

THE IMPORTANCE OF FOOD WASTE REDUCTION MEASURES IN ORDER TO ENSURE FOOD SECURITY IN ROMANIA IN THE CONTEXT OF COVID-19

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Abstract: This paper highlights the importance of food waste reduction measures to ensure food security in Romania, in the context of COVID-19. Measures to reduce food waste in order to ensure food security in Romania, through the processes of management, minimization and reduction of food waste and guaranteeing food security are essential aspects for the proper conduct of all activities in a state. Also, a country will have food security with improved stability only when food waste reduction measures are successfully implemented, so it will have sufficient availability of agricultural and food products able to cover the food needs of all the inhabitants included within the borders of the country.

Key words: Food waste, food security, COVID-19, reduce food waste

INTRODUCTION

Food waste is a global issue that has become increasingly important on the public and political agenda in recent years. The importance of this issue will continue to grow, especially given the need to feed the growing world population [22]. Food is a precious commodity, and its production needs significant resources, which also involve water, soil and energy [1].

Current estimates indicate that worldwide, about a third of food produced for human consumption is wasted or lost, which generates significant economic and environmental costs. Food waste puts undue pressure on limited natural resources and the environment [19]. Every opportunity must be seized to prevent food waste and strengthen the sustainability of the food system. Legal regulations on food safety may be exaggerated in some situations, but they must prevent food waste and biodegradable waste, which end up in landfills without a recovery solution, as well as poverty and social exclusion [2].

An issue that is increasingly addressed today at the national level, but still insufficiently understood, is the effects of food waste. This produces important consequences both on the economy and the well-being of the inhabitants of Romania, and on the environment, leading to a growing need to find solutions [18]. If we look at it from an economic point of view, food waste can lead to fluctuating prices, rising food costs and higher costs of transporting and treating waste [20]. Given that the largest food losses occur in households, in Romania the losses in the consumer sector are 2-3 times higher, compared to other European countries, where the percentage of average monthly income is much lower [3].

Measures to reduce food waste in order to ensure food security in Romania are essential, because it is necessary for citizens to better understand the notions of food waste and its causes, in order to prevent and manage the negative effects generated. Waste of food is not only a matter of ethics and economy, but also a phenomenon that deprives the environment of natural resources and so limited [4].

MATERIALS AND METHODS

Food waste is a widespread global problem, with significant consequences for both the economy and the well-being of people in developed and especially developing countries, as well as the environment, leading to a growing need to find new solutions [6].

Food waste means all food produced for human consumption that is lost or thrown away on the route from the place of production to the plate [5].

Food waste occurs along the entire agri-food chain: from primary production, processing, distribution, transport, marketing to the final consumer. Food loss is a decrease in the quantity or quality of food reflected in the nutritional value, economic value or food safety of all food produced for human consumption but not consumed by humans. More food is bought than necessary [12]. The difference between the quantity available and the one consumed is very large, resulting in food losses and losses of both finished products and losses in the process of preparation for consumption [8].

The food problem also results from the game of numerous contradictions in the field of food production and distribution, contradictions determined, in turn, by a set of economic, social and political phenomena, specific to countries and regions of the world. Natural resources allow the food support of the entire population [17]. Certainly the transport and distribution of food in less accessible areas are elements of great interest for ensuring food security. However, nothing can justify the waste of food (and not just food), which is reaching worrying levels even for economic operators [7].

The global nature of the food problem is accentuated by several circumstances, which have arisen in different stages of development of the human community: intensity and scale of manifestation, high degree of inequality in production and distribution, increased dependence of many developing countries on aid food and imports from other states, but also the likelihood of disastrous long-term developments [11].

All factors in the food chain have an important role in preventing and reducing food waste, starting with those who produce and process food (farmers, food producers and processors), those who market food on the market (hospital and retail sector) and in finally, the end consumer [15]. Food is lost or wasted throughout the supply chain: on the farm, in processing and production units, in shops, in restaurants and at home [10].

