Svitlana Cheremisina[a]
Volodymyr Rossokha[b]
Matyna Mohylova[c]
Nataliya Romanchenko[d]

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Transformation of solvent demand and food consumption in Ukraine in war conditions

Abstract

The article is devoted to the assessment of the state and peculiarities of the formation of the solvent demand for food products in Ukraine during the war and the determination of the optimal amount of wages to ensure the consumption of the main set of food products at the level of rational standards.

A comprehensive analysis of structural changes in the solvent demand for food consumption in Ukraine in the war was carried out using the monographic method. Determination of actual and aggregate costs at the level of rational standards for food products was carried out using the calculation-constructive method. The comparison of actual and necessary costs at the level of rational norms for nutrition was carried out on the basis of collected statistical and calculated data by the method of comparative analysis.

[a] S. Cheremisina, Ph.D., Associate professor, National Research Center "Institute of Agrarian Economics", Kyev, Ukraine (e-mail: cheremisinasvitlana@gmail.com).
[b] V. Rossokha, Ph.D., Professor, National Research Center "Institute of Agrarian Economics", Kyev, Ukraine (e-mail: rossokha@ukr.net).
[c] M. Mohylova, Ph.D., Professor, National University "Kiev-Mohyla Academy", Kyev, Ukraine (e.mail: mmogylova@gmail.com).
[d] N. Romanchenko, Ph.D., Associate professor, National University "Kiev-Mohyla Academy, Kyev, Ukraine (e-mail: nromanch22@gmail.com).
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It is recognized that the war has negative consequences in the nutrition of Ukrainians. During the first year of the war, the price affordability of food products decreased by 26.6% on average. In 2010-2022, the share of population spending on food remains very significant (from 51.6% in 2010 to 57.8% in 2022). In 2023, this indicator is expected to grow to 58.5%.

It has been proven that in order to consume basic food products in accordance with rational norms, the population of Ukraine had to spend 1.56 times more in 2021 than the actual expenses. To achieve the level of consumption in accordance with rational standards in 2022, an additional 23,478 UAH per year, or 1,957 UAH per month, is needed. The forecast for 2023 predicts a deterioration of the ratio of actual food costs to costs under rational standards to 1.68.

It was determined that in 2021 the wage level should be at least UAH 33,944 (EUR 1,131) per person per month, which is 2.41 times higher than the actual wage level in the country. The war worsened this ratio to 2.6. It was established that in 2023, for food at the level of rational consumption standards, a Ukrainian should earn 38,564 UAH (964 EUR per month), which is 2.9 times higher than the actual wage level (13,423 UAH or 335 EUR).

The novelty of the study consists in the development and practical testing of the methodology for determining the optimal wage of Ukrainians to ensure the consumption of the main set of food products at the level of rational standards.

Keywords: food products, price, solvent demand, availability and sufficiency of consumption, rational rate of consumption.

1. INTRODUCTION

Full-scale Russian military actions in Ukraine had an extremely negative impact on people's well-being, incomes, and living conditions. The economy of the country in 2022-2023 suffered catastrophic destruction and losses. Russia has seized territories, continues to destroy cities and villages, crush enterprises, roads, bridges, power plants, steals and takes away property, machinery, and equipment. All components of our country's economy suffered colossal losses. Due to the temporary occupation of part of our territories, a significant share of the production potential of the agrarian sector of the economy was destroyed and lost.

However, the Ukrainian agricultural sector has withstood and is adapting to the difficult conditions of wartime. After all, providing the population and the army with food is an extremely priority and important task.

It should be noted that the Ukrainian food market was not optimal in terms of price and physical availability even before the war. Modern conditions have further aggravated the problems of low solvency of the population, non-compliance of actual food consumption with established rational norms, anticipatory rates of price growth, and falling incomes of Ukrainians.

Given the primacy of food products in the structure of people's needs and the development of the domestic food market, the food problem of adequate nutrition for the population of Ukraine remains unsolved, which is not due to a shortage of food, but to the low solvency of people.

The issues of the functioning and development of the food market, the adequacy and criticality of food consumption, ensuring the availability and quality of food for the population are the objects of research by many domestic scientists. Modern problems of Ukraine's food security were solved in their work by Palapa, Demyaniuk & Nagorniuk (2022). The authors analyzed the state of food security and compared it with individual countries of Europe and the world, studied the dynamics of food consumption and determined the level of self-sufficiency of the food market.

Urba & Kopytko (2022) were engaged in researching the peculiarities of strengthening food security as a tool for realizing the development potential of agricultural sector entities, diagnosing the level of food security in Ukraine according to the domestic system of indicators and international methods. The authors proposed tools for strengthening the country's food security.

Buryak & Kuzmenko (2018) focused their research on the need to ensure a rational and balanced structure of production and consumption of food crops, to achieve a food balance that meets the norms of healthy nutrition and contributes to the preservation of the Ukraine population health.

Strashynska & Mykhaylyk (2023) were engaged in improving the methodological toolkit for determining the level of food security of the state. For a simplified formalization of food security index calculations, the authors used the taxonomy method. The proposed approach made it possible to assess the degree of cumulative influence of factor characteristics on the level of food security of the state.

Salo, Popova & Kotsyubynska (2022) devoted their work to the study of modern proportions of supply and demand in the domestic food market, determination of the compliance of the capacity and saturation of the food market with rational consumption parameters.

