

FOOD CONSUMPTION PATTERNS IN SLOVAKIA

Nikola Ivaničová¹, Ema Lazorčáková², Miroslava Rajčániová³

¹ Ing. Nikola Ivaničová (corresponding author *), Slovak University of Agriculture in Nitra, Faculty of Economics and Management, xivanicovan@uniag.sk

² Ing. Ema Lazorčáková, PhD., Slovak University of Agriculture in Nitra, Faculty of Economics and Management, ema.lazorcakova@uniag.sk

³ prof. Ing. Miroslava Rajčániová, PhD., Slovak University of Agriculture in Nitra, Faculty of Economics and Management, miroslava.rajcaniova@uniag.sk

Abstract

This paper investigates the evolving food consumption patterns in Slovakia, focusing on demand for healthier food options. By analyzing trends over time, we aim to determine whether Slovak consumers make healthier dietary choices compared to the past. This topic is particularly relevant in the context of rising health concerns and the global shift towards healthier lifestyles, especially in the light of the European Union's Farm to Fork Strategy, which emphasizes sustainable food systems and improved public health. The research revealed shifts in both expenditure patterns and food preferences between 2010 and 2023. There was a slight increase in household food spending in recent years, mainly due to a rising disposable income and inflation. Moreover, findings show an increasing interest in healthier food categories, with Slovak consumers choosing more fruits, vegetables, and dairy products while slightly reducing sugar and cereal consumption. These changes suggest a gradual alignment with healthier dietary choices, although meat remains a substantial part of the Slovak diet. Understanding these consumption patterns can help shaping public policies and initiatives that promote better nutrition while supporting the goals of sustainable agriculture.

Keywords: food consumption, demand, Farm to Fork Strategy

JEL Classification: Q11, Q13, Q18

INTRODUCTION

Consumer needs and preferences evolve quickly in today's fast-moving, interconnected world. People have different expectations when it comes to their eating habits, the time dedicated to meal preparation, and the quality and nutritional value of food they consume. Modern eating habits are increasingly linked to a range of health concerns. There is a marked increase in the desire for organic (bio) foods, plant-based options such as vegan and vegetarian diets, and more sustainable packaging solutions. This shift is also influenced by the technological and social advancements present, which are shaping the way food is produced, marketed, and consumed. In Slovakia, where a significant portion of household income is allocated to food expenditures, understanding how shifts in consumer demand influence consumption patterns has become an essential priority. Despite the increasing demand for higher-quality, healthier, and more sustainable food products, economic factors such as inflation, wages, and overall disposable income still play a major role in consumer food choices. As food prices rise, some consumers may have to balance their desire for premium, organic, or specialty foods with the need for more affordable options. These economic constraints suggest that public policy measures, like reducing VAT on essential healthy foods, imposing excise tax for sweetened drinks, or offering financial support to low-income families, could help address inequalities in the access to nutritious diets and lead to healthier food choices. In this article, we illustrate how the demand for food in Slovakia has changed in the recent years. We focus on the development of consumer spending for food and of food

consumption, and their structure. The first part of the article brings theoretical knowledge about changing food consumption patterns. In the second part of the paper, we present data and methodology used, followed by results of the empirical analysis and conclusions. The paper addresses the key research questions: (1) How have food expenditures in Slovakia evolved over the past decade? (2) What food categories have evidenced increased or decreased consumption? and (3) Does consumer demand for food reflect general trends for healthy food options? The expected value added of this paper lies in providing insights into the food economy of Slovakia, specifically the dynamics between consumer behavior, health trends, and the economic constraints of households. This understanding will be valuable for policymakers, businesses, and consumers alike, as it highlights the challenges of balancing affordability with healthier, more sustainable diets.

1. THEORETICAL BACKGROUND

There is a global consensus on the need to transform food systems to ensure nourishment and health for people while helping to reduce environmental pressures on ecosystems. The food system is the primary driver of numerous environmental challenges (Herrero et al., 2023). Key factors such as consumer demand, availability, affordability, and accessibility significantly influence dietary choices. It is crucial to address all four of these factors simultaneously when promoting dietary shifts (Global Panel on Agriculture and Food Systems for Nutrition, 2020). Changes in consumer preferences and higher demand for healthy food open up new challenges for politicians to consider, change and set procedures that would ensure satisfaction of citizens and protect their health.

