

Household food waste in the cantons of Geneva and Vaud: the main behaviours driving it, the constraint to reduce food waste, and the possible solutions to improve the situation

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by

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Executive Summary

Food waste is one of the major issues our society faces today. It is estimated that one-third of the food produced globally goes to waste. It has social, economic, and environmental impacts. There are 800 million people undernourished in the world, but if we stop wasting food we could have four times the food needed to feed all of them. Every year food waste costs approximately 1 trillion USD globally. And it is one of the major contributors to global warming. Food is wasted in every step of its journey and households are the main contributors. In Switzerland, almost 3 tons of food are wasted every year. Swiss households are responsible for 90 kilos per person a year and contribute to 38% of the impact that avoidable food waste have on the environment.

This paper studies the main household behaviours driving food waste in the cantons of Geneva and Vaud. As well as the main constraints preventing them to reduce it. It also investigates what are the actions they are already taking to avoid food waste, and the knowledge they have on the subject.

The collection of the data was done via an online survey that was conducted with 540 households from Geneva and Vaud, using the survey tool Qualtrics. The questionnaire on food waste tackled the specific topics of food labels, expiration dates, grocery shopping planning, leftovers, food conservation, uncalibrated fruits and vegetables, knowledge of food waste players, environmental impact, the main reasons food is wasted, and the actions households are taking to avoid food waste.

The study concluded that citizens from the cantons of Geneva and Vaud are doing great efforts to avoid food waste, although there is a lot of room to improve. Nevertheless, the data shows that the main household behaviour driving food waste is lack of planning. Also, the main constraint preventing them from reducing food waste is the lack of knowledge on how to properly optimise the conservation of their food.

Finally, the paper put forward a recommendation to add sustainability courses to the curriculum of the school, at a young age. The children of today will be the actors of tomorrow, thus they need to be well prepared for the challenge. On the Sustainability subject, it should be covered thematic like food waste, climate change, clean water, wildlife, oceans, forests, and all topics where attention is needed to save our planet. Consequently, in the food waste chapter, students would learn how to properly plan their food shopping and correctly store their food, among others. This is a long-term investment, but that could be already implemented.

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1. Introduction

Food waste is a critical threat to our future generation and one of the major challenges we are facing today. It is estimated that one-third of the food produced globally goes to waste (WWF, 2021).

This is an urgent issue to tackle, especially because food production is one of the major contributors to global warming, due to the number of resources needed to produce it. When food is wasted, we are not only throwing food but also all these resources. To produce food, we use 69% of our available water, 30% of the energy we consume, 34% of our land. It is responsible for 75% of the deforestation, and 60% of wildlife drop since 1970, all due to food production. Not forgetting about the labour and capital that are also wasted. Additionally, it emits greenhouse gases, CO₂, and rooting food emits methane that is 25 times more potent than CO₂ (WWF, 2021). If all the food we waste was a country, it would be the third-largest producer of carbon dioxide in the world, just after China and the USA (WFP, 2020).

Food is wasted or lost in every step of its journey, from the farm until the fork. According to WWF, if we stop wasting, we could have four times the food needed to feed all undernourished people every year (WWF, 2021). While in developing countries most of the food is wasted at the harvest process, in rich countries it happens at home. “Consumers in rich countries waste almost as much food as the entire net food production of sub-Saharan Africa each year” (WFP, 2020). While the number of undernourished people in the world is around 800 million (UN, 2021), the amount of food wasted globally is about 1.3 billion tons per year, which is worth 1 trillion USD approximately. As per the World Food Program, food waste is one of the root causes of hunger worldwide (WFP, 2020).

It is important to make the difference between avoidable and unavoidable food waste. Avoidable food waste is the one that is perfectly intended for consumption but ends up not being consumed, for example, food left too long in the fridge, leftovers, blemished fruits and vegetables, or food that we let expire. Unavoidable food waste is the food inedible to eat, for example, waste from preparation like eggshells, vegetable peelings, or food contaminated with a pathogen (FOEN, 2022).

The food having the highest rate of wastage are fruits and vegetables, plus roots and tubers. The global quantity for cereals is 30%; 40-50% for root crops, fruits, and vegetables; 20% for oilseeds, meat, and dairy; and more than 30% for fish (UNEP, 2022).



source IFCO (based on FAO data)

*Figure 1: Global Food losses and waste per year, and percentage of types of foods wasted.

All those facts and numbers are very worrying, and something must be done at every step of the food chain. Every country, city, suppliers, farmers, distributors, restaurants, supermarkets, at home, everyone must be involved. There are many organisations and governments already taking action to change the tone. As an example, the issue is one of the Sustainable Development Goals of the United Nations, the *SDG 12-Responsible Consumption and Production*, which has the objective of cutting global food waste in half by 2030 (WFP, 2020).

Food waste is a very complex and wide subject that touches every single country in the world. Given its complexity, this paper will focus on food waste from the consumer perspective, in the specific case of households living in the cantons of Geneva and Vaud, in Switzerland.

Switzerland

Switzerland is a small country located in Central Europe. Known for its beautiful mountains and banking services. Its population is 8,6 million people (World Bank, 2020). Home of many multinationals, Switzerland is a very attractive place for companies and foreign people. A landlocked country that has France, Germany, Italy, Austria, and Liechtenstein as neighbours. The languages spoken in the country are German, French, Italian, and Romansh. The capital is Bern and has Zurich and Geneva as very well-known cities.

Very wealthy and orderly country, when it comes to sustainability, they are a very good example:

“Switzerland is among the top five fastest nations on track to meet the Sustainable Development Goals set out in 2015. Switzerland has also been a leader in accountability to meeting the 2030 Agenda for Sustainable Development. The Swiss government conducted an extensive gap-analysis to isolate areas of improvement and have since implemented a robust

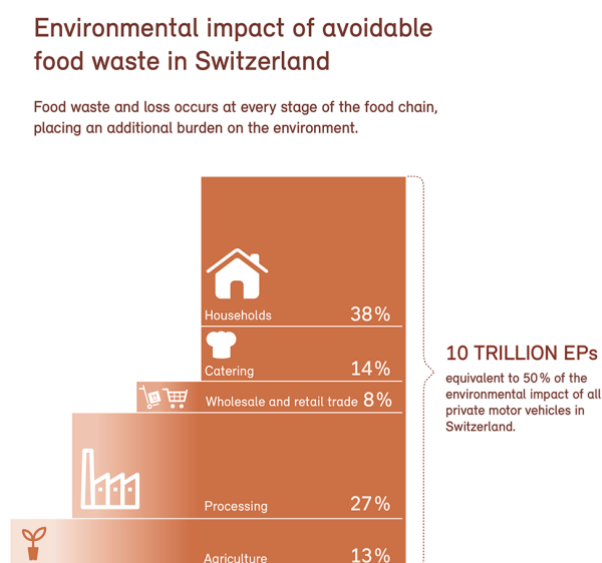
monitoring system to ensure that all sectors and industries contribute to achieving its 2030 target” (OWEN MULHERN, Earth.org, 2021).

But what about when it comes to food waste?

In Switzerland, almost 3 million tonnes of food are wasted every year, which represents 330 kilos (600 CHF) per person a year (WWF,2019). This number represents the total amount of food waste, from the production to the consumer table. The amount wasted only by households in Switzerland accounts for 90 kilos per year (OFEV, 2022).

Switzerland is one of the richest countries in the world and has the eighth highest GDP per capita in 2022 (IMF, 2022). Does it mean that households waste more than in poorer countries? If we compare Switzerland with other countries, we can quickly feel the disparity. In India, the household food waste, per year and per person, is 11 kilos against the 90 kilos in Switzerland (Nestlé, 2022). While Switzerland gets to spend only 8.7% of its income on food, countries like Nigeria spend 56.4% (World Economic Forum, 2016).

When measuring the impact of avoidable food waste on the environment, households are the ones responsible for the biggest share, amounting to 38% (FOEN,2019).