For the evaluation and solution of the food waste problem in Romania are preferred those models that involve, as working tools, the realization of detailed comparative analyzes at county, regional and national level, given the obvious differences that are found on all these levels, with the help of representative indicators, such as: agri-food resources, agricultural production, total and employed population in agriculture, income and food demand, the nutritional status of the population, climatic and environmental factors [13]. Recognizing the existence of the problem of food waste, as well as awareness of the implications and risks that its failure can induce on the health of the population, in the short, medium and long term, have materialized over time in intensifying development efforts. and implementation of food policies at county, regional and national level, whose general purpose is to safeguard the right of every individual to have permanent access to food necessary for an active and healthy life [9]. Efforts to combat food waste should be stepped up and better coordinated, which would allow Romania to play a more important role in relevant international fora [23]. This involves concrete action by state institutions to adopt a common strategy as soon as possible [21]. At the technical level, it should now draw up an action plan for the coming years, covering various policy areas [14]. It should include agreed descriptions of what constitutes food waste at all stages of the food chain, as well as a methodology for measuring the impact of the strategy [16].

RESEARCH RESULTS

The effects of food waste are a growing problem at the national level. This produces important consequences both on the economy, on the well-being of the inhabitants of Romania, and on the environment, leading to a growing need to find solutions. Thus food waste is a determinant factor that contributes to reducing food insecurity.

In order to identify the elements in the food chain through which individual consumers contribute to food waste, we considered it useful to develop a questionnaire that will reveal issues that may lead to reduced food risk at home, by applying measures, followed by recommendations that will contribute later to reduce and even eliminate food waste.

Table 1.
Identifying measures to reduce food waste in the Romanian environment

Questions	Answers
1. How many times a week do you buy vegetables and fruits?	
a) Daily	
b) 3 times a week	
c) Once a week	
2. How much vegetables do you actually eat from what you buy each week?	
a) Less than half of the quantity purchased	
b) Half of the quantity purchased	
c) The entire quantity purchased	
3. How much of the vegetables and fruits you buy spoil and throw away every week?	
a) Less than half of the quantity purchased	
b) Half of the quantity purchased	
c) The entire purchased quantity is consumed, thus the deterioration process will not be reached	
4. How many times a week do you buy meat and meat dishes?	
a) Daily	
b) 3 times a week	
c) Once a week	
5. How much meat and meat products do you actually eat from what you buy each week?	
a) Less than half of the quantity purchased	
b) Half of the quantity purchased	
c) The entire quantity purchased	
6. How much meat and meat products do you buy deteriorate and throw away weekly?	
a) Less than half of the quantity purchased	
b) Half of the quantity purchased	
c) The entire purchased quantity is consumed, thus the deterioration process will not be reached	
7. How many times a week do you buy milk and dairy products?	
a) Daily	
b) 3 times a week	
c) Once a week	
8. How much milk and dairy products do you actually consume from what you buy each week?	
a) Less than half of the quantity purchased	
b) Half of the quantity purchased	
c) The entire quantity purchased	
9. How much milk and dairy products do you buy deteriorate and throw away every week?	
a) Less than half of the quantity purchased	
b) Half of the quantity purchased	
c) The entire purchased quantity is consumed, thus the deterioration process will not be reached	
10. To reduce food waste, would you be willing to...?	
a) Store food properly in the refrigerator	
b) Cook in smaller quantities	
c) Shop as often as possible in small quantities	

The questions we proposed for the analysis of the measures and recommendations for reducing and even reducing food waste are (Table 1):

1. How many times a week do you buy vegetables and fruits?
2. How many vegetables do you actually eat from what you buy each week?
3. How much vegetables and fruits do you buy spoil and throw away every week?
4. How many times a week do you buy meat and meat dishes?
5. How much meat and meat products do you actually eat from what you buy each week?
6. How much meat and meat products do you buy spoil and throw away weekly?
7. How many times a week do you buy milk and dairy products?
8. How much milk and dairy products do you actually consume from what you buy each week?
9. How much milk and dairy products do you buy deteriorate and throw away every week?
10. To reduce food waste, would you be willing to...?

