

FOOD WASTE IN ROMANIA COMPARATIVE WITH THE NEIGHBOURING COUNTRIES

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Abstract: *The main objective of this paper is to assess the problem of food waste in Romania comparative with Hungary, Serbia, Bulgaria, Moldova and Ukraine, in the year 2019. Food that is appropriate for human consumption that is thrown away, whether or not it has been held over its expiration date or allowed to expire, is referred to as food waste. Usually, this is because the product in question has spoiled but it can also be due to market surplus or individual shopping/eating habits.*

Key words: *food waste; households; losses; trash*

INTRODUCTION

Food waste is one of the most critical concerns of our time. In 2019, the world generated 931 million tons of food waste, with household members producing 61% of it. All of this food could feed 2 billion people, which is "more than twice the number of undernourished humans around the world." [2,19]

Each state is obligated to ensure the food security of its citizens. While the population of developed countries and a part of the developing countries are in the positive segment of food security and generate enormous amounts of food waste, at the same time, the population of underdeveloped countries, but also a part of the developing countries, suffer from malnutrition, undernourishment and even die from lack of food. [8, 7]

Research indicates that food waste creates considerable national and European issues. Approximately 87.6 million tons of food are wasted annually in Europe. According to an analysis made by the United Nations, Romania ranks in the center of Europe in terms of the quantity of food waste. About 1.35 million tons of food are dumped annually in our country, counting only the food from households. Therefore, 70 kg of food per person are thrown in the trash each year. [3,5]

In Romania, almost 2 million tons of food are wasted annually, despite the fact that more than 4 million citizens cannot afford to purchase food on a daily basis. Romanians mention quick deterioration (26%), wrong estimation of the quantity of food consumed (21%), as well as excessive shopping (14%), as the leading causes for food waste. [12]

In rural regions, food waste is valued using traditional ways, but in urban areas, over 95% of trash ends up in landfills. Cooked food (24%), fruits (22%), vegetables (21%), bread or bakery goods (20%), milk and cheese (11%) and meat products (1%) are the foods that end up in the trash the most commonly. The remaining 1% did not reply. [11]

About 73% of restaurants in Romania participating in a study declare that they are facing food waste, and 55% of them have implemented measures to combat food waste, such as donating food, partnering with platforms through which they sell the remaining food at half price or improving the efficiency of raw resources management, shows the report by Edenred Romania, in partnership with the employers' Organization of Hotels and restaurants in Romania (HORA). [7,18]

Half of the operators throw away between 1-5% of the food produced daily, and 20% throw away between 5-15%. Among the most discarded products are raw materials –

fruits, vegetables, meat – 70%, followed by already prepared foods (30%). For 3 out of 10 operators, the waste occurs exclusively in the kitchen, while for the other 7 out of 10, it occurs in the restaurant or in both places. [16]



Figure 1. The food waste structure in Romania

Source: Food Waste Romania, 2019

Food waste minimization is one of the objectives in the United Nations 2030 Agenda for Sustainable Development. According to Goal 12, the worldwide waste of food at retail and consumer levels must be reduced by the end of the decade by 50%, and food loss must be minimized. The member states must adopt preventative and reduction measures in order to achieve these goals (campaigns, knowledge sharing and food waste reporting). [1,13]

As a member of the EU, Romania has taken initiatives to combat food waste. For instance, Law No. 217/2016 on the reduction of food waste states that minimizing food waste is an essential target for all agri-food sector economic operators. [4]

Change is in our own hands, therefore to prevent food waste, try the following:

- Plan the meal for the following several days in advance;
- Never shop without a list;
- Do not go shopping if you are hungry;
- Store the food properly;
- Freeze the food;
- Buy fruits and vegetables that do not have the perfect look which are often on sale.

