11. HOUSEHOLD FOOD WASTE—THE ORIGIN, LEVEL, STRUCTURE AND METHODS OF PREVENTION

https://doi.org/10.18559/978-83-8211-209-2/11

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Abstract

Food waste is one of the major problems that humanity needs to solve. The gargantuan amount of food wasted each year, estimated at around 1 billion tonnes, creates a range of environmental, economic and ethical problems. Unfortunately, food is wasted to the greatest extent by households. To a lesser extent, food is wasted by producers or intermediaries. Therefore, the aim of this article is first and foremost to identify the causes of food waste by households. To do this, a conceptual framework has been adopted. It assumes that household food waste originates in three predictable stages—when shopping, storing and serving. In other words, households waste food because they do not prepare the food they purchase, they do not serve the food they prepare, and they do not consume the food they serve. The considerations in the paper are based on the available literature and secondary data.

Keywords: food waste, household, food waste data.

JEL codes: D10, D11.

Introduction

People waste food. One can even say that food wasting seems to be an everyday activity of our existence. It is the reality, regardless of whether we act as household members, company employers and employees or farmers. We waste food along the entire value chain—at the stage of food production, transportation, storage, processing, retailing and consumption (Hermanussen et al., 2022). What is more, some of us do not think food waste is a big issue since food is natural and biodegradable (Wiliams et al., 2012).

Suggested citation:
Pierański, B., & Smutka, L. (2024). Household food waste—the origin, level, structure and methods of prevention. In K. Pawlak-Lemańska, B. Borusiak & E. Sikorska (Eds.), *Sustainable food: Production and consumption perspectives* (pp. 167–183). Poznań University of Economics and Business Press. https://doi.org/10.18559/978-83-8211-209-2/11

The Food and Agriculture Organization of the United Nations (FAO) estimates that about a third of all food produced in the world is not consumed and is lost as waste without any specific utilisation. Interestingly, it does not matter how developed a given country is—food is wasted by those who live in developed as well as developing countries (Gustavsson et al., 2011).

Food waste is a huge issue as food loss and waste matter in terms of the environment, economy, food security and ethics (Flanagan et al., 2019). In terms of the environment, food loss and waste are responsible for an estimated 8% of annual greenhouse gas emissions. If the total amount of wasted food was taken as a "separate country", it would be the third largest producer of greenhouse gases after China and the United States. In fact, food waste generates more than four times the annual greenhouse gas emissions produced by the aviation industry. Researchers warn that excessive waste can also have serious effects on the changes in climate. They estimate that about ten percent of greenhouse gases are produced by decomposing food in waste dumps. However, the ecological problems do not stop here. Food waste also consumes a quarter of all water used by agriculture each year and requires an agricultural area the size of China to grow food that ultimately is not eaten by people (Flanagan et al., 2019). It also leads to a high degree of eutrophication of water bodies, causing impairment of biodiversity.

It also has to be highlighted that the food wasted by consumers and at food institutions has a higher accumulated environmental impact than the food wasted in the distribution chain, and is therefore even more important to be reduced (Wiliams et al., 2012).

In terms of the economy, at a global level, the annual market value of food that is lost and wasted is estimated to be an astounding $940 billion. In terms of food security as well as ethics, more than 1 billion metric tons of food is lost and wasted per year in a world where, paradoxically, a large number of people suffer from hunger. These people live mostly in developing and underdeveloped countries. According to the UN, almost 700 million people living on Earth have been suffering because of hunger and another three billion people do not have access to sufficient quality food and healthy diets.

What is worse, all these above-mentioned problems are just estimations as we still lack a proper way to precisely calculate the amount of food that is wasted every year. This is due to the fact that widely accepted definitions and methodologies to analyse food waste are still missing (Koester et al., 2018).

As a result of all the presented issues, the food waste dynamics seems to be a serious challenge both for developed and developing countries. The problem is not only the process of food waste generation but also the process of food waste management and food waste utilisation. There is no efficient and relevant food waste recirculation approach applied. The increasing food waste volume is becoming a challenge and is heavily discussed in the USA, European Union and many other countries.