Mostova & Hutorov (2023) investigated the state and priority problems of food security in the countries of Central and Eastern Europe. The authors have formulated recommendations that will contribute to the reduction of food insecurity in the countries of Central and Eastern Europe.

A thorough analysis of the current state and risks of national food security of Ukraine was carried out by Shubravska & Prokopenko (2022). The authors proposed measures to increase food supply and food demand of the population of Ukraine in the post-war period.

Among foreign scientists, the following researchers made a significant contribution to the

study of the problems of improving food security, ensuring the quality and availability of food consumption.

Kemmerling, Schetter & Wirkus (2022) investigated the relationship between modern food crises and wars and violent conflicts. The authors developed and explored four "logics of war" that affect countries' food security, namely destruction, conflict-induced displacement, food control, and hunger as "weapons of war."

Martin-Shields & Stojetz (2018) carried out a comprehensive analysis of the impact of violent conflicts on food security, including on the model of food consumption. The authors also focused on measures to overcome the long-term consequences of the conflict and minimize risks.

The results of the research done by Cramon-Taubadel (2022) are quite interesting. The German scientist expressed an objective vision of the threatening consequences of Russia's war against Ukraine for agricultural markets and global food security in the modern world.

Kovács, Bachórz, Bunzl et al. (2022) in their work outlined a list of immediate consequences and long-term challenges associated with the Ukrainian war in food security and production systems in Eastern Europe. The authors investigated the relationship between the provision of food aid to millions of Ukrainian refugees, the aggravation of the humanitarian crisis and the deterioration of the economic situation of small farmers in Eastern Europe.

Mottaleb, Kruseman & Snapp (2022) studied the potential impact of the ongoing armed conflict between Russia and Ukraine on the price of wheat, its consumption, and the energy value of consumption. The authors found that a 50% reduction in wheat exports by Russia and Ukraine could increase producer prices for wheat by 15%, leading to a reduction in wheat consumption and energy consumption by at least 8%.

The conclusions drawn in their research by Lin, Li, Jia et al. (2023) are quite pessimistic. The authors determined that the conflict between Russia and Ukraine could greatly affect the food security of countries that are heavily dependent on wheat imports from Ukraine, such as Egypt, Turkey, Mongolia, Georgia, and Azerbaijan. The war would lead to a 10-30% increase in prices and a 15-25% drop in welfare for the most affected countries.

The purpose of the study is to monitor the state and peculiarities of the formation of the paying demand for food products in Ukraine during the war and to determine the optimal amount of wages to ensure the consumption of the main set of food products at the level of rational norms.

2. RESEARCH METHODOLOGY

A comprehensive analysis of structural changes in the solvent demand for food consumption in Ukraine in the war was carried out using the monographic method. Determination of actual and aggregate costs at the level of rational standards for food products was carried out using the calculation-constructive method. The comparison of actual and necessary costs at the level of rational norms for nutrition was carried out on the basis of collected statistical and calculated data by the method of comparative analysis.

Determining the required level of wages under the conditions of the price situation on the food market for a specific period considers the possibility of ensuring the level of food consumption by the population of Ukraine in accordance with rational norms, as well as their share in total costs at this level of nutrition. Calculations were made according to the improved method of determining the amount of wages to ensure food consumption at the level of rational norms.

A tabular method was used to display the research results. Formulation of conclusions was carried out according to the abstract-logical method.

The methodology of the conducted research can be structured in the form of the following algorithm.

1. Determination of indicators of physical availability (sufficiency and criticality of food consumption). The indicator of physical sufficiency characterizes the actual con-

sumption of food products during the year in relation to their rational norms. Ideally, the ratio between actual and rational consumption should be equal to unity. The criticality consumption indicator assesses the actual consumption of food products relative to their critical consumption rates.

The coefficient of sufficiency of consumption is found by the formula:

$$\mathrm{SC}_{Rkj} = \frac{F_{kj}}{R_k} \quad (1)$$

where SC_{Rkj} – indicator of sufficient consumption of the k food product in the j year;

F_{kj} – the actual level of consumption of the k food product in the j year, kg;

R_k – rational rate of consumption of the k food product, kg

The coefficient of criticality of consumption is found by the formula:

$$\mathrm{CC}_{Rkj} = \frac{F_{kj}}{C_k} \quad (2)$$

where CC_{Rkj} – indicator of the criticality of consumption of the k food product in the j year;

C_k – critical rate of consumption of the k food product, kg.

2. Determination of the actual expenses of one person for food during the month is carried out according to the formula:

$$\mathrm{FC}_{\mathrm{Fj}} = (\sum_{i=1}^{n} F_{kj} \times P_{ij})/12, \quad (3)$$

where FC_{Fj} – actual expenses of one person for food, considering expenses for meals outside the home and consumption of soft drinks per person in the jth year, UAH;

P_{ij} – average annual price of the i product in the j year, UAH.

