

Environmental Education at Waste Incineration Facilities in Japan: Educational Activities Continued Even during the COVID-19 Pandemic

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Abstract

This paper discusses the environmental education conducted at waste treatment facilities, which is a significant feature of waste management in Japan. This kind of research has never been done before. In this study, responses were obtained from 82.2% (755/919) of incineration facilities in Japan. According to the survey, 96% of incineration facilities accept visitors. During normal times before the COVID-19 pandemic, they were visited by 8.71 million people annually. Among them, 1.08 million people participated in field trips and lectures to learn about the waste treatment system, with 67% being fourth-grade elementary school students visiting as part of their classes. The practice of elementary school students learning about waste treatment began with the national curriculum guidelines enacted in 1971 and has continued for about half a century. Incineration facilities are equipped to accommodate elementary school students. In 2020, Japan was also hit by the COVID-19 pandemic. However, even in such circumstances, waste incineration facilities and elementary schools endeavored to continue the field trips for elementary school students. General visitors decreased by 92% from the previous year, but visits as part of elementary school classes only decreased by 77%. The survey results indicate that incineration facilities made efforts to continue the tours for elementary school students by adjusting the timing, implementing infection control measures, and limiting locations. It became clear that many waste management professionals believe that field trips to waste treatment facilities for elementary school students should continue even during the COVID-19 pandemic.

Keywords: incineration facility, field trip, environmental education, COVID-19, questionnaire survey

1. Introduction

Environmental education activities at waste treatment facilities have long been an integral part of waste management in Japan. Waste treatment was first included in the Ministry of Education, Science and Culture's elementary school social studies curriculum guidelines in 1971, and waste treatment facilities being subsequently equipped to host field trips by elementary school students. Almost all waste treatment facilities built since 1980 were designed with walkways, entrances, washrooms, and exhibition equipment for facilitating such field trips. In 1992, the national government also launched a scheme for subsidizing the costs of equipping facilities for sorting recyclables collected from consumers with the means for providing educational content aimed at communicating the importance of reducing waste and recycling resources. As a result, many waste treatment facilities now boast exhibition spaces for the display of relevant information, repair facilities for promoting reuse, and hold seminars and other events to educate the public on environmental matters. Waste-related environmental education activities have therefore been conducted in Japan on a nationwide scale for about half a century. I searched for other previous studies on environmental education for waste management, but found no examples for developed countries, although some mentioned shortages in developing countries.

Then, the COVID-19 pandemic struck the world. In Japan, the government declared a nationwide state of emergency in April 2020 that called on people to refrain as much as possible from going out and also closed schools.

For this study, I conducted a large-scale questionnaire survey of municipal waste incineration facilities throughout Japan with the aim of covering all such facilities. The purpose of this survey was to gather information on

incineration facility field trips and other initiatives being implemented under normal circumstances and to investigate the impact of a major external force such as a pandemic on such activities so as to ascertain the degree of importance attached to facility field trips and other environmental education activities by incineration facility managers and other relevant personnel.

2. Method of Questionnaire Survey

Questionnaires were sent out in November 2021 to all 936 incineration facilities in Japan listed in the 2020 Waste Management Yearbook. As shown in Table 1, seventeen facilities were removed from the list, including facilities for which the questionnaires were returned as “address unknown” and others that were found to have been closed. As such, the survey effectively targeted 919 facilities. Of these, we received responses of some kind from 755 facilities, a high response rate of 82.2%.

In Japan, statistics on public administration are compiled on an annual basis. The fiscal year 2019 used in this survey refers to the period from April 2019 to March 2020, and fiscal year 2020 to the period from April 2020 to March 2021. This means that the period of February–March 2020 in which COVID-19 infection showed signs of spreading in Japan comprises the tail end of fiscal 2019, but for the purposes of comparing activities in fiscal years 2019 and 2020 for this study, we have treated fiscal 2019 as a normal year preceding the pandemic, and fiscal 2020 as a year in which the pandemic was ongoing.