“Figure 2 shows the environmental impact of food loss along the Swiss food value chain in trillions of eco-points (EPs). This includes losses in foreign supply chains of food consumed in Switzerland (consumption perspective). The percentages indicate the contribution of each stage in the food chain. (FOEN, 2019)”

Switzerland, in the scope of the Sustainable Development Goal of the United Nations, is engaged in reducing food waste to its half by 2030. An action plan was adopted on the 6th of April 2022 by the Federal Council that aims to:

- 1. Halving the amount of avoidable food losses in Switzerland by 2030 compared to 2017;*
- 2. Defining industry-specific reduction targets together with the industries;*
- 3. Reducing the environmental impact of avoidable food losses as much as possible through the appropriate formulation and prioritisation of measures. (FOEN,2022)*

The action plan, that has a voluntary base intent, is destined to all companies and organizations in the food supply and value creation chains, as well as the Confederation, the cantons and the municipalities. However, if Switzerland wishes to reach its goals, besides implementing action plans to those actors, it must engage the population in the fight. Household actions are of extreme importance, as they are the main contributors to the total food waste. Nevertheless, it will be challenging, since it depends in the good will of each family to reduce its wastage of food.

Small actions are available to families to contribute, as an example giving a chance to uncalibrated fruits and vegetables, eating leftovers, making use of the freezer, eating yesterday's bread and pastry, or asking for smaller portions at the restaurant, each act counts.

Geneva

Is one of the most populous cities in Switzerland, it has 512 '000 habitants, 41% of whom are foreigners (Office Cantonal de la Statistique, 2021). The main language is French, although English is largely spoken. Home for many multinationals, governmental and non-governmental organisations, and the European headquarters of the United Nations (UN).

Vaud

The canton of Vaud has 806 '000 habitants and its main city is Lausanne. It is the third-largest canton by population and fourth by size (Swiss Federal Statistical Office, 2020). The official language is also French. The canton is known for its wines, universities, and gastronomy.

The two cantons have many associations, supermarkets, and stores very engaged in the fight against food waste. Main players like the supermarket leaders Migros or Coop are also contributing, as well as schools' cafeterias, companies, and restaurants. But what about households? How willing are they to contribute? As per a study done by a research group from ETH Zurich, most Swiss citizens wish to support food waste regulation even if it leads to an increase in prices. The authors conclude that the government, by proposing an adequate design and a convincing justification of the regulations against food waste, will gain public support (Lukas Fesenfeld, Lukas Rudolph and Thomas Bernauer, 2022).

Although we have information about food waste in Switzerland, as well as some data about actions taken around the country by different actors, it goes without saying that very little data is available about household food waste behaviours in the cantons of Geneva and Vaud. For this reason, with the intuition to gather data about the subject, a survey was done with 540 respondents from the cantons of Geneva and Vaud.

This paper addresses the main households' behaviours driving food waste in the cantons of Geneva and Vaud, and the main constraints they face to reduce it. It also investigates what households already know about the subject, and which actions they are currently taking to contribute to the fight. The paper proposes some ideas on how households could change their behaviour driving food waste and suggest a variety of actions that they could take at home. The ultimate objective of this work is to give a recommendation that could be useful to the sector. The research questions the paper seeks to answer are: What are the main household behaviours driving food waste in the cantons of Geneva and Vaud? What are the main drivers preventing households to minimise food waste? What are they doing to avoid food waste? and ultimately is Geneva and Vaud making enough efforts to avoid food waste?

The first section of the paper reviews literature related to household food waste. The second section describes the methods used on the survey, for instance, the data collected, how the research was conducted, the type of data, details about the respondents, and how the result was analysed. In the third section, the results of the survey are reported. In the fourth section, the key findings are discussed, the meanings and results interpreted, and a recommendation is proposed. Finally, the last section consists of a conclusion of the study and the answers to the questions asked on the paper.

2. Literature review

Food waste is a largely discussed subject around the world, due to its great importance and urgency. Many studies have been conducted on the subject, most of them focusing on reductions of food waste; waste management; treatment; disposal; strategies to reduce food waste; causes; impact; assessments, and innovations in the food waste service industry. Likewise, there is also much research and studies done specifically about household food waste.

Similarly to this paper, some studies have been conducted with the intent to understand the main drivers of household food waste. (Jayanath Ananda et al, 2021) claim that the main drivers of food waste among households are: food storage practices, dining out behaviour, leftover cooking skills, grocery spending, and frequency of shopping. It was concluded that the points to focus on to reduce food waste are food management skill and routine food-related behaviours. (Camila Ferro et al, 2022) identified that the main drivers of food waste are related to behavioural, personal, product, and contextual factors. The main points where actions are needed to reduce food waste are behavioural factors, planning, knowledge, and skills in food storage, handling, and preparation. It was also identified that households perceive their own wastage at home as very low while the waste of the whole country is perceived as very high. They see their waste as unavoidable and always try to find a reasonable justification behind it.

Food management is a subject of great discussion in the topic of food waste. Different kinds of interventions, actions and solutions are widely researched. An example is a cloud-based inventory management system which proposes a Recipe Suggestion tool with the intent of supporting households in their purchasing. It would also help to manage existing food and meal requirements. This is typically a potential solution to help in the reduction of household food waste (Elliot Woolley et al, 2021). Theoretical frameworks are also created in order to understand households' behaviours, it helps to find explanations of households' food waste habits, which can show great effectiveness when implementing educational campaigns (Ludovica Principato et al, 2019).

In the last years, an unprecedented disruption came to change our lives and behaviours in many aspects, specially at home. Covid-19 is also a factor that may have impacted the wastage of food in the world. Studies have investigated this impact on households' food waste, purchase, cooking behaviour, and perception related to food waste among 19 households in Guelph, ON, Canada. The research showed that unavoidable food waste increased, probably due to the fact that households cooked more often at home during the pandemic, or probably because they went less often to the supermarket but bought more in quantity when going. On

the other hand, avoidable food waste decreased. The reason could be that people eat more of their leftovers, increasing their meal planning and inventory management. Many shopping, cooking and waste behaviours showed that families waste approximately 5kg per week, also that their online food shopping increased and that they cooked more during the pandemic (Amar Laila et al, 2021). However, another study done in the same country but in another city showed a different result, it was found that households in London, Ontario waste 2.81 kg of food per week. The same study also examined the influences that food environment characteristics like demographic, socioeconomic, and neighbourhood have on households. It concluded that households with children waste more food and that the neighbourhood has an influence on food wastage, principally regarding availability, density, and proximity of supermarkets (Haley Everitt et al, 2021).

Children are an important factor that influences household food waste. Parents often claim that they are one of the main reasons food is wasted at home. Studies have shown that children often put pressure on parents to over purchase when doing food shopping. They also show picky behaviours and are often not open to eating uncalibrated fruits or vegetables. Moreover, they frequently change taste, making it hard for parents to follow, therefore parents over-cook to make sure to answer children's needs (Monika Kansal et al, 2021).

It is also under question if age influences food-management skills and food waste behaviour. Studies found that young people tend to waste more, probably because of a lack of experience and knowledge when it comes to shopping, storing, and cooking with leftovers. To mitigate that, the author recommends an action plan on social media to educate young people on the subject (Gamithri Gayana Karunasena et al, 2021). Equally, (Kim Borg et al, 2021) argues that 45% of a survey respondent (n2803) are "Considerate Planners", they are usually older and show considerable time investment on food planning, but not only, they also show how the experience can support them in wasting less food. (Saman Attiq et al, 2020) also affirms that age has an influence in the intention on food waste reduction.