The results of the study lead to the identification, analysis and interpretation of the problems related to food waste in Romania. The approached topic emphasizes the effects generated by food waste, as well as the methods that can be used to manage, minimize and prevent food losses. To conduct this study, we applied 50 questionnaires, which were completed by volunteers, the vast majority of whom were people I knew and whom I entrusted the completion of the questionnaire, knowing that they were in good faith and honest in their answers. The selected sample consisted of 50 people, 2 of whom could no longer be part of the study because they were stranded abroad.

The selected sample was classified according to age, respectively:

- people aged between: 20-30 years - 10 volunteers;
- people aged between: 30-40 years - 10 volunteers (9 left);
- people aged between: 40-50 years - 10 volunteers (9 left);
- people aged between: 50-60 - 10 volunteers;
- people aged between: 60-70 - 10 volunteers.

Following the application of the questionnaires, we collected relevant data on food waste and its variation in different phases of consumption, on different categories of food, as well as the willingness of people to get involved in reducing food waste at home.

The first question I asked in the questionnaire is: "How many times a week do you buy vegetables and fruits?", This aims to highlight the frequency with which vegetables and fruits are purchased weekly by volunteers who helped to make study.

Table 2.

Frequency of weekly purchase of vegetables and fruits

Crt. no.	AGE CATEGORY	Daily	3 times a week	Once a week
1	20-30	6	2	2
2	30-40	5	3	1
3	40-50	5	3	1
4	50-60	5	4	1
5	60-70	6	3	1
TOTAL		27	15	6

The data resulting from the application of the questionnaire are presented in Table 2, so it can be seen that most age groups make purchases of vegetables and fruits to a large extent, daily.

Figure 1 shows the high frequency of daily purchases of vegetables and fruits, age groups between 20-30 years and 60-70 years.

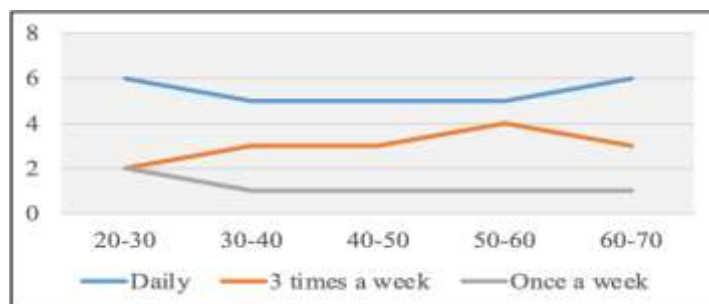


Figure 1. Variation of the frequency of weekly purchase of vegetables and fruits

People aged between 50-60 years, recorded the highest value in terms of shopping 3 times a week, and for the answer option aimed at shopping for vegetables and fruits once a week, the age category between 20-30 years, recorded the highest coefficient.

The second question I asked in the questionnaire is: "How many vegetables do you actually eat from what you buy, each week?", This aims to highlight the amount of vegetables actually consumed from what is purchased in each week by the volunteers who contributed to the study.

The data resulting from the application of the questionnaire are presented in Table 3, so it can be seen that young people consume a small amount of fruits and vegetables, and with age, the amount consumed increases, which highlights the fact that older people are more responsible for the consumption and subsequent generation of wasted fruit and vegetables.

Table 3.

The amount of vegetables actually consumed from that purchased weekly

Crt. no.	AGE CATEGORY	Less than half of the quantity purchased	Half of the quantity purchased	The entire quantity purchased
1	20-30	4	3	3
2	30-40	3	4	2
3	40-50	2	4	3
4	50-60	2	3	5
5	60-70	2	2	6
TOTAL		13	16	19

Figure 2 shows the aspect that people aged between 20-30 years, register the highest value, in terms of consumption of less than half of the amount of fruits and vegetables purchased, thus being the category that generates lowest consumption.