3. The amount of total expenditure of one person for food during the month under conditions of consumption at the level of rational norms, considering the cost of food outside the home and the consumption of soft drinks is determined by the formula:

$$\mathrm{RC}_{\mathrm{Rj}} = (\sum_{i=1}^{n} R_i \times P_{ij})/12 \quad (4)$$

where RC_{Rj} – total costs under the conditions of consumption at the level of rational norms, considering the costs for meals outside the home and the consumption of soft drinks per person in the j year, UAH;

K_{krj} – the adjustment factor for the costs of meals outside the home and the consumption of soft drinks by population groups, where food consumption is closest to the rational norms in the j year;

R_i – rational rate of consumption of the i food product, kg.

4. The amount of total aggregate costs of one person during the month under the conditions of consumption at the level of rational norms is determined by the formula:

$$\mathrm{TC}_{rj} = \frac{\mathrm{RC}_{Rj} * \mathrm{K}_{\mathrm{krj}}}{K_{shrj}} \quad (5)$$

where TC_{rj} – aggregate costs of one person during the month under conditions of consumption at the level of rational norms in the j year, UAH;

K_{krj} – the adjustment factor for the costs of meals outside the home and the consumption of soft drinks by population groups, where food consumption is closest to the rational norms in the j year;

The adjustment factor for the cost of meals outside the home and the consumption of soft drinks is determined by the formula:

$$K_{\mathrm{krj}} = \frac{\mathrm{FC}_{krjn}}{FC_{Fjn}}, \quad (6)$$

where FC_{krjn} – the aggregate food costs, including food supplies outside the home and consump-

tion of soft drinks in the n population group per person in the j year, UAH;

FC_{Fjn} – the aggregate food costs except for meals outside the home and consumption of soft drinks in the n population group per person in the j year, UAH;

n – a group of people where food consumption is the closest to the level of rational norms.

K_{shrj} – the share of total food costs in total costs under the conditions of food consumption at the level of rational norms in the j year, %

This indicator is calculated according to the formula:

$$K_{shrj} = \frac{K_{\text{shrFj}}}{(RC_{Rj} / FC_{Fj})} \quad (7)$$

where K_{shrj} – the share of total food costs in total costs under the conditions of food consumption at the level of rational norms in the j year, %

K_{shrFj} – the actual share of food costs in total costs in the j year, %.

5. The amount of the necessary salary to ensure food consumption at the level of rational norms is determined by the formula:

$$W_{\text{rj}} = TC_{rj} \times \frac{W_{fj}}{TC_{fj}}, \quad (8)$$

where W_{rj} – the necessary wage level to ensure food consumption at the level of rational norms in the j year, UAH;

W_{fj} – actual average monthly salary in Ukraine in the j year, UAH;

TC_{fj} – the actual amount of the total aggregate expenses of one person during the month on average in Ukraine in the j year, UAH.

3. RESULTS AND DISCUSSION

Solving the problems of ensuring the country's food security acquire special relevance in periods of socio-economic crises. A full-scale war became a real challenge for Ukraine. Due to the temporary occupation of part of the Ukrainian territory by the Russian Federation, our economy is losing a significant percentage of the production and logistics potential of its agrarian sector. The significant deterioration of the economic situation in the country could not but be reflected in the well-being, incomes and quality of food of the population.

In 2022, the inflation index (or the consumer price index, which characterizes changes in the general level of prices for goods and services purchased by the population) amounted to 126.6%. The national currency depreciated by 42%.

It is clear that the growth of inflation and the devaluation of the national currency led to a sharp reduction in the incomes of the population. This could not but affect the quality of food consumption by Ukrainians. It should be noted that the deterioration of the quality of food in the event of a significant increase in food prices, as well as the loss of stable income by the population, led to a shift in the balance of consumption in favor of bakery products and semi-finished products, a decrease in the consumption of livestock products, fish and seasonal products.

Our research is focused on the analysis of a set of indicators characterizing the state of the food market of Ukraine and changes in the quantitative and qualitative indicators of food consumption.

The effective functioning of the food market and the formation of its balanced structure are, first of all, mediated by two main criteria - price and physical availability of food products. Physical availability focuses on compliance of actual food consumption with rational norms. So, the actual consumption of food products during the year should correspond to the rational norm (the ratio between actual and rational consumption should be 1).

However, the full-scale war, which has been raging on the territory of Ukraine for the second year, has made adjustments to the diet of Ukrainians. Thus, the consumption of meat decreased by 5 kg (by 9.4%), milk and milk products – by another 21.5 kg (by 10.7%), vegetables – by 15.5 kg (by 9.3%) , fruits – by 12 kg (by 20.3%), fish and seafood – by 5.2 kg (by 39.4%). Traditionally, the consumption of cheaper and more accessible products - bread, cereals and potatoes - has increased (Table 1).