These are only a few of the measures that we should all take and that will undoubtedly have a good effect on the environment. [10]

Benefits of reducing food waste:

- Labor costs can be reduced by handling, preparing, and storing food more efficiently;
- Saving by buying only the amount of food that is necessary and avoiding excessive disposal costs;
- Reduced carbon footprint and methane emissions from landfills;
- Improved management of energy and resource, reducing pollution caused by the production, transport, and sale of food;
- By donating untouched, healthy food that might otherwise be thrown out, the community has benefits. [9, 15]

MATERIALS AND METHODS

The study presents a research based on external data, pertaining to food waste in 2019, provided by Our World In Data. Those second-party external data were analyzed and interpreted by the authors, using established methods of economic analysis and interpretation.

The main purpose of the study is to identify the level of food waste in Romania comparative with Hungary, Serbia, Bulgaria, Moldova and Ukraine in 2019.

RESEARCH RESULTS

In the present study, three relevant categories of food waste were considered: food waste per capita in households, food waste per capita in out-of-home consumption and food waste per capita in retail.

In the first case, the analyzed countries are Romania and Hungary. Our country is the 12th state by area of the Europe countries, with 238.397 km² while Hungary occupies the 18th place with 93.030 km². In 2019, the population of Romania was 19.37 million people and at the same time the population of Hungary was 9.771 million people. Romania's GDP for 2019 was \$251,02 billion \$ while Hungary's was 163.99 billion \$. [6]

Considering these things mentioned above, and although Hungary is a smaller country in area, with a lower number of inhabitants and lower incomes comparative with Romania, the food waste per capita in retail and food waste per capita in out-of-home consumption in both countries in 2019 measured the same value. The food waste produced in retail was 12,81 kg per capita and the food waste produced in out-of-home consumption was 25.57 kg per capita. Reporting the food waste per capita in households, Hungary produced a higher quantity of waste than Romania, 93.83 kg per capita comparative with 69.87 kg per capita.

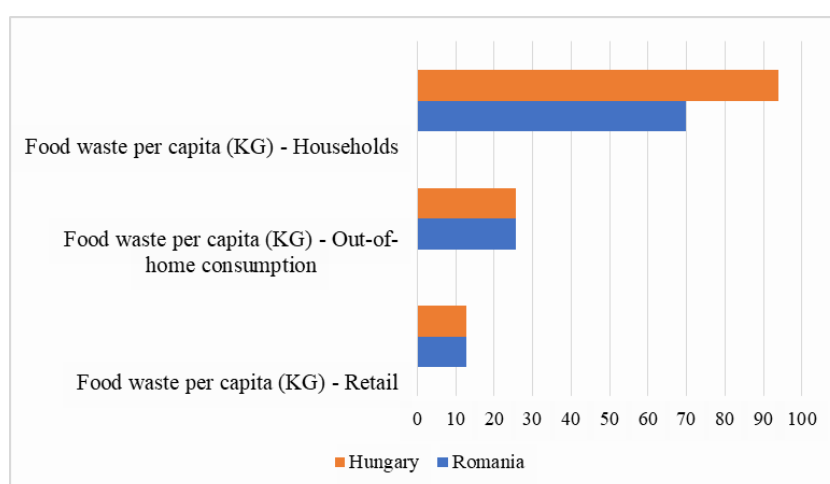


Figure 2. Food waste in Romania comparative with Hungary in 2019

Source: Our World In Data, 2019

In the second case, the analyzed countries are Romania and Serbia. Serbia is the 22th state by area in Europe and has a slightly smaller area comparative with Romania, more precisely 88.499 km². In 2019, the population of Serbia was estimated at 6.945 million people, approximatively third of the population of Romania in that year. In the presented year, the GDP of Serbia was 51.51 billion \$, with 200 billion \$ decreased than the one of our country. [14] The food waste generated in out-of-home consumption was 25.27 kg per capita in Romania, a more significant quantity comparative with the one from Serbia, which was 6 kg per capita. Speaking about the food waste in households, Serbia produced an amount with approximatively 13 kg per capita higher than Romania, precisely

82.78 kg comparative with 69.87 kg. The food waste in retail had also a higher quantity in Serbia, 15.64 kg per capita comparative with 12.81 kg per capita.

