

# **How is food wastage related to the level of affluence of countries?**

Category (2): Statistical Report

Age group (2): JC schools

Prepared by

Claire Ng Soo Ching

Trulli Lee

Lucas Kumar

of 2T19 of Catholic Junior College

Submitted on the 31st of July 2020

## **PAGE CONTENTS**

- 1. Abstract**
- 2. Introduction**
- 3. Objectives**
- 4. Hypothesis**
- 5. Scientific method**
  - 5.1. Raw Data**
- 6. Analysis/Results**
- 7. Conclusion**
- 8. Citation**
- 9. Annex**
- 10. Allocation of roles**

## **1. ABSTRACT**

As food wastage has become a prevalent issue in Singapore today, we would like to investigate the different reasons pertaining to it and how we can reduce the amount of food wasted in Singapore and around the world. The report aims to investigate the association between food wastage and the different income groups, with the hypothesis that there is an association between the higher income groups and the amount of food waste. Data is taken from secondary sources such as NEA and Statistica, in the year 2011 and 2019. An online survey was conducted with the use of Google forms and the data collected is used to calculate the chi square test for independence which was then used to investigate the association between food wastage and income level. Based on our calculations, there is strong evidence found for an association between the food wastage and income. Our hypothesis is not rejected, since there is sufficient evidence to conclude that there is a relation between the amount of food wastage is dependent on the income groups. But there are still many factors related to the causes of food wastage which we did not look into, such as the portion of the meals.

## **2. INTRODUCTION**

The topic we have chosen is food wastage, and we are interested in it because food wastage has become a big problem for Singapore in recent years. Did you know that Singapore threw away about 0.68 million tonnes of food waste in 2011 and only 10% was recycled? This means that on average, Singaporeans generated about 130kg of food waste a year. (Savefoodcutwaste). This is especially worrying since it has adverse consequences on the economy and the environment, food waste causes prices to increase (resucefood), reducing the number of people who can afford the healthy food they need. Food waste also takes away the

opportunity to help feed those in need as they would not know when or where they can have their next meal. It is also one of the contributors to greenhouse gases, quoted from (WWF).

So why are we interested in this topic? We must play an active role to reduce food wastage in Singapore as we ourselves would eventually be affected by this change. In the long run, current food prices would eventually become unaffordable. A simple meal of chicken rice could cost more than \$5, and we feel that it is an unreasonable price for anyone who has the money for it. Even though Singapore is considered a first-world country, there are still many people living in poverty and might not be able to afford the money they need to eat healthy meals. Therefore, it affects us personally and around the world, so we would like to investigate further into this topic.

### **3. OBJECTIVES**

This report aims to investigate the association between the amount of food wastage as well as the different income groups of countries, and the level of affluence of countries.

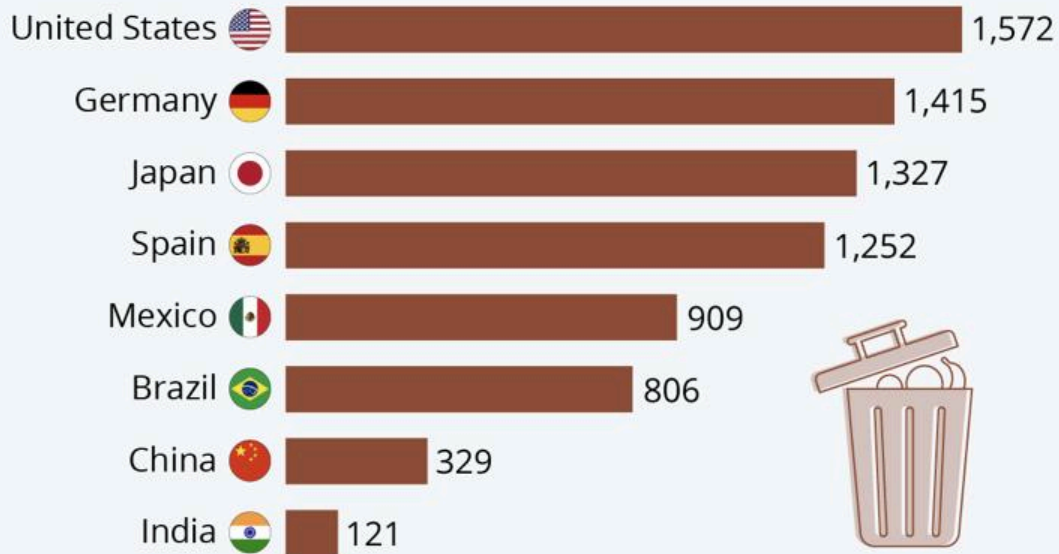
**4. HYPOTHESIS: *Food wastage is correlated to the level of affluence of countries.***