Available data suggests that most food is wasted within households. According to the FAO, approximately 14% of food produced globally is degraded before it is sold and about 17% of the total food volume is lost at the level of individual households (final food consumers). If this food waste was loaded into trucks (40 tons capacity), their number could wrap around the planet seven times. Furthermore, other data provided by the United Nations (UNEP Food Waste Index Report, 2021) corroborate the same facts: the majority of food waste is generated at the level of households (as their food waste volume is estimated to be around 74 kilograms per person per year)—over 61% of the total food waste volume (households often buy more than they are actually able to consume). On the other hand, food waste generated by catering and food distribution services (mainly shops in retail) accounts for 32% and 15%, respectively. These percentages correspond to the following absolute values: households waste 569 million tons of food a year, food service: 244 million tones, and the retail sector: 118 million tones. Together, this adds up to an appalling almost 1,000 (931) million tones (1 billion tones) of food wasted annually. Other data show that in the EU alone almost 100 (88) million tons of food waste are generated annually, which is equal to 174 kg food wasted per average EU citizen, 143 billion euros lost a year and 170 million tons of CO_2 emitted to the atmosphere (Stenmarck et al., 2016). The list of available data on food waste goes on, painting a very pessimistic picture of human activity regarding food.

As was mentioned above, households are responsible for the largest amount of food waste along the entire value chain. Therefore, the aim of this article is to investigate the origin, level and structure as well as ways of preventing food waste.

11.1. Reasons for household food waste

According to a definition, households "waste food", which is a very important statement as food can also be lost. To make a clear distinction between these two terms, one must provide definitions of both of them. Thus, "food waste" occurs at the end of the value chain, at the level of household consumption, whereas "food lost" occurs at previous stages of the supply chain, that is production, processing, distribution, etc. (Food and Agriculture Organization, 1981). The term "food waste" unambiguously identifies the entity that is the source of this phenomenon—the final consumer, which is not only the household but also canteens and restaurants (Hermanussen et al., 2022). However, this paper focuses mainly on households.

Food waste can be classified into different categories based on the degree to which it can be prevented: unavoidable waste, potentially preventable waste (facultative avoidable), and preventable waste (avoidable) (Parfitt et al., 2010). Unavoidable waste is produced during food preparation and relates to inedible components such as bones, shells, coffee grounds, etc. Facultative avoidable waste

occurs due to different consumer habits, such as peeling apples before consumption or not eating bread crust. Avoidable waste relates to food that is perfectly edible at the time of being wasted or that would be usable if it had been processed in time (Hermanussen et al., 2022).

Numerous studies have demonstrated that household food waste behaviour is influenced by various factors and interdependencies (BCFN, 2012; Gustavsson et al., 2011; Szymkowiak et al., 2022). To analyse food waste in a more systematic way, a conceptual framework will be adopted. It is based on the assumption that household food waste originates in three predictable stages—shopping, storing and serving (Wansink, 2018). Food waste occurs because households cook, prepare and serve more food than they can consume. That is, food can be purchased and never prepared, prepared and never served, or served and never eaten (Chandon & Wansink, 2012). In other words, the framework can provide an insight into why household members buy food they never prepare (cabinet castaways), why they prepare food they never serve (leftovers), and why they serve themselves food they throw away (plate waste) (Wansink, 2018).

