

"What a Waste":
Japanese and American College Student's Perceptions on Food Waste and
Its Environmental Impacts

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Abstract

In recent years, both the United States and Japan have developed major food waste problems at an industrial as well as an individual level. Food waste has been observed to have generated excessive greenhouse gases and is a major environmental issue among others including air and water pollution, deforestation, and global warming. We gathered data from 45 Japanese students and 45 American students to find out their food management habits as well as find out what their perceptions are surrounding food waste and its impact on the environment. We asked questions such as what types of foods they are throwing out, if they take any active measures to combat food waste, and what they think is the biggest challenge that prevents them from eliminating food waste in their personal life and habits. Upon our analysis of our survey results, we found out that both groups of students feel strongly about improving the environment, specifically the reduction of food waste. However, American students are more prone to wasting food than Japanese students due to America's large food portion sizes, misunderstanding of food disposal and storage, and food companies disposing of 'imperfect' or 'day-old' foods. Comparatively, Japanese students waste less food than American students due to smaller food portion sizes and strict rules about trash separation including food waste; however, Japanese grocers and companies likewise dispose of imperfect foods. With this, we concluded that reduction of food waste can not be done on an individual level only, and must also be prioritized on a community-wide and industrial scale.

Introduction

For this research project, we looked into the opinions of both Japanese and American college students regarding food waste and how they view their own impact on their food habits and the environment. From this research, we can see that although both the United States and Japan have their individual causes for food waste, American people are more prone to wasting food over Japanese people due to differences in social etiquette, education, and how food waste is prioritized in local and national governments.

1. Significance of the Study

In Judy's case: with the pressing matters of climate change, I always wondered if there was something I could do. Throughout my time at CSUMB, I found that food waste is a problem

people globally contribute to. I want to research the environmental impacts as well as the efforts being made to help alleviate this problem.

In Alyssa's case: as a college student, I tend to eat out a lot. I often neglect the leftovers in my fridge and end up throwing them out which not only wastes the money I work so hard to earn but also puts a strain on the environment. I would like to research how our own actions can help reduce food waste even in a society where that may be challenging.

2. Research Questions

1. What are the perceptions of Japanese and American college students on the reduction of food waste in their own households and within their community?
2. To what extent are American and Japanese college students aware of the environmental impacts?

3. Literature Review

3.1 Overview of Food Loss in Japan and the United States

To begin, 57% of America's food waste comes from businesses and 43% of food waste comes from households. (Feeding America, 2020) Of this, about 77% of all food wasted in America was potentially edible. In addition, the most disposed of food products in America include meat and dairy products. (Buzby, Jean C. et al.; Parfitt et al. 2010) A potential reason for this waste is that Americans eat plenty of meat, but may not know how to properly store it. Now looking at the overview of food waste in Japan, 54% of Japan's food waste comes from businesses and 46% of Japan's food waste comes from households. However, 33% of all food wasted was potentially edible, over $\frac{1}{3}$ less than America. (Natural Resources Defense Council, 2022) Similar to the United States, Japan's most disposed of food products include fruits and dairy products. The only difference being that America wastes more meat and Japan wastes more fruit, however both waste dairy products.

3.2 Main Causes of Food Waste in Japan and the United States

The main causes for food waste in the United States are among misunderstandings of food labels, food portion sizing, and extra and flawed food products. More than 80% of Americans misunderstand expiration labels, so products are thrown out before they actually go bad. Along with that, American food portions are the largest of any country, with Japan being one of the smallest. (Wansink, 2013) "Bulk Buying" results in waste from not eating all food before it goes bad as well. For food businesses, food is wasted due to flawed or unsold products "Imperfect" fruits and vegetables are not sold. (Young, 2002) Moving on to Japan's main causes of food waste, firstly Japan has an issue with grocery shopping and expiration dates. Many shoppers choose to grab the product with the freshest expiration date, leaving older products to stock up and go bad. (Ministry of Agriculture, Forestry, and Fisheries JP, 2018) When it comes to the misunderstanding of food labels, Japan's "tastes best by" and "recommended to eat by"

labels may confuse consumers, leaving them to throw out food that may not be bad. (Kimura, 2021; Manley, 2022) In addition, both America and Japan share that extra and flawed products are one of the main reasons for food loss. If packaging is damaged or faulty or is not sold within one day, food will be disposed of even if the food is still okay to eat. This often occurs at convenience and grocery stores.

