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Article

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CHANGE IN HOUSEHOLD DEMAND IN THE CONTEXT OF CONCERNS REGARDING THE TRANSITION TO A HEALTHY DIET

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Abstract
This article investigates household consumption in 2011 and 2021, to see if there is evidence of changes in household demands of food. The European policy from Farm to Fork aims at providing sustainable, healthy food for all consumers, through an increase in vegetable consumption at the expense of meat consumption. We estimated demand functions for 8 groups of commodities, estimating expenditure and cross-price elasticities. Our finding suggests that Romanian households still view meat as an important dietary requirement, and since its demand is one of the most elastic, the intake will further increase. The quantity and expenditure share of vegetables decreased in the interval. The expenditure elasticity shows that urban households value vegetable consumption more than rural ones. The demand for fruits is elastic, in some cases more so than the one for meat, so it is likely that the fruits demand will continue to grow. From the analysis we can conclude that Romanian households diet preferences are not fulfilling the European aim of achieving "food consumption and healthy diets", since the demand for meat continues to grow, while the demand for vegetables is at best stationary.

Keywords: change in the demand functions, estimation of demand functions, expenditure elasticity, cross-price elasticity.

JEL Classification: D12

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Introduction

The analysis of food demand trends in the European countries is becoming a subject of interest due, on the one hand, to the current developments in agricultural prices on the European and world markets, which restrict consumption, and on the other hand, to the aspirations arising from the current European policy on agriculture and food supply chains food, as presented in the Farm to Fork strategy. The current European strategies as well as those of other international institutions in the field (FAO) want a long-term change in the food consumption model, which will gradually become more sustainable, healthier, and less expensive from an economic point of view and which will affect the environment as little as possible environment, by reducing the consumption of animal calories, mainly. In 1990, on average 34% of the calories consumed were of animal origin at the European level (27.5% in Romania in 2022).

There is empirical evidence that reducing the consumption of red and processed meat can have a positive impact on environment and reduce the risk of cronic diseases (Aston *et al*. 2012).

Most often the data utilised by the consumption analysis are household consumption budgets, and the most used estimation method is AIDS (Lufuke and Tian, 2024; Mahfuza et al., 2024; Fan et al., 1994) or an extension of AIDS like LA/AIDS (Hayat et al., 2023; Mustafa et al., 2022, Scalamonti, 2023; Forgenie et al., 2024; Bilgic and Yen, 2013) or QUADS (Elzaki et al., 2021; Li et al., 2024; Korir et al., 2020). Although the majority of authors use AIDS and its extensions, some authors prefer other methods like translog demand functions (Caoa et al., 2020), or a generalisation of the Working model (Selvanathan et al., 2025).

Recent studies are analysing demand functions mostly for developing countries, for example Tanzania (Lufuke and Tian, 2024); Pakistan (Hayat et al., 2023; Mustafa et al., 2022); Sudan (Elzaki et al., 2021); China (Li et al., 2024; Caoa et al., 2020; Fan et al., 1994); Kenia (Korir et al., 2020); Turcia (Bilgic and Yen, 2013). But there are studies, especially in the case of developed countries, that analyse only part of the demand functions like demand for alcohol for Australian households (Selvnathan et al., 2025), the demand for bottled water in the case of Italian households (Scalamonti, 2023), or the demand for milk and milk products in the case of Bangladesh, a country which is from the category of less developed country: (Mahfuzza et al*.,* 2024).

The economic models identify incomes and relative prices as the main determinants of the food expenditure. Also important in determining consumers' choices are traditions, following certain diets (vegan, vegetarian, etc.), health concerns (for persons with certain diseases like diabetes, cardio-vascular diseases, etc.), geographic position like proximity to a large body of water, climate, age, gender. Most of the evidence that uses demographic variables to asses differences in food demand concentrates on age and gender. Riediger et al. (2008) show that the elderly population consumes less food and the structure of food demand is different from the entire population. Drewnowski et al. (2001) show that healthy food intake increases with age. There is also evidence of gender differences in quantity and quality of food intake (Arganini et al., 2012; Fraser et al., 2000).

Typically, it is not easy to influence the household decision to buy certain groups of foods, and the EU needs to devise campaigns to increase the consumers' awareness and educate them towards healthier diets.