Table 1. Questionnaire survey overview

Item	Details
Survey implementation period	Nov. 2021
Survey method	Distribution by mail/fax and collection by mail
Number of questionnaires initially sent out	936
Address unknown and facility closures	17 facilities
Effective questionnaire survey targets (A)	919 facilities
Number of responding facilities (B)	755 facilities
Response rate (B/A)	82.2%

3. Activities Conducted under Normal Circumstances before the Outbreak of COVID-19

3.1 Percentage of Incineration Facilities That Offered Field Trips

Most incineration facilities in Japan offer facility field trips and waste reduction-related environmental education content. Figure 1 shows the percentage of waste incineration facilities covered by this study that offered field trips in fiscal 2019 before COVID-19 outbreak. Thirty facilities responded that they had zero visitors, but of these, one was no longer in operation, and one was undergoing reconstruction, meaning that 28 facilities were in operation but offered no field trips. Of the 753 incineration facilities in operation that responded to the survey, 725 (96%) accepted visitors.

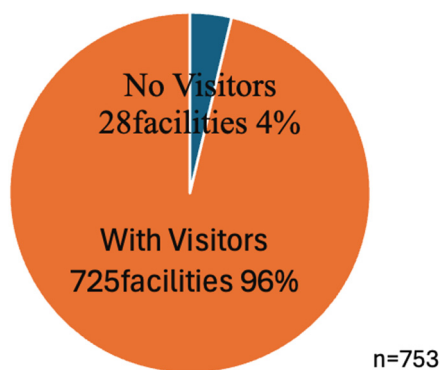


Figure 1. Percentage of incineration facilities that accepted visitors in normal times (FY2019)

3.2 Number of Visitors to Incineration Facilities

As shown in Table 2, in fiscal 2019, the incineration facilities that responded to our questionnaire were visited by a total of 8 710 242 people. Of these, 1 075 173 people participated in incineration facility field trips and other environmental education activities. The average number of visitors per incineration facility was 12 587. This high average is the result of extremely high numbers of visitors to certain facilities, and the median was 821. The average number of visitors who participated in facility field trips, lectures, and other environmental education activities was 1502, with the median being 627. Among the responding incineration facilities, the most visited facility received more than 400 000 visitors in fiscal 2019, and 4 others received more than 300 000 visitors. Such facilities were equipped with attached swimming pools, public baths, sports and other facilities using the residual heat from incineration. Some facilities responded that their field trips and environmental education activities attracted not only children from within the area, but also students from schools in China and the United States.

Table 2. Number of visitors to incineration facilities in fiscal 2019

	Visitors to incineration facilities in 2019	People who participated in tours or environmental activities at incineration facilities in 2019
Average (person per facility)	12,587	1,502
Number of facilities	692	716
Standard deviation	45,785	2,584
Median (person per facility)	821	627
Minimum (person per facility)	0	0
Maximum (person per facility)	403,208	28,665
Total (person)	8,710,242	1,075,173

3.3 Types of Participants in Field Trips and Environmental Education Activities

Figure 2 shows the types of people who visited incineration facilities and participated in facility field trips, lectures, and other environmental education activities in fiscal year 2019, before the COVID-19 pandemic. Fourth graders visiting as part of their elementary school education curriculum accounted for 67% of the total. Elementary school students who visited other than part of class tours accounted for a further 2%. Junior high, high school, and university student numbers were low. Citizen instructors (local residents appointed by municipal governments to promote waste reduction activities) accounted for 2%, field trip participants from other municipalities or private businesses a further 5%, and adult members of the public a further 16%.

According to the Ministry of Education, Culture, Sports, Science and Technology's Statistical Abstract (Monbukagakusho, 2019), the number of fourth grade students enrolled across Japan in 2019 was 1 080 540. The total number of fourth graders who visited the facilities that responded to the survey was 745 120, amounting to 69% of the fourth grade students. In some municipalities, resource sorting facilities have replaced incineration facilities as field trip destinations, and as a result, the total percentage of fourth grade students who visit waste incineration facilities and combined waste incineration/resource sorting facilities is likely higher than 69%.

