

The Correlation Between Household Income and Food Wastage: A Case Study of Food Wastage Quantity and Consumer Attitudes

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Cite as: Klugman, Izzy. **2024**. "The Correlation Between Household Income and Food Wastage: A Case Study of Food Wastage Quantity and Consumer Attitudes". *Food-Fueled*, **1**, e00011. doi:10.57912/25643304.

web address: <https://edspace.american.edu/foodfueled/issues/volume-i/the-correlation-between-household-income-and-food-wastage-a-case-study-of-food-wastage-quantity-and-consumer-attitudes/>

Abstract

Food waste is a multifaceted issue with immense social and environmental implications. Supply chain efficiency, supply and demand, and food knowledge all play a role in commercial and individual food waste. Though more commonly considered in the context of food insecurity, socioeconomic status should also be considered in the context of food waste. To determine whether there is a correlation between socioeconomic status and amount of food wasted, I conducted a qualitative research survey of peoples' attitudes toward food waste in San Mateo County. I also conducted quantitative analysis on existing data from Cal Recycle about per capita food waste and annual household income in San Mateo County. A positive correlation between food waste and annual household income was found. That is, people with higher income tend to waste more food. Although all survey respondents stated they do not want to waste food, higher-income individuals were not financially motivated to do so. These results convey the importance of targeting higher and lower-income individuals differently in the context of food waste solutions.

Introduction

Food waste is defined as any food that is suitable for consumption, yet does not get consumed because it is discarded in some way (Bagherzadeh et al., 2014). Food waste is a global problem: almost seven billion tons of food are wasted annually, and about 40% of food produced goes uneaten (CM, 2022). The impacts of food waste are seen in several aspects of society. Environmentally, food waste releases a significant amount of greenhouse gasses like methane into the atmosphere because so much food ends up rotting in landfills (Hawken, 2017). Socially, seven billion tons of food are

being wasted annually, an amount that could be diverted to the 850 million people struggling with chronic hunger and food insecurity (Chrobog, 2014).

Looking at the issue more closely, many different factors determine why food gets wasted. Elements such as supply and demand, supply chain efficiency, and knowledge of food all play roles in the levels of food waste individually and commercially (Laberge, 2020). Supply chain efficiency can determine whether or not food makes it to the consumption stage while still cosmetically pleasing and edible. A widespread lack of understanding of food standards leads to perfectly edible pieces of food being left in supermarkets and outlets simply because the food does not fit certain aesthetic standards.

Less discussed, however, is the impact of socioeconomic status on food waste. As previously mentioned, food insecurity is often tied closer to class than food waste. (Lukwa, et. al, 2020) This lack of association between the two is why it is necessary to study the relationship between socioeconomic status and food waste more closely.

As a society, efforts must be focused on targeting change within low-income groups in cases of food insecurity. Institutionally, changes in policy, establishment of "safety net" assistance programs like the Supplemental Nutrition Assistance Program (SNAP), and additional investment programs are all solutions linked to aiding low-income individuals. This fact does make sense as food access heavily affects lower-income groups (Fernald, Gosliner, 2019). However, higher-income individuals should not be excluded from being involved in food waste, and can often become part of the solution. In the case of food insecurity, high-income countries lack much of the infrastructure needed to alleviate the issue due to their privileged economic status. This approach neglects low-income individuals who are affected in these countries. The same applies to food waste.

In this case study, I conducted a quantitative analysis of existing food wastage data in San Mateo County. I then conducted a qualitative survey of consumer attitudes surrounding food waste in the context of their socioeconomic demographics. I released the survey to individuals in San Mateo County, sharing it to my high school community. As a result of this analysis, I concluded that there is a positive correlation between food waste and socioeconomic status as households with higher incomes in San Mateo County (above \$250,000), seemed to waste more food per household than individuals with lower incomes in San Mateo County. Peoples' attitudes toward food waste seemed to align with their socioeconomic status, with higher-income households lacking a financial incentive not to waste food while lower-income households tended to be motivated by a financial incentive.