Table 1. Dynamics of food consumption in Ukraine, 2010-2023, per person per year, kg*

Types of food	Nutritional norms		2010	2015	2017	2018	2019	2020	2021	2022	2023 (forecast)
	rational	minimal									
Meat and meat products	80	52	52.0	50.9	51.7	52.8	53.6	53.8	53.0	52.6	48
Milk and dairy products	380	341	206.4	209.9	200	197.7	200.5	201.9	201.5	199	180
Eggs (pcs)	290	231	290	280	273	275	282	278	272	260	252
Bread and bakery products	101	94	111.3	103.2	100.8	99.5	97.6	96.6	92.7	95.4	100.5
Potatoes	124	95	128.9	137.5	143.4	139.4	135.7	134.0	132.4	129	135.6
Vegetables and melons	161	105	143.5	160.8	159.7	163.9	164.7	164.0	165.9	155	150.4
Fruits, berries, grapes	90	68	48.0	50.9	52.8	57.8	58.7	56.5	59.0	51	47
Fish and fish products	20	12	14.5	8.6	10.8	11.8	12.5	12.4	13.2	9.5	8
Sugar, confectionery	38	32	37.1	35.7	30.4	29.8	28.8	27.8	28.5	26	25
Vegetable oil	13	8	14.8	12.3	11.7	11.9	12.0	12.3	13.6	10	9

Source: calculated according to the State Statistics Service of Ukraine (2023)

* the set of food products in the table is approved by the Resolution of the Cabinet of Ministers of Ukraine «On the approval of sets of food products, sets of non-food products and sets of services for the main social and demographic groups of the population» (2016)

The calculation of the dynamics of indicators of sufficiency and criticality of consumption is presented in Table 2.

In recent years, products such as bread, bread products, potatoes, vegetables, oil, and eggs have been approaching rational consumption standards. The actual consumption of this set of products until 2021 was considered sufficient. The indicators for the consumption of milk and milk products (53% of the rational norms and 59% of the established minimum indicators), meat, fish and fruits (66% of the rational norms) were critical.

During the war, the sufficiency of consumption of most food products in Ukraine decreased. The exceptions are bread and bread products, the consumption of which increased by 8.4% and potatoes (consumption increased by 2.4%).

Compared to 2021, the adequacy of consumption of fish and fish products decreased by almost 40% (by 4 kg less than the critical rate of consumption), fruit by 20.3% (by 15 kg below the critical rate), milk and milk products by 10.7 % (by 161 kg below the critical norm), meat – by 9.4% (by 4 kg below the critical norm). Despite the fact that the figure of meat consumption in 2022 (52.6 kg) is comparable to the value of 2021 (53 kg), the consumption of more expensive types of meat (beef and pork) is being replaced by more affordable chicken (Zhurakovska, 2023).

Table 2. Dynamics of sufficiency and criticality of food consumption in Ukraine, 2010-2023

Types of food	2010	2015	2017	2018	2019	2020	2021	2022	2023 (forecast)	2023 in % by 2010	2023 в in % by 2021
Consumption sufficiency indicator (SC_{Rkj})											
Meat and meat products	0.65	0.64	0.65	0.66	0.67	0.67	0.66	0.66	0.60	92.3	90.6
Milk and dairy products	0.54	0.55	0.53	0.52	0.53	0.53	0.53	0.52	0.47	87.2	89.3
Eggs (pcs)	1.00	0.97	0.94	0.95	0.97	0.96	0.94	0.90	0.87	86.9	92.6
Bread and bakery products	1.10	1.02	1.00	0.99	0.97	0.96	0.92	0.94	1.00	90.3	108.4
Potatoes	1.04	1.11	1.16	1.12	1.09	1.08	1.07	1.04	1.09	105.2	102.4
Vegetables and melons	0.89	1.00	0.99	1.02	1.02	1.02	1.03	0.96	0.93	104.8	90.7
Fruits, berries, grapes	0.53	0.57	0.59	0.64	0.65	0.63	0.66	0.57	0.52	97.9	79.7
Fish and fish products	0.73	0.43	0.54	0.59	0.63	0.62	0.66	0.48	0.40	55.2	60.6
Sugar, confectionery	0.98	0.94	0.80	0.78	0.76	0.73	0.75	0.68	0.66	67.4	87.7
Vegetable oil	1.14	0.95	0.90	0.92	0.92	0.95	1.05	0.98	0.93	81.8	89.0
Consumption criticality index (CC_{Rkj})											
Meat and meat products	1.00	0.98	0.99	1.02	1.03	1.03	1.02	1.02	0.92	92.3	90.6
Milk and dairy products	0.61	0.62	0.59	0.58	0.59	0.59	0.59	0.58	0.53	87.2	89.3
Eggs (pcs)	1.26	1.21	1.18	1.19	1.22	1.20	1.18	1.13	1.09	86.9	92.6
Bread and bakery products	1.18	1.10	1.07	1.06	1.04	1.03	0.99	1.01	1.07	90.3	108.4
Potatoes	1.36	1.45	1.51	1.47	1.43	1.41	1.39	1.36	1.43	105.2	102.4
Vegetables and melons	1.37	1.53	1.52	1.56	1.57	1.56	1.58	1.48	1.43	104.8	90.7
Fruits, berries, grapes	0.71	0.75	0.78	0.85	0.86	0.83	0.87	0.75	0.69	97.9	79.7
Fish and fish products	1.21	0.72	0.90	0.98	1.04	1.03	1.10	0.79	0.67	55.2	60.6
Sugar, confectionery	1.16	1.12	0.95	0.93	0.90	0.87	0.89	0.81	0.78	67.4	87.7
Vegetable oil	1.85	1.54	1.46	1.49	1.50	1.54	1.70	1.25	1.13	60.8	66.2

Source: calculated according to the State Statistics Service of Ukraine (2023)

As for affordability, during the war period, the following food products experienced the greatest increase in price: eggs – 2.7 times, fruits – 2.3 times, vegetables – 2.1 times, fish and fish products – 1.8 times, m food - 1.5 times. Only potatoes, which are mass-grown in households, have become cheaper.

