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FOOD WASTE ON THE KITCHEN SCALE – FOOD TYPES MOST TYPICALLY THROWN AWAY IN HUNGARY

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Abstract

Food waste is a major global problem, though developed regions are more concerned than economically poorer countries. Several European researchers dealt with measuring the quantity of household food waste, however these numbers are not comparable due to lack of standardized conditions. In this study we aimed to determine the most dominant types of food stuffs thrown away by the consumers. We have also endeavoured to quantify the amount of food waste by types generated by Hungarian households with a short-period survey. During the research project, avoidable and unavoidable food waste were measured separately. Fifty people (with different demographic factors) were involved in the investigation. Data were analysed by descriptive and multivariate statistical methods. Summarizing the results it is found that the proportion of avoidable food waste in households is very high, 16,45% of total household waste. On the basis of total food waste, the avoidable part reached almost 33%. Outcomes of cross tabs proved that more food waste generated by higher educated people, however – probably due to deficiency of the sample – we could not confirm any other published correlations. Fresh fruits and fresh vegetables were identified to be the most dominant types of avoidable food waste.

Keywords: *food waste, consumer behaviour, consumer study, public awareness campaign, survey*

Introduction

Food waste is a chronic environmental problem in all developed regions, prominently in US and EU based on the estimation of Food and Agricultural Organization (FAO, 2011). Some part of the losses is necessarily generated in the agricultural production and food processing sectors, however these fields are not significant compared to data which experienced at the household stage (BIO, 2011) (*Table 1*). It can be established that "bad" consumer behaviour is majorly responsible for food waste in developed states, in contrary to developing countries, where technological losses are dominant.

Table 1. Food losses and waste in five sectors of the food supply chain in EU27 in 2006 (Based on BIO, 2011)

Sector	Food losses and waste (in tonnes)	Food losses and waste (in tonnes)	Food losses and waste (in %)
Agricultural, hunting, forestry	32636495	66.2	26.8
Industry	34791269	70.5	28.6
Trade, distribution	4433333	9.0	3.6
Catering	12263212	24.9	10.1
Households	**37701760**	**76.4**	**30.9**
Total	121826069	247.0	100.0

According to the referenced study (BIO, 2011) household food waste is absolutely avoidable by correct consumer attitude. In reality, this statement is challenged by some facts. Several kitchen activities – such as peeling, removing damaged parts – result in some waste, moreover urban population has no possibility to utilize uneatable leftovers as an animal feed or composting material. According to this approach we can distinguish the following categories: avoidable, possibly avoidable and unavoidable (WRAP, 2009; Parafit et al. 2010). A

British research program concluded that the proportion of food waste deriving from consumer habits could be reduced with approximately 20 percentages by effective knowledge development.
Reduction of food waste could also be regarded as economic benefit (WRAP, 2010). We also found different opinions concerning the most dominant type and amount of food waste. Although, on the basis of FAO's evaluation cereals occur in the largest proportion all stages. Food waste, subdivided into smaller groups of products delivers different outcomes by country: dairy and eggs are most frequently thrown away in Dutch population, bakery products lead in Austria, and in the UK fresh vegetables and salads are at the top of the list (Thönissen, 2009; Schneider and Obersteiner, 2007; WRAP, 2009). It is really important to emphasize that the presented findings are from national quantitative surveys, while the FAO estimation is based on a theoretical calculation that was carried out on Eurostat data. After analysing the reports of these national surveys, we must point out that these results are not comparable due to lack of standardized methods. However, no traces of improvement in food waste production could be observed within any of the national data sets, which warns us that definite actions should be taken to break this unfortunate trend (European Union, 2014).

Materials and methods

In this study we aimed to determine the most dominant types of food waste thrown away in Hungarian households and attempted to give more accurate information about quantities. Participants of the survey were selected randomised on the basis of voluntary registration. We intended to exam the effects of some demographic parameters on the consumer attitude resulting in food waste production. The consumer survey required the following equipment: different coloured nylon bags in order to easier collection; general EC standard kitchen scale (accuracy in grams); data sheet. Respondents had to give information about quantity and types of unavoidable food waste, avoidable food waste and different kinds of other waste in their households. We used a carefully designed individual logbook to record the data of each households. The survey period took one week at each households. Data are analyzed with descriptive statistical methods to estimate quantity of waste per households and cardinal food waste types. With cross-tab procedure combined with Chi-square tests we tried to reveal significant factors influencing consumer behaviour concerning food waste. Sample collecting is the most critical part of all consumer surveys. However, due to limited budget of the research we could not allow to involve households in appropriate number and variance. This pilot study provides important observations in the same time, and gives a methodological indication for planning further research projects. The composition of the sample we summarized in *Table 1*.

