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Interest in Food Wastage Issues as a Determinant of Young People's Involvement in Reducing Food Waste

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Abstract: Tackling food waste and reducing its purely negative effects on our planet, both its inhabitants and the environment, is one of the most important challenges facing modern generations. The aim of the research was to find out whether young people's interest in this issue is reflected in their opinions and behaviours to reduce household food waste, and whether it is related to their search for information about food waste and the type of knowledge sources they use. The survey was conducted at the end of 2021 among 200 young people, using an online survey method (CAWI). The degree of interest in the topic of food waste significantly determined both respondents' opinions and all analysed behaviours aimed at reducing food waste. Respondents declaring a high level of interest in the issue declared such behaviours in the highest proportion. Regarding sources of information, three clusters of respondents were identified: „Mass media users", „Benefiting from science and Internet", and „Not information-seeking". Respondents in the third cluster were least likely to display behaviour aimed at reducing food waste. Most respondents wrongly perceived foodservice and retail as the links in the food chain with the highest food waste, rather than households. This may be a barrier to undertaking activities to reduce food waste. The results indicate that changes in consumer views and behaviour related to food management and consumption are needed. It is necessary to develop a broad information and education programme for the public at the national level so that awareness of the need to prevent food waste increases in each population group and this is reflected in household activities.

Keywords: food wastage, food waste, consumer behaviour, sources of information, young people.

Introduction

Tackling and reducing food waste is one of the most important challenges facing humanity in the 21st century. FAO estimates have shown that globally, one-third of the mass of food produced to feed the population, i.e. 1.3 billion tonnes, is wasted each year (Gustavsson et al., 2011). The FUSIONS project (2016) showed that 88 million tonnes of food are wasted in the European Union countries, and research conducted in Poland as part of the governmental PROM project shows that 4.8 million tonnes of food are wasted annually (Łaba et al., 2020). In developed countries, this challenge mainly concerns consumers in their households, as this stage of the food chain accounts for 53% of total wastage in the EU, and even more in Poland, 60% (92 and 73 kg/person respectively). Research carried out in Canada showed that, in an average household, the amount of food wasted per week in terms of energy was equivalent to the recommended calorie intake for 1.7 adults or 2.2 children (according to Canadian dietary recommended allowances). This means that the average household preventing food waste could provide 5 extra meals per week for an adult or almost 7 meals per week for a child (Von Massow et al., 2019). The social dimension of the negative effects of food wastage is linked to global food insecurity and the inability to provide sufficient food supplies for the world's growing population. Yet the food groups most valuable for ensuring food security and the nutritional value in the diet are the most wasted: cereals, roots and tubers, and fruit and vegetables (Joint Research Centre, 2020; Goryńska-Goldmann et al., 2021). These three groups account for 83% of the global food waste by weight, with fruits and vegetables accounting for the largest share (44%). Similarly, in terms of calories, these food groups account for 80%, with cereals comprising the largest share of global food loss and waste (53%) (Lipinski et al., 2013).

Food wastage also results in economic and environmental consequences. The estimated value of wasted food is more than 750 billion U.S. dollars (based on 2009 producer prices) per year (FAO, 2013). Food waste also results in reduced real incomes for market participants. Disposal of unused food products also results in additional costs and increased environmental pollution. Food wastage contributes to the environmental damage through the unjustified emission of greenhouse gases and other harmful substances released during the production of food that will not be eaten (Xue et al., 2017). The carbon footprint of food produced and not consumed is estimated at 4.4 billion tons of carbon dioxide equivalent globally. This means that food wastage is the third largest emitter of greenhouse gases after the US and Chinese economies (FAO, 2015). The environmental consequences of food waste are also linked to the waste of dwindling water resources and the use of 28% of the world's agricultural land resources for food production in vain (FAO 2013). The unproductive use of land, water and other resources to produce food that will not be consumed simultaneously means a loss of global biodiversity (FAO, 2013; Feldstein, 2017; Newsome et al., 2017).