Intervention among young people may be a step towards a reduction, principally in the long term, of food waste. Studies demonstrated the positive influence that educational activities at school have on students. They showed great involvement at home and waste of avoidable food was reduced among participating schools (Mark Boulet et al, 2021). The role of knowledge has been often evaluated, as an example, it was associated households' knowledge of food labels with reduction on wastage of food. Likewise, awareness about the negative impact of food waste was also associated with decrease of food waste (Assem Abu Hatab et al, 2021). Another study used a multifaceted educational approach to explore how it could impact on the food waste generation at home. The participants received online education and strategic

information for 5 weeks, through videos, podcasts, and infographics, where different strategies were presented to reduce food waste at home. It results from the intervention a significant decrease on household food waste, and an improvement in behaviour. Among the household participants, there was registered a reduction of 27,85% on food waste, showing the effectiveness of an educational intervention (Christopher Wharton et al, 2020).

Based on the above reviews, it can be concluded that food waste studies have different perspectives and focuses, which hugely contribute to the sector. The topic is the subject of much research and discussion, with a focus on many different countries and cities. Even though there is some data for food waste in Switzerland, there is no such study done in Geneva and Vaud. For this reason, a survey with 540 households from the two cantons was conducted to collect data on the subject. Therefore, this paper will fill the gap of a study about household food waste in the cantons of Geneva and Vaud. The objective is to understand their behaviours driving food waste, what prevents them from reducing it further and which actions they are already taking to avoid food waste. Finally, the information will be used to find which area of focus needs more attention, with the intent to contribute at a small scale to the fight against food waste, and propose solutions that will hopefully be useful and relevant to the sector.

3. Methodology

The research seeks to gain some understanding on what are the main households' behaviours that are driving food waste and discuss the main barriers to minimise it. The questions the paper asks are: What are the main household behaviours driving food waste in the cantons of Geneva and Vaud? What are the main drivers preventing households to minimise food waste? What are they doing to avoid food waste? and ultimately is Geneva and Vaud making enough efforts to avoid food waste?

As there is no recent study conducted about the food waste behaviours of citizens from the cantons of Geneva and Vaud, the primary data was collected for the research. Therefore, quantitative and qualitative data were gathered via an online survey.

This approach was chosen to gather a maximum of respondents' insights. The objective being to understand their behaviours, the constraints they face, and actions they take to avoid food waste. It was designed in a simple and easy way to respond, in order to keep the respondents engaged until the end of the survey, and to collect a great number of observations. This method suits the objective of the research, as assembling many pieces of information from a considerable number of people, who should be representative of the region, can give results that approach a maximum of the reality.

Primary data collection

The research was conducted with households from the cantons of Geneva and Vaud, using the survey tool Qualtrics. The survey was completely anonymous and had 23 questions of multiple-choice as well as open-ended questions. The questionnaire on food waste tackled the specific topics of food labels, expiration dates, grocery shopping planning, leftovers, food conservation, uncalibrated fruits and vegetables, knowledge of food waste players, environmental impact, the main reasons food is wasted, and the actions taken to avoid food waste. As consumers tend to underestimate their wastage of food, there is no question asking them to quantify their waste. To avoid bias, the survey was not introduced as food waste research but as food consumer behaviour research, with the intent of not influencing the respondent.

Survey distribution

The survey was randomly distributed, using the probability sampling approach, thus each citizen of Geneva and Vaud could have answered the study. The survey was widely distributed via social media, mainly on Facebook, but also on Instagram, LinkedIn, and Whatsapp, as well as inside HEG settings. It was available from the 13th of April to the 6th of May (23 days). The participants needed approximately 5 to 10 minutes to complete the survey.

Respondents

The research collected a total of 935 answers: 333 from Geneva, 315 from Vaud, 210 from the rest of Switzerland, 41 from France, 16 from different countries, and the remaining 20 ended the survey before answering where they are from. Were excluded from the research: 183 respondents that didn't finish completing the survey, and all the respondents that didn't live in Geneva or Vaud.

The final sample size was 540 respondents, distributed between the canton of Geneva and Vaud. Specifically, 51% from Geneva and 49% from Vaud.

The groups' age distribution:

Age group	Nb of respondents	Percentage
18-24	49	9%
25-30	132	24%
31-40	164	30%
41-50	107	20%
50	88	16%

*Table 1: Respondents group age (elaborate with the survey data)

Most of the respondents were in the age group of 31-40.

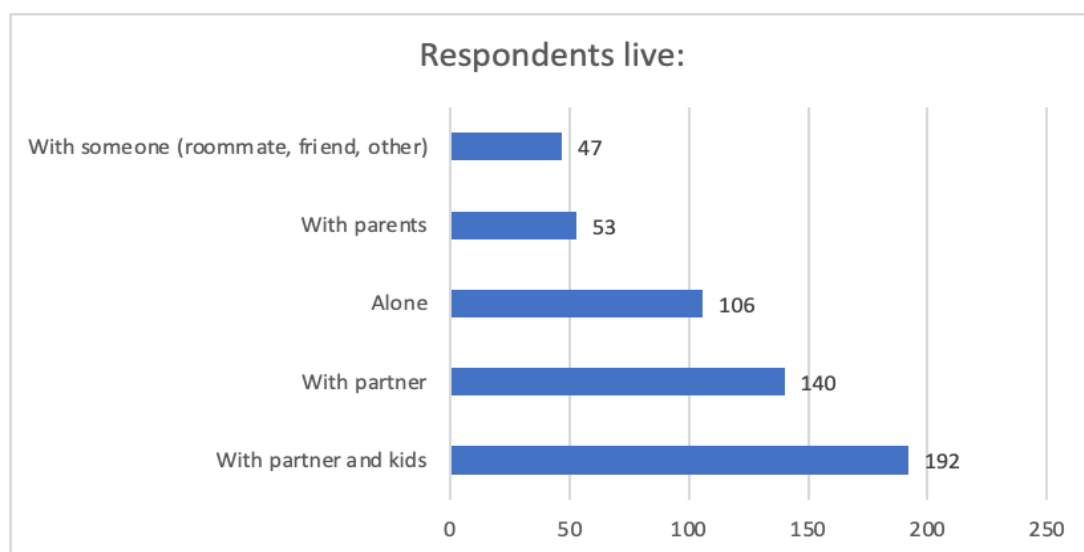
Respondents' education:

Education	Nb of respondents	Percentage
None	6	1%
High school graduate	49	9%
Technical/vocational training graduate (CFC, branch courses)	184	34%
Bachelor's degree	121	22%
Master's degree	116	21%
Professional degree	50	9%
Doctorate degree	14	3%

*Table 2: Respondent's education (elaborate with the survey data)

The majority of the respondents are Technical/vocational training graduated.

Respondents living situation:



*Figure 3: Respondent's living situation (elaborate with the survey data)

36% of respondents live with their partners and kids.

Participants' gender:

Gender	Nb. of respondents	Percentage
Female	464	86%
Male	71	13%
Prefer not to say	5	1%

*Table 3: Respondent's gender (elaborate with the survey data)

There is a huge discrepancy between the number of female and male respondents. The main reason could be that two Facebook groups were only for women, and it happened that those two groups were the most engaged in the survey. Nevertheless, it was also widely distributed in other groups, even so, the rate of males is very low. It could be speculated if the subject is of more interest to women than men. For the sake of generality, it is assumed that the subject is not a question of gender, and the respondents will be treated equally on this matter.

Analyses

The quantitative data was analysed using descriptive statistics, to describe and summarise the data points. The purpose was mainly to simply measure the frequency of the responses using Microsoft Excel spreadsheets and the results tools from Qualtrics.

For the question where qualitative data were gathered, the content analysis method was used. The data was classified and analysed to identify recurring themes, the same content was grouped to avoid repetitions and have a maximum of different insights.

An analysis of possible relations between behaviours and age, education level, or living situation of the respondents was done for all questions, and the ones where a relationship has been identified were reported in this paper. A link between some questions was also tested with the intention of explaining some behaviours or showing the consequences of some behaviours. As an example, it was checked if the number of respondents that claimed to leave food too long in the fridge were the same as those who claimed not planning their grocery shopping.