Table 1. Demographical parameters of sample

Parameters of involved households			
Number of households: 50			
Total participants: 145			
Gender of total participants in the households			
Male: 68 (46.90 %)		Female: 77 (53.10 %)	
Age of total participants in households			
Aged under 25 years: 43 (29.66 %)	Aged between 25 and 35 years: 35 (24.14%)	Aged between 36 and 49 years: 43 (29.66%)	Above 50 years of age: 24 (16.55%)
Habitation of the respondent			
Budapest: 35.50%	Other city: 51.70%		Village: 12.90%
Qualification of the respondent			
Elementary: 3.30%	High- school graduation: 33.30%		Degree 63.30%
Household's rate of income			
Above average 29.00%	Average: 58.10%		Below average: 12.90%
Number of people living in the same household			
One person: 3.1%	Two people: 34.40%	Three people: 21.90%	Four or more people: 40.70%
Is there a child under 14 in your household?			
Yes: 32.30%		No: 67.70%	

Results and discussion

According to results, proportion of food waste is slightly higher than the quantity of other waste types. A considerable outcome of the research, is that the amount of avoidable food waste is 16,4% of the total quantity of waste. On the basis of total food waste, the avoidable part reached almost 33% (*Table 2*).

Table 2. Proportion food waste based on own consumer survey in 2014

Waste categories	Amount of waste in kilogram (kg)	Proportion of waste in percentage (%)	Estimated for a household (kg)
Unavoidable food waste	86.744	33.89%	1.73
Avoidable food waste	42.113	16.45%	0.84
Another waste	127.076	49.65%	2.54
Total	255.933	100.00%	5.11

On the basis of recorded total food waste (unavoidable and avoidable) in the log books of households, we differentiate the categories shown in *Figure 1.* We found that the category of fresh fruits (23.68%) took the first place, but fresh vegetables and salads found also to be typical (19.31%). Other category (10.90%) included several kind of waste which could not be classified separately (for example honey, tea filter, bakery yeast, coffee ground, coffee capsule). The category of dairy products and eggs (12.15%) also had a great importance in this sample. The following products happened to be found less often in waste bins: meat and fish (9.35%); roots and tubers (8.10%); bakery (7.79%) and meals (5.92%). The following food products were mentioned only rarely: oilseeds and pulses (1.87%), oil and fat (0.62%), confectionery and snacks (0.31%).

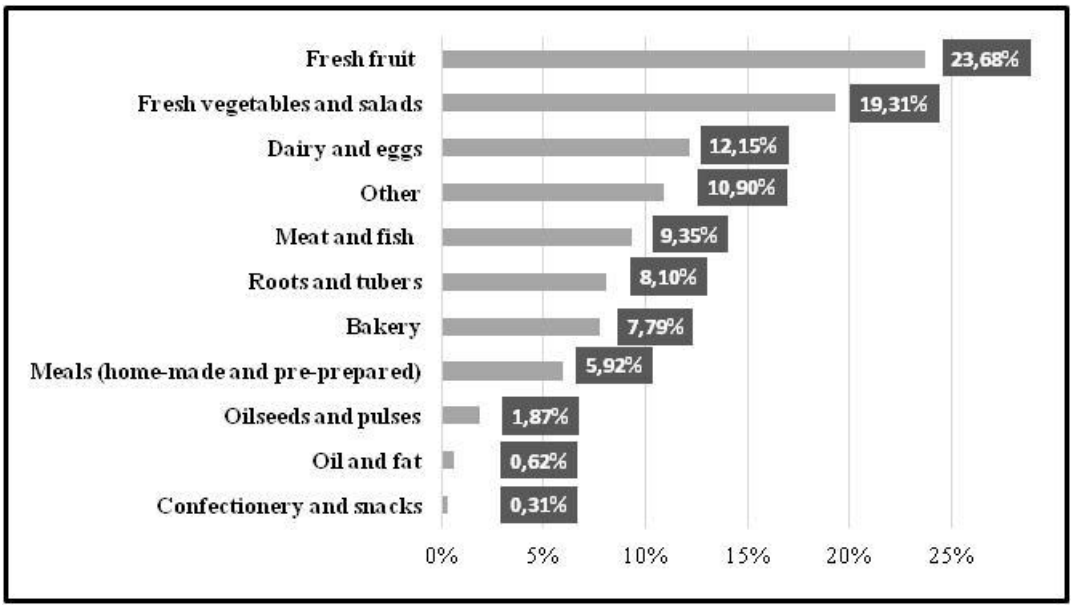

Figure 1. Ranked categories of food waste by consumer based on their frequency of occurrence

On *Figure 2.* we indicate the spread of households according to their waste producing behaviour.