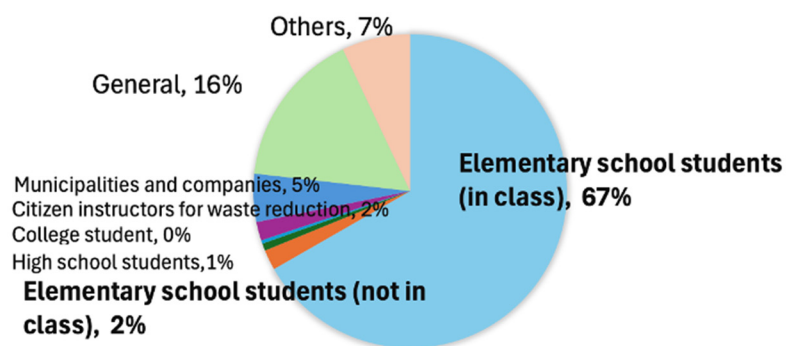


Figure 2. Types of participants in field trips and environmental education activities at waste incineration facilities

3.4 Reactions of Elementary School Students and Incineration Facilities to Field Trips

In the questionnaire, incineration facilities were asked about the behavior of elementary school students visiting the facilities and the reactions of the facilities that received them. The results are shown in Table 3. It appears that 97% of the elementary school students show interest in field trips to incineration facilities, and 79% of the facilities welcome these visits. Even among the 28 facilities that responded that field trips by elementary school students are “a bit of hassle” or “a great hassle,” it was reported that the students who visited the facilities seemed to be genuinely interested in the field trip.

Table 3. Reactions of elementary school students and incineration facilities to field trips

		Behavior of elementary school student					Subtotal	%
		Very interested	Somewhat interested	Nutral	Not very interested	Not interested		
Reactions of the facilities	Very welcoming	247	94	0	0	0	341	48%
	Somewhat welcoming	73	146	1	0	0	220	31%
	Neutral	19	85	18	0	0	122	17%
	A bit of hassle	4	19	1	0	0	24	3%
	A great hassle	0	2	2	0	0	4	1%
	Subtotal	343	346	22	0	0	711	100%
%		48%	49%	3%	0%	0%	100%	

Number of incineration facilities / n=711

4. Impact of the COVID-19 pandemic

4.1 Decrease in the Number of Visitors to Incineration Facilities and Participants in Field Trips and Environmental Education Activities

COVID-19 infection numbers rose explosively in fiscal 2020. Figure 3 shows the percentage decrease in the number of visitors to incineration facilities and participants in field trips and environmental education activities from fiscal 2019 to fiscal 2020. The pandemic caused the number of visitors to incineration facilities (including attached swimming pools, public baths, and other facilities) to decrease by 47%, and the number of participants in field trips and other environmental education activities by 74%.