3.3 Greenhouse Gasses

Globally, climate change caused by gas emissions at the industrial and personal level is being viewed as a problem. This gas is a greenhouse gas that maintains the average temperature of the earth. Global warming is caused by excessive human influence of water vapor, carbon dioxide (CO₂), methane (CH₄), ozone (O₃) and nitrous oxide (N_xO). The gas of greatest concern is carbon dioxide. About 95% of food loss becomes methane and carbon dioxide at landfills. This process is anaerobic digestion. Anaerobic digestion is the decomposition of organic matter by bacteria without oxygen. For US greenhouse gasses, 2007–2009: Emissions decreased due to reduced economic production. 2010-2012: Emissions were decreased by using natural gas and electricity instead of carbon fuels. America's greenhouse gas emissions accounted for 13.2 trillion pounds of carbon dioxide. This total has decreased by 7% since 1990 and by 20% since 2005. 2019-2020: There was a 9% reduction due to COVID (EPA, 2022). Compared to Japan's greenhouse gas emissions, the 1997 Kyoto Protocol set a 6% reduction in greenhouse gasses, but by 2006 they had increased by 6%. 2011: Fossil fuels were replaced by nuclear power after the Fukushima nuclear accident, and emissions increased immediately after the accident. 2020: Total greenhouse gas emissions in Japan will reach 2.5 trillion pounds of CO₂ equivalent. Currently, Japan is focusing on the use of renewable energy and nuclear energy to replace fossil fuels (Klein, 2022).

3.4 Impact on the Environment

Rotting food in landfills produces methane gas, a response to the climate change impact of food waste. Methane is 25 times more warming than carbon dioxide. The impact on greenhouse gas reduction, especially composting. Garbage and other organic matter make up soil which helps with plant growth – plants withdraw CO₂ from the atmosphere, which offsets greenhouse gas emissions (Awasthi. et al., 2020; Hall. et al., 2009). Next, education about the current environment. In some parts of the United States, environmental education is integrated into middle school and high school courses. Although the quality of education is not high, basic environmental education practices have made many Americans aware of the environmental impact of greenhouse gasses (EPA, 2022). In the case of Japan, there is little education about the Japanese environment in elementary and junior high schools, and high schools emphasize environmentally friendly activities. In Japan, environmental education is lagging behind, and awareness of the environment is low. SDGs are currently popular in Japan, but they focus more so on action and not much on environmental education itself (Imamura, 2017).

3.5 Disposal System

There is no general enforcement of how to dispose of garbage in the United States. There is a common misunderstanding about what kind of garbage and where to throw it (Cho, 2020). In Japan, different cities have different waste treatment systems. Japan uses special garbage bags for different types of garbage.

4. Survey Findings

4.1 Survey Method

We conducted our survey utilizing an online form through Google Forms. Within our research, we had 90 respondents who participated in the survey. Out of the 45 American student respondents, there were 23 males, 16 females, and 6 respondents who identified as non-binary. Out of the 45 Japanese student respondents, there were 15 males, 29 females, and one respondent who identified as non-binary.

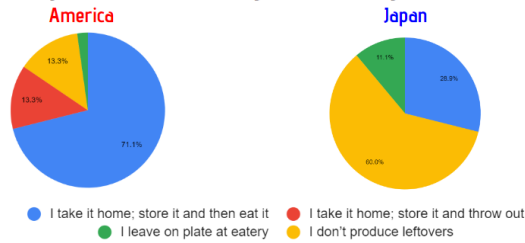
4.2 Survey Demographics

A majority of university student respondents from both countries are currently junior and senior standing. In terms of gender, over half of American student respondents identify as male, while around 64% of Japanese student respondents identify as female. Along with this, about 60% of American respondents are their own source of financial income, while 60 % of Japanese respondents' parents are their main source of finances. When asked how financially comfortable they feel regarding purchasing daily food products, respondents answered that they feel similar in their financial comfortability, with over 50% from both countries feeling somewhat comfortable. Lastly, when asked how many people they normally cook for in their current living situation, both Japanese and American respondents answered that they mainly cook for themselves; however, more American students do not cook at all.