The calculation of consumer price indices for the main groups of food products established

Table 3. Dynamics of consumer price indices for food products in Ukraine

Types of food	2015	2016	2017	2018	2019	2020	2021	2022	2023 (forecast)
Meat and meat products	1.23	1.42	0.97	1.18	1.05	1.03	1.21	1.38	1.18
Milk and dairy products	1.34	1.05	1.29	1.18	1.03	1.01	1.10	1.25	1.15
Eggs (pcs)	1.27	1.23	1.23	1.18	1.08	1.04	1.11	1.23	1.07
Bread and bakery products	1.45	0.88	1.22	0.95	0.86	1.30	1.09	1.76	1.11
Potatoes	1.03	1.07	1.11	1.16	1.10	1.10	1.21	1.30	1.10
Vegetables and melons	1.67	0.71	1.42	1.11	1.03	1.26	1.04	1.35	1.23
Fruits, berries, grapes	1.48	0.72	1.25	1.23	0.99	0.88	1.97	1.52	1.36
Fish and fish products	1.42	0.93	1.35	0.76	1.19	1.13	0.90	1.73	1.33
Sugar, confectionery	1.7	1.02	1.00	1.13	1.05	1.04	1.11	1.46	1.21
Vegetable oil	1.6	0.99	0.93	0.78	1.02	1.47	1.16	1.31	1.11
Average index	**1.42**	0.97	1.18	1.05	1.03	1.14	1.21	**1.38**	1.17

Source: calculated according to the State Statistics Service of Ukraine (2023)

a steady trend of annual price increases for almost all food products (Table 3). Two significant periods of consumer inflation were identified - 2014-2015 (the beginning of the war with Russia) and 2022 - a full-scale invasion of the territory of Ukraine. In these periods, the index of annual growth of food prices was 1.42 and 1.38, respectively.

Monitoring of the population's actual expenditure on food products revealed a stable growth dynamics (Table 4). During 2010-2021, the expenses of one Ukrainian on food increased 4.7 times - from UAH 556 to UAH 2,610 per month. In terms of EUR, this ratio will be 1.4 times (or from 62 to 87 EUR per month). At the same time, the share of the family budget spent on food remained consistently high – 51-53%.

Note that one of the main criteria for a country's development and wealth is the share of its population's expenditure on food. So, for comparison, in the USA, Singapore, Great Britain, Ireland, Canada, Switzerland, residents spend less than 10% of their income on food. In Germany, the Netherlands, Finland, Belgium, this indicator does not exceed 15%. In other European countries, as well as in China, Turkey, Israel, the share of food costs varies between 16-25% (Michkovska, 2023).

During the analyzed period, according to the indicator of food affordability, Ukraine lags behind most of the developed countries of Europe and the world.

The start of a full-scale war only worsened this situation. According to our calculations, in 2022, against the background of an average increase in the price of food products by 26.6%, a devaluation of the national currency by 42%, and an official increase in the average wage of only 5.9%, the share of population spending on food products increased to a catastrophic 57.8 %. Taking into account the existing trends of price growth and stagnation of wages of Ukrainians during 8 months of 2023, the share of food costs is expected to be 58.5%.

Table 4. Dynamics and structure of actual expenditure on food by the population of Ukraine per person, 2010-2023**(**FC_{Fj})

Types of food	2010		2015		2020		2021		2022		2023 (forecast)	
	UAH	%	UAH	%	UAH	%	UAH	%	UAH	%	UAH	%
Meat and meat products	1,534	23	3,105	18.8	5,493	20.1	5,978	19.1	7,390	19	7,944	19.2
Milk and dairy products	888	13.3	6,780	41.1	13,103	48	14,488	46.3	17,532	45.1	16,992	41.2
Eggs (pcs)	203	3	476	2.9	537	2	571	1.8	962	2.5	1,411	3.4
Bread and bakery products	289	4.3	1,404	8.5	2,164	7.9	2,521	8.1	3,377	8.7	3,920	9.5
Potatoes	967	14.5	963	5.8	1,367	5	1,403	4.5	1,445	3.7	1,356	3.3
Vegetables and melons	574	8.6	1,254	7.6	1,230	4.5	2,455	7.8	3,488	9	4,587	11.1
Fruits, berries, grapes	979	14.7	911	5.5	1,300	4.8	1,221	3.9	1,831	4.7	2,242	5.4
Fish and fish products	455	6.8	551	3.3	1,004	3.7	11,916	3.8	1,249	3.2	1,274	3.1
Sugar, confectionery	627	9.4	693	4.2	581	2.1	691	2.2	824	2.1	883	2.1
Vegetable oil	160	2.4	363	2.2	518	1.9	802	2.6	676	1.7	620	1.5
Total per year for 1 person	6,676	100	16,499	100	27,296	100	31,322	100	38,844	100	41,229	100
Total per month for 1 person	556	x	1375	x	2,275	x	2,610	x	3,231	x	3,436	x
Share in total costs, %	51.6	x	53.1	x	48.1	x	45.9	x	57.8	x	58.5	x

Source: calculated according to the State Statistics Service of Ukraine (2023)

As for the structure of food costs, milk and milk products (more than 40%) and meat (20%) occupy a consistently high share.