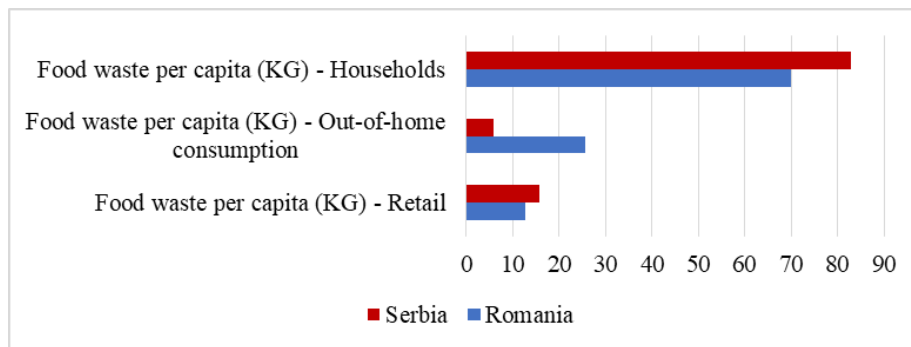


Figure 3. Food waste in Romania comparative with Serbia in 2019

Source: Our World In Data, 2019

In the third case, the analyzed countries are Romania and Bulgaria. Bulgaria is the 16th state by area in Europe with an expanse of 110.994 km² and in 2019 its population was 6.976 million people. Therefore, comparative with Romania, it is a smaller country in terms of area as well as of inhabitants. In 2019, the GDP in Bulgaria was 68.92 billion \$ while in Romania it was 251.02 billion \$. [14] Speaking about the food waste, Bulgaria has a higher quantity of food waste per capita comparative with Romania both in retail and out-of-home consumption, precisely 15.64 kg comparative with 12.81 kg and 27.65 kg comparative with 25.57 kg. The food waste amount produced in households in Romania in 2019 was with 1.49 kg per capita higher than the one from Bulgaria.

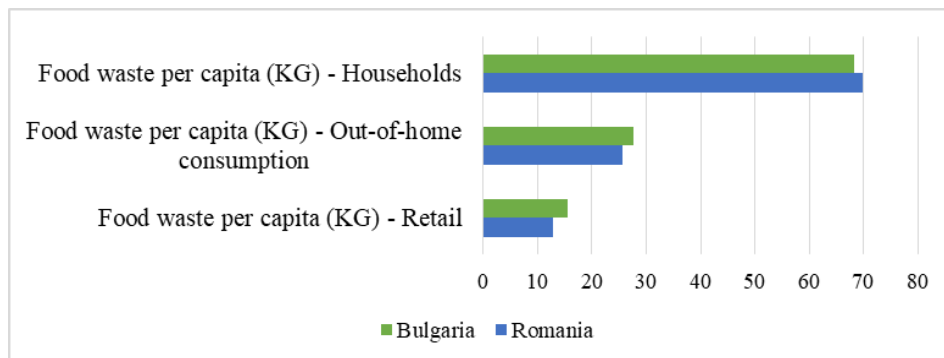


Figure 4. Food waste in Romania comparative with Bulgaria in 2019

Source: Our World In Data, 2019

In the fourth case, the analyzed countries are Romania and Moldova. Moldova is the 33th country in Europe by territory with 33.846 km² and in 2019 had the population of 6.976 million people. Moldova's GDP in 2019 was 11.97 billion \$. [14] Therefore, even if it is a less developed and smaller country in the mentioned terms than Romania, the quantity of food waste per capita generated in all the three categories in Moldova is higher than the one from our country. Firstly, the most significant difference is between the food waste per capita produced in households, 76.03 kg per capita comparative with 69.87 kg per capita. Secondly, the food waste per capita produced in out-of-home consumption it is again higher in Moldova than in Romania, 27.65 kg per capita comparative with 25.57 kg per capita. Thirdly, the food waste per capita produced in retail is with 2.83 kg per capita higher in Moldova than in Romania.