Raising awareness of the implications of food waste, which are purely negative, increases the chances of taking targeted action to prevent food loss and waste. Therefore, the aim of the research was to find out whether young people's interest in the problem of food waste is reflected in their opinions and behaviour against food waste at home and whether it is related to the search for information about food waste and the type of knowledge sources used.

Methodology

The research question was whether young people’s interest in the problem of food wastage is linked to their opinions and behaviours conducive to reducing food waste, and the use of sources of information on food waste.

The study was conducted in November and December 2021 through a cross-sectional survey. Data were collected using the CAWI (Computer-Assisted Web Interview) technique. The study was conducted according to the guidelines of the Declaration of Helsinki. The questionnaire was completed by 208 young adults, of which 200 were included to the study sample. More than ¾ of the sample was female, nearly half lived in large cities (more than 500,000 residents), and one in five survey participants lived in rural areas. All were students at various universities and forms of study. The questionnaire used in the study covered aspects such as:

(1) Interest in the food wastage issues: Are you interested in the topic of food wastage? (answer: from 1 - not interested at all to 5 - very interested);

(2) Sources of information about food wastage: What sources of information about food wastage do you use? (answer yes/no). Information sources such as newspaper articles, television, academic publications, books, Facebook, YouTube, Instagram, thematic blogs, and other online resources were included;

(3) Selected opinions conducive to reducing food wastage: Have you ever thought about the effects of food waste? (answer yes/no); At which stage of the food supply chain do you think the most food is wasted - agriculture, food industry, transportation, retail, foodservice, households? (answer yes/no); How would you rate your household in terms of measures to reduce food waste? (answer: nothing is being done; not much is being done; efforts are being made, but without success; there are already some successes in this area; there is a significant reduction in throwing away food);

(4) Selected behaviours conducive to reducing food waste: Do you engage with organizations that work to reduce food waste, e.g., eateries, food banks? (answer: no, occasionally, often, constantly cooperating); Do you buy products with a short shelf life from a promotional shelf in a shop or at a similar stall in a bazaar? (answer: no, occasionally, often, I constantly buy this way); Do you go to such restaurants that offer food at a lower price 2 hours before closing? (answer: no, occasionally, often, I constantly use this option); Do you donate food to an eatery? (answer: no, happened once or twice, occasionally, often, very often).

Descriptive statistics were used to present characteristics of study sample. The Chi-square test was used to assess the diversity of respondents’ opinions between groups. The Shapiro-Wilk test was applied to check the normality. P-value lower than 0.05 was considered significant. Factor analysis (FA) with Varimax rotation with Kaiser normalization was performed to identify main sources of information about food

wastage. To identify the factor the following criteria were applied: eigenvalue ≥1.0, interpretability of the solution and factor loadings of at least 0.60. KMO value was 0.597 Bartlett's test had a significance of $p < 0.0001$. A Varimax normalized rotation was used in order to extract no correlated four factors and obtain large variance explained (Field, 2009). The rotation reached convergence in 6 iterations. Total variance explained was 62.4% (Table 1). A K-means cluster analysis was applied using identified factors to separate groups which were homogenous in terms of the use of different sources of information about food waste (Berget, 2018). The Kruskall-Wallis test with Dunn's post hoc test was used to compare mean values between the three separate clusters of respondents. All analyses were performed with IBM Statistics SPSS, version 27.0 (IBM Corp, Armonk, NY, USA).

Results and discussion

Table 1 illustrates the correlations between the use of different sources of information about food wastage and each of the identified factors, i.e. social media, Internet, scientific sources and mass media.