Regardless of which stage of food waste is taken into consideration, there are a few fundamental reasons for food waste. Some of them are much more psychological in nature than economical. One such explanation is provided by the CAN concept. Within the framework of the CAN (Convenient, Attractive, Normal) model (Wansink, 2015), the ease of engaging in food waste depends on the perception of food waste reduction as a lack of convenience, attractiveness or normality. In other words, consumers waste food at all stages because saving food involves a lot of problems, more effort and time (related to, e.g., planning meals and purchases, storing food properly). Another psychological reason lies in the fact that in most cases food is not perceived as something valuable, and, as such, it is not worth minimising its wastage. This phenomenon can be explained by the "three A's" framework, comprising affordability, availability and attractiveness (Wansink, 2014), which offers three explanations. First of all, food has become more affordable than ever before—one research indicates that buying enough food is a financial struggle for only about 25% of consumers (wrap, 2022b). Secondly, food has also become increasingly available (in grocery stores), and, finally, it is more appealing (with multiple flavours of the same brand). To sum up, psychological explanations state that wasting food (that is not perceived as something valuable) seems to be easier than engaging in a cumbersome process of food preservation.

11.2. Stage I: Food is bought but not prepared

The most obvious answer to the question of why consumers buy food that is never uses is a massive marketing activity of both food producers and retailers. This

activity has frequently been criticised for enticing consumers to purchase unnecessary products that may go unused, resulting in waste. One common accusation is that marketing creates or amplifies an artificial need (Lang & Heasman, 2015). Other allegations focus on how various elements of the marketing activity, such as merchandising, make it overly convenient for individuals to select products they do not actually need, or how pricing strategies like multipacks or buy-one-get-one-free offers make products appear as scarce bargains. Additionally, simple modifications or extensions of product flavours, or line extensions, can make them more appealing and combat boredom or burnout. These products are supported by marketing budgets that can lead consumers to stockpile more than they actually need. Moreover, sales promotions associated with these products can encourage individuals to try a product even when they are unsure if their family will like it (Wansik, 2018).

Marketing strategies of food producers influence waste also by the labelling conventions used for food products. The use of expiration dates, "use by" labels or "best purchased by" labels, psychologically extends the perceived time window during which a person believes they can consume the product before having to discard it. The further the date, the more optimistic individuals may be that they will find an opportunity to prepare and consume the food. However, at this stage of the food waste framework one needs to distinguish between perishable food and shelf-stable food, as the reasons for not using either one can vary considerably.

When it comes to perishable food items, especially produce, meat and dairy, the decision to discard them often stems from safety concerns regarding spoilage and potential for illness. Foods that exhibit signs of spoilage, such as smelly milk, grey-looking meat and liquefying lettuce, are often discarded. Jörissen et al. (2015) identified some reasons for food wastage by Italian and German consumers in their studies, including mouldiness, inappropriate taste/smell of the products and exceeding the "use by" date/date of minimum shelf life. Additionally, in Polish (Tomaszewska et al., 2020) and Finnish (Silvennoinen et al., 2014) households, food spoilage was found to be the cause of wastage of 65% and 29% of food, respectively. For dairy products and grains, the introduction of the expiration date labels ("use by" or "best before") has provided consumers with seemingly objective criteria to either discard the expired products or consume them at their own risk (Graham-Rowe et al., 2014; Qi & Roe, 2016). However, research shows that, on average, consumers treat both "use by" and "best before" date labels similarly when it comes to disposal decisions for milk and yogurt. These findings suggest that there exists a notable portion of the population lacking comprehension regarding the distinction between the two categories of date labelling. Alternatively, even if individuals possess an understanding of the dissimilarity, they nevertheless exhibit a tendency to employ them in an interchangeable manner (wrap, 2023).

On the other hand, the reasons for wasting shell-stable food are a bit different as they are not strictly related to the food itself but rather to the motivation behind

a purchase. According to research, this type of food is bought but never prepared because the products were purchased for a recipe that has never been prepared, or they were purchased for a specific purpose or special occasion that has never transpired. When commenting on the results, one can also point out the psychological reasons for food waste, i.e. consumers' excessive optimism. In other words, consumers may harbour overly optimistic expectations about the likelihood of preparing elaborate dishes, and when these anticipated opportunities do not materialise, they are left with products they have not used. Over time, these items are gradually pushed to the back of the cupboard and forgotten (Wansik et al., 2000).