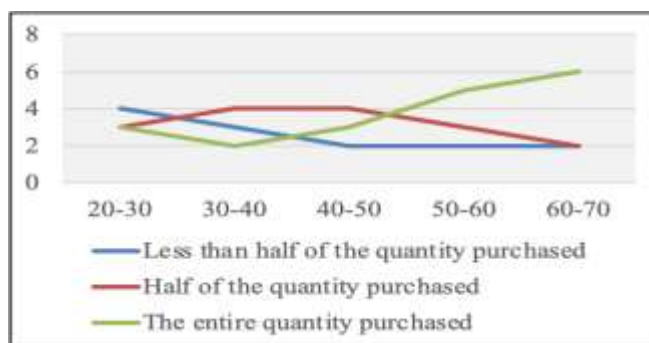


Figure 2. The variation of the quantity of vegetables actually consumed from the one purchased weekly

The age categories that register the highest values for the consumption of half of the purchased quantity of vegetables and fruits, are those between 30-40 years and 40-50

years. The whole amount of vegetables and fruits bought, ends up being consumed with age, so people aged 60-70 years have the highest value in this regard.

The third question I asked in the questionnaire is: "How much vegetables and fruits do you buy spoil and throw away every week?", This aims to highlight the amount of vegetables and fruits purchased that spoil and it is thrown away weekly by the volunteers who contributed to the study.

Table 4.

The amount of vegetables and fruits purchased that deteriorates weekly

Crt. no.	AGE CATEGORY	Less than half of the quantity purchased	Half of the quantity purchased	Consume the entire amount purchased
1	20-30	5	3	2
2	30-40	3	4	2
3	40-50	2	4	3
4	50-60	2	3	5
5	60-70	2	2	6
TOTAL		14	16	18

The data resulting from the application of the questionnaire are presented in Table 4, so it can be seen that young people achieve the highest waste of fruits and vegetables, and with age, the value of waste decreases, which highlights the fact that older people are more responsible for the waste of purchased fruits and vegetables.

Figure 3 shows the aspect that people aged between 20-30 years, register the highest value, in terms of consumption of less than half of the purchased quantity of vegetables and fruits, thus being the category that generates a high degree of food waste.

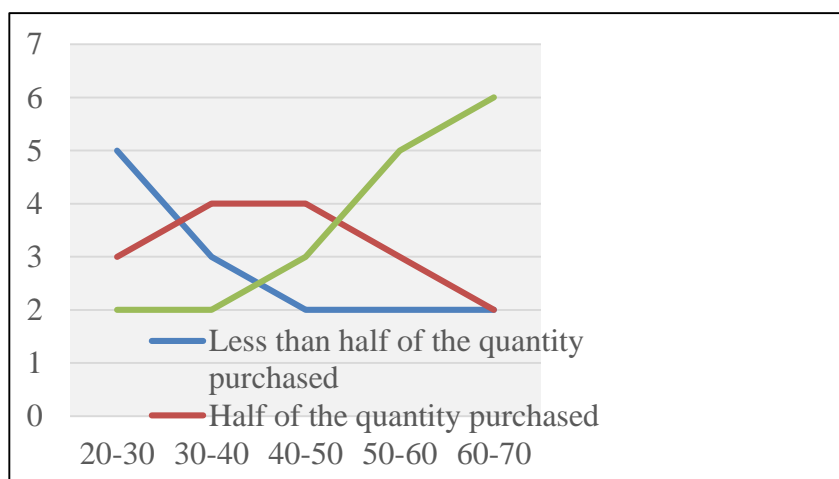


Figure 3. Variation in the amount of vegetables and fruits purchased that deteriorates weekly

The age categories that register the highest values for the deterioration of half of the purchased quantity of vegetables and fruits, are those between 30-40 years and 40-50 years.

Regarding the total consumption of the purchased quantity, people aged between 60-70 years, recorded the highest value, thus being the category with the lowest amount of vegetables and fruits that deteriorate and are thrown away weekly.

The fourth question I asked in the questionnaire is: "How many times a week do you buy meat and meat products?", This aims to highlight the frequency with which meat and meat products are purchased weekly by volunteers. which contributed to the study.

Table 5.

Frequency of weekly purchase of meat and meat dishes

Crt. no.	AGE CATEGORY	Daily	3 times a week	Once a week
1	20-30	1	6	3
2	30-40	3	4	2
3	40-50	2	5	2
4	50-60	3	4	3
5	60-70	7	2	1
TOTAL		16	21	11

The data resulting from the application of the questionnaire are presented in Table 5, so it can be seen that most young people prefer to buy meat and meat products, 3 times a week and once a week, while the elderly get to make daily purchases of meat and meat dishes.