4.3 Survey Results 1

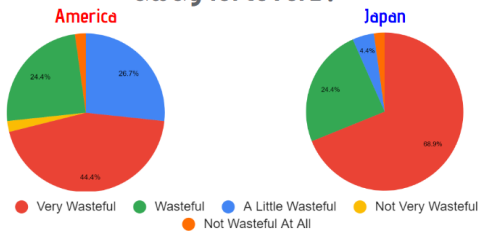
Here are the survey results of survey question one: "What are the perceptions of Japanese and American college students on the reduction of food waste in their own households and within their community?" In regards to this research, I will go over some of my questions. As you can see in Graph 1, according to the question, "When you eat out and have leftovers from eating out, what do you usually do with it?" about 70% of American respondents usually take their leftovers home; however, about 60% of Japanese respondents do not produce leftovers at all.

Graph 1: When you eat out and have leftovers from eating out, what do you usually do with it?



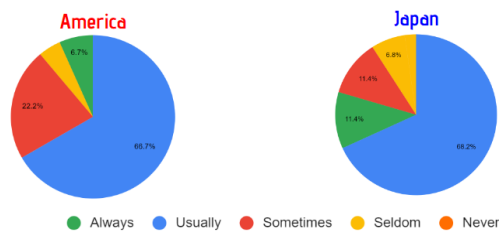
Moving forward, according to the question, “How wasteful do you feel about throwing away leftovers?”, both American and Japanese respondents concede that they feel very wasteful throwing away leftovers. (Graph 2)

Graph 2: How wasteful do you feel about throwing away leftovers?



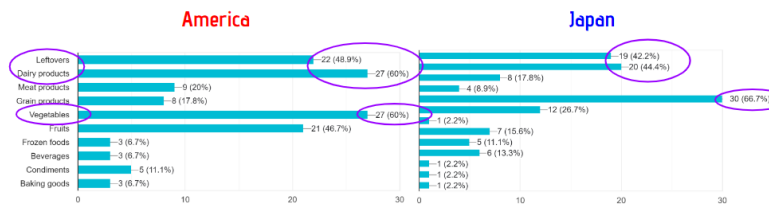
Next, according to the question, “How often are you able to eat all food items bought during grocery shopping before they go bad?”, we see that both Japanese and American students feel that they are usually able to eat all food items they buy before the food goes bad. (Graph 3)

Graph 3: How often are you able to eat all food items bought during grocery shopping before they go bad?



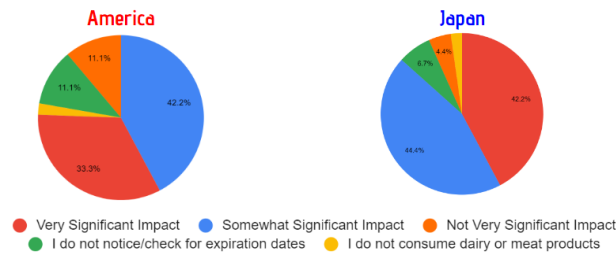
Furthermore, as can be understood from Graph 4, according to the question, “What types of food do you notice you often throw out? (Top 3)”, the students answered #1 as vegetables, #2 as dairy products, and #3 as leftovers. These results directly reflect what was discussed in the research background.

Chart 4: What types of food do you notice you often throw out? (Top 3)



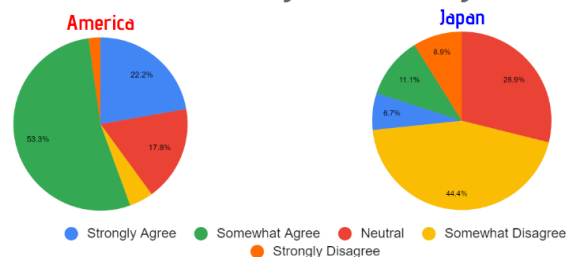
When buying meat and dairy products, it seems that both Japanese (87%) and American (76%) students feel that expiration dates have a very or somewhat significant impact on the way they shop. (Graph 5)

Graph 5: How significantly do expiration dates impact the way you shop for dairy and meat products?



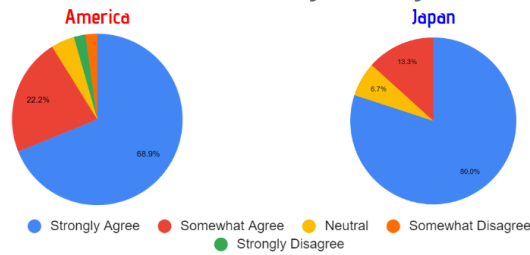
In accordance with the following statement: "Portion sizes in my country are too large to finish eating in one sitting.", about 75% of American students feel that U.S. portion sizes are too large, whereas about 53% of Japanese students feel that Japan's portion sizes are just right. (Graph 6)

Graph 6: "Portion sizes in my country are too large to finish eating in one sitting."