It seems that it is not only the product type that plays a paramount role at this stage. Another aspect could be the financial status of a household. Consumers that might be expected not to buy food in excess, and thus minimize food waste, are low-income individuals (Thyberg & Tonjes, 2016), given the scarcity of resources typically associated with their economic situation (Connell et al., 2017; Daniel, 2016). It would be expected that middle-income households, which have more financial means, would waste more food than their low-income counterparts. However, studies have shown that some lower-income consumers actually waste more food than their middle-class counterparts, leading to the emergence of what is referred to as the "food waste paradox" (Porpino, Parente et al., 2015). The paradox raises the question of why individuals who can afford food least sometimes exhibit wasteful behaviour.

One potential explanation for the food waste paradox is rooted more in psychology than economics. Recent studies with meal preparers in their homes have revealed that there are strong negative and aversive emotions associated with the sight of an empty plate when one is hungry. Even years later, these preparers may consciously or unconsciously over-buy food to ensure that their families do not experience the anxiety of an empty plate (Porpino, Wansink et al., 2016).

What is worth noting is that the food waste paradox is also visible at a more macro level that is the state level. Data shows (UNEP Food Waste Index Report, 2021) that food waste among households is much higher in lower middle-income countries compared to upper middle-income countries or even high-income countries (Table 11.1).

Table 11.1. Average food waste (kg/capita/year) by World Bank income classification

Income group	Average food waste by household (kg/capita/year)
High-income countries	79
Upper middle-income countries	76
Lower middle-income countries	91

Source: (UNEP Food Waste Index Report, 2021).

However, the food waste paradox is not supported across all studies. In one study, households which noted that price was important did not waste as much food as those which noted that price was less important. The reason for this could be due to better planning abilities or cost awareness in general (Wiliams et al., 2012).

Therefore, in general, it can be concluded that the financial status of a household does not clearly determine the level of food waste. Interesting light is shed on this issue by studies (wrap, 2022a) that have investigated the impact of rising food costs (induced by inflation) on level of food waste. The majority of households clearly indicate that they are most affected by the rising cost of buying food. For this reason, they try to reduce their food expenditure mainly by buying items on sale, shopping somewhere cheaper, purchasing value brands or buying in bulk. Furthermore, most households find ways to save food and to be more resourceful (e.g., through a shopping list). However, despite all these measures, half of the households indicate that they throw away at least as much food as they did the year before (2022 vs 2021) (wrap, 2022a).

11.3. Stage II: Food is prepared but not served

The next stage of food waste pertains to food that is prepared but not served, which includes instances of over-preparation and insufficient consumption. There are several reasons why food is prepared but not eaten. This encompasses, e.g., leftovers that are stored until they become inedible, as well as instances where there are insufficient portions remaining for another meal or when the refrigerator is already at capacity. It could also include instances where food is burnt or dropped, when newly tried recipes do not meet taste expectations, or when plans change and family members eat away from home. Additionally, food that no longer meets freshness or temperature preferences loses its appeal and is left on the table until eventually being discarded (Neff et al., 2015; Qi & Roe, 2016).

However, the main driver of not serving previously cooked food is over-preparation. That means that more food is prepared than a given family is able to consume. A very interesting explanation of this issue states that food waste resulting from over-preparation may be influenced by the principles of the Prospect Theory, which posits that individuals are more inclined to avoid losses than to pursue gains (Tversky & Kahneman, 1992). According to this, those who prepare food are mostly motivated by the desire to prevent disappointment among their family members and/or guests. As a result, they may exhibit a bias towards over-preparing food as a means of avoiding the loss associated with inadequate portions or the embarrassment of insufficient provisions. Rather than conserving food and risking the dissatisfaction of hungry individuals, they prioritise averting the "loss" of disappointing others over the potential gain of reducing food waste. This is somehow

related to the concept of a "good provider" which states that the willingness to offer nutritious and plentiful meals to family or guests is a major barrier to reducing food waste. The ability to provide healthy and abundant meals to those in the social circle can be seen as a symbol of the ability to protect and promote their well-being (Graham-Rowe et al., 2014).

