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ATTITUDE AND BEHAVIOUR OF BOSNIAN HOUSEHOLDS TOWARDS FOOD WASTE

SUMMARY

In order to determine the amount and value of food waste, a regional survey was carried out, among others, in the Bosnia and Herzegovina (BiH), at the beginning of 2016. A number of 581 respondents participated in on-line survey and their answers were processed using descriptive statistics and dual-non-parametric test. The results of the research were presented according to logical units: socio-economic characteristics of households; general habits when buying food; attitude toward food products shelf life; attitude toward food waste and factors of rational use of food. Most households in BiH prepare meals at home, and do not often eat in a restaurant or buy ready-made food. Food is mostly purchased in supermarkets and hypermarkets and about half of the respondents discard less than 0.5 kg of food weekly, the value of which is less than 5 euros. The above and other results suggest that food waste in BiH is still not a big problem, which is a consequence of the tradition and way of life, but also of low living standard.

Keywords: Bosnia and Herzegovina, food consumption, food waste, nutrition.

INTRODUCTION

Imbalance in food production and consumption results in starvation in the world, because some of the world's population does not produce enough food, or there is not enough money for purchasing food. On the other hand, there is an inconsistency between purchasing and consumption of food of the most powerful

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consumers, which causes some food waste. Numerous researches have been carried trying to determine the quantities of produced and necessary food.

Insufficient quantities and uneven distribution of food are directly related to the occurrence of hunger, malnutrition, undernutrition, undernourishment. According to the World Food Programme (WFP, 2009), almost 1 billion people struggle to find their next meal, while a joint study of FAO, IFAD and WFP (2015) pointed out that 795 million people are undernourished, mostly in Asia and Africa. Alexander et al. (2013) associated food waste with the failure to use potential edible items to address human hunger. Hence, food losses directly reduce the amount of food used to feed the world's population. According to Gustavsson et al. (2011), food waste at consumer level in industrialized countries is almost as high as the total net production in Sub-Saharan Africa. Lipinski et al. (2013) indicated that most food losses occurred in the final consumption stage in the regions of North America and Oceania (61%) and Europe (52%). This indicates that with the increase in wealth and living standard, food losses due to its non-use and throw-off at household level also increase. Food is lost at various stages of its production (pre, during and post-harvest), processing and consumption (Gustavsson et al. 2011; HLPE 2014). Parfitt et al. (2010) investigated the losses of agricultural products in post-harvest, food processing and retail phases, referring to various research and sources. According to secondary data sources they referred that food waste has recently ranged from 5.4 to 25% in UK, from 12.7% to 25% in USA, 15% in Australia, 26-27% in South Korea and 8-11%in the Netherlands. Jörissen et al. (2015) conducted a research of food losses in which they commented their results referring to more secondary sources about quantity of household food waste per week in different European countries. Aschemann-Witzel et al. (2015) analyzed, in general, causes for consumer-related food waste. In addition to the impact of food waste on food security and nutrition, certain researchers also dealt with the assessment of the impact of these losses on the environment (e.g. Venkat, 2011) as well as the reduction of the household budget available for other needs (Herath and Felfel, 2015). A number of institutions or researchers have estimated food waste during the supply chain. Stenmarck et al. (2016) studied European food waste and within it the household waste found out that at the level of EU-28 in 2012 there were 47 million tons, or 92 kg per person of food waste (where households participate in food waste with 53%). In developed countries, food waste is the subject of statistical monitoring. For example, in Sweden, estimated amount of household food waste increased by 9 kg/person, in two-year period (2010/2012), with estimated unavoidable food waste of (35%) (SEPA, 2012). In Slovenia, almost 14% of all food was wasted before it reached consumer plates (Žitnik and Vidic, 2016). Marangon et al. (2014) had similar study in North-Eastern Italy and Milutinović et al. (2013) in Serbia. It is very important to understand the wastage of food at the household level. The Committee for Economic and Commercial Cooperation of the Organization of Islamic Cooperation (COMCEC, 2017) identified three points of household food waste: between coming into home and

preparation, between preparation and serving and after serving. Capone et al. (2016) noted that food loss and waste prevention and reduction would allow meeting the food needs of about one billion undernourished people.

In line with already conducted researches about food waste, another regional survey has been performed whose results have been published so far for Morocco (Abouabdillah et al., 2015), Egypt (Elmenofi et al., 2015), Lebanon (Chrabel et al., 2016), Turkey (Yildirim et al., 2016), Algeria (Ali Arous et al., 2017), Montenegro (Berjan et al., 2019), and North Macedonia (Bogevska et al., 2020).