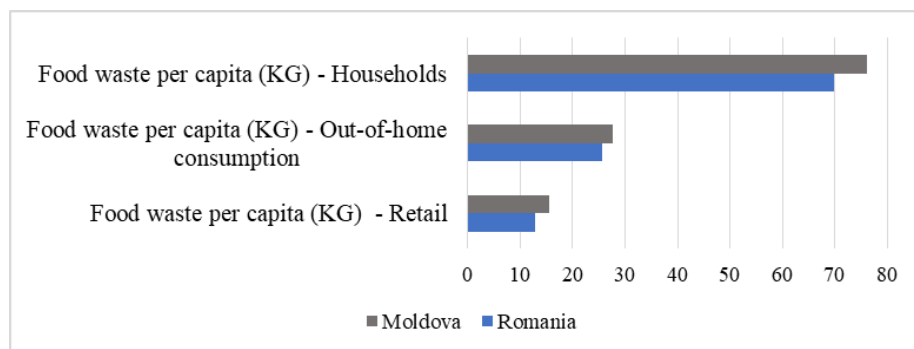


Figure 5. Food waste in Romania comparative with Moldova in 2019
 Source: Our World In Data, 2019

In the fifth case, the analyzed countries are Romania and Ukraine. Presenting Ukraine, it has the second large area from Europe, more exactly 603.628 km², almost three times the proportions of Romania. The total population in Ukraine was estimated at 44.39 million people in 2019, approximatively two times bigger than Romania's. Speaking about the GDP in the mentioned year, it measured 153.9 billion \$, with almost 100 billion \$ less than in our country. [14] In all the three categories of food waste, Ukraine has higher quantities than Romania. Firstly, the most significant difference is between the food waste produced in households, precisely 76.03 kg per capita comparative with 69.87 kg per capita. The difference between the food waste produced in out-of-home consumption is 2.08 kg per capita and the difference between the food waste generated in retail is 2.83 kg per capita.

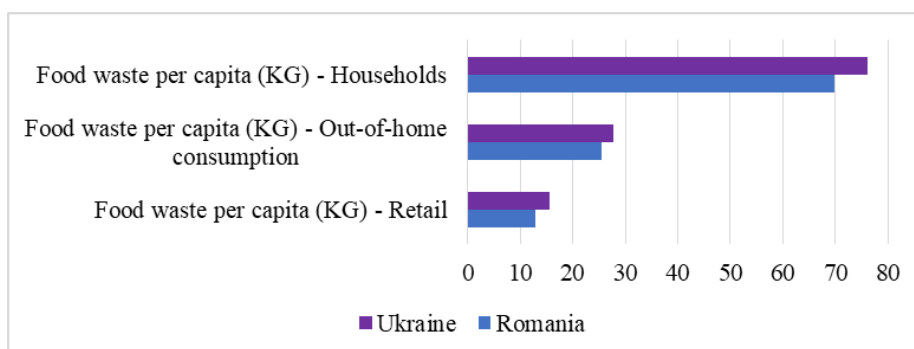


Figure 6. Food waste in Romania comparative with Ukraine in 2019
 Source: Our World In Data, 2019

Following the analysis, there are some aspects that need to be mentioned.

Comparing the food waste produced in retail, Romania and Hungary have an equal and increased quantity then the four countries Serbia, Bulgaria, Moldova and Ukraine who also have the same value, precisely 12.81 kg per capita comparative with 15.64 kg per capita.

Speaking about the food waste generated in out-of-home consumption, Serbia has the lowest income, 6 kg per capita. Romania and Hungary are the next ones in the ranking but at a big difference, with 25.57 kg per capita. Bulgaria, Moldova and Ukraine have the highest value, 27.65 kg per capita.