This tendency seems to be particularly prevalent especially among those who, at some point of their lives, have experienced problems with food availability. For instance, food preparers in food-insecure households tend to over-prepare meals in order to shield their families from the anxiety of witnessing empty serving bowls, which may evoke memories of past occasions when they went hungry (Porpino, Wansink et al., 2016). This could apply in most cases to low-income families. However, it could also be related to people that have experienced food shortages due to being citizens of countries with inefficient economies. This is true in Central Europe where the communist economy forced people to struggle for food. The memory of past experiences influences especially older generations to over-prepare food.

Another issue at this stage is a general lack of utilisation of leftovers. Although surplus food could be saved and reheated for future meals, it is often overlooked. This oversight is attributed to factors such as laziness, safety concerns or a general sense of disgust (Meah & Watson, 2013). This leads to a very important question: Why are leftovers saved if they often go uneaten? One perspective is that they are saved due to the concept of "maturation time," which allows individuals to postpone the uncomfortable or wasteful feelings associated with immediate disposal of food after a meal (Waitt & Phillips, 2016).

11.4. Stage III: Food is served but not consumed

With approximately 1,000 meals per year, we should have a reasonable sense of our hunger and the amount of food required to satisfy ourselves. Additionally, adults generally have knowledge of food preferences, especially when it comes to familiar dishes. Under such circumstances, it would be peculiar if mature household members consistently overserved themselves to the point of significant waste. While it may be difficult to finish overly large portions at restaurants or other places away from home, when it comes to familiar self-served food, most of what is put on plates should be consumed.

Multiple studies indicate that plate waste amounts to less than 10% (Wansink & Johnson, 2015), providing converging evidence across different methodologies that plate waste among adults is lower than commonly assumed.

However, unlike adults, children are not well calibrated when it comes to determining the appropriate amount of food needed to satisfy their hunger. They

are still in the process of experimenting and discovering their food preferences, as well as developing their taste preferences and tolerance for different flavours. While adults may know that they enjoy certain foods but dislike others, such as lamb but not eggplant or cilantro, children need to acquire this knowledge through experience. Therefore, a child who consumes only half of what they serve themselves is not wasteful but rather behaves in a manner that is considered normal for their developmental stage.

11.5. Level and structure of household food waste

Starting from the very global level, one can say that average food waste calculated per capita—ranging in most cases from 70 to 80 kg/capita/year—does not differ substantially across continents. The only exception is Africa, which, being the poorest region, wastes the most food per capita (108 kg/capita/year) (see Figure 11.1). However, drawing conclusions from these figures, we should take into account the fact that, given the scarcity of reliable data (especially in poorer regions of the world), these are only approximations.

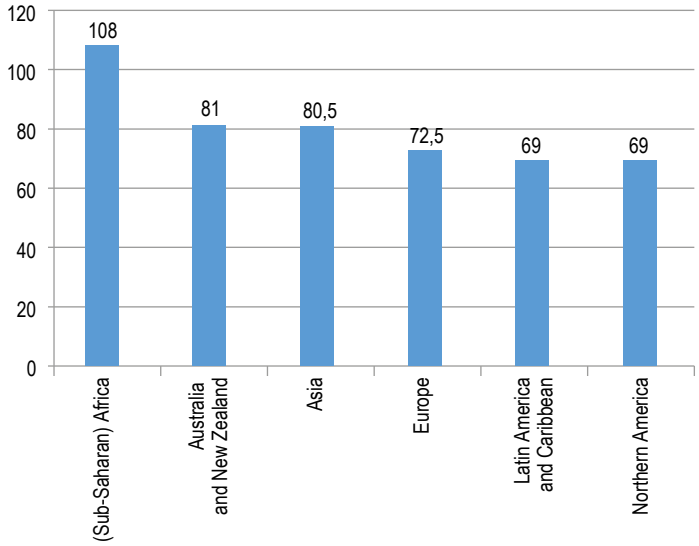

Figure 11.1. Average food waste of household (kg/capita/year) by continent
Source: based on (UNEP Food Waste Index Report, 2021).