Table 1

Factor-loading matrix for the factors identified by principal component analysis (PCA)

	Factors			
	Factor 1 Social media	**Factor 2 Internet**	**Factor 3 Scientific sources**	**Factor 4 Mass media**
Press articles	-0.141	0.161	0.312	0.649
Scientific publications	-0.097	0.236	0.622	0.225
Television	0.155	-0.080	-0.071	0.824
Books	0.189	0.009	0.800	-0.046
Facebook	0.720	0.053	-0.191	0.307
YouTube	0.696	-0.105	0.284	-0.064
Instagram	0.688	0.209	0.029	-0.090
Thematic blogs	0.142	0.758	0.265	-0.085
Other Internet resources	0.018	0.845	-0.021	0.117
Variance Explained (%)	22.0	15.8	13.4	11.2
Total Variance Explained (%)	62.4			
Kaiser's Measure of Sampling dequacy	0.597			

Subsequently, 3 clusters were distinguished in the study sample due to the declared use of food waste information sources: „Mass media users", „Benefiting from science and Internet", and „Not information-seeking" (Table 2). The number of respondents in the clusters was fairly even. Clusters differ from each other except for the lack of difference between "Mass media users" and "Benefiting from science and Internet" in the use of social media.

Table 2

Profile of the clusters in terms of factors identified in factor analysis

Clusters		**Factors**			
		Factor 1 Social media	**Factor 2 Internet**	**Factor 3 Scientific sources**	**Factor 4 Mass media**
Cluster 1 (N=62)	„Mass media users"	1.7a; 0.31	1.4a; 0.34	1.4a; 0.32	1,8a; 0,25

Cluster 2 (N=70)	„Benefiting from science and Internet”	1.7a; 0.29	1.9b; 0.22	1.6b; 0.38	1,3b; 0,31
Cluster 3 (N=68)	„Not information seeking”	1.5b; 0.36	1.1c; 0.23	1.1c; 0.29	1,1c; 0,19
Total sample		1,6; 0,34	1.5; 0.41	1.4; 0.37	1.4; 0.38

a, b, c – Means with the same letter are not significantly different in the Kruskall-Wallis test with a post-hoc Dunn test.

Separate clusters did not differ in their opinions about eating in restaurants that offer dishes at a lower price 2 hours before closing time, donating food to an eatery and indications of the link in the food chain where they think the most food waste occurs (Table 3). It turned out that the highest number of indications of food waste were in foodservice and retail, and much less in households, while the scale of waste is highest in households.

The perception that most food is wasted in retail may be due to the fact that consumers observe a significant oversupply of food items relative to demand at the point of sale. They also have opportunities to observe food management by outlet staff and consumer behaviour. This is a false stereotype, as in Poland these two stages of the food chain account for the smallest share of total food wastage, 1 and 7% respectively (Łaba et al., 2020). In the EU, the situation is similar, as the retail stage has the lowest share of total food wastage, equal to 5%. However, it is at the sales stage (retail and including wholesale) that completely edible food products are wasted to the greatest extent, as such food accounts for as much as 83% of the weight of discarded food. Households are second in this regard (60%), followed by foodservice (59%) (FUSIONS, 2016).

In the 'Mass media users' cluster, the largest percentage (45%) declared an interest in the topic of food wastage, but at the same time the smallest percentage was involved in the activities of organisations working to reduce food waste. The largest proportion of people in the 'Benefiting from science and Internet' cluster (46%) declared a very high interest in the topic of food wastage and almost all were thinking about the effects of food wastage. Also the largest percentage (but a small percentage, 11%) declared frequent or ongoing involvement in organisations working to reduce food waste and purchasing short-life products from the promotional shelf in the shop (almost 60%). More than 3/5 of respondents in this cluster declared that their households had managed to significantly reduce food throwing away. In the 'Not information-seeking' cluster, on the other hand, the fewest respondents thought about the consequences of food wastage and, at the same time, the majority declared at most an average interest in the topic of food wastage, did not get involved in the organisation's activities, and did not purchase short-life products from the promotional shelf in the shop. Only just over a third of these people declared that their households had succeeded in significantly reducing food throwing away, and one in four indicated no such activities (Table 3).