The United Nations established the 17 Sustainable Development Goals (SDGs) in 2015 as part of the 2030 Agenda for Sustainable Development, providing a framework for nations to address pressing global issues through social inclusion, economic growth, and environmental sustainability (United Nations, 2015). One of these goals, SDG 12, is especially concerned with encouraging patterns of responsible production and consumption. SDG 12's present framework focuses more on efficiency gains through technology and wise consumer decisions than it does on total consumption and production numbers, which are essential for true sustainability (Bengtsson et al., 2018). A new EU strategy, known as the Green Deal, aims to "protect citizens' health and well-being from environmental risks and impacts" (Haines and Scheelbeek, 2020). As a result, it is necessary to analyze what foods are produced and how they are produced in order to achieve both environmental and nutritional objectives (Mowlds, 2020). There is no doubt that the Green Deal has the potential to significantly improve health while lowering health risks associated with the climate change (Haines and Ebi, 2019). The Farm to Fork (F2F) policy is primarily dealing with sustainability of the EU food system. In addition to health benefits associated with lower emissions and environmental pollution, a cleaner and more sustainable food production and food processing, the strategy seeks to actively engage consumers by encouraging dietary habits to shift toward more sustainable foods such as vegetables, fruits, whole grains, nuts and seeds, and reduced consumption of red and processed meat (Willett et al., 2019). The policy proposes that the future diet include less red and processed meat than it does now, but it does not specify quantifiable targets for lowering meat consumption. To ensure improved health and reduced greenhouse gas emissions, consumers will need to include new sources of protein into their diets (Rao, 2020).

Among other things, an increase in customer desire for healthier eating can be noticed. According to Lem et al. (2014), healthy eating is seen as a driving force in consumer trends that will have a big impact on business strategies in the next years. In some circumstances, educating customers about healthy options can change their behavior (Herrero et al., 2023). Educational programs in high-income countries have raised awareness and resulted in increased fruit and vegetable consumption. However, most of them have not met long-term consumption targets (Brambila-Macias et al. 2011).

It is also known that consumer food decisions are made in an information-rich environment (Ran et al., 2022). This is much more true today than it was 5-10 years ago, as supermarket assortments expand and the usage of numerous media to acquire information and communicate marketing messages becomes more common

(Dholakia et al., 2010). Researchers investigated how the provision of information about food affects consumer choice. Providing nutritional information was observed to impact the behavior of customers who were already interested in nutrition, but it had no effect on consumers who were not interested in nutrition (Lone et al. 2009). Consumer with less healthy eating habits respond better to marketing incentives promoting healthy diets (Chan et al. 2017). When combined with better accessibility and availability of healthy foods, the effect was more pronounced (Van Cauwenberghe et al. 2010).

Improving food availability can enhance healthy diets. Broers et al. (2017) utilized a meta-analysis of research studies and found that using the nudges of behavioral economics and strategically placing fruits and vegetables in stores can increase consumption (Broers et al. 2017). Additionally, it has been proved that offering financial incentives to lower the cost of fruit and vegetable increased their intake (Olsho et al. 2016). Taxes, on the other hand, have been successfully utilized to decrease the consumption of unhealthy goods (Colchero et al. 2017; Roache and Gostin 2017).

2. MATERIAL AND METHODS

The aim of this paper is to analyze food consumption patterns in Slovakia. On the one hand, the paper investigates the development of total food expenditures and their structure and on the other hand it examines in more detail the development of consumption and expenditures for selected food commodities.

All data used for the analysis stem from the databases of the Statistical Office of the Slovak Republic and cover the period 2010-2023.

- Descriptive Analysis

We begin our analysis by providing a descriptive analysis of the data to give an overview of food consumption trends. The development of selected characteristics is visually depicted by figures and tables. An “arrow table” (Tab. 2) shows the change in per capita consumption of food categories compared to the previous year. A “heat map” (Tab. 3) illustrates annual changes in per capita expenditures (EUR/year) on selected foods and beverages.

- Regression Model for Food Expenditures

In addition to a descriptive analysis, trends in food consumption and the position of food in the consumption basket are revealed using a simple regression model for the share of food expenditures and expenditures for selected food commodities in total monetary expenditures. In the model, the share of food expenditures and expenditures for selected food commodities, respectively, are the dependent variable, and time is the independent variable:

$$s_F = a + bt \tag{1}$$

where s_F is the share of food expenditures and expenditures for selected food commodities, respectively, in total monetary expenditures, t is the time variable ($t = 1$ for 2010 ... $t = 14$ for 2023) and a, b are parameters to be estimated with a being the particular share in $t = 0$ (year 2009) and b being an average annual change of the share. If the coefficient b is statistically significant, a time trend can be confirmed. The model accuracy represented by adjusted R^2 (corrected goodness of fit) indicates the proportion of variance in the dependent variable explained by the independent variable and the linear regression curve.

If the development of the share of food expenditures and expenditures for selected food commodities in total monetary expenditures over time showed a break, equation (1) was adjusted for a dummy variable:

$$s_F = a + bt + cD \tag{2}$$

where s_F, t, a, b are as in equation (1), D is the dummy variable ($D = 0$ for time periods before the break and $D = 1$ for time periods after the break) and c is the parameter of the dummy variable.