Our article looks at the individual household units analysing food consumption at two points in time 2011 and 2021, in order to examine how household demand has changed in the last decade, and whether the change is consistent with the EU policy, and in doing so to identify whether there is still scope for intervention in order to help consumers make healthier choices regarding their intake of food. This article continues the work on demand functions of Romanian households started in the (Alexandri, Pauna and Luca, 2015).

Methodology

We use the QUAIDS model introduced by Banks, Blundell and Lewbel (1997), which is the quadratic extension of the Almost Ideal Demand System (AIDS) of Deaton and Muellbauer (1980). The model allows estimating expenditure elasticities according to household characteristics and, furthermore, it is imperative to include these characteristics for the accuracy of the estimation. So, we include in the model some demographic variables (number of adults in the household, a dummy for female household head, number of children, higher education for the household head and household head over 60 years old) that impact on food demand of household.

The QUAIDS model is based on the indirect utility function $U(p,x)$ that depends on the vector of prices $\boldsymbol{p}$ and the total expenditure x:

$$ln\, U(p,x) = \left[\left(\frac{ln\, x - \ln a(p)}{b(p)}\right)^{-1} + \lambda(p)\right]^{-1}, \quad (1)$$

where $a(p)$ is the price index defined by the translog function:

$$ln\, a(p) = \alpha_0 + \sum_{i=1}^{n} \alpha_i\, ln\, p_i + 1/2 \sum_{i=1}^{n}\sum_{j=1}^{n} \alpha_{ij}\, ln\, p_i\, ln\, p_j, \quad (2)$$

$b(p)$ is the price integrator based on Cobb-Douglas function:

$$b(p) = \prod_{i=1}^{n} {p_i}^{\beta_i}, \quad (3)$$

and

$$\lambda(p) = \sum_{i=1}^{n} \lambda_i\, ln\, p_i. \quad (4)$$

Let w_i be the expenditure share of some good i, $w_i = p_i q_i / x$, where q_i is the quantity of good i consumed by the household.

The expenditure equation in the QUAIDS model is:

$$w_i = \alpha_i + \sum_{j=1}^{n} \alpha_{ij}\, ln\, p_j + \beta_i ln\left(\frac{x}{a(p)}\right) + \frac{\lambda_i}{b(p)}\left[ln\left(\frac{x}{a(p)}\right)\right]^2, \text{ i=1,…, n.} \quad (5)$$

The two important ways to include demographics to distinguish between households with different demographic profiles are the scaling method, which transforms the equations in the QUAIDS model multiplicatively using scaling parameters s_i that depends on the vector of demographic variables d_i and the translation method, which translates the equations additively using translation parameters t_i that depends on demographic variables d_i:

$$w_i = s_i(d_i)\left[\alpha_i + \sum_{j=1}^{n}\alpha_{ij}\, ln\, p_j + \beta_i ln\left(\frac{x}{a(p)}\right) + \frac{\lambda_i}{b(p)}\left[ln\left(\frac{x}{a(p)}\right)\right]^2\right], \quad (6)$$

and respectively:

$$w_i = t_i(d_i) + \sum_{j=1}^{n}\alpha_{ij}\, ln\, p_j + \beta_i ln\left(\frac{x}{a(p)}\right) + \frac{\lambda_i}{b(p)}\left[ln\left(\frac{x}{a(p)}\right)\right]^2 \quad (7)$$

Description of the data base

The database use is the micro data Household Budget Shares (HBS) from 2011 and 2012, which consists of approximately 30,000 households a database which is representative for the Romania's population. The participating households are requested to record all types of expenditures and incomes for all household members. The household composition by number of members of which children is presented below (Table no. 1). It is interesting that 92.5% in 2011 and 91.4% in 2021 are households with at most 3 members, and very few with members under 18 years of age (5.5% in 2011 and 7% in 2021). In this section, for ease of presentation, we will limit our analysis to households with fewer than 3 members. As an observation, we can notice that there is a slight increase in the number of children in the sample in 2021 compared to 2011, from 10.2% to over 17%.

Table no. 1. Household composition (%) by number of persons and children

	2011			2021		
	No children	**1 child**	**>1 child**	**No children**	**1 child**	**>1 child**
1 member	41			33		
2 members	40	0.7		35	0.8	
3 members	6	4.6	0.2	9.4	6	0.2
4 members	1.7	1.4	2	3.6	3	4
5 members	0.4	0.5	0.8	0.8	1.3	1.6

Source: HBS 2011 and 2021

For the purpose of the article, we divided the food items into 8 groups: (1) cereals and cereals products, (2) meat and meat derivatives, (3) milk and milk products, (4) fruits, (5) vegetables, (6) sweets, (7) adult goods: coffee and alcoholic beverages and (8) others.