In BiH, there was almost no direct research on the topic of food waste, but indirectly some data can be found. Clausen and Pretz (2013) just mentioned food waste in their paper. Statistics authorities record the estimated amount of municipal waste, but do not classify it according to the waste type, so that data on food waste cannot be found there. Both entities in BiH have waste management strategies that treat organic waste as part of municipal waste. In one of two BiH entities, in Republic of Srpska, it is estimated that 0.76 kg of municipal waste is generated daily, out of which organic waste accounts for 34.2% (MSPCE RS 2016).

MATERIAL AND METHODS

The conducted research is a contribution to better understanding of food environment in BiH. HLPE (2017) defines food environment as "physical, economic, political and socio-cultural context in which consumers engages with the food system to make their decisions about acquiring, preparing and consuming food". Since no published results of previous research for the territory of BiH have been found, this paper has a pioneering significance and is the basis for the continuation of similar researches. The aim of the paper was to determine the habits and attitudes of food consumers in BiH in terms of food waste, identify the quantities, types and values of wasted food, as well as the reasons and factors that affect it and those that could reduce this type of food loss. Personal attitudes were collected by the survey method. A database was formed from the collected responses that was further processed applying certain statistical methods.

The survey was carried out on-line at the beginning of 2016, using the Survio software (www.survio.com). The questionnaire was pre-tested in pilot stage. Questions were available in Serbian. Potential stakeholders were invited to participate in survey via email and Facebook. On-line questionnaire consisted of 26 questions into five groups: (1) socio-economic characteristics of households; (2) place, value and habits when buying food; (3) way of storing/preparing food and attitude towards the shelf life of food; (4) quantity, value, types and reasons for food waste; (5) concern regarding food waste. Measurement of response was according to the Likert scale with answers in the range 1-3 or 1-5. All questions were closed type questions, with a number of typified, descriptive responses in the form of statements. On some question multiple responses were allowed. The questionnaire was opened by 1,458 respondents and within 36 days 581

respondents answered completely (the response rate was 40%). Two questionnaires were not suitable for processing, so the sample of responses over which further processing was carried out consisted of 581 questionnaires. All respondents were from the territory of BiH, so that the obtained results are fully relevant for BiH.

Data was processed using SPSS Statistic Software, Version 20. Descriptive statistics and binary nonparametric tests were used for data processing and interpretation of results. Statistical significance testing was done through X^2 independence test. Statistical significance was considered at two levels as highly statistically significant ($P<0.001$) or statistically significant ($P<0.005$).

RESULTS AND DISCUSSION

Socio-demographic characteristics

The analyzed sample consisted of 581 respondents who fully answered all the questions (Table 1). There were more women than men. Young respondents dominated, and those up to 35 years old accounted for 73% of respondents.

Table 1. Social-demographic characteristic of the surveyed sample (n=581)

Characteristic		Frequency	Percent
Gender	Male	239	41.14
	Female	342	58.86
Age (years)	18-24	195	33.56
	25-34	230	39.59
	35-44	108	18.59
	45-54	29	4.99
	55 and over	19	3.27
Family status	Single person or non-related community	55	9.47
	Living with parents	333	57.31
	Married	193	33.22
Level of education	Secondary school	151	25.99
	Technical qualification	15	2.58
	University degree	343	59.04
	Higher degree (MSc, PhD)	72	12.39
Occupation	Paid work (fulltime, part-time or retired)	287	49.40
	Student	179	30.81
	Unemployed, looking for work or home duties	115	19.79
Number of household members	One	26	4.48
	Two	89	15.32
	Three	164	28.23
	Four	183	31.50
	Five and more	119	20.48

The age of the respondents was the reason why only 1/3 of the respondents were married and the rest of them lived with their parents or independently. Regarding the education structure, those with university degree dominated, and as

for the working status about half of respondents (49%) were employed, although the participation of students was significant (31%). The sample was dominated by multi-member families.

