness research on noise pollution in Okinawa Prefecture

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### ABSTRACT

In Okinawa Prefecture, the noise caused by aircraft at US military bases has been taken up as a social problem. Therefore, the purpose of this study is to investigate the position of students living in Okinawa prefecture on pollution based on a questionnaire survey. The eight items that make up environmental problems are air pollution, water pollution, soil pollution, noise, ground subsidence, foul odors, radioactivity, and global warming gas. We conducted a research study on how noise is perceived as pollution.

In Okinawa Prefecture, the majority of students regard noise as one of the pollution problems, "it is not as important as pollution, but it is a familiar problem." It is possible that there is a tendency to think that noise is less dangerous to life, and that the importance of noise from aircraft at US military bases has become less popular.

### 1 First of all

#### 1.1 Research background

Regarding environmental problems, research on the position of warming gas in addition to air pollution, water pollution, soil pollution, noise, ground subsidence, foul odor, and radioactive pollution has been conducted at Fukushima University. In Fukushima Prefecture, from the survey results that radioactivity was regarded as important due to the effects of the nuclear accident, it was considered that the items of pollution may differ depending on the region.

#### 1.2 Research purpose

In Okinawa Prefecture, the noise caused by aircraft at US military bases has been taken up as a social problem. Therefore, the purpose of this study is to investigate the position of students living in Okinawa prefecture on pollution based on a questionnaire survey, and to investigate how noise as pollution is perceived in it.

### 2. Research method

#### 2.1 Two-dimensional image expansion method

The two-dimensional image development method introduces a virtual coordinate axis and participates in one aspect of the survey participants' consciousness about a certain theme and how the participants perceive the various items that make up the theme. It is a method of clarification by having the person himself / herself make a structural evaluation according to the axis.

## 2.2 Survey method

This time, "environmental problems" was set as the theme of the two-dimensional image development method, and the items that make up this theme are air pollution, water pollution, soil pollution, noise, ground subsidence, foul odor, radioactivity, and greenhouse gases. Items have been defined. In addition, as the coordinate axes used for evaluation, the horizontal axis defines "importance of subjective problems" and the vertical axis defines "familiarity of subjective problems".

As for the flow of answering the questionnaire, first, ask the questionnaire respondents to fill in the eight types of environmental problems shown as items at the bottom of the worksheet in the designated columns of the worksheet in order of importance from the right side. Next, put a circle in the corresponding section of the evaluation column for each item on the worksheet, and have each item evaluated on a 7-point scale from the perspective of familiarity.

Furthermore, in the May 2019 and January 2020 surveys, after completing the worksheets as usual, the respondents who are adjacent to each other exchange opinions based on the worksheets, and the respondents themselves obtained from them. We asked them to summarize their views on a worksheet, and from there, we extracted common opinions and tabulated them.

## 2.3 Survey subjects

A questionnaire survey was conducted from September 2014 to January 2020, targeting a total of 316 students, including those who attended lectures on the architecture course of the Department of Environmental Construction Engineering, Faculty of Engineering, Ryukyu University, and those who attended all faculties of common education subjects. Regarding the exchange of opinions conducted in the May 2019 and January 2020 surveys, a survey was conducted on 83 people, and 77 of them responded.

## 3 Survey results

**Table 1 Statistics for each item in the entire survey**

item	average ± standard deviation		average		Correlation coefficient
	Importance	Familiarity	Importance	Familiarity	
air pollution	5.91 ± 1.68	4.78 ± 1.77	6	5	0.18
water pollution	5.72 ± 1.56	4.33 ± 1.49	6	5	0.18
soil pollution	4.34 ± 1.63	2.92 ± 1.43	4	3	0.09
noise	2.61 ± 2.08	5.84 ± 2.08	2	6	0.01
ground subsidence	3.44 ± 1.88	2.47 ± 1.49	3	2	0.18
foul odor	3.42 ± 2.02	4.63 ± 1.87	4	5	0.14
radioactive pollution	6.19 ± 2.16	2.45 ± 1.60	8	2	0.02
warming gas	4.39 ± 2.30	4.63 ± 1.69	4	5	0.22

Regarding the average value from Table 1, the importance was highest in the order of radioactivity, air pollution, and water pollution, and the lowest rating was for noise. However, in terms of familiarity, noise was the highest rating and radioactivity was the lowest rating. From this, it was found that there is a large difference in the relationship between importance and familiarity regarding the items of noise and radioactivity.

In addition, from the standard deviation value, there is a large variation in the evaluation in the order of greenhouse gas, radioactivity, and noise in terms of importance, and in terms of familiarity, the evaluation varies in the order of foul odor, air pollution, and greenhouse gas seen big.

### 3.1 Comparison with Fukushima Prefecture regarding the positioning of pollution

Fukushima prefecture from 2012 to 2013 with 316 people surveyed in Okinawa prefecture from 2012 to 2013. Distribution of items for noise obtained from 264 people surveyed in Fukushima Prefecture. It shows the distribution of items for radioactivity, which was particularly highly evaluated in the survey, among environmental issues.

To consider how noise is positioned in Okinawa Prefecture by comparing it with students in Fukushima Prefecture.