Table 3

Profile of the clusters in terms of declared interests in food wastage, selected opinions and behaviours concerning food wastage

Variables	Total (% of sample)	Cluster (% of sample in each cluster)			p (Chi-square test)
		„Mass media users”	„Benefiting from science and Internet”	„Not information-seeking”	
Interest in the food wastage					
Little interested	37.5	37.1	14.3	61.8	<0.001
Interested	37.0	45.2	40.0	26.5	
Very interested	25.5	17.7	45.7	11.7	
Thinking about the impact of food waste					
Yes	84.5	87.1	97.1	69.1	<0.001

No	15.5	12.9	2.9	30.9	
Opinion on which stage in the food supply chain causes the most food wastage					
Primary production	1.5	0.0	1.4	2.9	
Food industry	2.5	3.2	2.9	1.5	0.556
Transportation	14.5	14.5	11.4	17.6	
Retail	28.0	19.4	37.1	26.5	
Foodservice	34.0	38.7	28.6	35.3	
Households	19.5	24.2	18.6	16.2	
Engagement with organizations that work to reduce food waste					
No	68.5	58.1	65.7	80.9	0.006
Occasionally	24.5	38.7	22.9	13.2	
Often or constantly cooperating	7.0	3.2	11.4	5.9	
Purchasing short-life products from a promotional shelf in a store or similar stall in a bazaar					
No	17.5	14.5	10.0	27.9	0.002
Occasionally	40.0	43.6	31.5	45.6	
Often or constantly cooperating	42.5	41.9	58.5	26.5	
Dining in restaurants that offer food at a lower price 2 hours before closing time					
No	62.0	59.7	54.3	72.0	0.215
Occasionally	26.0	29.0	28.6	20.6	
Often or constantly cooperating	12.0	11.3	17.1	7.4	
Donating food to an eatery					
No	79.5	77.4	75.7	85.3	0.336
Yes	20.5	22.6	24.3	14.7	
Assessment of own household in terms of actions to reduce food waste					
Not much is being done or efforts are without success	16.5	19.4	2.9	27.9	<0.001
There are already some successes	36.5	38.7	34.3	36.8	
There is a significant reduction	47.0	41.9	62.8	35.3	

The degree of interest in the topic of food waste significantly determined both the opinions of respondents and all analysed behaviours aimed at reducing food waste (Table 4). In the group declaring a very high level of interest in the issue, almost all of them had thought about the consequences of food wastage (96%). The same proportion declared that food throwing had already been reduced in their households, with 61% having made significant progress in this effort and 35% having achieved some success in this area. This group also had the highest number of people who were donating food to an eatery.

Redistribution of surplus food is the most desirable method of preventing food waste, as indicated in the universal food recovery hierarchy adopted in the global forum (HLPE, 2014), in the EU (European Union, 2020), in Poland (FPBŻ, 2013) and many other countries. Redistribution of surplus food is mainly handled by non-governmental organisations. Among them, the most involved are food banks, whose mission is to prevent food waste. Food banks acquire food at risk of going to waste free of charge and distribute it to those most in need. Food redistribution is also at the heart of food sharing, a relatively new social initiative involving the donation of surplus food to eateries by individuals, business organisations and others to people in need of support, with the mission of preventing food waste by building social responsibility. Eateries are specially marked fridges and cupboards where people can leave unwanted food (meeting food safety requirements) or use what others have left for free. More than 100 eateries have already been launched in Poland and are mainly located in large cities. In Warsaw (the

largest city, with around 2 million inhabitants, the capital) there are currently 46 eateries in operation (Konieczek, 2022).