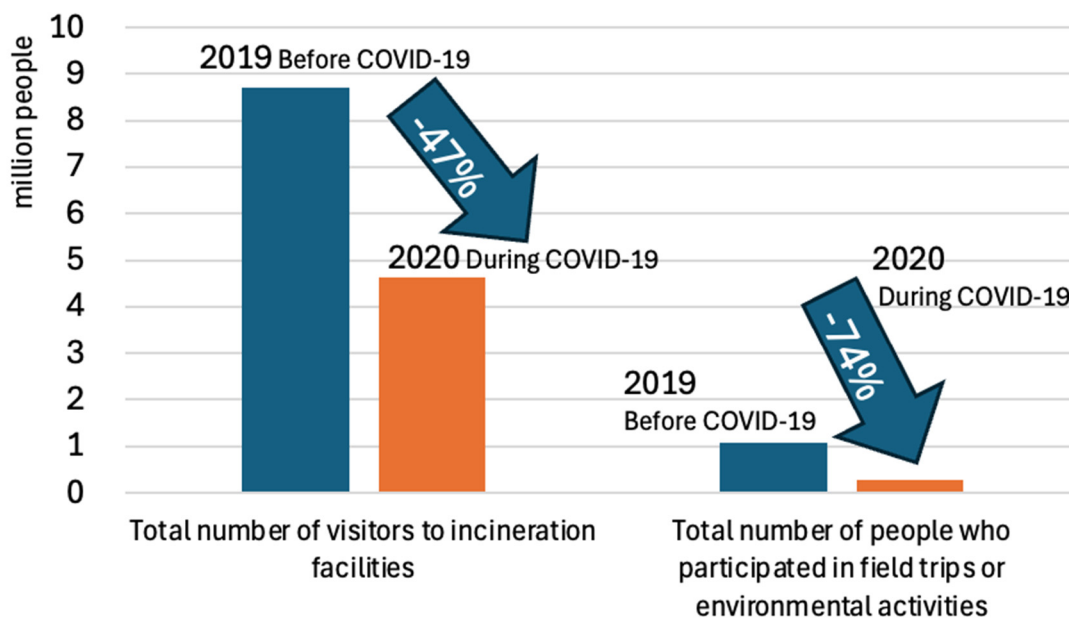


Figure 3. Decrease attributable to the COVID-19 pandemic in the number of visitors to incineration facilities and participants in field trips and environmental education activities

4.2 Difference in Decrease by Participant Type

Figure 4 shows the differences by attribute in percentage decrease of participants in study tours and environmental education activities between the normal year of fiscal 2019 and the pandemic year of fiscal 2020. We received responses to the questionnaire from 755 facilities, but for various reasons, the total for each type of participant did not match the total number of participants in certain cases. We accordingly compared changes between the two years using only data from the 524 facilities for which the total of the number each type of participant was consistent with the total number of participants. This is the reason for the lower total number of participants in Figure 4 compared to Figure 3.

Our data showed that overall participation in study tours and environmental education activities fell by 79% from pre-pandemic levels. The decreases varied by types of participants, with participation by university students dropping by 94% to only 6% of the pre-pandemic level, and by adult members of the public by 92%. Study tours organized by municipalities for waste reduction promotion personnel also decreased by 82%. Compared to such groups, the number of elementary school students participating in tours as part of their education decreased by only 77%.

	2020 (During COVID-19)		2019 (Before COVID-19)	
Elementary school students (in class)	122 303	23%	530 899	100%
Elementary school students (not in class)	1 460	28%	5 198	100%
High school students	1 276	25%	5 132	100%
College student	198	6%	3 272	100%
Citizen instructors for waste reduction	2 394	18%	13 228	100%
Municipalities and companies	15 609	18%	85 232	100%
General	3 352	8%	43 290	100%
Others	4 942	22%	21 989	100%
Total	151 534	21%	708 240	100%
	(person)	(%)	(person)	(%)

n=524

Figure 4. Differences in the decrease in participants in study tours and environmental education activities by type of participant

4.3 Arrangements for Hosting Study Tours during the COVID-19 State of Emergency

Although its actual duration varied by region, a state of emergency was declared in all regions of Japan from April to May 2020. Although no penalties were imposed for non-compliance, all members of the public were asked to cooperate in preventing the spread of COVID-19 infection by staying at home and reducing their contact with others by at least 70%, and ideally by 80% (Prime Minister's Office of Japan, 2020). Table 4 shows the results of my survey regarding how incineration facilities dealt with field trips during this period. Even during the state of emergency, 94 facilities (13%) kept their doors open to field trips by elementary school classes. "Self-guiding walkways kept open" means that already installed walkways designed to enable visitors to tour the facility freely without guides were kept open even during the pandemic. 11 facilities (2%) had such walkways in place.

Table 4. Incineration facility field trips during the 2020 COVID-19 state of emergency (multiple responses accepted)

Incineration facility tours during the April 2020 state of emergency	Number of facilities	%
All tours canceled	485	67%
Elementary school student tours accepted	94	13%
Self-guiding walkways kept open	11	2%
Tours hosted but participant numbers restricted	82	11%
Other	108	15%

n=726 (number of incineration facilities that responded)

In Table 4, 108 facilities (15%) selected "Other" with some comments. Therefore Table 5 summarizes the comments submitted in the questionnaire's free comment section of "Other". Comments to the effect that no field trip applications were received despite the facility imposing no restrictions were the most common, accounting for 31 of the 118 entries. A further 8 facilities commented that elementary school field trips were canceled by the school or board of education. In all these cases, the facilities concerned made it clear that they themselves were not instrumental in canceling field trips.