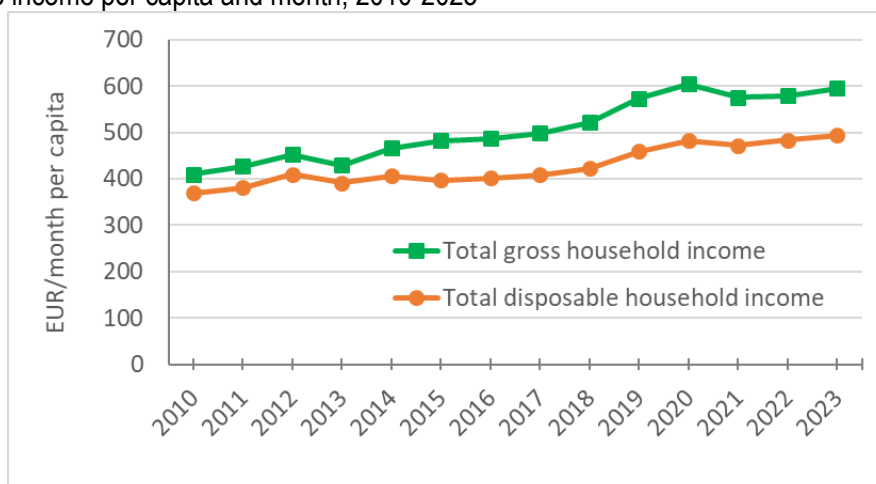
3. FOOD CONSUMPTION IN SLOVAKIA

3.1 Food expenditures

Recently, Slovak population's nutrition, consumption, supply, and demand for food have all changed. A consumer's limited disposable income is the primary determinant of her food decisions (Matošková et al., 2021).

Based on Fig. 1, we can observe that the average gross household income per capita and month and the total disposable household income per capita and month (in nominal terms) are upward sloping over the observation period from 2010 to 2023. In 2010, total disposable household income was recorded at an average of €369 per capita and month. In 2016 it was €402. In the last year 2023 it was €494. We note that there was less difference between total gross household income and total disposable household income per capita and month in 2010 than in 2023. In 2010, the difference was €41. In 2023, the difference was €101. Thus, total gross household income and total household disposable income did not grow proportionally.

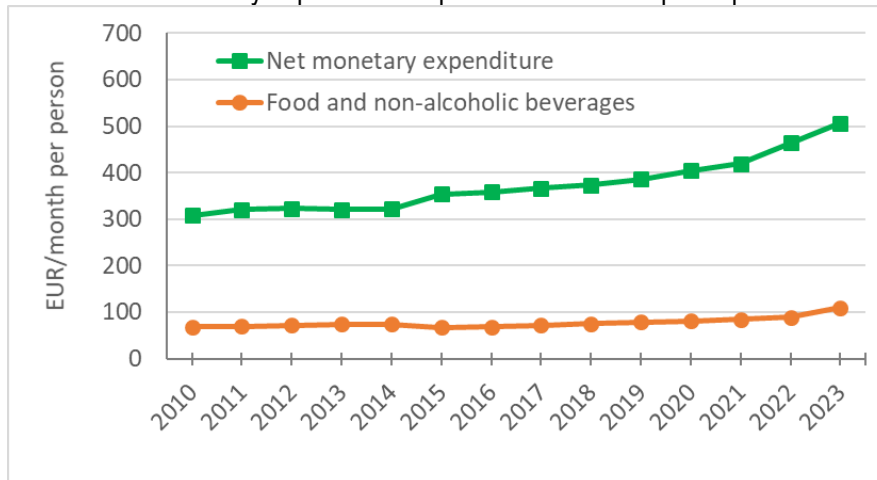
Fig. 1 Average income per capita and month, 2010-2023



Source: Own processing according to data from SO SR

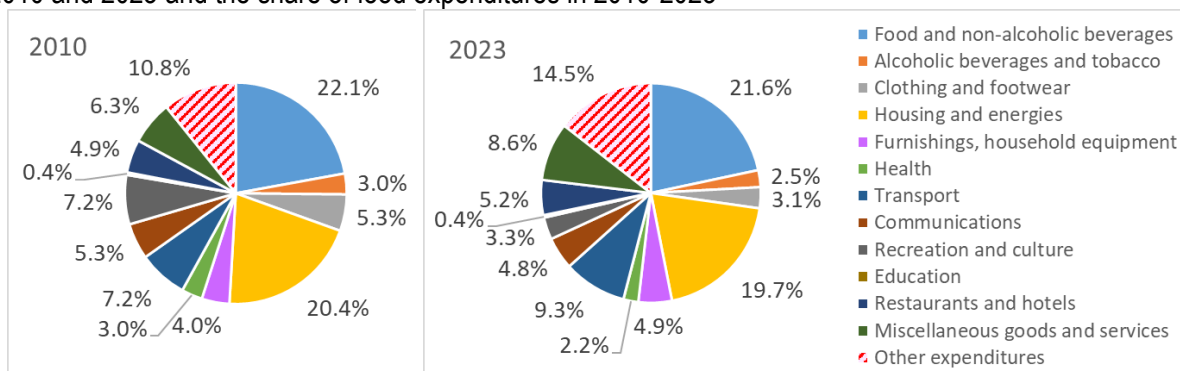
Net monetary expenditures reached on average €307.76 per capita and month in 2010 (Fig. 2.). Of this, food and non-alcoholic beverages accounted for €68.10. On average, a person spent 22.13% of their total expenditure on food and non-alcoholic beverages. The share decreased to 19.16% in 2016. In 2023, it was 21.65% as the net cash expenditures were €506.80 and the food and non-alcoholic beverages expenditures were €109.72 per capita and month. Total monetary expenditures have risen more markedly than expenditure on food and non-alcoholic beverages over the last 14 years. From this, we can conclude that people spent more money on items other than food now than it was in the past. Despite that, food expenditures and housing expenditures are the most represented items in total monetary expenditures over the whole period 2010-2023. Other important items are transport and miscellaneous goods and services. A more detailed structure of total monetary expenditures is shown in Fig.3.