As far as the European Union is concerned, it shall be highlighted that this is the most well-documented region among other continents regarding food waste. That results in the highest level of confidence when it comes the data. In the EU,

the differences in food waste among households across different member states appear to be more significant (Table 11.2). There is a fourfold difference between the country that wastes the most food (Greece: 142 kg/capita/year) and the one that wastes the least (Slovenia: 34 kg/capita/year). It is quite difficult to enumerate the reasons for a certain level of food waste among the EU countries. For instance, differences in the level of food wastage cannot be attributed to the wealth of a country. Indeed, the highest levels of food waste can be attributed to both the middle-income countries (Greece, Hungary) and the richest countries (Luxembourg, France). On the other hand, it can be pointed out that the countries where households waste food the least are the rich countries, with the exception of Slovenia and Poland.

Table 11.2. Household food waste estimates for EU countries

EU Country	Household food waste estimate (kg/capita/year)	Household food waste estimate (tons/year)
Greece	142	1 483 996
Malta	129	56 812
Hungary	94	908 669
Luxembourg	90	55 126
France	85	5 522 358
Croatia	84	348 091
Portugal	84	861 838
Denmark	81	469 449
Sweden	81	812 948
Estonia	78	102 743
Spain	77	3 613 954
Latvia	76	145 273
Lithuania	76	210 255
Germany	75	6 263 775
EU	**75**	
Czech Republic	70	746 894
Romania	70	1 353 077
Slovakia	70	381 301
Bulgaria	68	478 667
Italy	67	4 059 806
Finland	65	361 937
Poland	56	2 119 455
Ireland	55	267 073
Belgium	50	576 036
Netherlands	50	854 855
Austria	39	349 249
Slovenia	34	71 107
Cyprus	no estimates	

Source: based on (Food Waste Index Report, 2021).

Furthermore, more cultural explanations do not provide any insightful point of view. Countries that appear to be more culturally similar have different levels of food waste. This is the case, e.g., in the Nordic countries. In Denmark and Sweden, the level of food waste at 81 kg/capita/year in both countries is higher than the EU average, while Finland's is 65 kg/capita/year, which is below the average. The same is true for Southern European countries (e.g., Greece: 142 kg/capita/year vs Italy: 67 kg/capita/year) and Central European countries (e.g., Hungary: 94 kg/capita/year vs Slovakia: 70 kg/capita/year and Poland: 56 kg/capita/year).

When it comes to defining the categories of wasted food, the issue seems to be slightly complicated. This is due to the fact that there is no widely accepted common formula for analysing the structure of wasted food by households. For example, there is no basket of goods whose wastage would be analysed. Hence, available data from different sources can only be compared with some approximation. Despite such limitations, however, it is possible to identify the main categories of food products that are most often wasted. Shown in Figure 11.2 and Figure 11.3, the structure of wasted food comes from two countries—the USA and Sweden. Despite the fact that these countries differ significantly in terms of, e.g., culture or level of taxation, the categories of food most often wasted seem to be very similar and include Fruits and Vegetables as well as Prepared Foods and Leftovers.

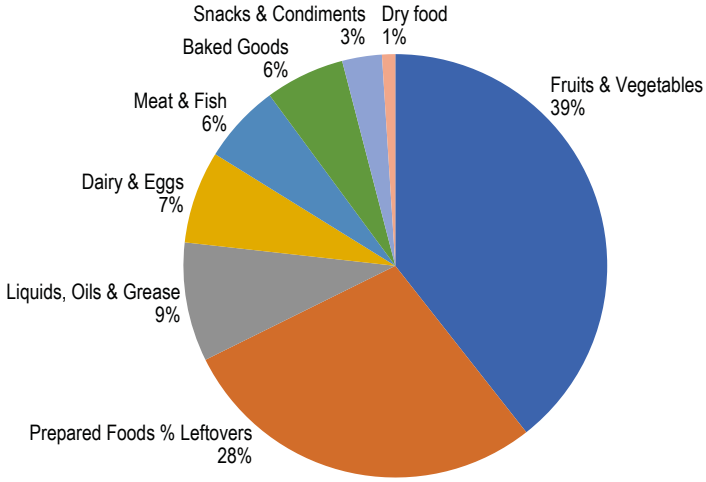

Figure 11.2. Edible food waste by category (%) (United States)
Source: (Hoover, 2017).