Constraints

The collection of data via survey can be challenging as it depends on the sincerity of the respondents. Lack of understanding and involvement can also be encountered. At the beginning of the survey, it was clearly stated: “*your authentic answers are very valuable, please answer spontaneously and honestly. There are no right or wrong answers.*” Even though some questions can be biased, given that people, even knowing that it is anonymous, are always scared to be perceived as a bad person. As food waste is a very sensitive subject, results from household self-reported surveys need to be taken with prudence. People tend to be very positive about their wastage of food, thus there can be a gap between what they say and what they actually do.

4. Results

At home, food waste occurs for several reasons, the main household behaviours that drive food waste can be lack of planning, shopping more than needed, cooking exaggerated quantities, handling leftovers, or not using the fridge, to name a few.

The lack of knowledge in many aspects linked to food is also a driver, such as how to properly store the food, understanding food labels, or using its judgment.

Many household behaviours also affect other actors of the food chain, for example, the choice of taking or not leftovers at the restaurant, the willingness to buy uncalibrated fruits or vegetables, and openness to buying discounted food close to the ending date or items that have lost a bit of their freshness.

Many other reasons can come to play when the subject is wasting food. Cultural aspects are one of them, the way people were raised, the country they come from, religion, social condition, or education.

The amount of food waste, from households, is not the same in developed countries as in countries under development.

“In developing countries, 40 percent of losses occur at post-harvest and processing levels while in industrialised countries more than 40 percent of losses happen at retail and consumer levels” (UNEP, 2022).

Very often, in poorer countries, people don't even have a fridge to store their food, bringing us to another issue, the material infrastructure, lack of proper space to store food, or standard of living.

Some questions can come to our minds even if the answers seem obvious. Would people have more tendency to waste food if it is difficult to get to a supermarket or if it is just next door? When food is cheap or very expensive? Many factors can play regarding our approach toward food.

In the following section, the results of the research will be reported, and subsequently the attempt to understand what the main drivers of food waste in the canton of Geneva and Vaud are, looking at the behaviours and choices shown by respondents.

HABITS AND BEHAVIOURS

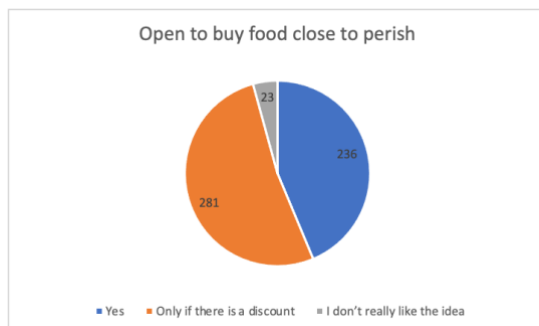
Planning

When asked about their grocery shopping habits, 64% of respondents claim that they *buy only the food they will consume in the next days*, while the remaining 36% claim to *buy a lot to avoid going back to the supermarket*. Of that 36% that prefer to avoid going back to the supermarket, most of them are in the group age of 41-50, adding 45% of the total group. Regarding the education group, the prevalent answers come from respondents with a doctorate degree, counting 57% of the cohort.

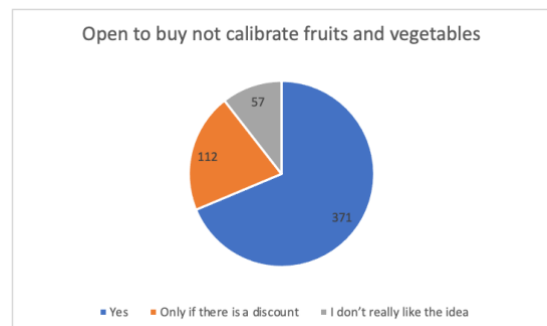
When it comes to the habit of making a list, 52% of the respondents answered *positively*, while 34% claimed to do it *sometimes*, and 13% affirmed *not doing a list*.

Uncalibrated fruits and vegetables and expiration date

It was asked if respondents would be open to buy food close to perishing to avoid food waste. 44% answered yes, and 52% said that they would buy but *only if there is a discount*. Only 4% confessed that they don't like the idea. Likewise, it was asked if they would be open to buy uncalibrated fruits and vegetables, 69% responded *positively*, 21% *would buy it only if there is a discount*, while 11% assumed they *do not like the idea*.



*Figure 4: Percentage of respondents open to buy food close to perish (elaborate with the survey data)



*Figure 5: Percentage of respondents open to buy uncalibrated fruits and vegetables (elaborate with the survey data)

Without discounts, respondents are more willing to buy uncalibrated fruits and vegetables than food close to the expiration date.

When questioned what respondents would do when one of their food items expired, 80% claimed that they *could still eat it many days after the expiration date*. 14% confess to *discarding it straight away*, and 8% choose the option *“other”*.

Among the 42 respondents that choose the option *“other”*, 42% of them have the habit of smelling, touching, tasting, and observing the aliment to check if it is still edible to eat. 41%

stated that it depends on the type of food, and the remaining 13% stated that they can still eat the food item, but only a very few days after the past date.

Leftovers

When the question of what respondents do with their leftovers was raised, 74% claimed to *eat it the day after*, 19% *prefer to reinvent another dish*, and 19% assumed to *throw it*. 21% answered “*other*” and stated that they freeze it or give it to their pet.

It was questioned what respondents usually do when they go to the restaurant and do not eat all their food. As 112 respondents claimed that they *always eat all their food*, they were not taken into consideration for the analyses of this question. Among the remaining 428 respondents, 29% affirm *always asking to take home leftover food* at the restaurant. 41% only *ask for it sometimes*, and 14% *rarely ask for it*, and finally, 16% of the respondents confessed to *never asking* to take home their leftover food at the restaurant.

From the respondents that assumed to *rarely or never ask for it*, which accounts for 30% of the 428, the majority are in the 18-24 group age.

It was asked to the 67 respondents that claimed to *never ask to take home their leftovers* at the restaurants, what were the reasons for that. 53% confessed not feeling comfortable asking it. 31% assumed that they just don't want to ask for it, and 13% chose “*other*” as an answer. Among those other answers, some claimed that they never thought about that or didn't know it was possible. One respondent noted *not being sure of the provenance of the food and not feeling safe to re-heat and eat it another day*.

When asked if they were used to freezing their food, knowing they won't be able to eat it, 64% said they are *used to freezing different kinds of food*, 18% said they *only freeze meat* and 15% assumed *not having the habit of freezing their food*.

KNOWLEDGE

Food Labels

It was asked if respondents understand the real meaning of the following food labels: Sell by, Use by, and Best before. 87% of the respondents pretended to *understand the real meaning of food labels*, 12% were *not sure of knowing the meaning* and only one respondent affirmed *not knowing at all the meanings*.

On the following question, respondents were tested, to check if they really know the meaning of food labels. They were asked to link the significations with the right labels, as the following:

Dates are for the retailers, letting them know how long a certain product can stay on the shelf: Sell by

Should not be eaten after the specified date: Use by

Dates are advisory and refer to the quality of the product, it will not necessarily be harmful, but may begin to lose its optimum flavour and texture: Best before

For the first label, *Sell by*, only 3% answered wrong. For the second label, *Use by*, 8% answered wrong, and for the third label, *Best before*, 9% gave the incorrect answer.

All the respondents that answered the “test question” wrong, had previously stated that they understand the meaning of food labels. Having answered wrongly shows that they probably don’t really understand it. Another fact is that all those who claimed not being sure about the meaning of food labels ended up giving the right answer for the three food labels.

Food conservation

The respondents were questioned if they know how to optimise the conservation of their food. 54% of them stated that they *are not sure*, 35% claimed to *know how to optimise their food* and 11% assumed *not to know it*.

Of the 350 respondents that *don’t know* or *are not sure* of how to optimise the conservation of their food, the prevalent group age was 18-24, as 88% of the group chose one of the two options.

For the level of education, the group with its majority answering not knowing how to optimise the conservation of their food was respondents with a doctorate degree, counting 79% of the cohort.