Methods

I created an 11-question survey (not including the three optional, more specific, questions) to gauge peoples' attitudes surrounding food waste in relation to their annual household income and other demographic factors. The full list of questions is in Appendix 1.

Survey Design

To design my survey, I accounted for various factors. I considered my high school's unique demographic makeup in the demographic questions (differing incomes/levels of education than the general American population). I reduced demand characteristics in responses by making sure questions were not obviously phrased to be answered in a certain way. In other words, I designed questions so that participants do not just respond the way they think they should respond. I was mindful of people's attention spans. Specifically, in this survey I tried to minimize the amount of required open-ended questions and made more of them optional. I increased the number of multiple-choice/scale questions. I shortened the length of the survey by reducing the number of questions.

I tried to assess multiple aspects of household food waste by assessing four different areas of household food waste (preparation, leftovers, ingredients/storage, uneaten food left on the plate) to make sure at least one question was targeted at that area. I considered how people may respond to the questions, hypothesizing potential trends in responses and how they would reflect the information I am looking for in my research. I considered that the people my survey will be released to are all generally connected to my high school, and they share a similar set of values to give their children the best possible education. This set of values may not be representative of the entire population of San Mateo County.

I then distributed the survey by sending it out to 20 people in my school population via email. I asked those 20 individuals to send the survey out to anyone they knew in the school population, a method known as snowball sampling.

I coded qualitative responses in the survey results based on logical groupings. ie: for question 7 when individuals are asked why they choose not to waste food, I coded the responses for financial reasoning, personal preference, and global impact. (Values Coding: codes that attempt to exhibit the inferred values, attitudes, and beliefs of participants. In doing so, the research may discern patterns in world views.)

Table One shows the race demographics of the people who took the survey. White, Asian, and Latino people were represented, but the vast majority of respondents were Asian. It is important to note that two people who took the survey did not fill out this question, so there are different demographics that are unknown.

Table Two shows the income range demographics of respondents of the survey. Everyone who took the survey answered this question. There is a uniform distribution between all 6 demographics, with slightly more in the \$200,000-\$500,000 range (generally higher income).

Table Three shows the education demographics of the survey respondents. 30 of the 36 people who answered the question had at least some college education, meaning the majority of the respondents were highly educated. (Note, one person did not respond to the education question in the survey).

Table 1. Race demographics

Race demographics of survey	
Asian	24
White	8
Latino	2
Other	1
Total Answered	35**

Table 2. Annual Household Income Ranges

Annual Household Income Ranges	
Less than \$75,000	6
\$75,000-100,000	7
\$100,000-\$150,000	5
\$150,000-\$200,000	5
\$200,000-\$500,000	8
\$500,000-\$1,000,000	6
Total Answered	37

** (There were 37 responses to the survey, however only 35 filled out this question) Annual Income Range demographics.

Table 3. Education Demographics

Highest Level of Education	
High School	6
Some College	3
Bachelor's Degree	7
Master's Degree/ Professional Degree	11
PHD, MD	9
Total Answered	36**

** There were 37 responses to the survey; however, only 36 filled out this question.

Simultaneously, while creating the survey, I conducted quantitative research comparing the 2019 average annual household income of 17 jurisdictions in San Mateo County and the 2019 annual tons of food wasted per jurisdiction using databases from the California Census and California's government recycling agency (CalRecycle). I also found data on the population size of each jurisdiction to find the average amount of food wasted per capita.

Results

The goal of this study was to determine whether there is a correlation between socioeconomic status and percentage of food wasted in households and if peoples' attitudes towards food waste reflect these trends. I tested this hypothesis by conducting quantitative research on the amount of food wasted annually in 17 jurisdictions in San Mateo County compared to their average annual household income and distributing a qualitative survey regarding food waste attitudes to individuals in San Mateo County. The results from both analyses showed that there is a correlation between income and food waste, both in terms of attitude and actual food wasted. People with generally higher incomes tend to waste more food than people with lower household incomes and even though everyone states they do not want to waste food, people with higher incomes are not financially incentivized to do so.

