

CHANGES OVER THE 17 YEARS FROM 1999 TO 2016 IN AWARENESS AMONG FEMALE STUDENTS ATTENDING THE K COLLEGE OF NURSING REGARDING WASTE SORTING AND DIOXIN ISSUES IN JAPAN

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Introduction

The Act on the Promotion of Sorted Collection and Recycling of Containers and Packaging (“Containers and Packaging Recycling Act”) to promote waste reduction, recycling and proper waste management was enforced in 1997 and fully implemented in April 2000. The Act not only holds the municipalities and business operators responsible for performing sorted collection and recycling, respectively, but also holds the consumers responsible for discharging sorted waste¹⁾.

In 1985, Wakimoto *et al.* reported that dioxins were being discharged from Japan’s waste incineration plants as byproducts of the waste-incineration process from chloride-containing plastics, etc²⁾. The Ministry of the Environment indicated the need for waste reduction by aiming to reduce the dioxins discharged from waste incinerators of municipal solid waste by 97% from 1997 to 2002³⁾. Local municipalities have launched a promotion of waste sorting and reduction as a measure to curb dioxin discharge. Thus, to promote waste reduction even more than before, it is necessary to raise and maintain the public’s awareness on waste. Countermeasures that were taken upon the establishment of the 1999 Act on Special Measures against Dioxins resulted in a 98% reduction in the discharge of dioxins from waste facilities in 2003 compared to 1997⁴⁾.

There have been few studies of the public's awareness of waste-sorting, waste-reduction policies and dioxin issues. Yanagibori *et al.* conducted an awareness study on middle-aged women aged 30 to 59 and indicated that middle-aged women were also highly aware of dioxin issues as they felt that the number of sorted-waste categories at municipalities was insufficient and were amendable to increasing the number of sorted-waste categories if plastics were currently included as part of the combustible waste⁵⁾. To raise public awareness for waste-sorting and waste reduction, we believe that the public need to be made aware starting with the younger generation, as part of their environmental education.

The purpose of this study is to analyze and examine changes among female nursing college students over the 17 years from 1999 to 2016 regarding I) how they perceive information provided by municipalities regarding waste reduction, and II) their awareness on waste reduction and dioxin issues.

Materials and Methods

Subjects of survey were female students ages 18 to 28 who attended the K college of nursing. The

survey was conducted from July 1999 to July 2016 on a total of 1,525 subjects, 1,347 of whom responded (response rate: 88%). It was conducted during class unrelated to the survey, the investigator visiting the classroom and distributing the questionnaires and collecting the anonymous responses on the spot. χ^2 -test was conducted to find the difference among the years surveyed.

We first explained to the research respondents (i.e., students) the purpose of the study, the freedom to participate or not in the study, the right to quit after starting or to refrain from participating, about privacy protection, and data anonymization. We also explained orally and on paper that not agreeing to participate in the study will not negatively affect the student nor affect their grades, etc., in the classroom, that the data will not be used for any other purpose other than the study, that they have the right to withdraw after first agreeing to participate in the study, and that by turning in the questionnaire responses, they agree to participate in the study.

Result and Discussion

In response to the question, **“Are you happy with the waste-sorting required in the town in which you live?, ”** 45% of the students responded “yes” in 1999 while the points continued to grow annually until 94% of the students answered “yes” in 2013. A significant difference was found every year in the percentages between those students who responded they were “happy” and those who responded, “not happy” ($p < 0.0001$, Fig. 1).

In regards to **“Information provided about the waste-sorting required in the town in which you live,”** a significant difference was found every year in the percentages between those students who were “happy with the information being provided” and those who were “not happy with the information being provided” ($p < 0.0001$). While the percentage of students who were “happy” was 9% in 1999, it increased gradually every year to be 62% in 2016 (Fig. 2). It was the high positive correlation between being happy re: waste-sorting and being happy re: information provided ($r = 0.8891$, Fig. 3).

In response to the question, **“Do you know what is being done to reduce waste?, ”** 80% or more of the students through all the years from 1999 to 2016 responded, “no.” No significant difference was found every year in the percentages between those students who “knew” about what was being done and those who “didn't know” (Fig. 4).

While 95% or more of the students in 1999 had **“interest in dioxin issues,”** the interest dropped every year until it was 71% in 2007, after which the percentage of students who “had interest ” remained around 70% and dropped 57% in 2016. A significant difference was found every year in the percentages between those students who were “interested ” and those who were “not interested” ($p < 0.001$, Fig. 5).

In regards to **“the need for reducing waste to curb dioxin emission,”** 90% or more of the students through all the years from 1999 to 2013 felt that there was a need. No significant difference was found every year in the percentages between those students who “felt the need” and those who “did not feel the need.”

Koyano and Ynagibori conducted an awareness study on middle-aged women aged 20 to 59 (537 females and 11 males) in September 1997 and reported that 95% of the total were

interested in dioxin issues⁶). Yanagibori and Koyano. also reported that in municipalities that included plastics as part of combustible waste in their categorization, those women who wanted to have plastics sorted separately were highly interested in dioxin issues⁵). In this study, the percentage of students among the female students who were interested in dioxin issues was high in 1999 at 94.7% while it dropped significantly in 2004 to 76.5% (Fig.5). The number of articles that contain the keyword “dioxin” surged in 1997, with 2,500 in newspaper articles posted in 1998. The number of articles has gradually decreased since then, dropping to fewer than 500 in 2003 and to about 100 from 2009 on. The blue line indicates the number of articles that contain both the keywords “waste” and “dioxin,” which revealed the same trend as the trend of the single keyword “dioxin” found in newspaper article searches. What is interesting here is that the number of articles on waste-sorting also shows a similar trend as the number of articles with the single keyword “dioxin,” although it peaks slightly differently, at 2000. The number of newspaper articles in the media decreased in accordance With the decrease in the amount of dioxins generated. We believe this is one of the factors for the drop in the female college students’ interest in the issue.