The analysis of the dynamics of consumption and actual costs of food made it possible to establish that the significant increase in spending by the population of Ukraine on food products over the past 12 years is caused mainly by the increase in food prices, rather than a quantitative increase in the consumption level. For example, the consumption of meat and meat products during 2010-2021 increased by only 1 kg (or by 1.9%), and the costs of its purchase increased by 3.9 times. Thus, a 1% increase in meat consumption accounts for a 205% increase in its cost. For

Table 5. Dynamics and structure of expenditure on food by the population of Ukraine under the conditions of consumption at the level of rational norms, per person, 2010-2023 **(**RC_{Rj})

Types of food	2010		2015		2020		2021		2022		2023 (forecast)	
	UAH	%	UAH	%	UAH	%	UAH	%	UAH	%	UAH	%
Meat and meat products	2,360	25.4	4,880	19.4	8,168	18.9	9,024	18.5	11,240	18	13,240	19.1
Milk and dairy products	1,634	17.6	12,274	48.8	24,662	57.1	27,322	56	33,478	53.7	35,872	51.8
Eggs (pcs)	203	2.2	493	2	560	1.3	609	1.2	1,073	1.7	1,624	2.3
Bread and bakery products	263	2.8	1,374	5.5	2,262	5.2	2,747	5.6	3,575	5.7	3,939	5.7
Potatoes	930	10	868	3.5	1,265	2.9	1,314	2.7	1,389	2.2	1,240	1.8
Vegetables and melons	644	6.9	1,256	5	1,208	2.8	2,383	4.9	3,623	5.8	4,250	6.1
Fruits, berries, grapes	1,836	19.8	1,611	6.4	2,070	4.8	1,863	3.8	3,231	5.2	3,663	5.3
Fish and fish products	628	6.8	1,282	5.1	1,620	3.8	1,804	3.7	2,630	4.2	3,186	4.6
Sugar, confectionery	642	6.9	737	2.9	794	1.8	920	1.9	1,205	1.9	1,341	1.9
Vegetable oil	140	1.5	384	1.5	547	1.3	767	1.6	879	1.4	896	1.3
Total per year for 1 person	9,280	100	25,158	100	43,156	100	48,753	100	62,322	100	69,252	100
Total per month for 1 person	773	x	2,097	x	3,596	x	4,063	x	5,194	x	5,771	x

Source: calculated according to the State Statistics Service of Ukraine (2023)

milk and milk products in general, a simultaneous decrease in consumption by 2.4% and a 16-fold increase in costs were recorded. Thus, during 2010-2021, the increase in the income of the Ukrainian population was offset by the increase in food prices.

Conducted studies of the dynamics and structure of aggregate expenditures on food products of Ukrainians under rational consumption norms (Table 5) established their growth compared to actual indicators from 1.39 to 1.68 (Table 6).

Table 6. Dynamics of the cost ratio of food per person, 2010-2023

Types of food	2010		2015		2020		2021		2022		2023 (forecast)	
	coefficient	structure deviation%	coefficient	structure deviation%	coefficient	structure deviation%	coefficient	structure deviation%	coefficient	structure deviation%	coefficient	structure deviation%
Meat and meat products	1.54	2.4	1.57	0.6	1.49	-1.2	1.51	-0.6	1.52	-1	1.67	-0.1
Milk and dairy products	1.84	4.3	1.81	7.7	1.88	9.1	1.89	9.7	1.91	8.6	2.11	10.6
Eggs (pcs)	1.00	-0.8	1.04	-0.9	1.04	-0.7	1.07	-0.6	1.12	-0.8	1.15	-1.1
Bread and bakery products	0.91	-1.5	0.98	-3	1.05	-2.7	1.09	-2.5	1.06	-3	1.00	-3.8
Potatoes	0.96	-4.5	0.90	-2.3	0.93	-2.1	0.94	-1.8	0.96	-1.5	0.91	-1.5
Vegetables and melons	1.12	-1.7	1.00	-2.6	0.98	-1.7	0.97	-2.9	1.04	-3.2	0.93	-5
Fruits, berries, grapes	1.88	5.1	1.77	0.9	1.59	0	1.53	-0.1	1.76	0.5	1.63	-0.1
Fish and fish products	1.38	0	2.33	1.8	1.61	0.1	0.15	-0.1	2.11	1	2.50	1.5
Sugar, confectionery	1.02	-2.5	1.06	-1.3	1.37	-0.3	1.33	-0.3	1.46	-0.2	1.52	-0.2
Vegetable oil	0.88	-0.9	1.06	-0.7	1.06	-0.6	0.96	-1	1.30	-0.3	1.45	-0.2
Total for 1 person	1.39		1.52		1.58		1.56		1.60		1.68	

Source: calculated according to the State Statistics Service of Ukraine (2023)

According to our calculations, it was established that for the consumption of basic food products in accordance with rational standards, the population of Ukraine had to spend 48,753 UAH per year in 2021, but in fact 31,322 UAH were spent (1.56 times less). Similar calculations based on the data of 2022 established an increase in this discrepancy to 1.6. To achieve the level of consumption in accordance with rational norms in 2022, an additional 23,478 UAH per year, or 1,957 UAH per month, is needed.