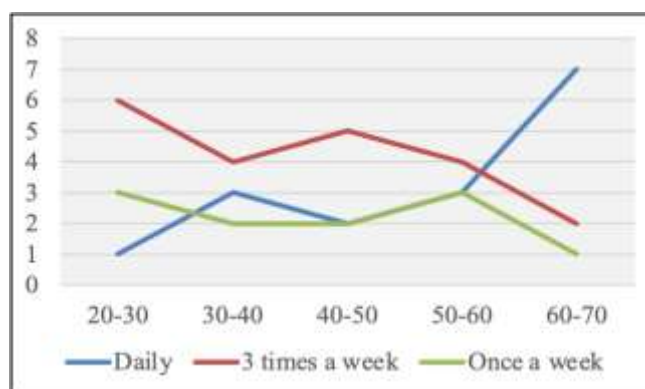


Figure 4. Variation of the frequency of weekly purchase of meat and meat dishes

People aged between 20-30 years, recorded the highest value in terms of shopping 3 times a week, and for the answer option aimed at shopping for meat and meat products once a week, category aged between 30-30 years and those aged between 50-60 years, recorded the highest coefficients.

The fifth question I asked in the questionnaire is: “How much meat and meat products do you actually eat from what you buy each week? “. It aims to highlight the amount of meat and meat preparations actually consumed, from what is purchased each week by the volunteers who contributed to the study.

Table 6.

The amount of meat and meat preparations actually consumed from that purchased weekly

Crt. no.	AGE CATEGORY	Less than half of the quantity purchased	Half of the quantity purchased	The entire quantity purchased
1	20-30	5	3	2
2	30-40	4	3	2
3	40-50	3	3	3
4	50-60	2	3	5
5	60-70	2	2	6
TOTAL		16	14	18

The data resulting from the application of the questionnaire are presented in Table 6, so it can be seen that young people consume a small amount of meat and meat products, and with age, the value of the amount consumed increases, which highlights the fact that older people they are more responsible for the consumption and subsequent generation of the waste of meat and meat preparations purchased.

Figure 5 shows that people aged 20-30 years have the highest value, in terms of consumption of less than half of the amount of meat and meat preparations purchased, thus being the category which generates the lowest consumption.

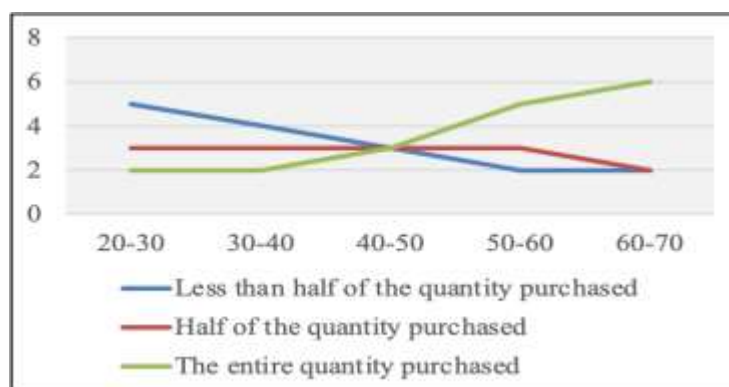


Figure 5. Variation in the amount of meat and meat preparations actually consumed from the one purchased weekly

The age categories that register the highest values and at the same time equal in terms of consumption of half of the purchased quantity of meat and meat preparations, are those between 20-30 years, 30-40 years, 40-50 years, and 50-60 years.

The entire amount of meat and meat products purchased, ends up being consumed with age, so people aged 60-70 years have the highest value in this regard.

The sixth question I asked in the questionnaire is: "How much meat and meat dishes do you buy deteriorate and throw away weekly?", This aims to highlight the amount of meat and meat products purchased. which is damaged and thrown away weekly by the volunteers who contributed to the study.

Table 7.