Interestingly, the situation in Poland seems somewhat different despite the fact that it does not generally differ from the data for the USA and Sweden. In fact, what distinguishes Poland is the fact that the most frequently wasted food by Polish

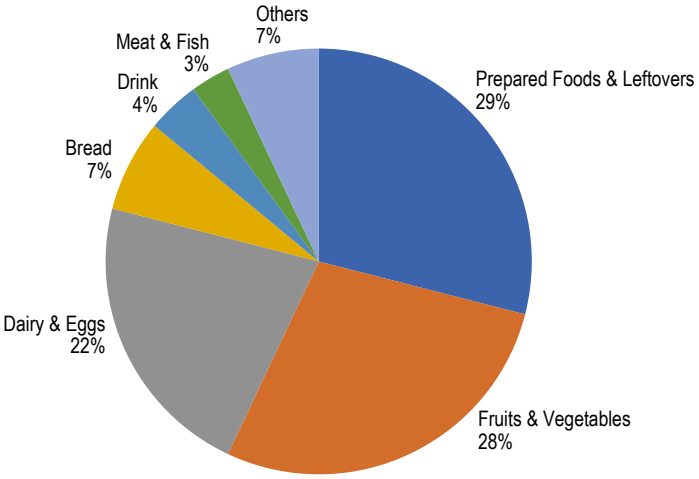

Figure 11.3. Edible food waste by category (%) (Sweden)
Source: (Hoover, 2017).

households is bread, fruits and vegetables, meats and dairy products. In Polish households, unconsumed meal components are also wasted, mainly cooked potatoes, rice and pasta or vegetables (Tomaszewska et al., 2020). However, the discarding of bread is not only characteristic of Poland. A study conducted among Norwegian households (Hanssen et al., 2016) also indicates that bread is among the most frequently wasted food products. Nowadays bread has to meet high freshness requirements, and stale bread is most often thrown away by consumers (Schneider & Lebersorger, 2012). A survey of 1,000 Austrians aged 15 years and over showed that 78% of respondents rated freshness as the most important attribute of bread (Starmayr, 2008).

11.6. Ways of preventing food waste

The issue of reducing food waste may be addressed from several perspectives. These include the perspectives of the economy, public policy, and businesses at different stages of the value chain and, of course, households.

As far as measures aimed directly at households are concerned, these take the form of recommendations relating mainly to how to handle food in order to minimise food losses within the household. It is also about households becoming more responsible and more conscious consumers of food. According to Parizeau et al. (2015) and Secondi et al. (2015), careful planning of grocery shopping is an effective tool to prevent food waste. Quested et al. (2013) indicated that there is

a strong positive correlation between creating a shopping list and other behaviours, such as planning meals in advance and checking food stocks before shopping.

For household members, recommendations take the form of easy-to-follow steps such as: (Flanagan et al., 2019):

- Buy only what you expect to eat: check the refrigerator and cupboards before shopping, use a shopping list and plan meals in advance.
- Know the difference between "use by" (which is about food safety) and "best before" (which is about quality, and it is still safe to eat food after this date).
- Freeze or preserve food before it spoils and find out how to best store different foods so that they stay fresh and safe longer.
- Find creative ways to use leftover ingredients and products past their peak quality (e.g., in soups, sauces, smoothies), as well as ways to cook parts you do not normally eat (e.g., stems, cores).
- Organise the kitchen and refrigerator so that items do not get lost and spoiled.

These recommendations can also be grouped according to the process of purchasing, storing and preparing food.