### **5. SCIENTIFIC METHOD**

We think that the more wealthier a country is, there is a higher tendency to waste more food. This is because people with more income have a higher privilege to spend more money on food than those people living in poorer and developing countries. As they have better living standards, they are able to afford to waste food without any losses since they have the money to buy food to eat, unlike those people living in poverty in developing countries. This is further supported by Statistia (Patrick Wagner and Katharina Buchholz) which also agreed that food wastage is related to the affluence of countries. Therefore, we hypothesise that affluent countries have greater food wastage.

# Food Waste Most Prevalent in Affluent Countries

Per-capita food waste in selected countries in 2011  
(in kcal/day)

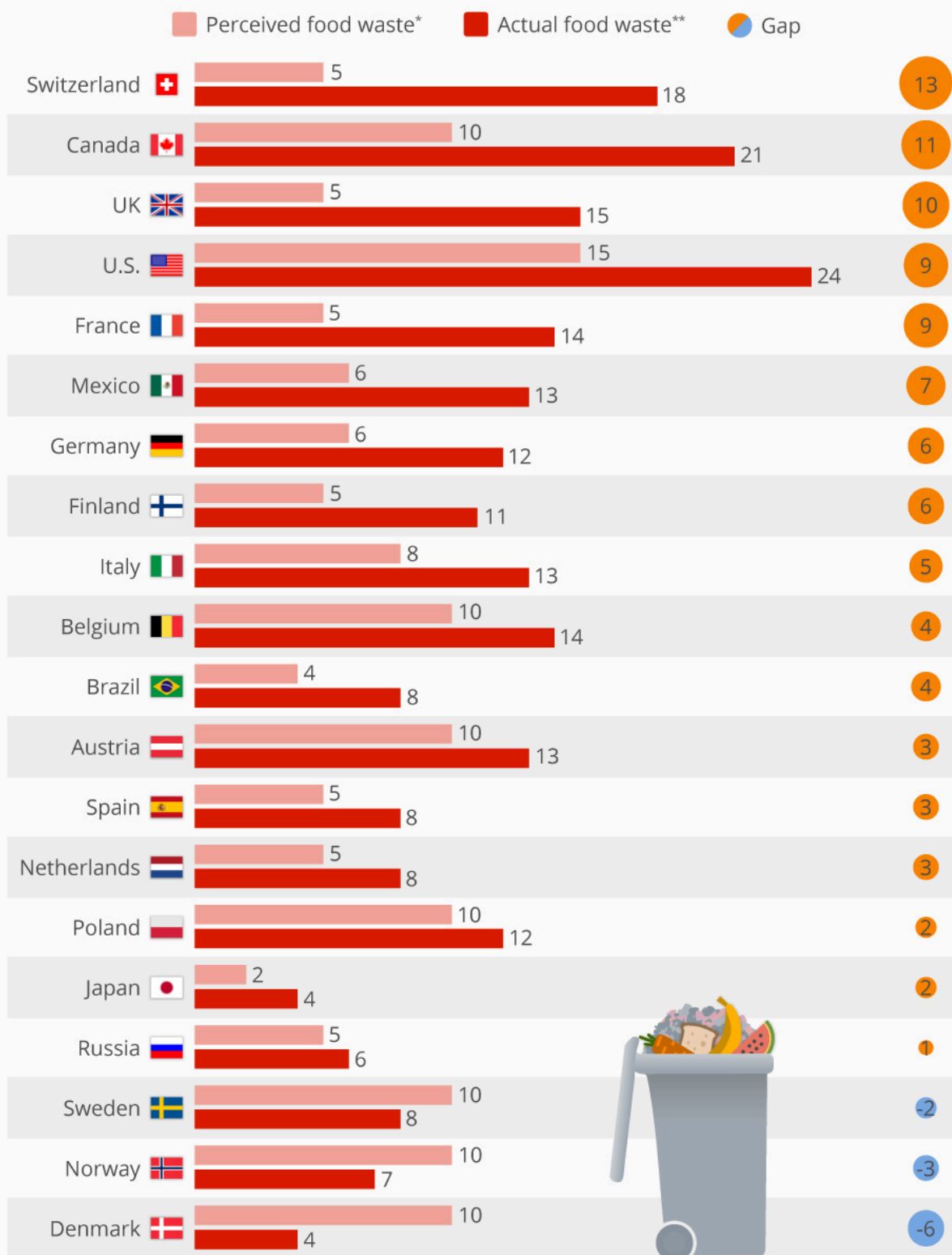


Source: Van den Bos Verma et al. Consumers discard a lot more food than widely believed. Plos One



# Households Waste More Food Than Estimated

Perceived and actual food waste in households per country (in %)



\* Estimations by 18,000 heads of households in 20 countries (aged 22 to 60 years), 2017/2018

\*\* Qualitative research in 20 family- and 10 singlehouseholds; 2017/2018

But before comparing the amount of food waste by countries, let us compare the amount of food wasted in Singapore first. So how prevalent is food wastage in Singapore? According to the National Environmental Agency (NEA), the data shown below is the amount of food waste generated in the last 10 years:

Year	Food Waste Disposed of (‘000 tonnes)	Food Waste Recycled (‘000 tonnes)	Total Food Waste Generated (‘000 tonnes)	Recycling Rate (%)
2019	607	136	744	18%
2018	637	126	763	17%
2017	677	133	810	16%
2016	680	111	791	14%
2015	681	104	786	13%
2014	687	101	789	13%
2013	696	100	796	13%
2012	618	85	703	12%
2011	606	70	676	10%
2010	538	102	641	16%

From this, we are able to compare with the data we collected ourselves.

We conducted an online survey using Google Survey forms, and shared it on our social media to get responses. In the survey, we want to know how much money they spend on food per day (their financial circumstance) and how much food they waste in a meal. We were able to gather up to 134 responses in total (at the time this report is written). The sample is ensured to be random as we asked teenagers and adults from various income groups to respond. Since sample size is more than 30, it is sufficiently large, thus by central Limit Theorem, it is assumed to be normally distributed.

### 5.1. Raw data:

The charts shown below are relevant to the question we want to answer - is food wastage related to the different income groups in Singapore?

Firstly, we want to know...

How much money do they spend on food per day?

How many meals do they eat in a day?

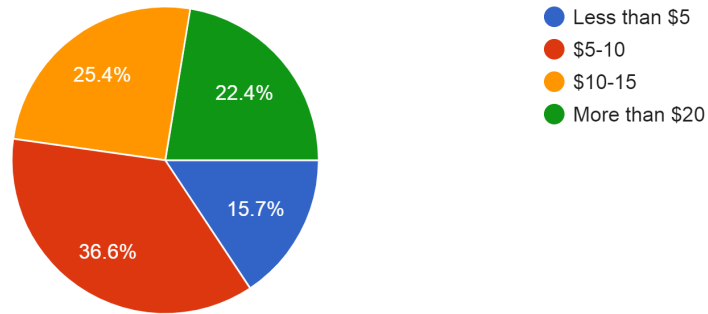
Do they always finish their food?

Are they guilty of wasting food?

**Assumptions:** Amount of money spent on food is an indicator of which income group they belong to

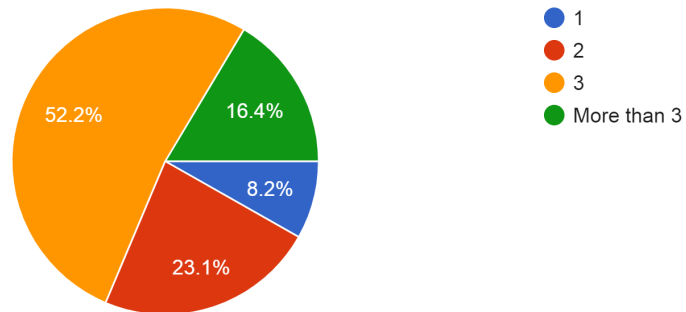
How much money do you spend on food PER DAY?