It is interesting to note that the most important food expenditure for households is the meat category, with over a quarter of the food expenditure paid on meat and meat products; the share increased further in 2021. The second category is cereals with around 18% of the food budget, followed by milk and milk products, between 16% and 19%. The share of expenses on vegetables is the fourth in terms of importance, but the share decreased in 2021, by around 2%.

The evolution of food shares from 2011 to 2021 can give an image regarding the change in preferences, as well as information regarding the effect of children on food shares. In 2011 (Table no. 2) households with children have larger expenditures for (1) cereals, (3) milk, and (4) fruits. Vegetables (5), meat (2), and adult goods (7) are mostly negatively affected by the presence of children.

Table no. 2. Food expenditure[1] shares by type of household in 2011

	1 member	2 members no children	2 members 1 child	3 members no children	3 members 1 child	3 members 2 children
w1	0.175	0.179	0.189	0.188	0.182	0.235
w2	0.26	0.254	0.238	0.259	0.25	0.235
w3	0.167	0.163	0.19	0.159	0.176	0.182
w4	0.06	0.058	0.068	0.056	0.063	0.049
w5	0.147	0.143	0.133	0.136	0.127	0.132
w6	0.047	0.044	0.056	0.045	0.054	0.055
w7	0.061	0.078	0.043	0.077	0.069	0.03
w8	0.084	0.08	0.083	0.079	0.08	0.083

Source: HBS 2011 and 2021

In 2021(Table no. 3) the tendency is still visible, families with children consume more cereals (1), milk (3), fruits (4) and less vegetables (5), meat (2) and adult goods (for 3 members families).

Table no. 3. Food expenditure shares by type of household in 2021

	1 member	2 members no children	2 members 1 child	3 members no children	3 members 1 child	3 members 2 children
w1	0.151	0.156	0.17	0.165	0.167	0.193
w2	0.295	0.286	0.273	0.285	0.286	0.272
w3	0.175	0.166	0.188	0.158	0.169	0.195
w4	0.069	0.067	0.078	0.066	0.071	0.07
w5	0.128	0.124	0.115	0.12	0.107	0.108
w6	0.05	0.05	0.069	0.054	0.059	0.07
w7	0.064	0.084	0.04	0.088	0.078	0.03
w8	0.068	0.067	0.067	0.063	0.063	0.064

Source: HBS 2011 and 2021

The comparison between 2011 and 2022 shows that the share of households expenditure on cereals (1) has decreased the most in the interval followed by share of vegetables (5) and the other category (8). By far the biggest increase is in the share of meat (2), but the share of fruits increased for all types of families as well. The tendency of meat shares to increase is somewhat opposite to the EU desired outcome of a healthy diet for Europeans.

The figures presented in the two tables are diluted due to the fact that they embed the prices in them. The 2011 to 2021 period saw significant increases in prices, and it is not clear whether incomes were adjusted enough to ensure that the households are no worse of in 2021.

[1] The household consumption encompasses both food purchased during the month of the interview, as well as food that the household already had in stock. The presence of food in stock is either due to the fact that households buy in bulk, or they produce part of their food inhouse. In order to obtain the share of food expenditure we imputed prices for each food category, as the median of the price distribution, and computed the value of the food in stock. The obtained value was added to the expenses on foods in the same category, if any, and shares of all food categories were computed.

The evolution of household demand from 2011 to 2021

A better analysis of household demand can be performed with the use of quantities instead of expenses for each category. They have the advantage that the information in them is not distorted by prices beyond the utility maximisation decision.

Table no. 4. Food consumption per month (kg.) for categories by household composition

	2011			2021		
Cereals	**0**	**1**	**>1**	**0**	**1**	**>1**
1 member	14.93			13.36		
2 members	25.23	22.24		21.93	18.79	
3 members	33.66	30.42	33.12	29.87	27.52	26.72
Meat						
1 member	6.47			7.64		
2 members	9.91	8.78		11.41	10.4	
3 members	12.56	11.8	10.4	15.04	14.56	12.2
Milk						
1 member	10.03			10.09		
2 members	16.14	17.46		14.77	15.51	
3 members	18.94	20.72	20.28	17.96	19.06	21.56
Fruits						
1 member	7			7.34		
2 members	10.35	10.57		11.74	11.88	
3 members	12.53	13.28	10.35	13.22	14.3	12.96
Vegetables						
1 member	16.11			15.5		
2 members	24.53	21.88		22.81	21	
3 members	29.3	27.42	25.16	28.9	26.11	22.55
Adult goods						
1 member	3.31			3.44		
2 members	6.14	2.12		6.71	1.99	
3 members	7.22	5.89	2.05	9.73	8.09	2.37