Familiar ↑	65	33	7	6	7	3	10	9
	34	18	9	7	3	3	3	1
Not familiar ↓	15	10	7	5	3	1	3	2
	4	8	2	4	1	2	1	1
	10	3	2					1
	2	1	1	1				
	3	2						1
	← Not important				is important →			

Figure 1 Placement of noise items in Okinawa Prefecture

Familiar ↑	17	9	6	1	3	3	3	5
	15	8	2		2	2		2
Not familiar ↓	23	12	4	6	3	4	4	
	17	8	3	4	1	3		1
	12	4	3					
	15	7	1	1	1			2
	31	9	2	4	1			
	← Not important				is important →			

Figure 2 Placement of noise items in Fukushima Prefecture

Familiar ↑					1			5
			1		2	4	1	4
Not familiar ↓		2	2	2	3	1	4	5
		1	2	4	4	2		2
	2	3	7	6	4	6	3	16
	5	3	3	1	10	2	8	36
	6	8	3	8	8	4	16	56
	← Not important				is important →			

Figure 3 Placement of radioactive items in Okinawa Prefecture

Familiar ↑	2	5	5	7	14	12	12	77	
	2	2	7	7	9	9	7	21	
Not familiar ↓	3	3	6	8	4	4	5	5	
	1	1	1	2		1	1		
						1	1	1	
			1	1		1		1	
	1	1				1		1	
	← Not important				is important →				

Figure 4 Placement of radioactive items in Fukushima Prefecture

In Okinawa Prefecture, 55 respondents evaluated noise as important, accounting for 17% of the total.

The number of respondents who evaluated this was 266, or 84% of the total. Regarding radioactivity,

The number of respondents who evaluated the important side was 247, 78% of the total, and evaluated the side close to them.

The number of respondents was 47, which was about 15% of the total.

In Fukushima Prefecture, 40 respondents evaluated noise as important, which is 15% of the total.

The number of respondents who evaluated the closest side was 134, which was 51% of the total.

Also, about radioactivity the number of respondents who evaluated the important side was 198, which is 75% of the total, and was evaluated by the familiar side.

The number of respondents was 246, or 93% of the total.

Regarding the noise item, students in Okinawa prefecture were rated higher than students in Fukushima prefecture, but Fukushima

The item of noise in Okinawa prefecture is more important than the item of radioactivity in island prefecture.

There was a big difference.

From this, students in Okinawa Prefecture think that noise is a familiar problem, but it is an important problem.

### 3.2 Summary of respondents' views by exchanging opinions

In the May 2019 and January 2020 surveys, how was the position regarding pollution?

After filling out the worksheet, students next to each other exchange opinions based on the worksheet.

And asked the respondents to fill in their own opinions obtained from the survey, and conducted a survey of 83 people. Yes, 77 of them answered.

Table 2 Opinions and number of respondents by exchanging opinions (some answers are available)

		May-19	Jan-20
①	We ranked the importance from the idea that life-threatening things are important.	23	7
②	Ratings for items of unknown risk are low	6	7
③	Problematic items vary depending on the area where you live and where you are from	7	4
④	Noise is not important as it can be tolerated	4	3

The most frequently seen position regarding pollution is that it is related to life activities.

From the idea that it is related to radioactivity and life support, which are known to have a high risk to the human body.

Emphasis is placed on water pollution and air pollution related to air and water, and less dangerous noise is important.

Nearly 40% of the respondents said that they rated it low, and the average value for importance is this.

Since the three items of the above occupy the top, the evaluation of the importance from the degree of danger related to life It is believed that they tend to be valued.

In addition, a review of items whose danger is difficult to understand due to the idea that the value will be low, there are few judgment criteria in the pollution items due to the bias of knowledge. There was a tendency to underestimate things.

Furthermore, there are opinions that it is not important because you can get used to noise and endure it.

This is one of the reasons for the low evaluation of the importance of noise.

### 3.3 Survey on impressions of health damage caused by noise

Ryukyu University to see how you are interested in showing the damage caused by noise

We asked the participants of the lecture of the architecture course of the Faculty of Engineering of the Faculty of Engineering to watch the video on the theme of noise of the video.

The content is that there are deaths from myocardial infarction caused by the noise of aircraft at U.S. military bases.

And night noise increases the risk of various adult diseases such as myocardial infarction due to mild sleep disorders

Things to do and noise damage to households with infants around the base.

The impressions were obtained from 36 out of 40 people. The results are shown below.

Table 3 Number of people about their impressions of noise-related images (some answers are available)

		Number of people	Percentage (%)
①	Relationship between noise and risk to health	20	59
②	Noise disturbs sleep	10	29
③	About the annoyance around the base	9	26
④	Noise inhibits baby's growth	2	6

About noise damage Students mentioned that noise affects the human body and there are cases of death

There were 20 people, which was close to 60% of the total. In addition, among them, studies that clearly state that there is an impact on health

There were 14 students, 36% of the total, so it was confirmed that noise would cause health problems.

It seems that few students are aware of it.

## Summary

In Okinawa prefecture, the majority of students said that noise was one of the pollution problems, but it was not as important as pollution.

It's a familiar problem, "and it tends to think that noise is less life-threatening.

It is probable that the evaluation of the importance has been lowered due to the fact that the noise from the aircraft at the US military base has become commonplace.

However, regarding noise and the danger of life, as reported by the survey results that noise also has health hazards,

Since it is possible from this survey that this is not widely known, we will show the relationship between noise and health hazards in the future.

Because of the changes in the position of noise in pollution and the fact that this time the target was only students.

It is considered necessary to conduct a detailed awareness survey on pollution by age group.

## References

(1) Koji Nagahata: How noise researchers position noise problems among environmental problems, Proceedings of the Japan Society for Noise Control Engineering Research Presentation, pp1-12, 2014

(2) Miho Sonoda: Examination of 2D image development method to visualize how to grasp various environmental problems, Journal of Human and Environmental Society, pp27, 2015

(3) Okinawa Times: "Noise and health effects at Kadena Air Base: Estimated 17,453 patients with sleep disorders" Okinawa Times + Plus, March 14, 2019

<https://www.okinawatimes.co.jp/articles/-/396240>