Habits of buying and consuming food

Consumer habits explains the results of research that 37% of respondents never eat outside the family (home) or order ready-made food, and 54% of respondents do it less than twice a week. At the same time, 75% of respondents never use ready-made food for preparing meals at home. The survey showed that a negligible number of consumers bought food directly from farmers (1.5%). Food was mainly bought through trade (61%), with the largest share of supermarkets and 37% of respondents bought food in stores. Most often, food was bought every day (35%) and the frequency of purchase decreases as the number of days increases. When buying food, most respondents bought food without a pre-prepared list (72%), which means that when shopping, they were mostly guided by visual and other impulses. This is confirmed by the answers of 37% of consumers who responded that they paid special attention to discounts when buying food, and another 53% said that they did it occasionally. The amount spent by surveyed households on food per month shows that most of them chose the highest interval on the offered scale (more than 150 euros). With the decrease in monthly food expenditure, the number of households was proportionally reduced. Considering the average salary in BiH in the survey period (838 KM, that is 428.5 euros; AS BiH, 2018), it can be seen that almost half of the households spent more than 35% of the average salary on food.

Attitude towards food shelf life

Surveyed food consumers in BiH are quite rigorous according to the food-labelled deadline "use by" date because 81% of them believed that such food should be eaten by that date or thrown after that date. If it is recommended that food is best used up to a certain date, " best before" date, the percentage of those who thought that after that date it should be discarded was smaller (68%). The answers to both questions indicated that consumers were disciplined and that their habits were largely dependent on the shelf-life of food products designated and declared by producers, which means that producers indirectly had the responsibility for the utilization of processed foods, as well as traders in terms of timely procurement planning and placing food on the market.

Attitude towards uneaten food

Answers regarding food waste indicated a high level of consumer responsibility, as 86.9% of the respondents chose the answer indicating that they were concerned about food waste and tried to avoid it (Table 2). Another 8.8% of respondents were aware of the problem of food waste and they were willing to change their behaviour in the future, so the number of those who were indolent to this phenomenon was quite small (<5%).

Table 2. Consumer profiles regarding food throwing

	Statement	Response (%)
1.	I'm worried about throwing food and trying to avoid it whenever I can	86.92
2.	I do not consider throwing food an important problem	4.30
3.	I've been aware of the problem of throwing food away, but I do not think I will see my behaviour in the future	8.78

The answer to the next question is in correlation with the previously stated concern regarding food waste as 59.5% of the respondents confirmed that they discarded almost no or discarded very small quantity of food. Another 1/4 of them thought it was a reasonable quantity, so the number of those who discard more food than it should be discarded was 15%.

Table 3. Quantity of discard food

	Statement	Response (%)
1.	More than it should	15.49
2.	Reasonable quantity	24.96
3.	Almost nothing	20.14
4.	Very little	39.41

The way of life in BiH influenced the answer to the question "What do you do with uneaten food?" so that about 1/3 (31%) of households throw uneaten food into the waste bin (municipal waste), and even 2/3 (65%) of respondents used that food to feed animals (in addition to pets, such as dogs and cats, also birds). The number of those who made compost or donated food was negligible (<1%).

Table 4. Treatment of united food

	Statement	Response (%)
1.	Throwing in a trash can	31.67
2.	Feed animals	65.06
3.	Other	3.27

The frequency of food waste reflects a certain degree of responsibility, as 10.6% of respondents did not discard food ever, and 53.5% did it less than once a week.

Table 5. Frequency of food waste

	Statement	Response (%)
1.	More than twice a week	7.7
2.	1-2 times a week	28.2
3.	Less than once a week	53.5
4.	Newer	10.5

This was confirmed by the distribution of the answers to the question of how often the main meal was prepared from fresh products, because 30% of the

respondents did it daily, adapting the quantity of food to daily needs. Of course, due to the modern lifestyle, there was a large number of those who prepared the main meal less than twice a week (60%).

Table 6. Frequency of preparing the main meal of fresh ingredients

	Frequency	Response (%)
1.	More than seven times a week	29.95
2.	3-6 times a week	59.55
3.	Less than two times a week	10.50

Therefore, it is not surprising that there was a large number of people who did not eat meal from the previous day more than twice a week (70%).

Table 7. Frequency of eating meals from the previous day

	Frequency	Response (%)
1.	More than seven times a week	2.93
2.	3-6 times a week	14.63
3.	Less than two times a week	82.44

The main reasons for food waste are summarized in Table 8. The most common answers were expiration date (for processed foods), or food leftover after meals. Very frequent reasons were, also, long stay in fridge and deterioration of food organoleptic properties.