Source: HBS 2011 and 2021

Some trends that were visible from the expenditure share are confirmed by the quantities as well; the quantities of cereals consumed by households decreased 2021 in comparison to the 2011 level, for all types of households. Surprisingly, the consumption of milk decreased, as well, in the interval, probably due to the significant increase in prices for this product (the price index of the milk products increased from 4.74 in 2011 to 8.71 in 2021). The quantities of vegetables consumed also decreased in the analysed interval.

The increase in the consumption of meat is still visible; households consumed over 1 kg more of meat per month (depending on its size), despite the significant increase in prices (the index rise from 8.4 to 20.7. The increase in the price index reflects the trend of prices in the industry, but might reflect a move towards higher quality meats. Another category which is consumed more by households in 2021 are fruits, a tendency that was not visible from budget shares. For the adult goods (mostly alcoholic beverages), the tendency is positive as well, with the exception of 1 adult 1 child households. The 1 adult 1 child household is typically an adult female rising a child, so the tendency for the quantity of adult goods to decrease is not surprising as an adjusting mechanism to the increase in food prices.

Estimation of the food demand functions

We estimated the demand system for two years, separately for urban and rural sample, using AIDS model QAIDS model, in order to test which of the model is better suited for our sample.

Table no. 5 shows the results of the Likelihood Ratio test, which differentiates between the two models, AIDS and QAIDS, with the null hypothesis being that the additional coefficients from the QAODS model are jointly equal to zero. In all the four cases the null hypothesis is rejected, which leads us to choosing the QAIDS model for the demand system.

Table no. 5. The likelihood ratio test for the QUAODS and AIDS model

	Urban sample 2011	Rural sample 2011	Urban sample 2022	Rural sample 2022
LR chi2(7)	179.07	168.08	89.24	194.09
Prob > chi2	0.0000	0.0000	0.0000	0.0000

Source: HBS 2011 and 2021

In addition to the mandatory variables to be included into the demand system, namely price indices and the food expenditure, we have included some demographic variable as well: number of adults in the household, a dummy for female household head, number of children, higher education for the household head and household head over 60 years old, in order to reduce the heterogeneity of the sample and test if the characteristics have a influence on the demand share of goods. The results are shown in the following tables (Table no. 6 - Table no. 9).

Table no. 6. The effects of demographic variables for the urban sample, 2011

	No, adults		Female hh head		No. chidren		Univ. educ		>60 old	
cereal	0.109		-0.960	**	4.081	**	-3.196	**	0.137	
meat	-1.895	**	-0.699	**	0.483	**	-1.314	**	-2.419	**
milk	-1.517	**	0.169		2.869	**	-0.787	**	-0.338	
fruits	-1.339	**	0.246	**	0.402	**	1.054	**	-0.949	**
veget	-1.374	**	0.326		0.471	*	-1.705	**	-0.614	**
sweets	-0.332	**	0.195	**	0.315	**	-0.050		-0.321	**
alcohol	-0.167	**	-0.108	**	-0.116	**	-0.072	**	-0.275	**
other	-0.778	**	0.084		0.310	**	-0.006		-0.787	**

Source: HBS 2011 and authors' computations

The number of adults in the household increases only the share of bread and cereal products consumed by the household; the influence is consistent over time. What is interesting is that the effect that the number of adults has on essentials (meat, milk, fruits, and vegetables) is stronger for rural households. Meat and meat products are the most affected share of commodities since the coefficient is close to -2 in 2011, and slightly lower for urban households in 2021. The share of expenditure on sweets and alcohol is the least adversely affected by the increase in the number of adults.