134 responses



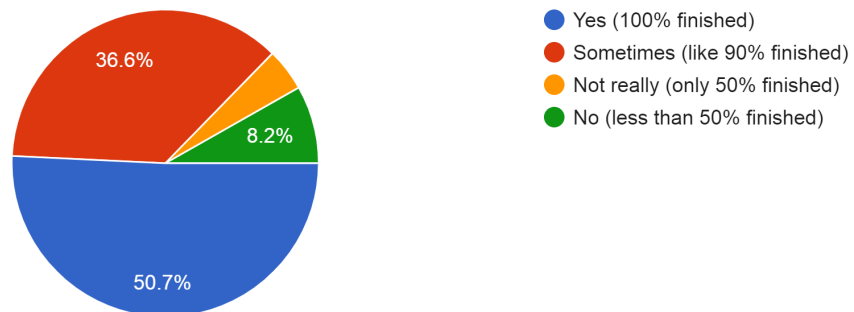
How many meals do you eat in a day?

134 responses



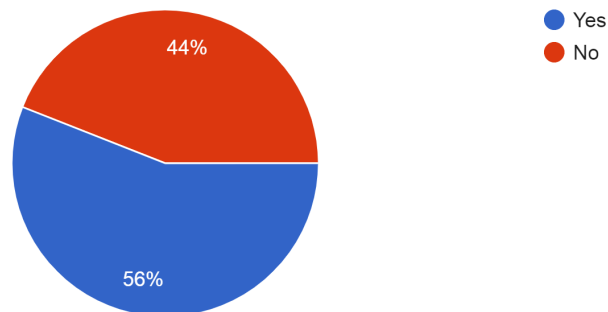
Do you always finish your food?

134 responses



Are you guilty of wasting food?

134 responses



## 6. ANALYSIS/RESULTS

As seen above from our raw data, it seems like more than half of our participants admitted to be guilty of wasting food. This is strong evidence that food wastage is a serious problem in Singapore. Thus, we want to look into greater detail on the issue of food wastage as it needs to be resolved quickly.

Secondly, we compare our collected data to the ones that we found online and gauge the results. If our collected data seems to be too far off the ones from online, our hypothesis is wrong.