Table 4

Respondents' opinions on various options for reducing food waste according to their interest in the problem

Variables	Total (% of sample)	Interest in the food wastage			p (Chi-square test)
		Little interested	Interested	Very interested	
Thinking about the impact of food waste					
Yes	84.5	66.7	94.6	96.1	<0.001
No	15.5	33.3	5.4	3.9	
Opinion on which stage in the food supply chain causes the most food wastage					
Primary production	1.5	1.3	1.4	2.0	
Food industry	2.5	2.7	4.1	0.0	0.239
Transportation	14.5	12.5	14.3	20.0	
Retail	28.0	27.8	24.3	38.0	
Foodservice	34.0	38.9	42.9	20.0	
Households	19.5	20.8	18.6	22.0	
Engagement with organizations that work to reduce food waste					
No	68.5	86.7	60.8	52.9	<0.001
Occasionally	24.5	10.7	33.8	31.4	
Often or constantly cooperating	7.0	2.7	5.4	15.7	
Purchasing short-life products from a promotional shelf in a store or similar stall in a bazaar					
No	17.5	28.0	9.5	13.7	<0.001
Occasionally	40.0	53.3	44.6	13.7	
Often or constantly cooperating	42.5	18.7	45.9	72.5	
Dining in restaurants that offer food at a lower price 2 hours before closing time					
No	62.0	73.4	60.8	47.1	0.023
Occasionally	26.0	21.3	27.0	31.4	
Often or constantly cooperating	12.0	5.3	12.2	21.6	
Donating food to an eatery					
No	79.5	89.3	77.0	68.6	0.015
Yes	20.5	10.7	23.0	31.4	
Assessment of own household in terms of actions to reduce food waste					
Not much is being done or efforts are without success	16.5	34.7	6.8	3.9	<0.001
There are already some successes	36.5	30.6	43.2	35.3	
There is a significant reduction	47.0	34.7	50.0	60.8	

The study showed that interest in food wastage issues is determined by the search for information on the subject and the type of knowledge sources used. The literature shows that there are a number of other factors that shape behaviour regarding food waste prevention, including the socio-demographic characteristics of individuals. For example, people in Scandinavian countries are more sensitive to sustainability issues, including not wasting food. In a comparative study among Polish and Swedish

students, it was shown that Swedish students perceived food waste mainly in terms of negative environmental impacts, while for Polish students the most important issue was the loss of money (Zabłocka et al., 2016). Similarly, the WRAP project on food waste in the UK showed that in households the vast majority of people consider wasting food to be a waste of money. Wasting food has also been shown to be a waste of good quality food and often leads to feelings of guilt (Quested et al., 2013). Norwegian students, like Swedish students, also had a better understanding of the necessity of population behaviour in the context of sustainability compared to Latvian students. But many students from both countries understood the need for sustainability and believed that sustainability topics should be included in school curricula (Porozovs et al., 2017).

Conclusions

In the sample of young people participating in the survey presented here, 3 clusters were identified, bringing together similar numbers of respondents. A distinguishing factor was the use of different types of information sources on food wastage. The research showed that about 2/3 of the respondents from the 'Not information-seeking' cluster were not interested in food wastage issues and were not concerned about its consequences. These behaviours determined their least involvement in each of the food waste prevention options analysed, as well as their least achievement in reducing food waste in their households. Respondents using scientific and Internet sources of information on food wastage issues ('Benefiting from science and Internet' cluster) performed most favourably in this respect. Declaring greater interest in the topic of food wastage was associated with taking action to reduce food waste. Most people linked food waste to foodservice and retail rather than the household which may be a barrier to taking action in the latter.

Meanwhile, the EU's "Farm to Fork Strategy" adopted a commitment to halve food waste in retail and consumption by 2030 (European Commission, 2020). This means that a programme of specific actions needs to be implemented in each Member State to achieve this goal. In the initial stages of the food supply chain, innovative solutions, methods, techniques and tools are needed. In the final stages, on the other hand, where not wasting food is the responsibility of the consumer, it is necessary to disseminate knowledge about the impacts of food waste and methods of reducing it. Raising awareness should result in desirable changes in views and various behaviours related to food management and consumption in households. The need for extensive action in this area is confirmed by the results of the own survey among young people presented here.

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