Table no. 7. The effects of the demographic variables for the rural sample, 2011

	No, adults		Female hh head		No. chidren		Univ. educ		>60 pld	
cereal	0.479	*	-0.022		4.894	**	-2.338	**	-0.019	
meat	-1.992	**	0.136		0.258		-0.725		-3.435	**
milk	-3.351	**	0.368		3.083	**	-1.779	**	-3.584	**
fruits	-1.423	**	0.450	**	0.192	*	0.275		-1.766	**
veget	-2.273	**	1.471	**	1.022	**	-2.459	**	-3.123	**
sweets	-0.371	**	0.349	**	0.309	**	0.017		-0.521	**
alcohol	-0.430	**	-0.133	**	-0.239	**	-0.169		-0.613	**
other	-0.639	**	0.509	**	0.384	**	-0.195		-0.828	**

Source: HBS 2011

A female household head has a significant effect on food expenditure shares. In most cases, the shares of cereal as well as the share of alcohol consumption decrease. The consumption of meat is either not affected (urban sample 2011) or decreases, while the share of milk consumption is not affected by the gender of the household head in 2011 and it increases when the household head is female in 2021. Both the share of fruits and vegetables is affected more by a female household head in 2021 in comparison to the 2011. These results indicate that female household heads are more preoccupied by establishing a healthier diet.

Table no. 8. The effects of the demographic variables for the urban sample, 2021

	No. adults		Female hh head		No. chidren		Univ. educ		>60 pld	
cereal	0.785	*	-0.788	**	2.378	**	-2.404	**	0.155	
meat	-1.198	**	0.141		-0.257		-2.083	**	-1.710	**
milk	-0.526	**	0.438	**	1.793	**	-1.584	**	-0.374	*
fruits	-1.197	**	0.558	**	-0.179		-0.433	**	-1.558	**
veget	-1.089	**	1.362	**	-1.095	**	-2.814	**	-1.442	**
sweets	-0.063	**	0.214	**	0.128	*	-0.378	**	-0.475	**
alcohol	-0.073	**	-0.258	**	-0.373	**	-0.295	**	-0.309	**
other	-0.382	**	0.357	**	-0.535	**	-0.413	**	-0.548	**

Source: HBS 2021

The number of children also has an important influence on the division of income across different food types, the coefficients for all food groups are positive with the exception of the alcoholic beverage. The most food group influenced by the presence of children is cereals, but the influence decreases from a coefficient of 4 and almost 5 (for the rural sample) in 2011 to almost 2.5 and 3.7 in 2021. There is also a decrease in alcohol consumption in households with children, and the decrease is significantly larger (double) in 2021.

Table no. 9. The effects of the demographic variables for the rural sample, 2021

	No, adults		Female hh head		No. chidren		Univ. educ		>60 pld	
cereal	0.093		-0.466	**	3.738	**	-1.230	**	-0.558	-
meat	-2.222	**	0.162		0.045		-0.387		-3.326	**
milk	-2.073	**	0.849	**	2.077	**	-0.812	*	-2.169	*
fruits	-1.867	**	0.492	**	0.256		0.230		-2.248	**
veget	-3.069	**	1.618	**	0.247		-0.931		-3.893	**
sweets	-0.849	**	0.311	**	0.363	**	0.000		-1.176	**
alcohol	-0.764	**	-0.253	**	-0.642	**	-0.125		-1.044	**
other	-0.435	**	0.204	**	-0.056		0.272		-0.369	**

Source: HBS 2021

The university educated household head has a more significant influence on the share of different food categories for the urban population, probably because that higher educated people are more likely to reside in urban regions. The influence that older household head has is different depending on the residence zone. Urban older households influence significantly the share of meat, while in the case of rural households, basically all necessary food groups are significantly decreased.

Table no. 10. Expenditure elasticities, for 2011 and 2021

	2011		2021	
	urban	**rural**	**urban**	**rural**
cereal	0.935	0.831	0.808	0.791
meat	1.046	1.003	1.160	1.072
milk	0.903	1.064	0.790	0.835
fruits	1.075	1.085	1.120	1.119
veget	1.036	0.984	1.046	0.998
sweets	0.989	0.870	0.951	1.062
alcohol	1.212	1.795	1.104	-0.605
other	0.954	0.865	1.049	0.911

Source: HBS 2021

The expenditure elasticity for 2011 and 2021 is presented above (Table no. 10). All but one figure in the table are positive which means that most goods are normal (their demand increases with the increase in the income). The only exception is rural households from 2021, whose expenditure elasticity in the case of alcoholic beverages is -0.605 from 1.795 in 2011. The change in the elasticity in 2021 needs further investigation.