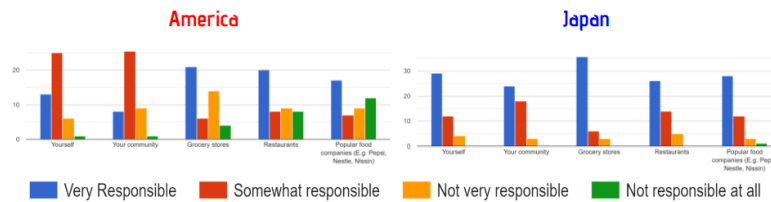
Moreover, according to Graph 7, about 70% of American students and about 80% of Japanese students feel that they strongly agree with the statement "Reducing food waste is important for the future of my country".

Graph 7: “Reducing food waste is important for the future of my country.”



As can be understood from Chart 8, according to the question “How responsible are the following groups in your local community towards reducing food waste?”, although American students feel that individual and community efforts are the most responsible, Japanese students feel that industry efforts hold more responsibility.

Chart 8: How responsible are the following groups in your local community towards reducing food waste?



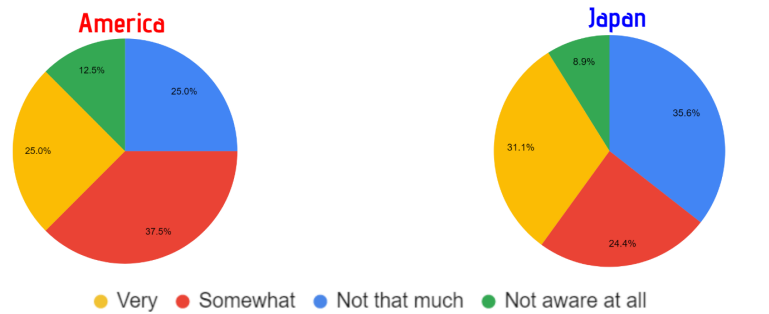
4.4 Summary of Survey Results 1

Here, I will explain the main highlights of the survey results from research question one. First, due to larger food portion sizes, American college students tend to produce more leftovers than Japanese college students. In addition, due to time constraints college students have, both American and Japanese students mostly waste perishable food items with short expiration date periods. Finally, both Japanese and American college students believe that reducing food waste is important, but feel that a large-scale reduction of food waste can not be done only through individual actions.

4.5 Survey Results 2

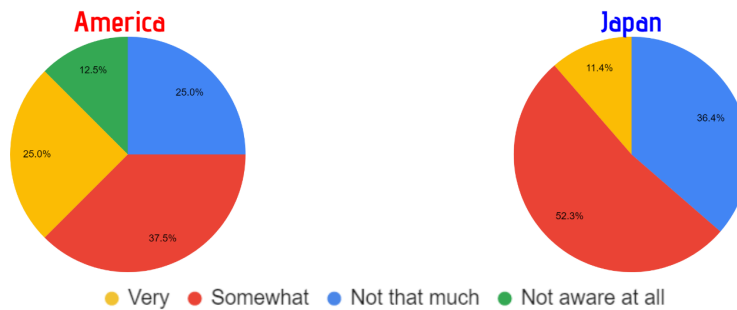
I will summarize the research question about how much Japanese and American university students know about the environmental impact of food loss. First, when asked how much they are aware of the impact of food waste on climate change, respondents expressed varying degrees of awareness. (Graph 9)

Graph 9: How aware are you of the effect food waste has on climate change?



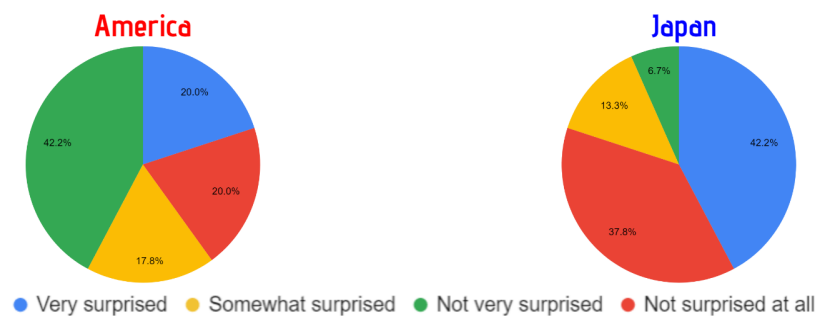
In addition, while a majority of both Japanese and American students agreed with the statement, "My own food management habits have a large impact on greenhouse gas (GHG) emissions from food waste," the majority of Japanese students did not disagree. (Graph 10)