In this research, we found that female nursing college students grew increasingly happier in recent years regarding waste-sorting methods (Fig.1). Each year, more than 90% or so of the students felt that waste reduction was needed to curb dioxin emission, but their interest in dioxin issues has decreased every year since the 1999 survey, with only 70% of the students having any interest in dioxin issues from 2007 to 2016 (Fig.5) On the other hand, while we found that interest in dioxin issues decreased over the 17 years of the survey, students continued to highly support the need to reduce waste to curb dioxin emission (Fig.6). We believe that this is due to the decreased awareness among the public regarding dioxin issues. We found, however, that in spite of fading awareness regarding dioxin issues, students continued to feel the need to curb dioxin emission.

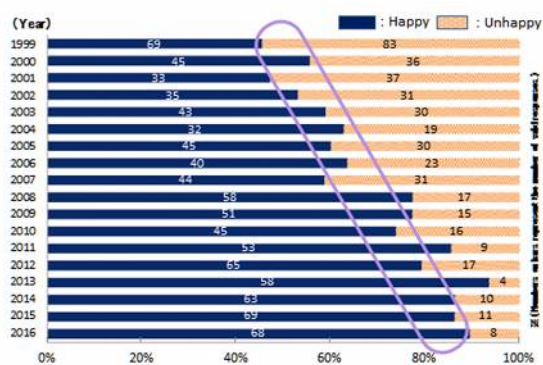


Fig. 1 Whether female college students were happy re: waste-sorting methods (Significant p<0.0001)

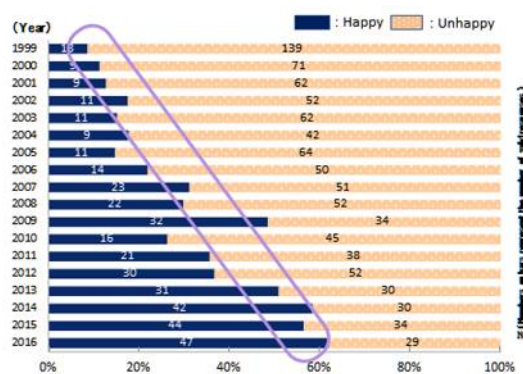


Fig. 2 Whether female college students were happy re: information provided on waste sorting (Significant p<0.0001)

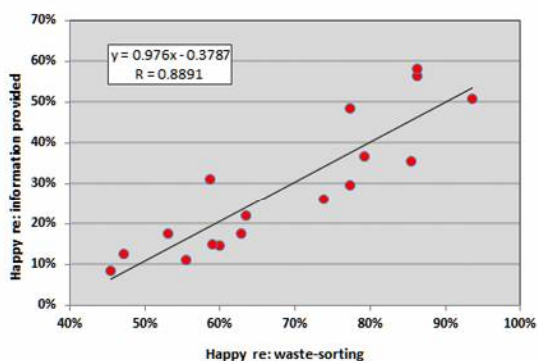
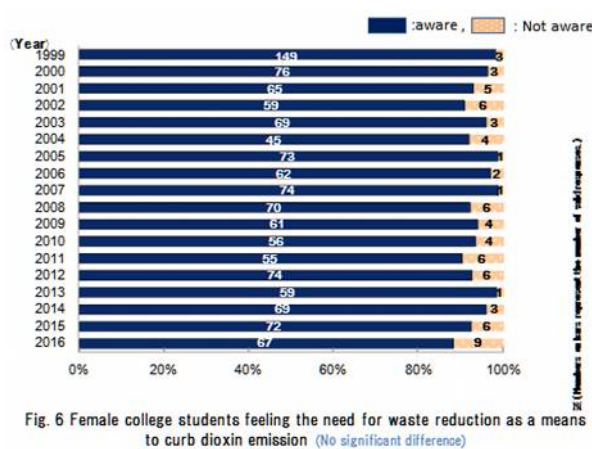
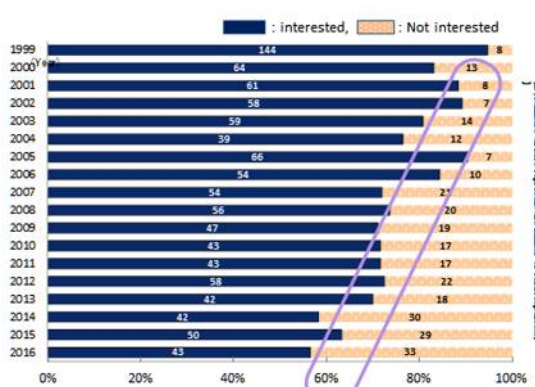
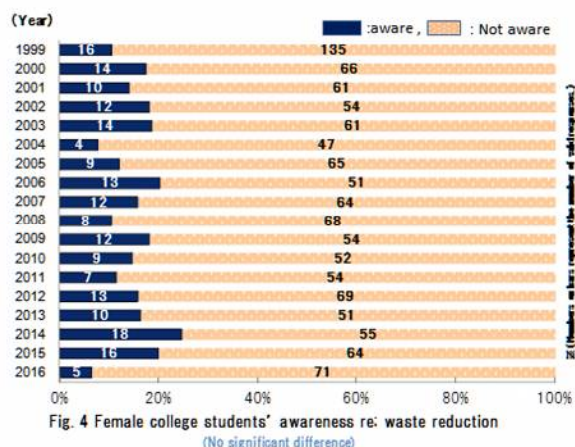


Fig. 3 Correlation between being happy re: waste-sorting and being happy re: information provided



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