Out of all food categories, bread and cereals, milk and milk products have an inelastic demand for both years, and it becomes more inelastic in 2021, which means that an increase in income/expenditure will affect them less than proportional to the increase. On the other hand, meat and meat products, as well as fruits, are elastic and will become more elastic in 2021, so their demand will increase with the increase in income/expenditure by more than

the expenditure increase. The elasticity of vegetables is elastic for the urban sample and inelastic for rural households.

Table no. 11. Cross price elasticities for the urban sample, 2011

	1	2	3	4	5	6	7	8
1	-0.430	-0.115	-0.188	-0.135	-0.079	-0.402	0.033	0.056
2	-0.147	-0.795	*-0.006*	*0.023*	-0.108	-0.194	-0.068	-0.019
3	-0.194	-0.028	-0.691	0.052	-0.142	-0.075	0.028	0.063
4	-0.042	0.009	0.033	-0.789	-0.125	0.034	0.020	*-0.010*
5	-0.048	-0.057	-0.096	-0.265	-0.559	-0.151	*0.003*	0.043
6	-0.114	-0.038	-0.017	0.020	-0.056	-0.128	-0.054	-0.009
7	0.033	*-0.005*	0.032	*0.028*	0.013	-0.057	-1.192	0.026
8	0.031	-0.013	0.035	-0.023	0.020	-0.019	*0.011*	-1.108

Source: HBS 2011

Next, we analyse the effect that changes in prices (own and other goods) have on the demand (Table no. 11-Table no. 14). Most cross-price elasticities are significant at 5% level of significance, and we signalled with italics the coefficients that are not significant). The most sensitive to changes in own prices is the demand for alcoholic beverages. Its own price elasticity is over -1.15. It is interesting to observe that most food groups are substitutes for alcohol, since they react positively to increases in the price of alcohol beverages, the only exception being sweets.

Table no. 12. Cross price elasticities for the rural sample, 2011

	1	2	3	4	5	6	7	8
1	-0.563	-0.085	-0.154	-0.065	-0.073	-0.503	-0.062	0.080
2	-0.067	-0.800	*-0.013*	*-0.025*	-0.146	-0.169	-0.082	0.032
3	-0.097	*-0.001*	-0.786	0.066	-0.115	-0.030	-0.053	0.020
4	*-0.007*	*-0.003*	0.022	-0.810	-0.094	0.024	-0.010	*0.004*
5	-0.028	-0.082	-0.103	-0.233	-0.545	-0.145	-0.047	0.048
6	-0.125	-0.039	-0.017	*0.012*	-0.057	-0.069	-0.029	*0.010*
7	0.023	0.008	*0.004*	0.017	*0.006*	*-0.005*	-1.182	0.084
8	0.035	*-0.001*	*-0.005*	*-0.008*	0.015	*0.015*	0.035	-1.141

Source: HBS 2011

The lowest in terms of value is the own price elasticity of sweets in 2011, indicating that the demand reacted less to changes in its own price (-0.128 and -0.069 for urban and rural households, 5 times as low as a typical value) but increased importantly (in absolute value) towards -0.7 in 2021, suggesting that, things changed in time, and households in 2021 are willing to reduce their sugar intake as a reaction to changes in prices. Furthermore, since the cross-price elasticity of fruits is positive, households increased fruit consumption as a result of increases in sweets prices.

Table no. 13. Cross price elasticities for the urban sample, 2021

	1	2	3	4	5	6	7	8
1	-0.350	-0.134	-0.115	-0.144	-0.177	-0.042	-0.020	-0.027
2	-0.157	-0.638	-0.101	-0.121	-0.320	-0.220	0.067	-0.107
3	-0.133	-0.122	-0.580	-0.098	-0.090	-0.034	0.091	-0.038
4	-0.048	-0.034	-0.018	-0.640	-0.102	0.070	0.020	0.000
5	-0.117	-0.151	-0.034	-0.177	-0.386	-0.069	0.065	0.049
6	-0.007	-0.054	-0.001	0.042	-0.036	-0.717	-0.036	0.064
7	0.007	0.008	0.055	0.013	0.037	-0.039	-1.264	0.034
8	0.005	-0.034	0.003	-0.006	0.029	0.088	0.035	-1.028

Source: HBS 2021

With the exception of sweets, the own price elasticity of bread and cereals is the lowest (in absolute value), and it further decreased from 2011 to 2021. Most food groups react strongly to the increase in the prices of bread and cereals, meat, milk, and sweets. The most affected by the increase in prices in bread and cereals are sweets, in 2011, the cross-price elasticity of sweets is comparable to the own price elasticity of bread and bread products.