Analysing the food waste produced in in households, Hungary is the first state in the ranking, with 93.83 kg per capita, followed by Serbia with 82.78 kg per capita. Moldova and Ukraine have the same value, 76.03 kg per capita, followed by Romania, with 69.87 kg per capita. The country with the lowest quantity of food waste generated in households is Bulgaria, with 68.38 kg per capita.

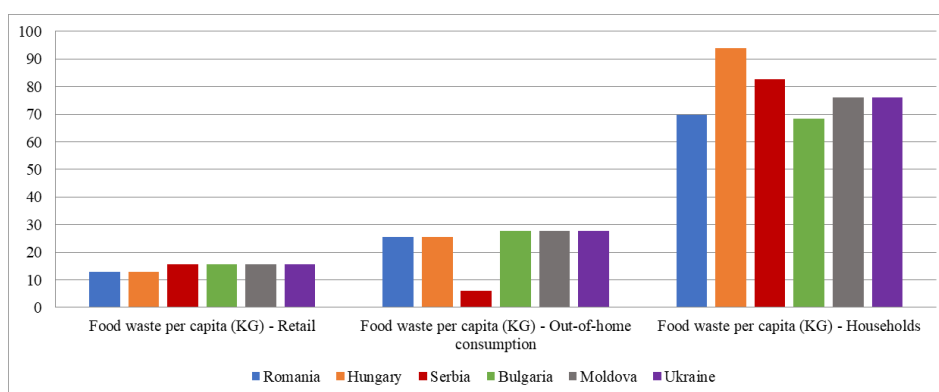


Figure 7. Food waste in Romania comparative with Hungary, Serbia, Bulgaria, Moldova and Ukraine

Source: Our World In Data, 2019

CONCLUSIONS

After the presented aspects, it can be observed that the situation of food waste differs in all the six countries.

Comparing these three categories of food waste, a thing to reveal is the fact that Serbia is the country with the lowest quantities of generated food waste, 104 kg per capita. This result is not a positive one, the amount of 104 kg per capita is enormous but comparative with Hungary which has 132 kg of food waste per capita, it is a favourable case. Romania is the second state after Serbia, with 108 kg of food waste per capita.

In conclusion, it is clear that food waste is caused by people in developed countries but also in the countries under development. Understanding how and where food waste occurs is the first step in developing solutions. The answer is complex and depends on the geography, food type and other elements. Rethinking supply chains, energy use, collaboration between the public and private sectors, laws, behavioral economics, and many other factors is necessary to find the answers to this problem.

REFERENCES

- [1]. **ARCHIP B.C., BANATEAN-DUNEA I., PETRESCU D.C., PETRESCU-MAG R.M.**, 2023, Determinants of Food Waste in Cluj-Napoca (Romania): A Community-Based System Dynamics Approach, *Int J Environ Res Public Health*, 20(3), 2140. DOI: 10.3390/ijerph20032140. PMID: 36767506; PMCID: PMC9915448.
- [2]. **BALAN IOANA MIHAELA, GHERMAN R., TRASCA T.I., TULCAN CAMELIA, SABRY A. E., BRAD I., DINCU ANA MARIANA, GHERMAN EMANUELA DIANA, MARTIN ANAMARIA ROXANA**, 2022, Food Waste Worldwide – Top 10 countries, *Scientific Papers: Animal Science & Biotechnologies / Lucrari Stiintifice: Zootehnie si Biotehnologii*, 55(2)
- [3]. **BALAN IOANA MIHAELA, POPESCU A.C., IANCU T., POPESCU GABRIELA, TULCAN CAMELIA**, 2020, Food Safety Versus Food Security in a World of Famine, *Journal of Advanced Research in Social Sciences and Humanities*, 5(1), 20-30. DOI:10.26500/jarssh-05-2020-0103, Available at SSRN: <https://ssrn.com/abstract=3791137> or <http://dx.doi.org/10.2139/ssrn.3791137> https://link.springer.com/chapter/10.1007/978-981-16-3260-0_13
- [4]. **CHEREJI A.-I., CHIURCIU I.-A., POPA A., CHEREJI I., IORGA A.-M.**, 2023, Consumer Behaviour Regarding Food Waste in Romania, Rural versus Urban, *Agronomy* 13, 571. <https://doi.org/10.3390/agronomy13020571>