Food waste players

It was asked if respondents know the mobile application Too Good To Go, and those were the results:

- | | |
|--|-----|
| • <i>I know but I don’t use it</i> | 43% |
| • <i>Never heard about</i> | 19% |
| • <i>I know and I use it sometimes</i> | 16% |
| • <i>I know and I use it rarely</i> | 13% |

- *I know and I use it frequently* 9%

Very few respondents *use frequently* the mobile application Too Good To Go, and almost half of them *don't use* the app.

62% of the respondents *don't use* or *never heard about* the application Too Good To Go. Among those:

- 68% of the respondents from Geneva don't know or never heard about (189 out of 277)
- 95% of the group age 41-50 don't use or never heard about
- The level of education standing out are respondents holding a doctorate degree, counting 79% of the cohort

When asked the respondents if they know any restaurant or store in their city that the core concept is to avoid food waste, 88% answered *no* and only 12% responded *positively*.

Among the 88% of the respondents that don't know any restaurant or store where the core concept is to avoid food waste:

- 90% of the total Geneva respondents (248 out of 277)
- 86% of the total Vaud respondents (225 out of 263)
- From the group age 31-40, 93% of the cohort
- None of the respondents holding a doctorate degree know a restaurant or store that the core concept is to avoid food waste

From the respondents knowing restaurants or stores having a concept of avoiding food waste, the following were cited:

*Le Local, Union Maraîchère, Bagel 111, Migros, Coop, Denner, **Assbar**, Pouly, Caritas, Chez Sils, Frederic Ducret, Contel, Café Dunia, Manor, Bal Blanc, **Reffetorio**, Starbucks, Fleur de Pain, Le Wok Royal, Boulangerie de Moulins, Haas, Dunkin Donuts, Landi Payerne, Agip, Café Basane.*

But in fact, almost all of them are traditional businesses or associations that are doing actions and are engaged in avoiding food waste, but food waste is not the main core concept. From the respondents' answers, only two businesses have food waste as a core concept, the restaurant Reffetorio in Geneva and the bakery Assbär present in a few cities in Switzerland, including Lausanne in the canton of Vaud.

Food waste environmental impact

Respondents were questioned if they know that food waste is responsible for 10% of greenhouse gases worldwide and contributes significantly to the climate crisis. The answers were: 40% of them responded that they *could imagine*, 34% *had no idea* and 27% affirmed being *aware* of the information.

ACTIONS

It was investigated if respondents do any action to avoid food waste at home, 63% answered *yes*, 31% answered *sometimes* and 6% confessed *not doing any action*.

From the respondents affirming doing some actions to avoid food waste at home, the following actions came up more frequently:

Eat the leftover the day after	Buy the right quantity
Freeze leftovers	Cook the right quantity
Freeze food close to the end date	Check the fridge before buying
Cook another dish with the leftover	Prepare the meal in advance
Eat/cook the food close to perishing/going bad first	Do a grocery list
Feeding the dog, snail, chicken, hedgehog with the leftovers	Invite friends to eat when cooking a lot/ share with others
Freeze meat right after buying	Plan meals
Buy discounted products	Check if the food is still edible
Check the dates of the food	Eat food beyond end date
Cook small portions	Use app Too Good To Go

It was asked what are the main reasons respondents waste food. Each respondent could give between one and four answers, 1142 inputs were collected.

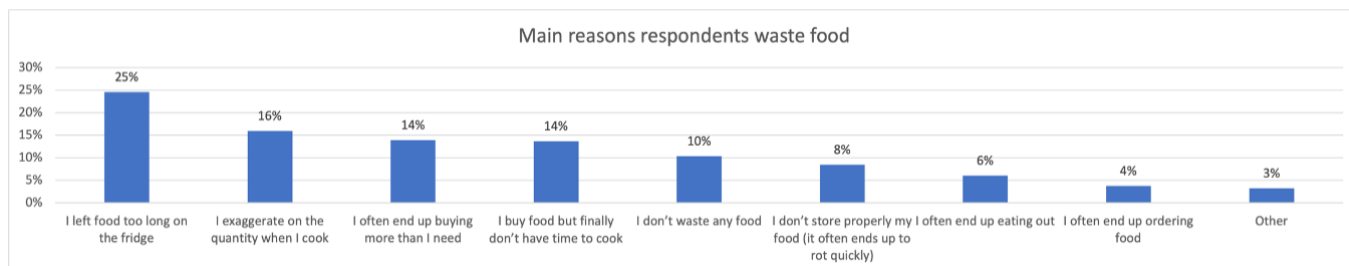


Figure 6: Main reasons respondents waste food (elaborate with the survey data)

Most of the respondents claimed to leave food too long in the fridge.

From the respondents that claimed *to leave food too long in the fridge*, the prevalent cohort is respondents in the age group 25-30, as 59% of them gave this answer. Equally, 58% of respondents living with their parents also replied the same.

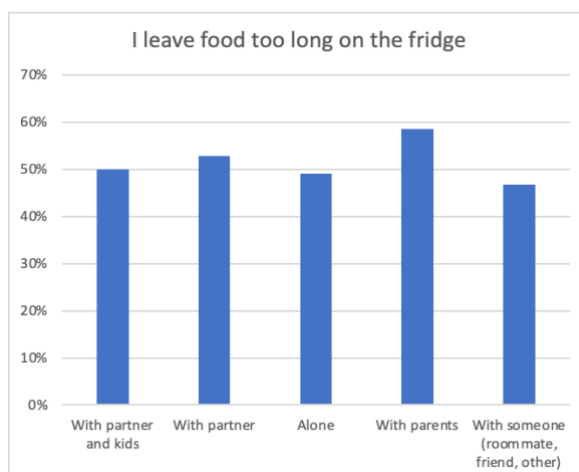


Figure 7: Respondent's reason – I leave food too long on the fridge (elaborate with the survey data)

The second biggest reason respondents waste food is that they *exaggerate the quantity when cooking*. The issue seems to be faced more in the canton of Vaud than in Geneva, as 40% of the Vaudois claimed to exaggerate the quantity when cooking, against 25% of respondents living in Geneva. The prevalent group age is 18-24, 57% of the group have given the answer. Also, 45% of respondents living alone claim to face the issue.

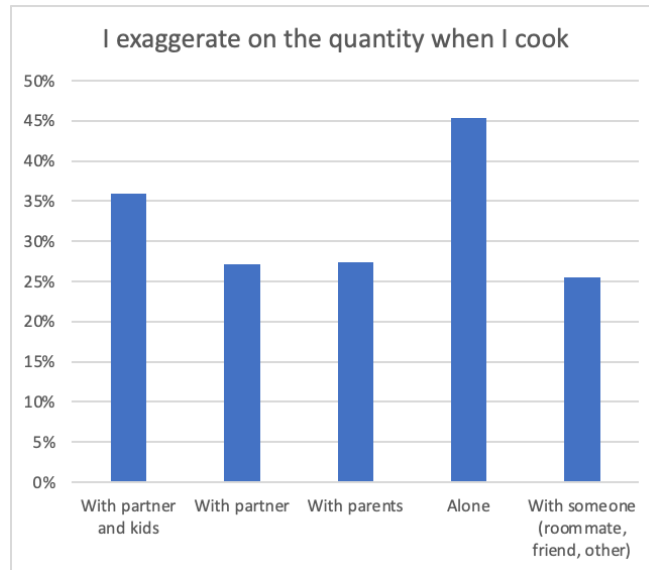


Figure 8: Respondent's reason – I exaggerate on the quantity when I cook (elaborate with the survey data)

Some insights from the 36 respondents that choose the option *other*:

19% of them claimed that their children are the main reason why there is some food waste in their home. As when they are little, they often don't like what is on their plates, or, when they grow up, they often change their plans without previous information. Other 19% complain about how quickly fruits and vegetables go bad nowadays. Some of the respondents claim that the waste happens due to unplanned circumstances.