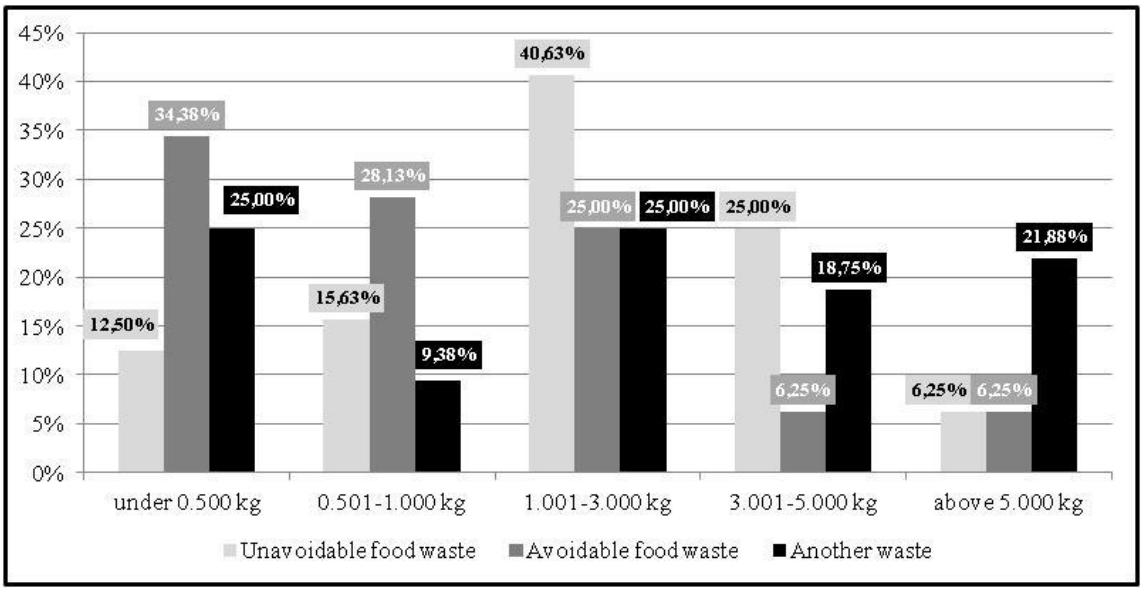

Figure 2. Categories for level of food waste produced by households

According to cross tabs analysis we found some influencing demographic factors in connection with food waste production. The proportion of avoidable food waste – similarly our expectation – was significantly influenced by the household size: food wastage was more in larger households than in a smaller ones. Composition of a household (presence of children) was not determinate parameter in this study. In case of single-person householders we did not found outstanding results, however this group in the sample only existed in 3.1 percent. Several studies presented lower food loss can be recorded in low-income households compared richer ones (Osner 1982; Lyndhurst 2007). Our paper also confirms this statement in case of avoidable food waste, but the correlation is not really robust (Pearson R^2=0,661). There is an interesting and statistically verifiable relationship between education level and all food waste: more than 50 percent of highly educated people generate more than 0.5 kilograms avoidable food waste, while lower educated respondents tend to be more sparing in this respect. Hamilton et al. (2005) proved that age of consumers also affects the quantity of food waste. The analysis of our sample could not confirm this, probably due to the inappropriate size and variance of the sample.

Conclusions

In spite that our budget was too limited to acquire a sample size and complexity to represent the whole Hungarian population, by the analysis of this pilot project, we are strongly convinced that similarly to most of the developed countries, avoidable food waste is a significant problem in Hungary. Both the developed survey methodology and the suggested statistical modelling are suitable to handle greater sizes of household samples that are required to a more accurate quantity estimation. We believe that research in this area could contribute to effectively promoting a more conscious consumer behaviour, which is a key factor to decrease the amount of total food waste produced in Hungary.

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