Table 8. Main reasons for food waste in households (n=1.391)[1]

	Reason	Frequency	Percentage (%)
1.	Food leftovers	238	41.0
2.	Expired date of food	236	40.6
3.	Food has been in the fridge for a long time	224	38.6
4.	Food does not look good/eatable	176	30.3
5.	Food has unpleasant smell and taste	147	25.3
6.	Food was mouldy	131	22.5
7.	There was an error in planning/buying food	68	11.7
8.	Incorrect food storage	60	10.3
9.	Poor cooking skills	11	1.9
10.	Labels lead to confusion	11	1.9
11.	The package was not of an appropriate size	7	1.2

[1] It was possible to select more than one answer.

The quantity of food waste weekly was generally below 1 kg, and as many as 43.7% responded that they did not have any food waste at all.

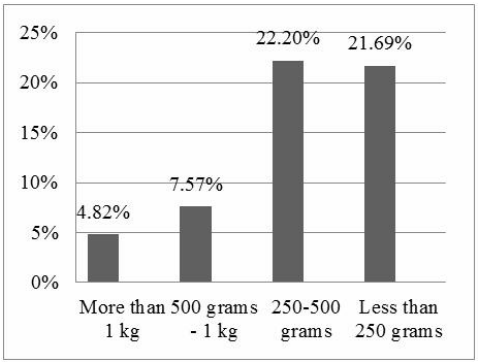

Figure 1. Quantity of food waste weekly

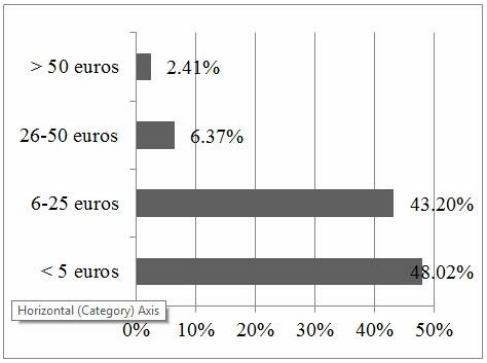

Figure 2. Value of food waste monthly

The value of food waste is relatively small, usually less than 5 euros per month. The relatively small quantity and value of food waste are the consequences of a lifestyle (preparing hot meals in the household and consuming cold foods that do not have to be eaten immediately), the tradition, and a low standard of living that does not allow the scattering of modest income.

Food waste was mostly connected with bread and milk (1/4 of households discarded more than 5% of bakery products, and 15% of respondents discarded more than 5% of dairy products). Food waste regarding fish and meat was very low.

Table 9. Quantity of food waste in a household regarding its type

		Cereals and bakery products	Roots and tubers	Pulses and oilseeds	Fruits	Vegetables	Meat and meat products	Fish and seafood	Milk and dairy products
1.	< 2%	48.4	63.5	70.1	72.4	68.3	75.3	84.7	62.3
2.	3% - 5%	25.7	21.4	20.4	17.8	22.1	14.6	11.2	22.6
3.	6% - 10%	13.7%	10.5	6.5	5.0	4.5	5.3	2.9	9.3
4.	11% - 20%	6.0	2.4	2.1	2.7	2.9	3.9	0.5	2.9
5.	> 20%	6.2	2.2	0.9	2.1	2.2	0.9	0.7	2.9

Factors of rational use of food

After fact that there was not a lot of food waste, it was surprising that the meal from the previous day was not consumed very often (70% less than twice a week). This suggested good planning of preparing meals and adjusting their size to daily needs. Most of the respondents thought that they would have had less food waste if food packages had been more suitable regarding the size, or if they had been better informed about the negative consequences of such actions (Table 10).

Table 10. Reasons that would positively affect the reduction of food waste (n=773)[2]

	Reason	Frequency	Percentage (%)
1.	Better information about the negative impact of food waste on the environment	208	26.91
2.	Better information about the negative impact of food waste on economy	106	13.71
3.	More suitable food packages	217	28.07
4.	More clear food labelling	75	9.70
5.	Some sort of tax on food waste	167	21.60

[2] It was possible to select more than one answer.

X^2 test was used to analyze the association between socio-economic characteristics and behaviour of the consumers. Out of 26 questions, 6 were related to the socio-economic characteristics of the respondents, or their households. In 3 questions, more than one answer was possible, so cross-examination of statistical significance (cross tabulation) for some of the characteristics of the sample could be done in the case of responses to 17 questions.