% of food waste according to \$ spent on food

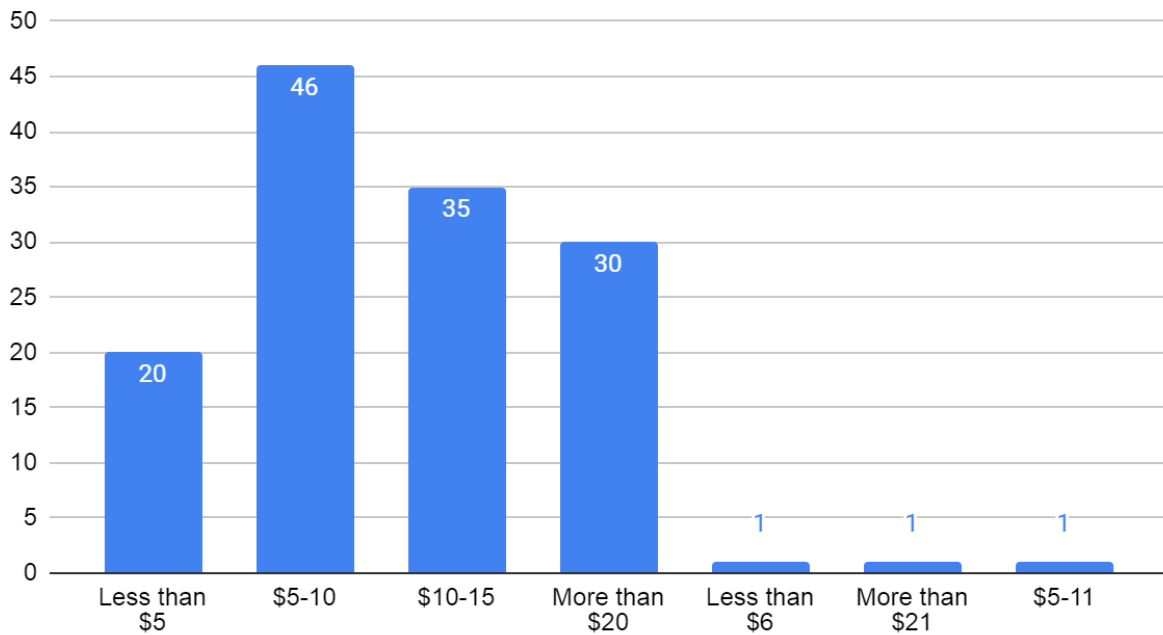


Figure shows the % of food wastage according to the amount of money spent on food in the survey

Using chi-square test,

Hypothesis:

H0: Amount of food wastage is dependent on the income

H1: Amount of food wastage is independent on the income

Observed frequencies					
Amount of food waste in a meal	Amount of money spent in a meal				
	Less than \$5	\$5-\$10	\$10-\$15	More than \$20	total
0-25%	20	26	26	26	98
25-50%	0	21	10	5	36
total	20	47	36	31	134

Observed frequencies	Expected frequencies
20	14.626
26	34.373
26	26.328
26	22.671
0	5.3731
21	12.627
10	9.6716
5	8.3283

Expected frequencies					
Amount of food waste in a meal	Amount of money spent in a meal				
	Less than \$5	\$5-\$10	\$10-\$15	More than \$20	total
0-25%	14.6268	34.373	26.3283	22.6716	98
25-50%	5.37313	12.6268	9.67164	8.32835	36
total	20	47	36	31	134

Expected values more than 5, there is no need to combine the column or rows

Degree of freedom=  $(4-1)(2-1) = 3$

P-value=  $7.86915 \times 10^{-4}$

Chi square value= 16.773

Therefore we reject  $H_0$  at 1% level of significance as there is sufficient evidence to conclude that the amount of food wastage is dependent on the income groups.