Given that the size of respondents is robust enough, it might provide insights to the paper, and consequently lead to eventual recommendations.

5. Discussion

This section will discuss the main results of the survey and the most important facts coming out of the research. Moreover, solutions and points of action will be proposed, in order to help households decrease food waste at home. Finally, a recommendation that would hopefully be useful to the sector will be proposed.

Following the analyses of the results, it is expected to have enough facts to answer the questions: What are the main household behaviours driving food waste in the cantons of Geneva and Vaud? What are the main drivers preventing households to minimise food waste? What are they doing to avoid food waste? and ultimately is Geneva and Vaud doing enough efforts to avoid food waste? The previously reported results will be analysed and discussed in two main blocs: answers with very positive results and answers with less positive results. Taking out the demographic and input requested questions, 14 questions were asked, of which 11 with positive results and 3 with less positive results.

The questions to which respondents showed positive behaviours, or stated taking actions to avoid food waste, were the followings:

- 87% of the respondents understand the meaning of **food labels**

We can conclude that respondents in the region have a good knowledge of food labels. Given that, on the question which respondents were tested on the meaning of food labels, the percentage errors were minimal, 3% to 8%. Overall, most of the respondents answered right, what can bring us to suppose that the lack of knowledge of food labels is probably not the main reason driving food waste in the region.

- 79% still eat their food item many days after **expiration date**

Respondents showed the good habit of eating their food item, even if the expiration date is over. Many items can be eaten after a past date, and this could also confirm their knowledge about food labels. Moreover, among the respondents that chose the option: *other* (8%), most of them already have the good reflex of using their judgment, which is one very important habit to avoid food waste.

- 87% do a grocery **shopping list**, often or at least sometimes

Making shopping lists is one of the important aspects of planning. It can avoid buying exaggerated quantities, thus the risk of wasting. Even if a great number of the respondents claimed to make shopping lists, in further questions it can be seen that planning is something that needs to be improved.

- 74% eat their **leftover** the day after

Quite often people end up cooking more than they can eat, or a member of the family changes their plans. Eating the leftovers considerably decreases the amount of avoidable food waste. Most of the respondents showed having the habit of eating their leftovers.

- 76% of respondents when going to the restaurant either always eat all their food, or ask to **take their leftover home** (always or at least sometimes)

It is important to say, the share of food waste due to restaurants in Switzerland amounts to 210 '000 tones, even if it is a lot less than the households who waste a total of 778' 000 tones, it is still a huge amount (OFEV, 2022). Either because the portions served are too big or that exaggerated quantities are prepared. Thus, as the households are the ones going to the restaurant, they can help decrease this amount of food waste. By asking for smaller portions or asking to take home their leftovers. In the cantons of Geneva and Vaud, it seems to be already the case, as they always finish their plate or always/sometimes ask to take home their leftovers. A good action would also be if restaurants propose systematically to the clients to take their rests, some already do it but not all of them.

Nevertheless, it is worth discussing the 23% that rarely or never ask to take home leftovers from the restaurant. Even if only a few of them stated clearly not feeling comfortable asking for it, we can still suppose that it is a feeling probably shared with many people. Principally in a rich country where most of the people don't "need" to do this: why would I ask for the rest of this food if I can buy more whenever I wish? The fear to be judged as a person in need or stingy. Thus, a lot of food can go to waste if people think that way. Not surprisingly, the age group prevalent is 18-24, as 38% of the cohort responded never or rarely asking to take the leftovers at the restaurant. This behaviour could be seen as a lack of maturity or confidence.

Food security could also be a reason that prevents people from asking to take home leftovers. If they are not sure of the provenance, or how many times that food was reheated, they would probably feel fear of eating it the day after.

- 96% would be open to buying **food close to expiration**, with or without discount

Some supermarkets or even specialised stores already have the concept of selling food close to expiration around the world. In Geneva and Vaud, this is not the case. There are only the usual supermarkets that sell discounted products when their expiration date is close. They have a red or orange sticker and are usually found at the end of the day or weekends. The supermarkets also donate it to associations like Partage, and Caritas, or sell it on the mobile application Too Good To Go. Caritas also proposes food that is close to expiration in their

store, but it is only available for people with very low income. Regarding our respondents, most of them show great interest in buying this kind of product.

- 89% would be open to buying **uncalibrated fruits and vegetables**, with or without a discount

One of the reasons fruits and vegetables get wasted is that they don't meet the "standards", meaning that they are not visually "perfect" enough to be sold. Sometimes their size doesn't fit the exigencies, or they have a "weird" look. This waste is accounted for in the agricultural sector. In Switzerland, it is estimated that the sector wastes 556' 000 tons of food per year (OFEV, 2022). Uncalibrated fruits and vegetables sometimes are not even harvested, but a part of them is still being used in restaurants.

Yet, people are starting to show more openness to those products. At the beginning of the pandemic, some swiss supermarkets started to offer uncalibrated fruits and vegetables, and consumers didn't seem averse to the idea. Nevertheless, after an investigation done by the Federation Romande des Consommateurs, FRC, a few months later these products became rare again. The same association, with its partners, conducted an online survey in July 2020 with 4150 consumers. More than half of them affirmed that they bought uncalibrated products, when they were available, during the pandemic crises. 66% of them confirmed still being interested in buying this kind of product. 25% of them affirmed that they should not necessarily be sold at a discounted price. Their investigation showed that the consumers are more willing to buy the products than the supermarkets to sell them (FRC, 2020). Interestingly, the survey conducted for this paper research with respondents from Vaud and Geneva, shows almost the same number, as 69% of the respondents affirmed to be open to buying uncalibrated fruits and vegetables. 21% would buy only if there is a discount, and only 11% don't really like the idea.

A website called Ugly Fruits, sells uncalibrated fruits and vegetables, with free delivery anywhere in Switzerland. An important initiative that not only helps to find a destination for those kind of products but makes them popular. The website proposes fresh and organic fruits and vegetables, bought directly from the local producers, but principally without any discrimination. The products are sold at a less expensive price than the mass distribution (uglyfruits.ch, 2022).

Union Maraîchère de Genève also proposes their uncalibrated and unsold fruits and vegetables. The main concept is, since 1945, to assemble all the farmers of the region and help them to commercialise their products. But, in 2008, they opened their first store to sell at a lower price the unsold and uncalibrated fruits and vegetables, helping the farmers to have

an additional source of income and avoid food waste. They also collaborate with charities. Today they have three stores in Geneva, two of them offering uncalibrated products. There you can also find products made from unsold fruits and vegetables, like tomato juices, sauces and different sorts of soups (Union Maraîchère de Genève, 2022).

- 94% do **actions to avoid food waste** at home, and some respondents do it at least sometimes

Almost all the respondents affirmed doing some actions at home to avoid food waste. Their contribution is truly important to the fight, as they are the main actors wasting food. Respondents showed some knowledge of many habits that are essential to decrease food waste.

- 64% are used to **freeze** different kinds of food

When we buy a lot of food, or we know not being able to eat that leftover, the best action is to freeze the food. Some fruits that are about to go bad can be frozen and a good smoothie can come out of it later. Same for vegetables, which can become amazing soups after unfrozen. The freezer is our best friend. Among the respondents, most of them seem to be used to using their freezer frequently.

- 66% know or could imagine the effects of food waste in the **climate crisis**

When the subject is climate crisis, households in Switzerland have a share of 38% of the environmental impact, due to avoidable food waste, thus the biggest contributor to the issue. Often forgotten, the impact caused by the food wastage is not only due to the food left to rot in landfills. All the emissions due to transport, processing, storage, packaging, and preparation also contribute to the climate crisis. It is not a coincidence that households, by being the last of the chain, end up being the ones more accountable for the issue. All the way the food goes under until our plates, represent a huge number of resources lost. Of these resources, water, energy, and fuel are the main ones. The agricultural sector alone is accountable for 70% of the water used in the world. Thus, when wasting food, we are also wasting fresh water, which is needed to grow fruits and vegetables, for cattle, poultry, fish, and for irrigation of the crops. For example, producing meat needs a huge amount of water, and it is one of the most wasted foods. As per earth.org:

“Throwing away a kilogram of beef is equivalent to throwing away 50,000 litres of water. Pouring a glass of milk down the sink is nearly 1,000 litres of water wasted. Additionally, taking into account global food transportation, large amounts of oil, diesel and other fossil fuels are consumed as well” (JANGIRA LEWIS, earth.org, 2022).