Fig. 2 Basic structure of net monetary expenditure of private households per capita and month, 2010-2023



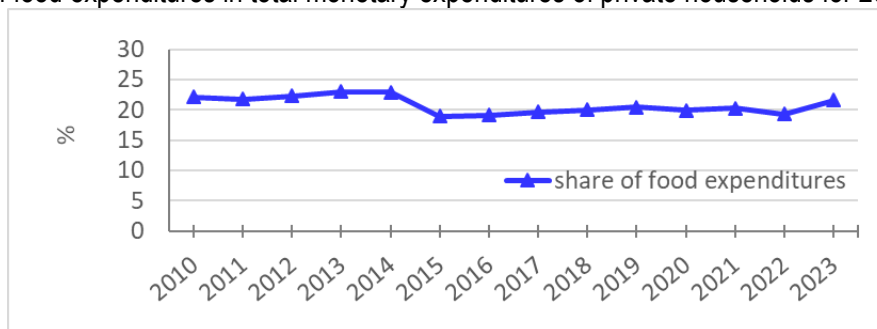
Source: Own processing according to the data from SO SR

Fig. 3 Comparison of basic structure of net monetary expenditure of private households per capita for years 2010 and 2023 and the share of food expenditures in 2010-2023



Source: Own processing according to data from SO SR

Fig. 4 Share of food expenditures in total monetary expenditures of private households for 2010-2023



Source: Own processing according to data from SO SR

When looking at the share of food expenditures (including non-alcoholic beverages) in total monetary expenditures (Fig 4.), we can observe that it oscillated around 22.4% in years 2010-2014. Then, in 2015-2023, the average annual share reached 19.9%. The decline of the share of food expenditures can be

explained by several facts. First, in 2015, there was a jump in expenditures for transport and household equipment, which persisted and could have influenced expenditures for food. Second, in 2015 a law decreasing the VAT for selected food items from 2016 was adopted (MPRV SR), which might have prevented a re-growth of food expenditures. Third, there could be other factors (like a change in data collection methodology) leading to an alteration of data. Taking into account the identified break, the development of the share of food expenditures (in total monetary expenditures) and hence, the position of food in the consumer basket, can be described by results summarized in Tab. 1, which indicates that the share increased on average by 0.2 percent points annually.

Tab. 1 Results summary – share of food expenditures

Share of food expenditures in total monetary expenditures (adjusted R ² = 0.8559)	constant	time	dummy
	21.8068 ***	0.2137 ***	-4.0025 ***

Notes: *** - significant at 1%

Source: Own processing according to data from SO SR

3.2 Consumption and expenditures for selected food items

In the past, eating habits of the Slovak population did not align with a healthy lifestyle (Michalovičová, 2006). Matošková et al. (2021) found that an excessive energy intake, mostly from fats and carbs, can lead to deficiencies in vitamins, minerals, and fiber. An excessive consumption was discovered for pork and poultry, which exceeded the recommended dietary intake. Although food consumption trends have altered in tandem with lifestyle changes, nutrition is still excessively energy-dense and imbalanced (Matošková et al., 2021). Pork and poultry meat, milk including dairy products and cereals have a dominant position in food consumption, while other foods like legumes, fruits, vegetables, and fish are underutilized. Consumption of meat, fish, milk, and milk products, fats, potatoes, pulses, vegetables, and fruit has increased when comparing the values from 2010 and 2023. Conversely, the consumption of eggs, cereals and sugar has slightly fallen. The most year-by-year increases in per capita consumption were recorded for meat and for fruit. To better understand the situation, Tab. 2 shows the year-by-year changes for selected food groups. The highest year-by-year decrease was recorded in the period 2012/2013 and it was a drop of 18.75% for the commodity legumes. The largest increase was also in legumes, by 15.38% from 2014 to 2015.

Tab. 2 Year-by-year changes in food consumption per capita, 2010-2023, and per capita quantity consumed in kg in 2023