The forecast for 2023 predicts a deterioration of the ratio of food costs according to rational norms to actual indicators to 1.68.

During 2010-2021, according to the indicator of purchasing power of 1% of expenses, deterioration of food availability by almost 10% was established.

In 2010, the share of population expenditure on food was 51.6% of the budget, and the daily caloric content of food was 2933 kcal. At the rate of

Table 7. Determination of the dynamics of wages to ensure rational standards of food consumption

Indicator	2010		2015		2020		2021		2022		2023 (forecast)	
	in fact	consumption according to rational norms	in fact	consumption according to rational norms	in fact	consumption according to rational norms	in fact	consumption according to rational norms	in fact	consumption according to rational norms	in fact	consumption according to rational norms
Total expenses for food products for 1 person, UAH / month	556	773	1,375	2,097	2,275	3,596	2,610	4,063	3,237	5,194	3,436	5,771
Share of expenses for meals outside the home,%	2.6	2.6	2.5	2.5	2.5	2.5	2.3	2.3	1.9	1.9	1.6	1.6
Share of total food costs in the total cost structure,%	51.6	37.1	53.1	34.8	48.1	30.4	45.9	29.5	57.8	36	58.5	34.2
The total amount of costs for 1 person, UAH / month.	1,106	2,138	2,654	6,177	4,848	12,101	5,817	14,090	5,707	14,702	5,967	17,144
Average salary, UAH/ month	2,250		4,195		11,591		14,014		14,847		13,423	
The ratio of wages and total expenses in the current year, times	2.03	1.05	1.58	0.68	2.39	0.96	2.41	0.99	2.60	1.01	2.25	0.78
The required amount of wages in Ukraine, UAH/month		4,340		9,762		28,932		33,944		38,249		38,564
The difference between the required and actual wages		1.9		2.3		2.5		2.4		2.6		2.9

Source: calculated by the authors

1% of expenses, this is 56.8 kcal. In 2021, these indicators were 52.2%, 2677 kcal and 51.3 kcal, respectively.

Analysis of the qualitative structure of food consumption by the population made it possible to establish the following trends. During 2010-2021, the total caloric content of the diet practically corresponded to the rational norm (2928 kcal) [16]. However, the basis of food consumption of Ukrainians is plant-based products - in 2010, their share in the diet was 72.4%, and in 2021, it decreased to 70.3%. Accordingly, animal products in the diet accounted for 27.6% in 2010 and 29.7% in 2021.

In the course of the study, the amount of the wages of Ukrainians, necessary to ensure the food consumption at the level of rational norms, was determined.

It was established that during 2010-2022, the difference between the needed and actual wages only increased - from 1.9 in 2010 to 2.6 in 2022. In the current year 2023, this indicator is predicted to increase to 2.9 (table 7).

The shares of total food costs were calculated under the conditions of consumption at the level of rational norms. It was established that the actual share of food costs should be 1.6 times less on average. Thus, in 2021, the actual share of food costs in total costs in Ukraine was 45.9%. Whereas a similar indicator under the conditions of consumption of products at the level of rational norms should be no more than 29.5%.

In 2022, this ratio will be 57.8 and 36%. In the current year 2023, the ratios is forecast to be 58.5 and 34.2%, respectively.

It was determined that in 2021 the wage level should be at least UAH 33,944 (EUR 1,131) per person per month, i.e. 2.41 times more than the actual average wage level in the country – UAH 14,014 (EUR 467).

The start of a full-scale war worsened this ratio even more. In 2022, the actual wage level was UAH 14,702 (EUR 367), and the required wage level under the conditions of food consumption at the level of rational norms, according to our calculations, increased to UAH 38,249 (EUR 956 at the current exchange rate).

Taking into account the further decrease in the real income of the population in the conditions of war, the presence of significant consumer inflation and the renewed devaluation of the national currency, in 2023 we expect a further deterioration in the ratio of the required wage to its actual level. Yes, the required level will be UAH 38,564 (EUR 964), which is 2.9 times higher than the actual salary (UAH 13,423 or EUR 335).

Thus, the trend of deterioration of food consumption by the population of Ukraine will only increase.

During 7 months of 2023, if compared with the same period of 2022, consumer inflation decreased significantly - 4.6% against 17% last year. However, the rate of food price increase, the increase in the cost of utilities, and transport services are ahead of the rate of increase in wages of the population.

In 2023, the prices of food products increased the most: vegetables (by 24.4%), meat and meat products (by 10.7%), fruit (by 10.1%), milk and milk products (by 4 .3%), fish (by 3.6%). Housing and communal services rose in price by 12%. The cost of electricity increased the most - by 70%.

The main reasons for the increase in prices during the war are an rise the of agricultural production cost as a result of a significant increase in the prices of fuel and lubricants and fertilizers, and an increase in food storage costs. An additional factor in the increase in food prices in 2022-2023 was severe energy restrictions and the lack of stable electricity supply to agricultural and processing enterprises due to massive shelling by Russian troops of energy facilities and energy infrastructure of Ukraine.

We believe that the further increase in prices for almost all food products against the background of stable wage stagnation and the loss of stable income by consumers will lead to a deterioration in the quality of the diet. There will be a shift in the balance of consumption in favor of

bakery products and semi-finished products, a decrease in the consumption of livestock products, fish, vegetables and fruits.