Discussion

Generally, those with higher incomes tend to waste more food than people with lower incomes. People with incomes of greater than \$250,000 wasted, on average, 138 pounds of food per person annually, while people with incomes of less than \$250,000 wasted, on average, 112 pounds of food per person annually, a 24% difference in food wasted. Outside studies on global food waste in relation to income align with my data (Lopez Barrera and E.T. Hertel 2020). This study determined that higher-income countries wasted 24%-40% of food annually while low-income countries wasted, at most, 16% of food annually. There appears to be a clear divergence between how people intend to fight food waste and their actual behaviors. 100% of the survey respondents across all income ranges said they would save extra food after a meal for later. However, on average across all respondents, they said they had wasted food they had forgotten about between three and five times in the past month. This result aligns with a 2015 study on consumer behaviors surrounding food waste (Neff, R. A., et. al 2015). The study determined that people's own perceived behaviors regarding food wastage in their households diverge greatly from the actual national averages of annual food waste. Specifically, 69% of individuals believed they wasted 10% of food or less and only 10% reported wasting 30% of food or more which is the national average.

There may be a trend between income and reasons behind why respondents decide not to waste food. Higher-income participants chose not to waste food because of personal preference (that is, non-financial, non-climate-related reasons) while lower-income individuals said they chose not to waste food because of mostly financial reasons. The majority of respondents in

higher income ranges (between \$200,000 and \$1,000,000) said they chose not to waste food because of personal preference. On the lower income side, there was a much more equal spread between financial and personal preference being the reason why they chose not to waste food. A study conducted in 2020 about demographic indicators of food waste reflects the conclusion made above (Pappalardo, G., et al.). The researchers found that people with lower incomes pay attention to budget constraints in the context of the food they buy, contributing to their lower levels of household food waste.

Because of different attitudes regarding food waste across socioeconomic groups—lower income groups with financial incentive and higher income groups with moral/environmental incentive—different targeted objectives should be implemented to better address each group. It would be difficult, for example, to provide higher-income individuals with a financially angled incentive and expect them to reduce their food waste under those circumstances. High-income households do not need to worry about affording food in the same way that lower-income households do. An objective that relates the environmental impacts to food waste would better suit higher income groups because, as supported by my survey, their attitudes more closely align with climate change and morality. Simultaneously, this hypothetical environmental incentive would not be effective for lower-income groups for the same reasons stated above; a financially targeted incentive would better suit those individuals.

Additionally, it should be noted that contradictory studies have been published that refute the correlation between high income and increased food waste (Porpino et al., 2015). Acknowledging the paradox between increased food waste and lower income, the study concludes that food waste reduction policies should be targeted at low-income households as they make up the majority of the world's population. Even though higher-income individuals are wasting a higher percentage of their food, lower-income individuals make up a larger amount of the world's population, and therefore end up wasting more food in total as a group. However, my conclusion supports the need to target both groups, not one or the other.

Across both income groups, the discrepancy between how much food people think they waste and how much they actually waste needs to be addressed. Based on the findings above, there is an apparent discrepancy in how people in general do not intend to waste food but end up wasting it anyway. But why is there a discrepancy? Possible explanations to this contradiction can be attributed to psychology, specifically the intention-action gap (Kuo, Young 2008). People blindly assume the best in themselves and respond as such when asked questions about their behaviors. In my survey, I gave a

hypothetical situation in which respondents were asked what they would do if they had extra food after a meal. 100% of respondents said they would save the food for later. However, based on national (C.M., 2022) and even regional averages in San Mateo County, it is clear that people do waste substantial amounts of food, supporting the divergence in intentions versus actions defined above.

Similarly, when I asked the question regarding the amount of food people wasted more directly, requesting respondents to count how many times they actually wasted food in the past month, respondents gave more generous answers. This contradictory result can be attributed to the difference in the way the questions were phrased, in which one of them did not force respondents to think about their actual waste habits and one of them did, abstract vs actual. This shows that simple differences in the way questions are phrased can yield different results in individuals.