Table 11. Cross-examination of the impact of consumer characteristics on the relation to purchasing, using of food and food waste

		Gender	Age	Education	Employment	Marital status	Family size
P1	Place of food purchase	0.032	-	0.118	-	0.085	-
P2	Frequency of food purchase	0.183	0.334	0.131	0.157	0.055	0.032
P3	Food expenses per month	0.002*	0.000**	0.003*	0.000**	0.000**	0.208
P4	Use of shopping lists	0.005	0.210	0.768	0.186	0.008	0.004*
P5	Reaction to special offers/discounts	0.001*	0.008	0.695	0.004*	0.253	0.631
P6	Best before (date)	0.601	0.037	0.064	0.043	0.044	0.463
P7	Use by date	0.092	-	-	0.207	0.005	-
P8	Concern regarding food waste	0.015	-	0.365	0.009	0.166	0.786
P9	Quantity of uneaten food/ food waste	0.328	0.087	0.879	0.183	0.183	0.449
P10	Method of discarding uneaten food	0.449	0.048	-	0.008	0.000**	0.000**
P11	Frequency of food waste	0.453	0.469	0.647	0.417	0.728	0.314
P12	Preparation of fresh food meals	0.804	0.378	0.203	0.584	0.001*	0.000**
P13	Eating yesterday's meal	0.083	-	-	0.036	0.005	-
P14	Eating out or eating fast food	0.284	-	-	-	-	-
P15	Eating ready-made food	-	-	-	-	-	-
P16	Quantity of food waste	0.098	0.100	0.817	0.082	0.544	0.196
P17	Value of food waste	0.412	-	-	0.322	0.772	-

Legend: - data not valid; * P<0.05; ** P<0.01

The cross-comparison of the characteristics of the sample and their habits showed that gender had a statistically significant effect on the amount of monthly expenditure on food and the response to special offers. The age of respondents and education had highly statistically significant impact only on the amount of monthly expenditure on food. Employment had a high statistical impact on the amount of food expenditure and a statistically significant impact on reactions to special offers. Marital status had a highly statistically significant effect on the amount of monthly expenditure on food and the treatment of uneaten food. The size of the family had a highly statistically significant impact on the treatment of uneaten food and the preparation of fresh food meals, and statistically significant influence on the use of a preprepared shopping list for food purchases.

Having an insight into the results of the same research in Algeria (Ali Arous et al., 2017), Lebanon (Charbel et al., 2016), Turkey (Yildirim et al., 2016), Morocco (Abouabdillah et al., 2015) and Egypt (Elmenofi et al., 2015), the discussion also provides an overview of the results of the research from BiH in relation to the results from those countries.

Regarding the place of purchase, consumers from BiH usually buy in super and hypermarkets, and very rarely directly from the producers. This is a consequence of the expansion of supermarket chains in BiH in recent years, which has led to a rapid decline in the number of small shops. Also, opportunities for direct purchasing is low (e.g. green markets, are small, as their number is constantly decreasing). Consumers from BiH most buy frequently food because even 65% of them buy food every day or every second day. Also, after the Moroccans, they do not frequently use the pre-arranged list, and do not respond to special offers and discounts. If compare the expenditure for food, consumers in BiH spend less compared to consumers from most other countries. The reason could be their small purchasing power, although other countries do not have much higher average income. Consumers in BiH have expressed the highest level of concern over food waste. Consumers in BiH spend more time eating food from fresh ingredients at home; they rarely eat yesterday's meal the next day, and very rarely eat out. Regarding the quantity of food waste, consumers in BiH are among the most conservative, and the reasons for food waste are roughly the same as in other analysed countries. For some of the factors it was not possible to make a comparison, because the results of data processing were not presented in the same way.

CONCLUSION

Given that there have been no previous surveys on household food waste in BiH, this study makes one of the first contributions in this regard. It showed that consumers in BiH spent a lot of money on food, having in mind their total income. Probably because of this, they were quite rational in terms of planning, ways of preparing, and the frequency and quantity of food waste. Moreover, the amount and value of food waste were quite small. The majority of consumers had a good perception of food shelf life, although there was a fairly high percentage

of those who believed that food could be eaten even after the expiration of recommended shelf life. A high number of consumers was worried about food waste, and they are ready for certain steps that could reduce food waste generation in Bosnian households. This pointed to the need for better consumer awareness on how to store, prepare and alternatively use food. The conducted research had a pioneer character in the territory of BiH and its results could certainly be utilised to plan specific actions in the direction of reducing food waste. It also sets up a baseline for research activities on household food wastage in BiH that would be undertaken in the future.

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