**Graph 10
"My own food management habits have a big impact on the Greenhouse gas emissions from food waste"**



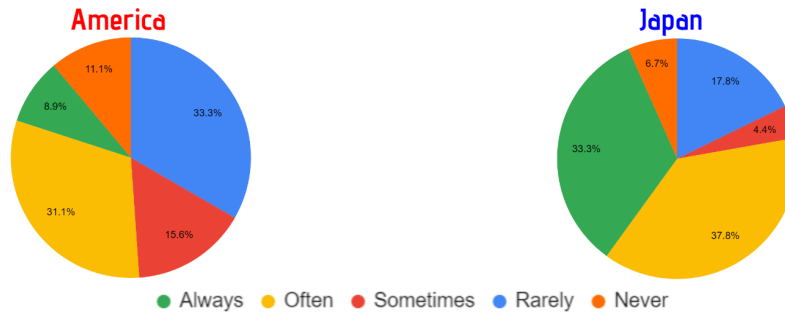
According to graph 11, a majority of Americans were not surprised by the amount of GHGs emitted by the food industry, regarding the fact that the food industry contributes 20% of total greenhouse gas emissions. However a majority of Japanese answered that they were surprised.

**Graph 11
"The food industry contributes to 20% of the total greenhouse gas emissions"**



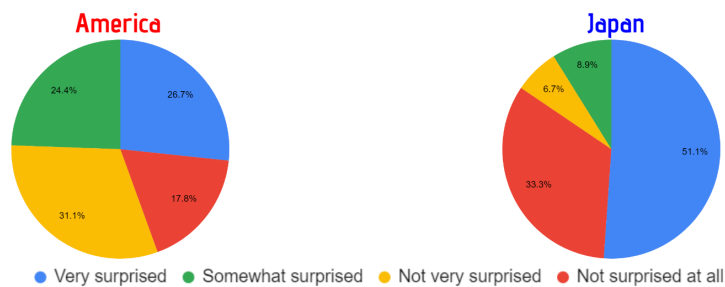
In response to the question of how often do you use plastic bags when shopping, a majority of American and Japanese respondents reportedly use plastic bags, but significantly more for Japanese (Graph 12).

Graph 12: How often do you use plastic bags while grocery shopping?



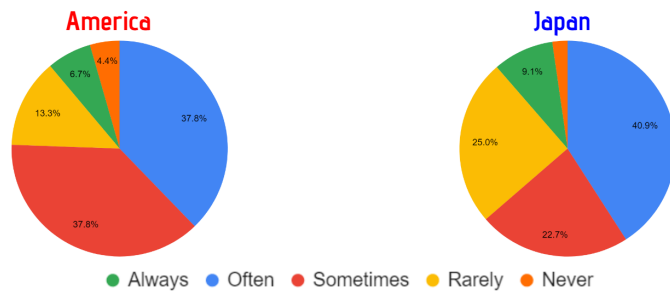
Furthermore, in response to the fact that "1.3 billion tonnes of food was wasted in 2007, which was 1/3 of the food production for human consumption" American students had a more varying view on this topic while the Japanese were more opinionated with 51% of the students being very surprised (Graph 13).

Graph 13
"1.3 billion tonnes of food was wasted in 2007, which was 1/3 of the food production for human consumption"



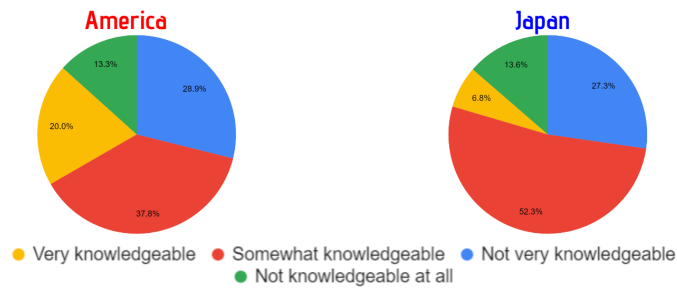
When asked if they were actively taking any countermeasures against food waste, 42% of Americans and 50% of Japanese answered that they were not taking any or very little countermeasures against food waste (Graph 14).