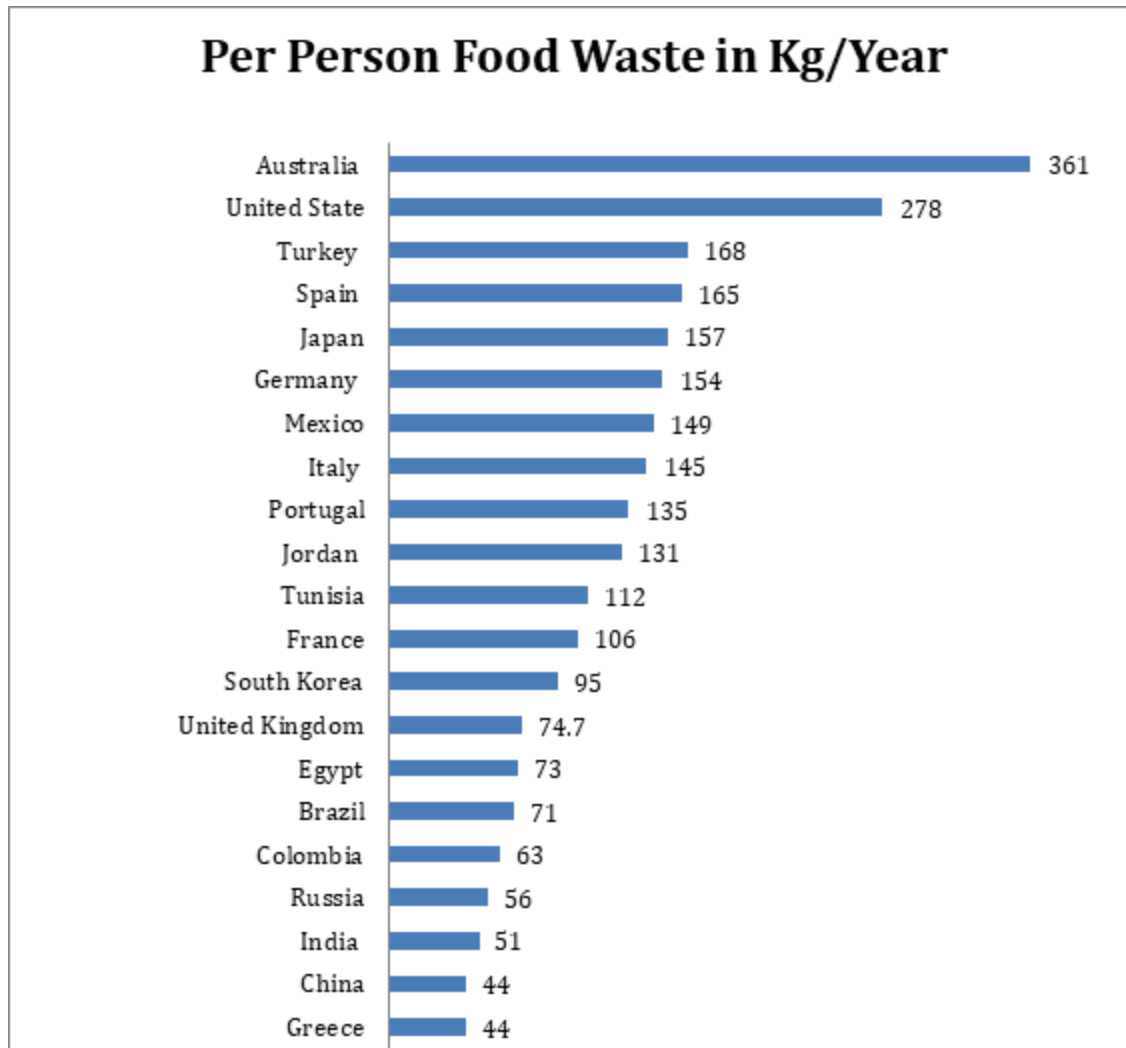
**Assumptions:** Distribution follows a normal distribution. Since the sample size is large, we used central limit theorem to approximate. Assume that the raw data is random as we are able to get a fair share of people from the different age groups- teenagers and working adults.

**Limitations:** Unknown population variance and population mean. We are only able to get results from people we know since it was done online, we were unable to reach out to other adults who have other circumstances, for example, we did not ask youtube food mukbangers if

they waste a lot of food since they are known for doing live streams of themselves eating huge amounts of food.

## 7. CONCLUSION

In conclusion, there is sufficient evidence at 1% level of significance that food waste is related to income groups. From this, we can thus assume that wealthier countries like the USA, United Kingdom and China tend to waste more food than developing countries such as India and Africa.



Since our data supports that higher income groups tend to waste more food than those in the lower income groups, it is safe to conclude that on the global level, the level of affluence of each country is related to the amount of food they waste.

## 8. Citation

<http://www.savefoodcutwaste.com/food-waste/food-wastage-in-singapore/>  
<https://rescuefood.ca/food-prices-could-increase-by-up-to-3-5-in-the-coming-year/>  
<https://www.worldwildlife.org/stories/fight-climate-change-by-preventing-food-waste#:~:text=Today%2C%20an%20estimated%20one%2Dthird,the%20world%20goes%20to%20waste.&text=And%20if%20food%20goes%20to.if%20we%20stop%20wasting%20food.>  
<https://www.statista.com/chart/20825/food-waste-by-consumers-selected-countries/>  
<https://www.statista.com/chart/15143/percieved-food-waste/>  
<https://www.nea.gov.sg/our-services/waste-management/3r-programmes-and-resources/food-waste-management>  
<https://thewotrblog.wordpress.com/2019/06/05/is-our-food-use-pattern-sustainable-to-address-the-growing-water-crisis-and-climate-change/>

## 9. Annex

Google survey form on food wastage: <https://forms.gle/hFPfMtmkx7q8g5yt5>

## 10. Allocation of roles

Lucas: Group leader

Claire: Researcher

Trulli: Writer