The National Bank of Ukraine predicts a 19.6% increase in the average nominal wage in 2023. At the same time, the real wage (the amount of goods and services that a person can buy for a nominal wage) will increase by only 3.9% (National Bank of Ukraine, 2023).

Even if these indicators are obtained, the lag behind the determined necessary level of wages, which allows the consumption of food products at the level of rational standards, will be 2.2 times.

4. CONCLUSIONS

The ongoing war on the territory of Ukraine has significantly aggravated the problem of insufficient supply of food to the population, especially of animal origin. Consumption of meat decreased by 9.4%, milk and milk products by another 10.7%, vegetables by 9.3%, fruits by more than 20%, and fish and seafood by almost 40%. The consumption of cheaper and more affordable products - bread, cereals, potatoes, and semi-finished products - is increasing.

During 2010-2021, the expenses of one Ukrainian on food increased 4.7 times - from 556 to 2,610 UAH per month (or from 62 to 87 EUR per month).

It was determined that almost 20% of the salary was spent on food every month by a Ukrainian. In 2022, this indicator increased to 21.8%, and in 2023 it is expected to grow to 25.6%. If the minimum wage (161 EUR per month) is taken into account, food costs will reach 50%. During 2010-2022, a trend of a consistently high share of population spending on food products was established (from 51.6% in 2010 to 57.8% in 2022). In 2023, this indicator is expected to grow to 58.5%.

It was established that the actual expenses of Ukrainians for food are significantly less than expenses under the conditions of consumption at the level of rational norms. During 2010-2023, the ratio deteriorated from 1.39 to 1.68. The qualitative structure of food consumption by the population has deteriorated significantly - the share of plant-based products exceeds 70%.

Research has determined the amount of wages of Ukrainians necessary to ensure the consumption of food products at the level of rational norms. It was established that the difference between the required and actual wages is only increasing - from 1.9 in 2010 to 2.6 in 2022. In the current year of 2023, this indicator is predicted to increase to 2.9. With the actual level of the average salary in the country in the amount of UAH 14,847 (EUR 362 per month), in order to eat according to rational norms, a Ukrainian must earn UAH 38,564 (EUR 964 per month).

In the near future, no significant changes in the nutrition structure of the population of Ukraine are expected. We believe that in the conditions of war against the background of further price increases for almost all food products and stagnation of wages, the qualitative and quantitative consumption of food products in Ukraine will deteriorate.

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Transformacija solventne potražnje i potrošnje hrane u Ukrajini u uvjetima rata

Sažetak

U radu se procjenjuje stanje i posebnost formiranja solventne potražnje za prehrambenim proizvodima u Ukrajini tijekom rata te određivanju optimalnog iznosa plaća kako bi se osigurala potrošnja osnovnog seta prehrambenih proizvoda na razini racionalnih normi.

Sveobuhvatna analiza strukturnih promjena u solventnoj potražnji za potrošnjom hrane u Ukrajini tijekom rata provedena je korištenjem monografske metode. Određivanje stvarnih i ukupnih troškova na razini racionalnih normi za prehrambene proizvode provedeno je pomoću metode proračuna i konstrukcije. Usporedba stvarnih i potrebnih troškova na razini racionalnih normi za prehranu izvršena je na temelju prikupljenih statističkih i proračunskih podataka metodom usporedne analize.

Pokazano je da rat ima negativne posljedice na prehranu Ukrajinaca. Tijekom prve godine rata, cjenovna pristupačnost prehrambenih proizvoda smanjila se u prosjeku za 26,6%. U razdoblju od 2010. do 2022. godine, udio potrošnje stanovništva na hranu ostaje vrlo značajan (od 51,6% u 2010. do 57,8% u 2022. godini). U 2023. godini, očekuje se da će ovaj pokazatelj porasti na 58,5%.

Dokazano je da je za konzumaciju osnovnih prehrambenih proizvoda u skladu s racionalnim normama stanovništvo Ukrajine 2021. godine trebalo trošiti 1,56 puta više od stvarnih izdataka. Kako bi se postigla razina potrošnje u skladu s racionalnim standardima u 2022. godini, potrebno je dodatnih 23.478 UAH godišnje, ili 1.957 UAH mjesečno. Prognoza za 2023. godinu predviđa pogoršanje omjera stvarnih troškova hrane i troškova prema racionalnim standardima na 1,68.

U radu je pokazano da je 2021. godine razina plaća trebala biti najmanje 33.944 UAH (1.131 EUR) po osobi mjesečno, što je 2,41 puta više od stvarne razine plaća u zemlji. Rat je pogoršao ovaj omjer na 2,6. Pokazano je i da bi 2023. godine, za prehranu na razini racionalnih normi potrošnje, Ukrajinac trebao zarađivati 38.564 UAH (964 EUR mjesečno), što je 2,9 puta više od stvarne razine plaća (13.423 UAH ili 335 EUR).

Doprinos rada sastoji se u razvoju i praktičnom testiranju metodologije za određivanje optimalne plaće Ukrajinaca kako bi se osigurala potrošnja osnovnog seta prehrambenih proizvoda na razini racionalnih normi.

Ključne riječi: prehrambeni proizvodi, cijena, solventna potražnja, dostupnost i dostatnost potrošnje, racionalna stopa potrošnje.