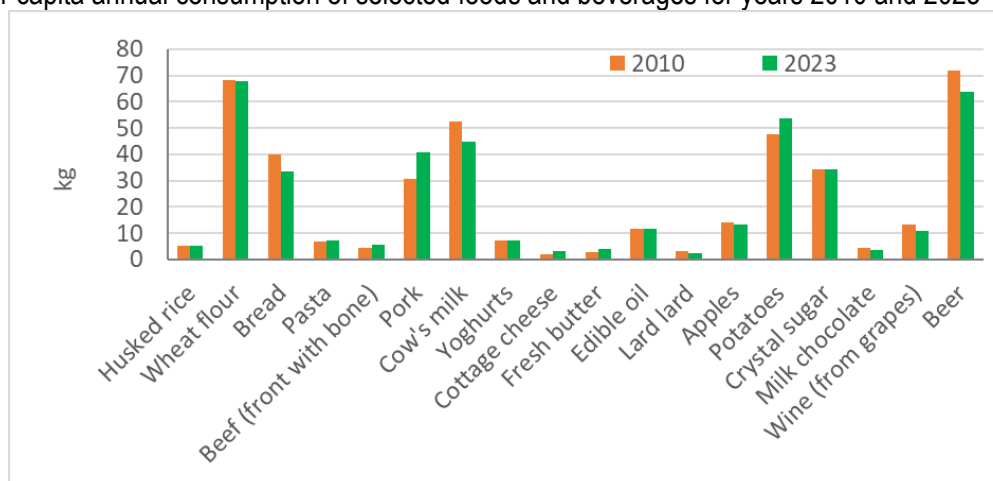
	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	Con 2023
Meat total	⇒	↓	↑	↓	↑	↑	↑	↑	↑	⇒	↑	⇒	↑	72.50
Fish total	↓	↑	↑	↑	↓	↑	↑	↑	↑	↑	⇒	↓	↑	5.80
Milk and milk products	↓	↑	⇒	↑	↑	↑	⇒	↓	↑	↑	↑	↓	↑	191.60
Eggs	↓	↑	↓	↓	↑	↑	↑	⇒	⇒	↑	↓	↓	↓	11.70
Fats total	↓	⇒	⇒	↓	↑	↑	⇒	↓	↑	⇒	↓	↑	↑	23.90
Sugar	↓	↓	↑	↓	↑	↑	↑	↓	↑	↑	↓	↑	↑	34.20
Cereals total	↑	⇒	↓	↓	↑	↓	↓	↓	⇒	↑	↓	↑	↑	78.30
Potatoes total	↑	↓	↓	⇒	↑	↓	↑	↑	↑	↑	↓	↑	↓	53.50
Legumes total	⇒	⇒	↓	⇒	↑	↑	↓	↓	⇒	⇒	↑	↑	↑	2.00
Vegetables total	↑	⇒	↑	⇒	↓	↑	↓	↑	↑	⇒	↓	↓	↓	97.10
Fruit total	↓	↑	↑	↑	↑	↓	↑	↑	↑	↑	↑	⇒	⇒	70.80

Notes: Milk and milk products – in milk equivalent excluding butter, Fats total - in market weight, cereals total - in flour equivalent including rice. If the change in consumption compared to the previous year is within the interval [-1%;+1%], consumption is marked as stable with a yellow arrow. If the difference is more than 1%, a green arrow is used for an increase in consumption. If the difference is less than -1%, a red arrow is used for a decrease in consumption. Con 2023 = consumption in 2023 in kg/capita.

Source: Own processing according to data from SO SR

For selected specific food commodities, Fig. shows the levels of their consumption comparing the years 2010 and 2023. The largest difference in quantities consumed was recorded for annual consumption of pork meat – an increase of 9.80 kg per capita. The second highest positive difference of plus 5.90 kg was for potatoes. In contrary, the largest absolute decrease in consumption between 2010 and 2023 was for beer (decrease of 7.80 liters per capita), followed by a drop of 7.30 liters/capita in consumption of cow's milk.

Fig. 5 Per capita annual consumption of selected foods and beverages for years 2010 and 2023



Notes: Consumption of apples in 2023 estimated by the authors (data not available, calculated as an average of the last 3 available years). For liquids a simplified unit conversion applied: 1 liter = 1 kg.

Source: Own processing according to data from SO SR

For the selected specific food items, annual per capita expenditures do not copy the same development as annual per capita consumption. A heat map (Tab. 3) shows the year-by-year change in per capita expenditures. The heat map goes from deep red depicting the largest year-by-year decreases to deep green depicting the largest increases. During the last two years (2021/2022 and 2022/2023), the most increases in expenditures occurred. Although consumption of most of these food items increased, the increases in expenditures are caused simultaneously by a change in consumption and a change in price of the food items.

Tab. 3 Heat map of year-by-year changes in annual per capita expenditures (EUR) on selected foods and beverages, 2010-2023 and annual per capita expenditures on the selected foods (EUR) in 2023