- [5]. **GHEORGHESCU C.I., VELCOTA I.I., MARTIN A.R., BALAN I.M.**, 2019, Food waste a major problem in the European Union. *Journal Agricultural Management*, 21(3), 65-80
- [6]. **IANCU T., PETRE I.L., TUDOR VALENTINA CONSTANTA, MICU M.M., URSU ANA, TEODORESCU FLORINA RUXANDRA, DUMITRU E.A.**, 2022, A Difficult Pattern to Change in Romania, the Perspective of Socio-Economic Development, *Sustainability*, 14, 2350. <https://doi.org/10.3390/su14042350>
- [7]. **SCHANES K., DOBERNIG K., GOZET B.**, 2018, Food waste matters - A systematic review of household food waste practices and their policy implications, *J. Clean. Prod.* 182, 978–991
- [8]. **YETKIN ÖZBÜK R.M., COŞKUN A., FILIMONAU V.**, 2022, The impact of COVID-19 on food management in households of an emerging economy., *Socioecon Plann Sci.* 82:101094. DOI: 10.1016/j.seps.2021.101094. Epub 2021 Jun 9. PMID: 35721384; PMCID: PMC9192139.
- [9].*** **EUROPEAN COMMISSION**, Food Waste|Food Safety. Available online: https://ec.europa.eu/food/safety/food_waste_en. Accessed on March 12, 2023
- [10].*** **EUROPEAN PARLIAMENT**, Report on How to Avoid Food Wastage: Strategies for a More Efficient Food Chain in the EU. 2011. Available online: https://www.europarl.europa.eu/doceo/document/A-7-2011-0430_EN.html. Accessed on 11 March, 2023
- [11].*** **FAO**, An Introduction to the Basic Concepts of Food Security, 2008, <https://www.fao.org/3/al936e/al936e00.pdf>. Accessed on March 18, 2023
- [12].*** **FOOD WASTE ROMANIA**, 2019, Catalog of Romanian organizations involved in waste prevention and capitalization of food surplus. Retrieved from <https://bit.ly/2W3ifJ8>
- [13]. *** **FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS**, 2022, Consumer Food Waste, www.fao.org/flw-in-fish-value-chains/value-chain/consumption/consumer-food-waste/en/. Accessed on March 10, 2023
- [14].*** **OUR WORLD IN DATA**, <https://ourworldindata.org/>
- [15].*** **REDUCING FOOD WASTE** - Method for Measuring Waste Quantities. Available online: <https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/2122-Establishment-of-a-methodology-of-measurement-of-food-waste>. Accessed on March 17, 2023
- [16].*** **MOVE FOR HUNGER**, <https://moveforhunger.org/>
- [17].*** **THE STATE OF FOOD AND AGRICULTURE**, 2019, Moving Forward on Food Loss and Waste Reduction. CCBY-NC-SA3.0 IGO. Rome: Licence. 2019. Available online: <http://www.fao.org/3/ca6030en/ca6030en.pdf>. Accessed on March 23, 2023
- [18].*** **UN ENVIRONMENT PROGRAMME**, FOOD WASTE INDEX REPORT 2021, <https://www.unep.org/resources/report/unep-food-waste-index-report-2021>
- [19].*** **WWF**, Driven to Waste Global Food Loss on Farms.”, 2020, www.panda.org/discover/our_focus/food_practice/food_loss_and_waste/driven_to_waste_global_food_loss_on_farms/. Accessed on March 10, 2023