The amount of meat and meat products purchased that deteriorates weekly

Crt. no.	AGE CATEGORY	Less than half of the quantity purchased	Half of the quantity purchased	Consume the entire amount purchased
1	20-30	6	2	2
2	30-40	4	3	2
3	40-50	3	3	3
4	50-60	2	2	5
5	60-70	2	3	6
TOTAL		17	13	18

The data resulting from the application of the questionnaire are presented in Table 7. Thus, it can be seen that young people achieve the greatest waste of meat and meat preparations, and with advancing age the value of waste decreases, which emphasizes the fact that older people are more responsible for the waste of meat and dishes. of meat purchased.

Figure 6 shows that people between the ages of 20 and 30 have the highest value, in terms of consumption of less than half of the purchased quantity of meat and meat preparations, thus being the category which generates a high degree of food waste.

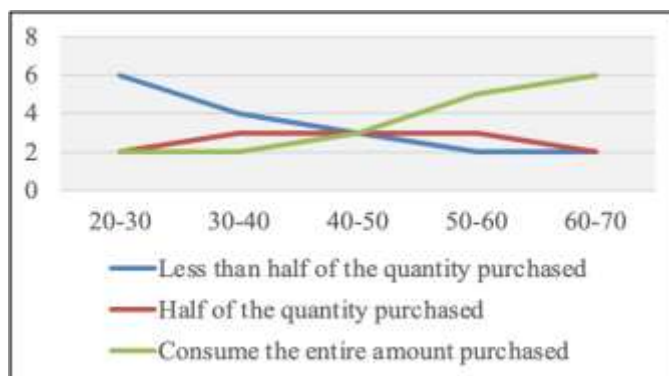


Figure 6. Variation in the amount of meat and meat preparations purchased that deteriorates weekly

The age categories that register the highest values for the deterioration of half of the purchased quantity of meat and meat preparations are those between 30-40 years, 40-50 years and 50-60 years.

In terms of total consumption of the quantity purchased, people aged between 60 and 70 years, recorded the highest value, thus being the category with the lowest amount of meat and meat products that deteriorate and are thrown away weekly. .

The seventh question I asked in the questionnaire is: "How many times a week do you buy milk and dairy products?", This aims to highlight the frequency with which milk and dairy products are purchased weekly by volunteers who contributed to the study.

Table 8.

Frequency of weekly purchase of milk and dairy products

Crt. no.	AGE CATEGORY	Daily	3 times a week	Once a week
1	20-30	2	5	3
2	30-40	4	3	2
3	40-50	3	4	2
4	50-60	4	4	2
5	60-70	6	3	1
TOTAL		19	19	10

The data resulting from the application of the questionnaire are presented in Table 8, so it can be seen that most people buy milk and dairy products both daily and 3 times a week, the two answers being chosen in equal numbers. As can be seen in Table 8, a smaller number of people end up buying milk and dairy products once a week.

Figure 7 shows the high frequency of daily purchases of milk and dairy products, the age category between 60 and 70 years.

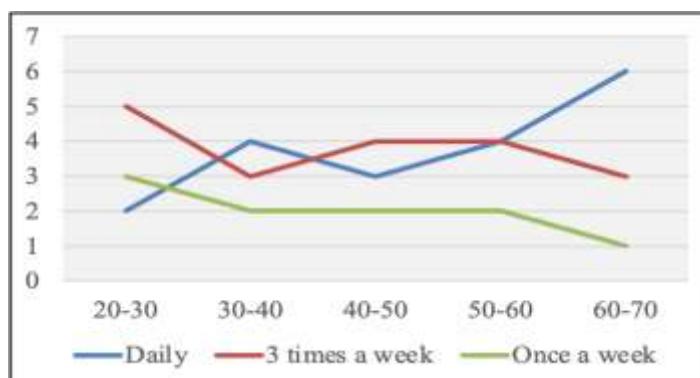


Figure 7. Variation of the frequency of weekly purchase of milk and dairy products

People aged between 20-30 years, recorded the highest value in terms of shopping 3 times a week, and for the answer option aimed at making purchases of milk and dairy products once a week, the category of age between 20-30 years, recorded the highest coefficient.

The eighth question I asked in the questionnaire is: "How much milk and dairy products do you actually consume from what you buy each week?", This is to avoid the amount of milk and dairy products actually consumed, from what is purchased each week, by the volunteers who contributed to the study.

Table 9.