	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	Exp 2023
Husked rice	-5,9	8,8	-11,6	-4,2	12,3	10,4	3,2	-10,7	13,3	2,3	-3,5	24,0	11,8	11,32
Wheat flour	59,7	-0,2	-3,5	-8,1	0,4	-10,3	-4,1	0,5	15,8	4,9	-4,9	59,7	10,6	56,44
Bread	4,5	-4,8	1,6	-4,5	-2,8	-9,5	1,4	6,3	5,8	1,9	4,5	22,8	21,2	76,94
Pasta	16,2	3,2	3,6	-7,8	-12,1	21,7	-6,3	5,8	7,3	7,2	-6,5	26,2	14,7	26,55
Beef (front with bone)	-7,7	4,3	27,2	-5,5	2,7	1,3	13,4	2,9	2,2	7,4	17,0	22,0	10,8	59,35
Pork	10,2	1,2	6,5	-11,8	2,7	3,2	16,1	-1,0	14,7	15,0	-3,6	12,4	24,8	253,67
Cow's milk	11,7	6,7	-6,9	1,5	-3,0	-19,8	9,1	5,0	2,6	10,4	-2,6	15,0	27,4	52,65
Yoghurts	9,7	-13,7	19,4	19,1	1,4	6,0	0,0	-10,3	-16,6	8,6	-7,9	12,3	16,8	25,92
Cottage cheese	1,8	7,9	6,6	13,9	6,5	-4,3	11,5	1,7	-0,8	6,2	5,1	10,2	9,4	17,64
Fresh butter	24,5	11,5	-1,4	9,8	8,2	-4,5	22,6	3,1	-10,9	18,8	15,8	36,0	-4,1	56,09
Edible oil	2,9	-4,4	-0,1	-26,3	-6,7	7,5	2,8	-3,9	9,9	8,1	-2,4	101,9	9,6	37,05
Lard	2,0	21,9	24,7	6,6	-6,8	-4,5	-7,6	2,6	-12,1	10,2	-7,3	20,2	11,0	10,91
Apples	9,5	14,5	-8,1	3,5	-5,6	-19,1	36,0	13,5	-19,7	33,8	-25,7	11,8	8,2	17,99
Potatoes	11,6	-29,3	58,5	-22,4	-1,7	18,6	2,5	5,1	50,8	-18,8	-4,4	32,5	26,7	62,60
Crystal sugar	23,6	0,4	0,8	-19,5	-17,3	12,7	12,9	-24,0	0,2	7,1	-6,5	43,7	55,3	48,91
Milk chocolate	6,3	20,0	-3,7	9,9	-6,1	-13,4	2,7	-5,2	21,7	-20,2	28,2	-7,8	15,3	48,62
Wine (from grapes)	4,3	-1,3	8,6	44,5	-20,4	-11,8	-1,9	5,0	14,7	-4,9	3,7	-3,5	-0,3	37,73
Beer	8,1	3,2	-4,7	-2,6	6,1	-7,7	7,0	2,6	3,1	-6,0	-13,1	4,4	22,3	104,80

Notes: Consumption of apples in 2023 estimated by the authors (data not available, calculated as an average of the last 3 available years). For liquids a simplified unit conversion applied: 1 liter = 1 kg. Exp 2023 = per capita expenditures in 2023 in EUR.

Source: Own processing according to data from SO SR

Development of the share of expenditures for the selected commodities in total monetary expenditures varies over time and cannot be explained by simple trend models. The exceptions are beef, fresh butter and beer, for which 2/3 of the variation of the respective expenditure share in total expenditures (on an annual basis) can be explained by a time trend. For pork, cow's milk, cottage cheese and milk chocolate expenditure shares, 1/3 of the variation can be explained by a time variable (see regression results in Tab. 4). The shares of expenditures for beef, pork, cottage cheese and fresh butter in total monetary expenditures increased over time. The shares of expenditures for cow's milk, milk chocolate and beer decreased over time.

Tab. 4 Results summary – share of expenditures on selected food items

Share of expenditures on ... in total monetary expenditures	constant	time
... beef (front with bone) (adjusted R ² = 0.7398)	0.5706 ***	0.0245 ***
... pork (adjusted R ² = 0.4860)	2.8432 ***	0.0668 ***
... cow's milk (adjusted R ² = 0.3412)	0.9399 ***	-0.0165 **
... cottage cheese (adjusted R ² = 0.5639)	0.2410 ***	0.0045 ***
... fresh butter (adjusted R ² = 0.7690)	0.4968 ***	0.0308 ***
... milk chocolate (adjusted R ² = 0.3976)	1.1022 ***	-0.0224 ***
... beer (adjusted R ² = 0.8073)	2.6368 ***	-0.0678 ***

Notes: *** - significant at 1%, ** - significant at 5%. The table captures only those commodity models for which adjusted R² > 0.33 and the time coefficient is significant at <=10%.

Source: Own processing according to data from SO SR

CONCLUSION

The need of a transition towards healthier and more sustainable diets is emphasized by policy initiatives like the EU's Green Deal and the Farm to Fork strategy. These regulations aim to increase consumption of plant-based meals, to decrease consumption of red and processed meat, and to support sustainable methods of food production. The EU's initiatives are complementary to the Sustainable Development Goal 12, which emphasizes responsible consumption and production. The role of consumer education, access to nutritional information, and the strategic placement of healthy options in retail settings can also have an impact on consumer dietary choices.