Another possible explanation for this discrepancy between individuals' intentions and actions is that people have other goals that inhibit their intentions to minimize food waste. Offering an overabundance of food to family members, following a healthy diet full of fruits and vegetables, and avoiding potentially "risky" (food with cosmetic deformities) foods are all factors that contribute to wasted food (Barone, Grappi, Romani, 2019). These factors line up with responses from my survey regarding why people do end up wasting food. It is clear then, that these factors to waste food outweigh reasons to not waste food.

As such, addressing consumer knowledge of food quality and food systems, or more accurately the lack thereof, would be helpful to reduce wastage under this misconception (Kavanaugh, Quinlan, 2020). Educating these individuals on the scope of food waste, responsible consumption habits, and misconceptions regarding food edibility are potential actions local and state governments can take to reduce levels of food waste. This way, people are more knowledgeable about a range of facets of food consumption habits which can help them when deciding what and how much food to purchase. Government initiatives targeted at limiting the amount of food wasted in households can be implemented. For example, goals can be set by jurisdiction for the total amount of food wasted annually based on previous waste trends, and can be tracked by local waste agencies.

Conclusion

In San Mateo County, CA, individuals with higher incomes waste 24% more food annually than individuals with lower incomes. Furthermore, peoples' intentions to not waste food often contradict their actions. All respondents

replied that they would save extra food for later while on average they admitted to wasting food they forgot about three to five times in the past month.

Another example of a possible initiative could be encouraging households to keep track of the food they waste. This initiative would also be a potential way to increase their awareness of the amount of food they discard. As reinforced by my qualitative survey, there is a discrepancy between the amount of food people intend to waste and the actual amount of food wasted, resulting in an underestimation of the levels of food they throw out in their households. Therefore, by increasing the awareness of their food wastage habits in their own household, it is possible that higher-income individuals will reduce their personal waste levels (Oria, Schneeman, 2020).

Additionally, motivations towards food waste correspond to income as the majority of respondents with higher incomes replied that they chose not to waste food because of personal and environmental reasons while most respondents with lower incomes replied that they chose not to waste food because of financial reasons. Solutions for food waste should therefore consider differences in motivation based on socioeconomic status. Implementing different targeted objectives that align with the values of each group could be more effective. Examples of such objectives could be educational courses that raise awareness of responsible consumption and food quality, or goals set by jurisdiction for annual levels of food waste. Food waste is a nuanced issue. Across the entire socioeconomic spectrum, there is a substantial amount of food wasted. Thus, the issue needs to be addressed across all these groups. Solutions should account for the socioeconomic variability between groups to fully capture the nuance of the issue.

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Appendix 1

1. **On a scale of one to ten, how likely are you to throw away leftovers that have been put in the refrigerator? (1 being never and 10 being always)
Optional Question: Please explain why/why not you might throw some leftovers away
2. **You've been served a meal that has too much food to eat in one sitting. Would you:
a) throw out what is left on your plate
b) save it for later
c) other: please explain
Optional Question: Please explain your choice
3. **Alex is making pasta for his family of four. He makes five servings of pasta in case people are extra hungry. They all eat a regular amount of food leaving one portion left. Next Alex should:

4. **Where in your household do you see the most food waste?
 - a) Meal preparation
 - b) ingredients/storage
 - c) Uneaten food left on the plate
 - d) Leftovers
5. **In the past month, how many times did you throw out ingredients that were still edible?
 - a) Zero
 - b) Less than three times
 - c) Between three and five times
 - d) More than five times
6. **In the past month, how many times did you throw out food that became inedible because you forgot about it?
 - e) Zero
 - f) Less than three times
 - g) Between three and five times
 - h) More than five times
7. **For your answer above, please explain some of the reasons why you threw out the ingredients
8. **Why do you choose not to waste food?
Demographic questions (confidential)
9. **What is your approximate annual income range for your household?
Please select the one that best represents your income level
 - a) Less than 75,000
 - b) 75,000–100,000
 - c) 100,000–150,000
 - d) 150,000–200,000
 - e) 200,000–500,000
 - f) 500,000–1,000,000
 - g) 1,000,000+
10. **What is the highest level of education you have completed?
 - a) High school
 - b) Some college
 - c) Bachelor's degree
 - d) Master's degree/professional degree
 - e) PHD, MD