Water is a precious and scarce resource that we must preserve to ensure life on earth.

For this and many other reasons, households need to be very conscious of the social, economic, and environmental costs of the food they are throwing away. It is important to always recall them, campaign and education being the most important tool. Of the respondents, 66% declared to be aware of the effects, but to which extent they understand the implication is not possible to know. This number, even if acceptable, is far from being enough. Household contribution is essential to decrease food waste.

- 64% of the respondents, when going to the supermarket, **buy only what they will consume** the next days

One of the main reasons people waste food is lack of proper planning, meaning they often end up buying more than they need. They can eventually change plans, either because they are invited, too lazy or tired to cook, or their favorite delivery service sends an email with a promotion. No matter the reason, it can happen to everyone to overbuy food and not cook it. Nowadays, people are also very busy and do not want to waste time at the supermarket, consequently buying a lot more than will be consumed. Of the respondents, almost two-thirds affirm not making the mistake, however, in another question, they show different behaviours.

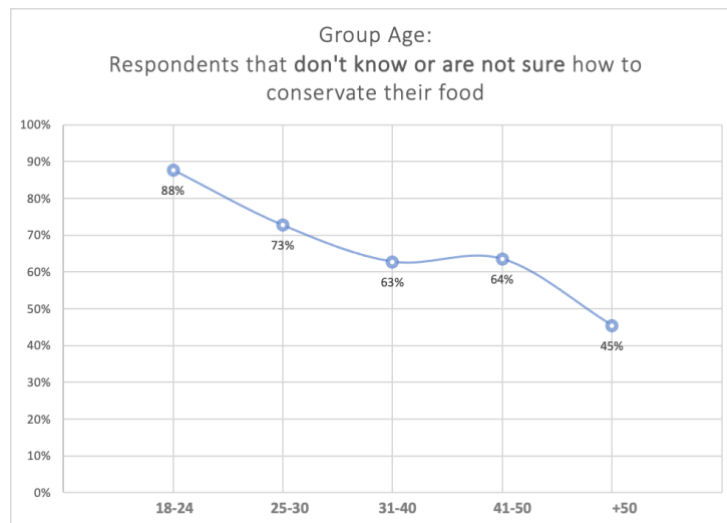
It can be concluded that the topics above are possibly not the main causes that explain food waste in the region. Although there is room to improve, the respondents seem to be very conscious about the subject, and willing to make efforts.

Nevertheless, the following topics had less positive results:

- 65% of respondents don't know or are not sure how to **optimise the conservation of their food**

Probably one of the major issues encountered by households, the conservation of the food is a challenge often overseen by people. More difficult than it seems, food storage is almost a science. Everything has its right place, some inside of the fridge, others outside, some in the dark, others in the light. To extend the food shelf life, many actions need to be taken. No one taught us at school or elsewhere how to properly store the food we buy. If people don't have the idea to look by themselves at how to do it correctly, they would never know.

Not surprisingly, among the respondents assuming not knowing how to optimise the conservation of their food, most of them were in the 18-24 group age, as 88% of the cohort stated that. The lack of experience could be a factor that explains it. As we can see on the graph below, as the respondents' age increases their knowledge of how to conserve the food increases.



*Table 4: Respondents group age compared to knowledge on food conservation (elaborate with the survey data)

From all the questions asked related to food waste behaviour and knowledge, it is concluded that the conservation of food could be the main reason why people in the cantons of Geneva and Vaud waste food.

To mitigate that there are many actions that can be taken, those are a very few examples:

- Respect the first in first out rule, put food that is closer to perish in the front of the cupboard/fridge
- To protect food from spoilage: storage dry food in airtight and transparent glass or plastic containers. Same for opened packages, transfer them into containers.
- Bread stays fresh longer in bread boxes. Otherwise, it can be frozen.
- In the fridge, everything has its right place, and not everything goes together.
- The fridge should be settled to 5°C, higher temperatures foster bacteria growth
- Fruits and vegetables are better conserved into breathable or perforated bags.
- Don't fill up too much the fridge

(Savefood.ch, 2022)

There are many other rules that can help to correctly conserve the food. It can be found on many websites, YouTube, or mobile applications. All the resources and tools are available to help households reduce food waste.

The following questions, even if the results were not positive, is not directly contributing to household food waste but in fact, are preventing them from helping in the fight.

- 62% don't use or never heard about the **app Too Good To Go**

Game-changing mobile application, Too Good To Go links merchants with consumers. The concept is simple, the mobile application shows all unsold food that is proposed by the merchants. Supermarkets, bakeries, and restaurants offer what they call “surprise baskets” at a specific time, quite often at the end of the day/service. All the food that is proposed is about to go to rubbish, and people are invited to “save it”, for a much lower price. Bread from the day before, meat about to expire, or a meal not bought at the restaurant, everything that is still edible can be proposed on the mobile application. The objective is to sell a maximum of the unsold food, to avoid it being wasted. The application is a tool for the merchants to sell what would go to the bin, and for people to contribute to the fight against food waste, and also save money. At the end, everyone is happy, and principally, food is not wasted.

As per the company, the mobile application is being used by 1'742'011 people in Switzerland. They have 5'438 partners around the country, it can be cafes, restaurants, supermarkets, bakeries, or hotels. Users helped to save around 5'380'789 across the country (Too Good To Go, 2022).

Very surprisingly, 19% of the respondents have never heard about the mobile application Too Good To Go and 43% know the application but never use it, a high number that was not expected. Among the respondents, only 9% use the app frequently. This can be seen either that people are not really involved in the fight against food waste or that the application is not marketing enough its services. From the respondents, the age group prevailing is 41-50, with 75% of them claiming not knowing, or rarely using the app. They are probably slightly less connected than the younger generation, or simply that they are not really looking for economies. Regarding the education level, the cohort dominant is respondents holding a bachelor's degree, with a rate of 79%. It is often forgotten that this kind of application is not mainly about paying less for something, but principally to save food from the bin.

- 88% of respondents don't know any **restaurant or store** in their city where the **core concept is to avoid food waste**

In Switzerland, very few restaurants or stores have as a core concept the fight against food waste. Probably the reason why most of the respondents don't know any. A great number of food businesses are engaged in avoid wastage, but we cannot say that it is their main concept.

In addition, the 12% of respondents who said they know businesses whose core concept is to avoid food waste were asked to provide the names of those. Respondents ended up giving the names of usual businesses that are just engaged in the fight. Only 2,5% of the total respondents gave names of businesses that the main core concept is to avoid food waste. Those were Refettorio only mentioned twice, and Äss-bar mentioned twelve times. It is worth mentioning that there is a possibility that 12% of respondents didn't understand the question.

In Geneva, the restaurant Refettorio opened its door in 2021, following the covid crisis. The idea is to collect the food surpluses from supermarkets and local producers, prepare meals that are available for everyone at lunch, and give dinner for free to people in need (Refettorio, 2022). There is also the grocery store La Farce, not cited by respondents, which gives unsold food collected from its partners to students in need, without asking for any justification of revenue (La Farce, 2022).

In Lausanne, the bakery Äss-Bar collects yesterday's bread and pastries from its partners and sells them at a lower price. The bakery is a pioneer in the region, it opened in 2013 and is now available in twelve different locations in Switzerland (Äss-Bar, 2022).