Food is a vital commodity and from the economic perspective, it significantly influences monetary expenditures of households. Food expenditures in Slovakia build up more than 20% of total per capita household expenditures and the share increases over time. This is especially relevant for policies focusing on low-income households because if the share of food expenditures increases, other living costs might be compromised. From food groups, the highest share of food expenditures is allocated to meat, followed by bread and cereals and milk products. In quantitative terms, the highest consumption is of milk and milk products, followed by vegetables and cereals. A comparison of the consumption of selected food types and the recommended food intakes (based on SO SR, 2016) reveals that only total meat consumption, eggs consumption, fats and sugar consumption reached or even exceeded the recommended consumption doses. For meat the recommended intake is 57.3 kg per capita and year. An increasing trend in meat consumption was observed over the period 2010-2023, in 2010 meat consumption per capita was 55.8 kg and nowadays it is 72.5 kg. Although meat is a valuable source of protein, an overconsumption of meat is not recommended, especially if pork is the dominant meat type. For eggs the recommended intake is 11.2 kg per capita. In

Slovakia, this threshold was exceeded during the whole analyzed period, with a maximum of 14 kg in 2020 and a minimum of 11.7 kg per capita in 2023. Annual consumption of fats varies closely around the recommended intake. The recommended dosage is 22 kg per capita and year, actual consumption was evidenced in the interval from 20.6 kg to 23.9 kg per capita and year, which means a variation from -6% to +9% compared to recommendations. A similar pattern can be observed also for sugar. Its consumption varies around the recommended intake, which is 30.9 kg per capita and year. However, the range of variation is slightly bigger, from -5% (29.5 kg per capita in 2012) to +11% (34.3 and 34.2 kg per capita in 2010 and 2023, respectively). In the structure of Slovak consumers' diet, fruit and vegetable consumption as well as consumption of milk and milk products increased over the last 14 years, nonetheless the recommended doses have not yet been reached. For fruit and vegetables, the recommended intakes are 96.7 kg and 127.9 kg per capita and year, real consumption reached only 70.8 and 97.1 kg per capita in 2023. For milk and milk products the recommendation is 220 kg per capita and year, real consumption lagged behind by 28.4 kg in 2023. Absolute per capita consumption of fruit, vegetables and milk only slowly approaches the recommended intakes and from the dietary perspective it can be evaluated as insufficient as these commodities are rich sources of vitamins, calcium and protein.

In monetary terms, the shares of expenditures for beef, pork, butter and cottage cheese in total monetary expenditures increased over time. Their consumption also exhibits an increasing trend but with a different dynamic. The share of expenditures for cow's milk, milk chocolate and beer in total monetary expenditures decreased over time as their consumption did. From the health and sustainability perspective, we can positively evaluate the trends observed for cottage cheese, milk chocolate and beer. A shift toward healthier food choices reflects a gradual compliment with sustainable consumption.

In Slovakia, where economic factors like price changes and disposable income continue to affect food consumption, it is becoming more difficult to achieve a balance between the growing need for higher-quality, organic, and sustainable foods and affordability. The role of policies is to ensure that changes in consumer preferences for healthier meals, partially resulting from internal motivation of consumers and partially from overall trends, are supported by economic measures that make these diets affordable for everyone, especially vulnerable households with lower incomes. Public policies that provide financial assistance or tax incentives for healthier food groups could alleviate the financial burden on households while encouraging a shift toward a balanced nutrition. Strategies such as supporting local food producers, reducing food waste, and implementing price controls on healthier options could help bridge this gap. These measures not only benefit household budgets but also contribute to long-term public health improvements. It will be essential to address these challenges to improve environmental sustainability and public health. In conclusion, achieving a balance between sustainable, healthy food choices and economic affordability is key. Addressing these challenges will be critical in enhancing environmental sustainability and improving public health for future generations. Encouraging changes in consumer choices not only benefits public health but also advances Slovakia's commitment to sustainable development. Encouraging sustainable dietary patterns and more responsible food consumption practices contribute to a reduction of environmental impacts and align Slovakia's outputs with the global SDGs, the European Green Deal and the Farm to Fork strategy.

Acknowledgement

This work was supported by the Slovak Research and Development Agency under the contract No. APVV-22-0442 and by the Vega Agency under the project No. VEGA 1/0225/22.