Also, although the questions were not limited to elementary school field trips, many of the responses focused on how elementary school field trips were conducted. Responses such as "We staggered field trip times" (6 facilities), "We allowed field trips but imposed infection prevention precautions" (11 facilities), "We allowed field trips but restricted (shortened) tour routes" (5 facilities), "We allowed field trips but restricted participant numbers and target participants" (13 facilities), "We used videos and online tours" (6 facilities), and "We dispatched facility personnel to schools to explain facility operations" (3 facilities) exemplify the way in which many facilities went out of their way to educate elementary school students about their operations and waste management in general while weathering the pandemic. Schools also showed themselves to be committed to such education, with a teacher in one case recording video at incineration facility to show to his students.

Table 5. Summary of free comment section entries about the hosting of field trips during the 2020 COVID-19 pandemic

Entries in the free comment section	Number of facilities
Tours hosted as usual	8
No tour applications (facilities not instrumental)	31
Elementary school tours canceled by schools/boards of education	8
Elementary school tour times staggered	6
Implemented with infection precautions in place	11
Implemented with restricted (shortened?) tour routes	5
Implemented with restrictions on participant numbers and target participants	13
Videos/online tours provided	6
Facility personnel dispatched to schools	3
Pamphlets sent	1
Implemented according to COVID-19 infection situation	5
Tours discontinued	5
Not hosted for other reasons such as construction	9
Other	7

n=118 (Number of incineration facilities that responded in the free comment section)

5. Conclusion

In Japan, waste incineration and resource sorting facilities have long conducted facility field trips and waste reduction-related environmental education activities. Field trips for fourth graders are particularly common and are conducted through cooperation between waste treatment facilities and elementary schools nationwide. The results of my questionnaire survey of incineration facilities showed that 96% of such facilities open their doors to field trips, and that a total of 1 075 173 people participated in field trips held at the facilities that responded to the questionnaire in fiscal 2019. My results also showed that 67% of those participating in field trips and environmental education activities at these facilities were fourth graders visiting the facilities as part of their elementary school education. Based on the number of elementary school students enrolled and the results of this questionnaire survey, no less than 69% of fourth grade elementary school students in Japan visited incineration facilities in fiscal 2019. These field trips by elementary school students started in 1971 and continued in the same way as today since around 1980 for more than 40 years. The responses from the elementary school students who visited the facilities were positive, and many of the facilities also welcomed the field trips, creating a virtuous cycle between the students and the incineration facilities.

Despite the nationwide voluntary restrictions on going out during the COVID-19 pandemic, some incineration facilities continued to accept field trip participants. In fiscal 2020, when the COVID-19 pandemic was at its height, the number of participants to such facilities was 275 380, a decrease of 74% compared to the pre-pandemic fiscal 2019, but many facilities continued to keep their doors open to field trips even during the height of the pandemic.

Analysis of the decrease in visitors by visitor type during the pandemic showed that the decrease in elementary school students participating in incineration facility field trips as part of their education was smaller than that of university students and the general public. This result points to the determination shown by many waste management facilities to continue educating elementary school students even during the unprecedented circumstances of the COVID-19 pandemic. Even during the state of emergency, 94 facilities (11%) kept their doors open to field trips by elementary school classes. In the free comment section of the questionnaire, 31 incineration facilities (28% of 118 entries) stated that they were not instrumental in the cancellation of field trips during the pandemic. The survey also revealed that facilities made various efforts to continue providing elementary school students with waste management-related education opportunities, including staggering field trip times; taking precautions against infection; restricting (shortening) tour routes, participant numbers, and target participants to visit; providing videos and online tours; and dispatching personnel to elementary schools.

My survey showed that incineration facilities and elementary schools throughout Japan are actively engaged in

hosting field trips and environmental education activities. This long-standing educational partnership has earned broad acceptance by a wide range of people nationwide and will undoubtedly play an important role in fundamentally resolving modern waste management issues and transitioning to more sustainable lifestyles.

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Data sharing statement

No additional data are available.

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