Graph 14
How often do you take active measures to combat food waste?



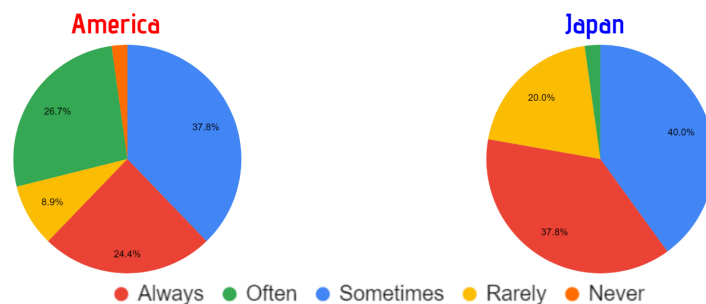
Next, when asked how much they knew about proper food storage methods, 58% of Americans and 59% of Japanese had some knowledge about proper food storage (Graph 15).

Graph 15
To what degree are you knowledgeable of how to properly store foods?



When asked if they freeze food to prolong its shelf life, 78% of Japanese say they freeze their food while just about 51% of Americans knew (Graph 16).

Graph 16
When you're able to, how often do you freeze your food to make it last longer?



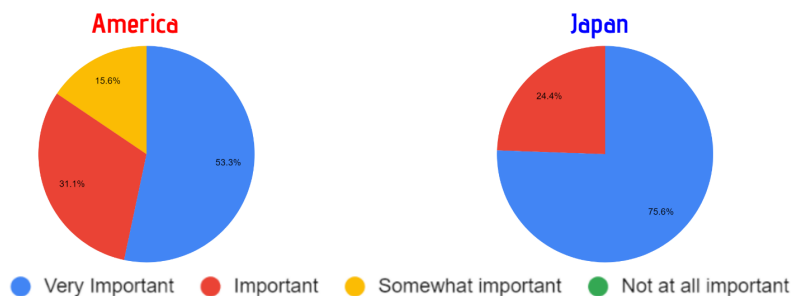
Both students were asked what their biggest challenge was that prevented them from eliminating food waste, 71% of the American students' forgetfulness prevented their food waste. The Japanese results had more varied reasons (Graph 17).

Graph 17: What is the biggest challenge for you that prevents you from eliminating food waste in your life?



When asked how important it is to reduce their own food waste in order to prevent environmental damage, 84% of Americans feel it is important to change their habits, whereas 100% of the Japanese students responded that it is important.

Graph 19 How important do you feel it is to reduce your own food waste to prevent environmental damage?



4.6 Summary of Survey Results 2

I'll begin to point out the main findings of survey results two here. To start off, American students have more knowledge of the environmental effects food waste has caused by food industries than the Japanese students due to their respective education systems. Japanese students seem to take more actions to prevent food waste due to the eco-friendly action focus within their education. The biggest challenge for the American students to prevent food waste was largely due to their own forgetfulness, however the Japanese students had evenly various reasons as to why they found it challenging.

5. Conclusion

To conclude, I will begin by stating the shared opinions of both the American students and the Japanese students. First off, both groups of students believe that the reduction of food waste is a priority, both groups mostly waste perishable food items, and finally, there is collectively not enough knowledge on food labels and storage efforts. In addition to the opinions expressed, I would also like to discuss the potential reasons these groups of students may have differing opinions. American students are more prone to wasting food than Japanese students due to America's large food portion sizes, misunderstanding of food disposal and storage, and companies disposing of 'imperfect' or 'day-old' foods. Japanese students waste less food than American students due to smaller food portion sizes and strict rules about trash separation including food waste; however, Japanese grocers and companies likewise dispose of 'imperfect' foods. This is a result of limited food health education and food waste not being a prioritized issue within local and national governments.

6. Limitation of the Study and Future Research

Both a majority of American and Japanese students attend a university in California, a state known for its environmental efforts. Results may not reflect a general perspective of these two groups on environmental issue awareness. In addition, due to many university students currently living in dormitories, results may not properly reflect opinions of those who do not currently have kitchens or kitchen appliances. In the future, we would like to survey students outside of California to analyze how perceptions of food waste vary by different states or countries. We would also like to have a more balanced ratio of male to female respondents.

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