11.6.1. Purchasing process

Suggestions at this stage claim that engaging in strategic planning, food preparation and effective food storage practices can substantially reduce food waste within households. The act of devising a weekly meal plan that aligns with culinary preferences can yield financial and temporal benefits. By purchasing only the necessary ingredients, one can increase the likelihood of maintaining their freshness and utilising them fully.

Streamlining one's meal choices requires households to maintain an ongoing record of favoured dishes and their corresponding ingredients. This enables easy selection, efficient shopping and seamless meal preparation based on anticipated consumption patterns. Before venturing out to buy groceries, it is prudent to inspect the refrigerator, freezer and pantry to avoid acquiring items that are already available.

To optimise resource allocation, households are advised to plan meals for the week ahead of the shopping expedition and purchase solely the required provisions. Factors such as the frequency of dining out, consumption of pre-cooked frozen meals and the intention to incorporate leftovers into subsequent meals should also be taken into consideration.

While purchasing items in large quantities, e.g. by taking advantage of buy-one-get-one-free deals, can offer potential savings, it is essential to ensure that all acquired food is utilised before it spoils. Opting to purchase food from bulk bins

presents a cost-effective and waste-reducing alternative, as it allows to procure the precise amount needed rather than predetermined portions. Another crucial aspect is proper storage of bulk purchases in appropriately sealed and labelled containers.

Embracing the consumption of imperfect produce or upcycled products can also foster sustainability. Imperfect produce, despite physical blemishes, maintains its safety and nutritional value, and is often available at discounted prices. Upcycled products utilise ingredients that might have otherwise been discarded, contributing to waste reduction efforts.

11.6.2. Storing process

This stage focuses on the best possible storage methods, which often are very technical. For instance, households should keep in mind that fruits like bananas, apples, pears, stone fruit and avocados emit ethylene gas during ripening, which can accelerate the ripening process of nearby produce and potentially lead to spoilage. Therefore, it is advisable to store such items separately. What is more, certain vegetables prone to wilting, such as leafy greens, carrots, cucumbers and broccoli, fare best in the high humidity drawer of the refrigerator.

To optimise refrigeration practices, it is recommended to avoid storing perishable items, such as milk or eggs, in the refrigerator door, as it is the warmest part of the fridge.

11.6.3. Preparing food process

The main assumption at this stage is that ingredients past their prime, as well as leftover odds and ends, can still serve a purpose in cooking. Repurposing these ingredients in soups, casseroles, stir-fries, frittatas, sauces, baked goods, pancakes or smoothies not only prevents their wastage but may also result in the discovery of new favourite culinary creations. When feasible and safe, utilising edible parts of food that are typically discarded can contribute to waste reduction.

Furthermore, it is also of great importance to understand the distinctions among labelling terms such as “sell by”, “use by”, “best by”, and expiration dates, which is crucial in making informed decisions about food consumption and disposal.

Striving to cook and serve appropriate portions based on the number of individuals being fed helps to avoid excessive food waste.

It is crucial to refrain from leaving perishable food items at room temperature for more than two hours to mitigate the risk of bacterial growth and spoilage. Leftovers should be promptly refrigerated or frozen in small, transparent containers that are labelled with the date and contents to facilitate their subsequent utilisation.

Conclusions

As stated above, household food waste behaviour is influenced by various factors and interdependencies. Hence, solving this problem is not an easy or short-term process. Actions to change household attitudes towards food in general and towards food waste in particular can play a major role here. Treating food as a valuable product should lead households to become more resourceful—that is, to buy only the amount of food they can consume, thereby minimising food waste. It is open to question whether changes in attitudes towards food should be achieved through suggestions, incentives, awareness-raising (the proverbial carrot) or coercive measures, such as increasing the level of taxation as food waste increases (the proverbial stick).

Development of a consistent widely acceptable methodology for calculating the level of food waste in households remains a separate issue. This should be done so that the data collected are both reliable and comparable across countries.

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