The amount of milk and dairy products actually consumed from that purchased weekly

Crt. no.	AGE CATEGORY	Less than half of the quantity purchased	Half of the quantity purchased	The entire quantity purchased
1	20-30	6	2	2
2	30-40	5	1	3
3	40-50	4	1	4
4	50-60	3	2	5
5	60-70	2	2	6
TOTAL		20	8	20

The data resulting from the application of the questionnaire are presented in Table 9, so it can be seen that young people consume less milk and dairy products, and with the rise of age, the amount consumed increases, which highlights the fact that older people are more responsible for the consumption and subsequent generation of waste milk and dairy products purchased.

Figure 8 shows that people between the ages of 20 and 30 have the highest value, in terms of consumption of less than half of the amount of milk and dairy products purchased, being thus the category that generates the lowest consumption.

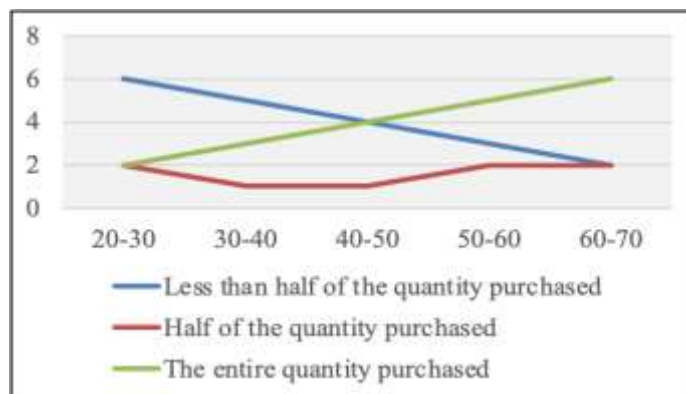


Figure 8. Variation in the amount of milk and dairy products actually consumed from the one purchased weekly

The age categories that register the highest values for the consumption of half of the purchased quantity of milk and dairy products, are those between 20-30 years, 50-60 years and 60-70 years. The entire amount of milk and dairy products purchased, ends up being consumed with age, so people aged 60-70 years have the highest value in this regard.

The 9th question I asked in the questionnaire is: "How much milk and dairy products do you buy deteriorate and throw away weekly?", It aims to highlight the amount of milk and dairy products purchased. it deteriorates and is thrown away weekly, by the volunteers who contributed to the study.

Table 10.

The amount of milk and dairy products purchased that deteriorates weekly

Crt. no.	AGE CATEGORY	Less than half of the quantity purchased	Half of the quantity purchased	Consume the entire amount purchased
1	20-30	5	3	2
2	30-40	4	3	2
3	40-50	3	3	3
4	50-60	3	3	4
5	60-70	2	3	5
TOTAL		17	15	16

The data resulting from the application of the questionnaire are presented in Table 10. Thus it can be seen that young people have the highest waste of milk and dairy products, and with age the value of waste decreases, which highlights the fact that older people are more responsible for the waste of milk and dairy products purchased.

Figure 9 shows that people between the ages of 20 and 30 have the highest value, in terms of consumption of less than half of the quantity purchased of milk and dairy products, being thus the category that generates a high degree of food waste.

All age groups recorded equal values for the deterioration of half of the purchased quantity of milk and dairy products.

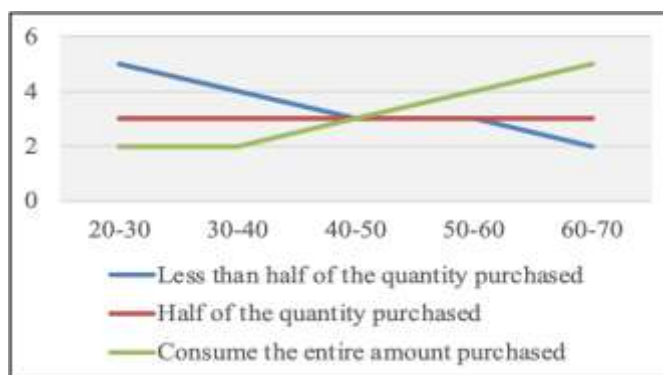


Figure 9. Variation in the amount of milk and dairy products purchased that deteriorates weekly

Regarding the total consumption of the purchased quantity, people aged between 60-70 years, recorded the highest value, thus being the category with the lowest amount of milk and dairy products that deteriorate and are thrown away weekly.