Even though it is not their main core concept, there are also a few associations that give, sell or prepare food that is about to go to waste. Partage is one of them. They collect, sort, store and redistribute unsold food from Geneva food businesses and give it to many different associations. As per Partage, 320 '000 kilos of unsold food were collected only in the year 2020, 1'635 tons of food were distributed in 2021, and 12 '000 people benefited from the help of the association (Partage, 2022). Table Cuvre-Toi has the same concept and can be found in the canton of Vaud as well as in other six places in Switzerland (Table Cuvre-Toi, 2022).

The main difference between Äss-Bar and Refettorio with the above associations is the fact that the first-mentioned are available to all public, and everyone can have access to the products and meals, thus contributing to the fight against food waste. On the contrary, the associations are only available to people in need.

Therefore, the fact that most of the respondents, 88% of them, don't even know the few stores, and restaurants that are available, prevents them from helping to decrease food waste. These restaurants and stores should probably improve their marketing, in such a way that more people would be aware of their existence.

MAIN REASONS RESPONDENTS WASTE FOOD

It was required to the respondents to indicate the main reasons they waste food, 1142 inputs were collected. Analysing the top three reasons, which account for 54% of all answers, we can notice that they are all linked to planning.

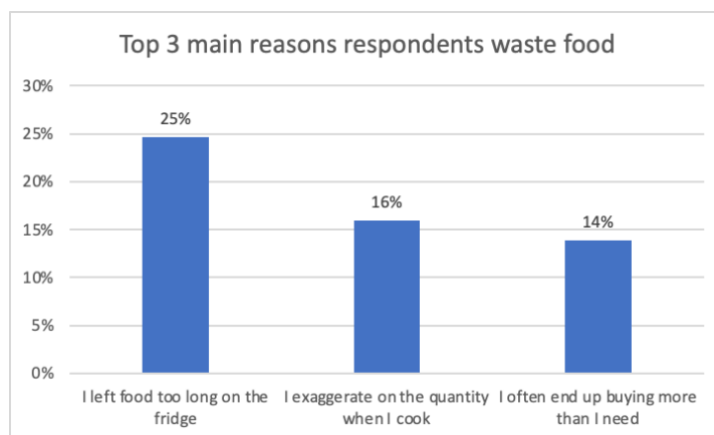


Figure 9: Top 3 reasons respondents waste food (elaborate with the survey data)

I left food too long in the fridge & I often end up buying more than I need

The two answers are very much related as one can be the consequence of the other. If people buy too much food, more than needed, it will eventually stay too long in the fridge, waiting to be eaten. This finally links to the fact that, if people don't know how to properly optimise the conservation of their food, the final destination will be the bin. Lack of planning can lead to this situation, which drives the avoidable waste of food.

From the respondents that claimed **to leave food too long in the fridge**, most of them are among the younger cohorts, as 55% of the 18-24 group and 59% of the 25-30 affirmed doing so. Lack of knowledge and experience can be a cause.

Additionally, it happens very often to change plans, whatever the reason is. To mitigate that, it would be smarter to buy fewer meal preparations. People tend to be quite often ambitious about their cooking plans, by just decreasing by one meal or two when buying, would already contribute.

In another question, 36% of respondents have already claimed **to buy a lot to avoid going back to the supermarket**, thus, probably **buying more than they need**. The majority are in the 41-50 group age, a few reasons that could probably explain that is the fact that, on average, those people are in a demanding career level, or/and with teenagers/young children, trying to be practical and not waste time at the supermarket. What could support this supposition is also the fact that, in the education level cohort, most of the respondents are holding a doctorate

degree, counting 57% of the cohort. As people live a very busy life, are often tired, and do not have time, they prefer to buy a lot of food at a time to avoid going back to the supermarket.

A smart solution could be to order on internet the right quantities of food, after having well planned. It can be delivered in front of your door, or you can just go pick it up at the supermarket. It will avoid losing time and energy at the supermarket, but principally preventing the purchase of excessive quantities, that could end up in the bin. Making a shopping list and not going hungry at the supermarket are also basic behaviours to follow. There are also mobile applications to help with food shopping planning.

I exaggerate the quantity when I cook

Not managing the quantity while cooking is in a certain way linked to planning. If meals are adequately planned, as well as its portion and quantities, there will be less chance of wasting.

Of the respondents that declared **exaggerating the quantity when cooking**, respondents living alone were the predominant cohort, not surprisingly. When people live alone it is even harder to handle portions. Cooking for one person is often difficult to figure out the right quantity. At the supermarket, they also face issues regarding quantities that are often not adapted for one person.

One of the many solutions could be simply to follow receipts, checking quantities before cooking. There are many mobile applications that help with meals planning and figuring out the right quantities to cook.

Relation between respondent behaviours

It was tried to make a relation between the main reasons people waste food: *I left food too long in the fridge* with:

Respondents that claim to *buy a lot to avoid going back to the supermarket*:

When grocery shopping:					
#	Field	I buy a lot to avoid going back to the supermarket		I buy only what I will consume on the next days	
					Total
6	I left food too long on the fridge	34.87%	91	65.13%	170
					261

Surprisingly, people that claimed to *buy only what they will consume on the next days* were the ones that most stated *leaving food too long in the fridge*, which is slightly contradictory.

Respondents that *do a grocery list* for food shopping:

Do you do a grocery list for food shopping?						
#	Field	Yes		No		Sometimes
						Total
6	I left food too long on the fridge	44.83%	117	14.94%	39	40.23% 105
						261

Again, people that affirmed *doing a grocery list for food shopping* were also the ones that most stated *leaving food too long in the fridge*. It would be expected that, if they plan their food shopping, thus buying the right quantities, they wouldn't leave food too long in the fridge.

We can conclude that there is no evident link between these behaviours and answers could be considered contradictory. It can often have a discrepancy between what people think they waste and what they actually waste.

Recommendation

The study shows that the main household behaviour driving food waste is lack of planning. Also, the main constraint preventing them from reducing food waste is the lack of knowledge, on how to properly optimise the conservation of their food. Therefore, there is a need to focus on education, on working on the problem at the source to eliminate it. For this reason, it is recommended to add sustainability courses to the curriculum of the school, at a young age. Along with mathematics, history, geography, languages, or any other courses that are considered essential in the education system. It shouldn't be just an option in the last year of university, it must be an obligation from kindergarten. There is an urgency in tackling the challenges that the climate crisis will bring to us. The children of today will be the actors of tomorrow, thus they need to be well prepared for the challenge. On the Sustainability subject, it should be covered thematic like food waste, climate change, clean water, wildlife, oceans, forests, and all topics where attention is needed to save our planet. Consequently, in the food waste chapter, from a young age, students would learn how to properly plan their food shopping and correctly store their food, among others. This is a long-term investment, but that could be already implemented.

6. Conclusion

To conclude, the results suggest that, overall, Geneva and Vaud citizens are making a great effort to avoid food waste, as most of the survey results were rather very positive. Although there is a lot of room to improve, they showed special efforts in handling their leftovers, freezing food, knowledge of food labels, judging expiration dates, and taking leftovers from restaurants. They also showed openness to food close to the expiration date and uncalibrated fruits and vegetables. They are at present doing many actions to avoid food waste. They also claimed to have some knowledge of the impact food waste has on the environmental crisis. Moreover, if we believe in those very positive results shown by the study, together acting with the other actors, Switzerland could achieve the goal of reducing food waste by half by 2030.

Nevertheless, taking into consideration the responses collected on the survey, we could interpret that the main behaviour driving food waste is the lack of planning, given that the top three reasons respondents waste food are leaving food too long in the fridge, exaggerating the quantity when cooking and buying more food than needed. The constraint preventing them to minimise food waste is the lack of knowledge on how to properly optimise the conservation of the food. Also, the lack of knowledge of important actors in the fight against food waste could also prevent them from contributing to minimising food waste in other chains.

Finally, the recommendation shows the opportunity that sustainability education could have for our future generation and the benefits this knowledge could bring to our society. The perspective of reimagining the existing school system would be valuable and provide concrete advantages to address the challenges of today and tomorrow.

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