REFERENCES

- Brambila-Macias, J., Shankar, B., Capacci, S., Mazzocchi, M., Perez-Cueto, F. J. A., Verbeke, W., & Traill, W. B. (2011). Policy interventions to promote healthy eating: a review of what works, what does not, and what is promising. *Food and Nutrition Bulletin*, 32(4), 365–375. <https://doi.org/10.1177/156482651103200408>
- Bengtsson, M., Alfredsson, E., Cohen, M., Lorek, S., & Schroeder, P. (2018). Transforming systems of consumption and production for achieving sustainable development goals: Moving beyond efficiency. *Sustainability Science*, 13(6), 1533–1547. <https://link.springer.com/article/10.1007/s11625-018-0582-1>
- Broers, V. J. V., De Breucker, C., Van den Broucke, S., & Luminet, O. (2017). A systematic review and meta-analysis of the effectiveness of nudging to increase fruit and vegetable choice. *European Journal of Public Health*, 27(5), 912–920. <https://doi.org/10.1093/eurpub/ckx085>
- Chan, E.K., Kwortnik, R., & Wansink, B. (2017). McHealthy. *Cornell Hospitality Quarterly*, 58(1), 6–22. <https://doi.org/10.1177/1938965516668403>
- Colchero, M. A., Rivera-Dommarco, J., Popkin, B. M., & Ng, S. W. (2017). In Mexico, evidence of sustained consumer response two years after implementing a sugar-sweetened beverage tax. *Health Affairs*, 36(3), 564–571. <https://doi.org/10.1377/hlthaff.2016.1231>
- Dholakia, U.M., Kahn, B. E., Reeves, R., Rindfleisch, A., Stewart, D. & Taylor, E. (2010). Consumer Behavior in a Multichannel, Multimedia Retailing Environment. *Journal of Interactive Marketing*, 24(2), 86–95. <https://doi.org/10.1016/j.intmar.2010.02.0>
- Global Panel on Agriculture and Food Systems for Nutrition (2020). *Future food systems: for people, our planet, and prosperity*.
- Haines, M., & Ebi, M. (2019). The Imperative for Climate Action to Protect Health. *The New England Journal of Medicine*, 380(3), 263–273. <https://doi.org/10.1056/NEJMra1807873>
- Haines, A., & Scheelbeek, P. (2020). European Green Deal: a major opportunity for health improvement. *The Lancet*. [https://doi.org/10.1016/S0140-6736\(20\)30109-4](https://doi.org/10.1016/S0140-6736(20)30109-4)
- Herrero, M., Hugas, M., Lele, U., Wirakartakusumah, A. & Torero, M. (2023). A Shift to Healthy and Sustainable Consumption Patterns. In J. von Braun, K. Afsana, L.O. Fresco, & M. H. A. Hassan (Eds.), *Science and Innovations for Food Systems Transformation* (pp. 59-85). https://doi.org/10.1007/978-3-031-15703-5_5
- Lem, A., Bjordal, T., & Lappo, A. (2014). Economic analysis of supply and demand for food up to 2030 - Special focus on fish and fishery products. *FAO Fisheries and Aquaculture Circular*.
- Lone, T.A. et al. (2009). Marketing healthy food to the least interested consumers. *Journal of Foodservice*, 20(2), 90–99. <https://doi.org/10.1111/j.1745-4506.2009.00131.x>
- Matošková, D., Gálik, J., & Krížová, S. (2021). *Potravinársky priemysel v kontexte zmien spotrebiteľského správania*. NPPC-VÚEPP Bratislava.
- Michalovičová, M. (2006). *Sledovanie výživového stavu vybraných vekových skupín dospelaj populácie v SR, Program ozdravenia výživy*. Bratislava: ÚVZ SR, 2006, s. 340
- MPRV SR. (2015). *Zníženie DPH na 10 % u vybraných potravín je dôležitý počin*. <https://mpsr.sk/znizenie-dph-na-10-u-vybranych-potravin-je-dolezity-pocin/107---9686/>

- Mowlds, S. (2020). *Sustainable Food Systems: Steps Ireland can take to become a global leader*. Trócaire. Oxfam Ireland. <https://shorturl.at/hqyMT>
- Olsho, L. E., Klerman, J. A., Wilde, P., & Bartlett, S., (2016). Financial incentives increase fruit and vegetable intake among supplemental nutrition assistance program participants: a randomized controlled trial of the USDA Healthy Incentives Pilot. *American Journal of Clinical Nutrition*, 104(2), 423–435. <https://doi.org/10.3945/ajcn.115.129320>
- Ran, Y. et al., Lewis, A. N., Dawkins, E., Grah, R. Vanhuyse, F., Engström, E., & Lambe, F. (2022). Information as an enabler of sustainable food choices: A behavioural approach to understanding consumer decision-making. *Sustainable Production and Consumption*, 31, 642-656. <https://doi.org/10.1016/j.spc.2022.03.026>
- Rao, M. (2020). *EU Green Deal: 5 ways policy might impact our food system*. FoodUnfolded. <https://www.foodunfolded.com/article/eu-green-deal-5-ways-policy-might-impact-our-food-system>
- Roache, S.A., & Gostin, L.O. (2017). The untapped power of soda taxes: Incentivizing consumers, generating revenue, and altering corporate behavior. *International Journal of Health Policy and Management*, 6(9), 489–493. <https://doi.org/10.15171/ijhpm.2017.69>
- Statistical Office of the Slovak Republic (SO SR). *Database Datacubes, section Demography and Social Statistics*. www.statistics.sk – Databases – Datacube.
- Statistical Office of the Slovak Republic (SO SR). (2016). *Spotreba potravín v SR 2015*. Bratislava.
- United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development*. <https://sdgs.un.org/publications/transforming-our-world-2030-agenda-sustainable-development-17981>
- Van Cauwenberghe, E., Maes, L., Spittaels, H., van Lenthe, F. J., Brug, J., Oppert, J.-M., & De Bourdeaudhuij, I. (2010). Effectiveness of school-based interventions in Europe to promote healthy nutrition in children and adolescents: systematic review of published and grey literature. *British Journal of Nutrition*, 103(6),781–797. <https://doi.org/10.1017/S0007114509993370>
- Willett, W. C. et al. (2019). Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems. *The Lancet*, 393(10170), 447–492. [https://doi.org/10.1016/s0140-6736\(18\)31788-4](https://doi.org/10.1016/s0140-6736(18)31788-4)