The tenth question I asked in the questionnaire is: "To reduce food waste, would you be willing / willing to...?", This aims to highlight the methods of reducing food waste, preferred by volunteers who have contributed to the study.

Table 11.

Ways to reduce food waste

Crt. no.	AGE CATEGORY	Store food properly in the refrigerator	Cook in smaller quantities	Shop as often as possible in small quantities
1	20-30	4	3	3
2	30-40	4	3	2
3	40-50	3	4	2
4	50-60	3	3	4
5	60-70	2	4	4
TOTAL		16	17	15

The data resulting from the application of the questionnaire are presented in Table 11, so it can be seen that people in the age group 20-30 years, consider that a main way to

reduce food waste is to store food correctly in the refrigerator, this this aspect is also valid for people in the age category 30-40 years.

Those aged between 40-50 years, consider that in order to reduce food waste, it is necessary to cook in small quantities, and volunteers aged between 50-60 years and 60-70 years, considers that shopping in small quantities as often as possible is an essential solution. Regarding the general situation, which can be seen in Table 11, the most popular measure is cooking in smaller quantities, followed by the correct storage of food in the refrigerator and shopping as often as possible in small quantities.

Figure 10 shows that the measure on the correct storage of food has the highest value for people aged 20-30 years, this measure being considered beneficial to reduce food waste of this age category, and in as for the other categories, the value is descending, depending on the increase in age.

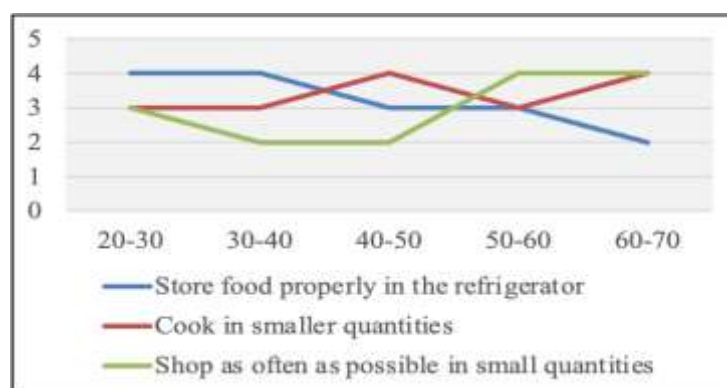


Figure 10. Variation of ways to reduce food waste

Another measure to reduce food waste is cooking food in smaller quantities, from the graph it can be identified that this measure to combat food waste is most appreciated by the age groups between 40-50 years and 60- 70 years.

Also, shopping as often as possible in small quantities is a popular solution, but the highest value in the chart is found in people between the ages of 50-60 years and 60-70 years.

CONCLUSIONS

Romania's food security must be a component of national security, and in the future a coherent and secure strategy must be implemented to ensure food security for all citizens. Ensuring an adequate production of food and basic agricultural products, as well as maximizing the stability of the supply flow with agricultural products, will have to be a vital issue in order to guarantee national food security.

Without a coherent policy approach, without proper financial and investment support, accompanied by successful agricultural and rural development strategies and policies, without concrete measures such as food waste management, minimization and prevention, food security in Romania could be severely affected in the future. It must be taken into account that this aspect will be greatly amplified by the effects of volatility, as well as by global warming and climate instability, in general by the exacerbation and expansion of drought and other natural phenomena with negative impact on Romanian agriculture.

The recommendations on reducing food waste to ensure food security are applicable to both young people and other age groups and consist of the following measures:

- making shopping lists, every time you perform this action;

- verifying the data and ensuring the understanding of the meaning of the labels;
- correct storage of food according to the instructions on the package;
- shopping as often as possible in small quantities.

Also, all these measures applied by each person will contribute significantly to minimizing food waste, but it is necessary for all Romanian citizens to better understand the notions of food waste and its causes, in order to prevent the negative effects generated by this phenomenon.

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