Table no. 14. Cross price elasticities for the rural sample, 2021

	1	2	3	4	5	6	7	8
1	-0.525	-0.114	-0.091	*-0.023*	-0.160	-0.172	-0.051	0.112
2	-0.124	-0.651	-0.027	-0.226	-0.334	-0.202	-0.031	-0.066
3	-0.085	-0.052	-0.712	0.052	-0.138	-0.033	-0.065	*0.016*
4	*0.009*	-0.053	0.035	-0.751	-0.084	0.034	*-0.007*	*0.000*
5	-0.096	-0.151	-0.082	-0.161	-0.293	-0.025	-0.020	*0.000*
6	-0.048	-0.043	*0.000*	0.028	*-0.009*	-0.676	-0.037	0.055
7	0.022	0.016	0.010	0.016	0.017	-0.030	-1.138	0.023
8	0.051	-0.025	0.009	*-0.011*	*-0.006*	0.051	-0.012	-1.048

Source: HBS 2021

It is interesting to note the impact that the increase in the price for meat has on the demand of other essential staples. Fruits, vegetables, and sweets react strongly and negatively to the increase in meat prices (between -0.1 to -0.2 in 2011) the effect is more severe in 2021 (-0.3 for vegetables). The strongest staples to react to increases in the price of milk are cereal products, vegetables, which are complements, and fruits, which are substitutes. In the case of the price of fruits, vegetables react the strongest, and surprisingly they are complements not substitutes. Similarly, increases in the price of vegetables depress the most the demand for fruits); the elasticity is around 0.25 in 2011, but decreased to around 0.15 in 2021.

Conclusions

The tendency of the household demand for food was analysed by looking at the share of food groups in household food expenditure, at the quantities consumed from each food group, and at elasticities. The analysis of the first two was carried on different household composition.

The most important household food expense is on meat and meat products, around 25% in 2011, and the share continues to increase in 2021. This category also has a very large elasticity, second only to the alcoholic beverages, which indicates that if the positive income trend continues, the demand for meat will increase systematically. The increase in the expenditure elasticity that happened from 2011 to 2021 indicates that the it is likely that the elasticity will not decrease in the near future, so the demand of meat will be strong.

The second largest share of expenditure is the expense of bread and cereal products. The tendency of the share is to decrease, as we observed in 2021, and the tendency is still evident when looking at quantities instead of shares. The elasticity of cereal products decreased in 2021 compared to 2011. It is very likely that the share of bread and cereal products will continue to decrease, since the demand is inelastic.

The expenditure of milk and milk products is the third in terms of its importance in the budget. Its share of the budget seems to be on an ascendent trend, since it increased in 2021 in comparison to the 2011. When looking at quantities, we notice that the tendency is reversed, milk and milk products decreased from 2011 to 2021. This is due to the significant increase in prices of milk and milk products that caused consumers to reduce their consumption. . The expenditure elasticity for milk products is inelastic, which means that the increase in milk expenditure is less than the increase in expenditure; therefore, the share of expenditure of milk might decrease in the future.

The share of vegetables (approximately 14% of food expenditure) decreased with at least 2 percent in 2021, the tendency is evident when analysing quantities as well. The elasticity of vegetables consumption is in the urban area elastic, while in the rural are it is inelastic, but very close to 1. In the situation that the income will continue to increase the demand for vegetables will increase as well.

The share of fruits is on a slight ascending trend, and the situation is confirmed when analysing the quantities as well. The demand for fruits is elastic, and is also increasing, in most cases is even larger than the elasticity of meat; therefore, it is very likely that the demand for fruits will continue to grow.

Adult goods is another group of foods whose share did not decrease in 2021 in comparison to 2011, and the quantities consumed followed almost for all types of households an ascending trend. The demand of the good is (with the exception of rural population in 2021) very elastic, which would suggest an increase in the demand of alcoholic beverages.

Another aspect with potential to influence the demand of foods by households is the change in the structure of the households. Future changes in the household composition, by increasing the number of households with female household heads, would alter the demand, since females value more healthier staples like vegetables in the detriment of meat, and alcoholic beverages. An increase in the households with children, and the household composition of the 2021 sample showed an increase, would favour the consumption of cereals.

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