

Analyzing and Assessing Armenia's Critical Imports through the Lens of Food Security

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Abstract

With the development of the modern global economy and the uncertainty that increases every year, the issues of national security in general and food security in particular are coming to the fore in many countries. Food security is directly related to imports and their cost in terms of food products. Developing economies are more vulnerable in this respect than developed economies. The article aims to assess the food security of Armenia in the context of the structure of critical food imports and ways to reduce them. The analysis shows that Armenia is highly dependent on food imports, which reduces the level of its food security and negatively affects the overall economic security of the country.

The country needs to revise its policy on ensuring the food security of Armenia in the medium and long term.

1. Introduction: Problem statement

The issue of food security is frequently examined in conjunction with critical imports, defined as goods that are indispensable to the functioning of any economy. Furthermore, given the current stage of global economic development, it is impossible for small open economies to exist without a significant share of imported goods in domestic markets. In the context of the intensely competitive global commodity markets, the capacity of producers from small open economies to compete on price is invariably constrained by their inability to capitalize on economies of scale. A substantial body of empirical evidence, as well as the practices of these countries, indicates that most middle- and low-income countries currently import food [Valdés and Foster 2012; Stuckler et al. 2012; Andrew et al. 2022].

This phenomenon is primarily attributable to the preeminence of transnational corporations within global commodity markets, encompassing food markets [Stuckler and Nestle 2012; Allen 2020; Plahe et al. 2013]. This predominance is largely attributable to the processes of trade liberalization and the repudiation of protectionism at the level of national economies [Kearney 2010; Friel, Hattersley et al. 2013; Friel, Labonte et al. 2013].

A multitude of factors have contributed to the deterioration of food security in numerous countries worldwide. These factors include, but are not limited to, the decline in economic production in the face of a rapidly expanding service sector, intense competition in global markets, and a decrease in the agricultural sector's contribution to the GDP structure across most nations, as well as others [Thaman 1982; Hughes and Lawrence 2005; Thow and Snowden 2010; Farrell et al. 2019]. The issue is particularly pronounced in developing economies, which currently function as the primary importers of food within the global economy [Valdés and Foster 2012].

The concepts of economic and food security are inextricably linked to the notion of domestic production capacity, particularly in terms of its role in ensuring a sufficient and reliable food supply. However, in a highly turbulent global economy, issues related to survival in the face of uncertainty are becoming increasingly salient, which can include the task of ensuring food security. For a small open economy, the complete realization of this task is unattainable. Nevertheless, policies aimed at enhancing food security should indubitably be accorded a high priority by any small open economy. In particular, import substitution policies for food security-critical goods may be one means to achieve this objective [Nassir 2019; Sedova, Ananiev, and Ananieva 2018]. For the nation of Armenia, this phenomenon is of the utmost relevance, thus serving as the primary factor in determining the subject of our study.

A substantial body of research has been dedicated to the subject of food security in the context of the development of the agro-industrial sector in the economy. This research has primarily been from the perspective of import substitution, including in the post-Soviet space. In particular, Altukhov, Drokin, and Zhuravlyov [Altukhov, Drokin, and Zhuravlyov 2015] place significant emphasis on a strategy of agricultural development for the purpose of import substitution of food products. In a similar vein, the problem of food security has been examined by Primo Braga [Primo Braga 2006] and Zobov et al. [Zobov et al. 2017]. A considerable body of research has examined this issue from the

vantage point of augmenting the domestic consumption of domestic goods [Annunziata & Vecchio 2013; Cardozo, Barreiro, and Huenchuñir 2008; Langrell et al. 2015].

The issue of ensuring food security in the context of reliance on imported food products merits a dedicated study, which was conducted within the scope of this article using the Republic of Armenia (RA) as a case study.

2. Food security in Armenia

Ensuring food security constitutes a pivotal element of a nation's economic security. Food security policy constitutes a series of legal, organizational, logistical, and other measures designed to ensure the necessary quality and sufficient quantity of food products that are safe for human consumption and accessible to all members of society, including the most vulnerable segments of the population. These measures ensure that food is available to consumers at any time and in any situation, including during emergencies and periods of martial law. The country's food security is ensured primarily through the development of agriculture, food production, and food import systems.

Food security implies that the population has physical and economic access at all times to sufficient, safe food of good quality needed for an active healthy life.¹ According to the Committee on World Food Security (CFS) Reform Document, the pillars of food security are:

- Availability (of food),
- Access,
- Utilization,
- Stability.²

In the conditions of modern trends in the global economy, food security in Armenia comes to the forefront. In order to ensure the food security system in the country, a number of normative legal acts have been adopted. Among these, we can single out:

- RA Law "On Ensuring Food Security,"
- "National Security Strategy of the Republic of Armenia,"
- "The Concept of Ensuring Food Security of the Republic of Armenia,"
- "Strategy for Sustainable Rural and Agricultural Development of the Republic of Armenia for 2010–2020,"
- "Program of measures arising from the Concept of Food Security of the Republic of Armenia for 2017–2021" approved by the protocol decision of the Government of the Republic of Armenia No. 48 of December 1, 2016, etc.

The primary indicator of a nation's food security is its level of food self-sufficiency.

An analysis of the national food balance data of the Republic of Armenia reveals that, in terms of energy value, the level of self-sufficiency in vital foodstuffs averaged

¹ Rome Declaration on World Food Security and the Plan of Actions in Reference to the World Meeting on the Highest Level Concerned with Food Problems. Available at: <https://www.fao.org/3/w3613e/w3613e00.htm>

² UNO Food and Agriculture Organization. Available at: <http://www.fao.org/about/ru>

approximately 50.5% in the 2022–2023 period, according to the data. Armenia has a relatively high level of self-sufficiency in potatoes, vegetable crops, fruits, grapes, mutton and goat meat, eggs, and fish. The level of self-sufficiency in beef and pork, milk and dairy products is above average. However, as illustrated in Table 1 on p. 100, the degree of self-sufficiency is minimal for wheat, leguminous crops, vegetable oil, and poultry meat.

A cursory examination of the dynamics data on essential goods reveals disconcerting findings. For a considerable number of goods, there is not only a low indicator, but also a downward trend. Consequently, the level of self-sufficiency in wheat decreased from 33.2% in 2017 to 27.9% in 2023. A similar downward trend is evident in grain legumes, with a decline from 49.7% in 2017 to 35.2% in 2023. This decline is also observed in vegetable oil, where the level of self-sufficiency reached 0% in 2023. Sugar also demonstrates a downward trend, with a decrease from 65.2% in 2017 to 42.8% in 2023. Finally, pork shows a decline from 58% to 48% in 2023. In addition to these commodities, the self-sufficiency level for chicken is also low, amounting to only 25.4% as of 2023.

Table 1. Level of self-sufficiency in essential foodstuffs, %

	2017	2018	2019	2020	2021	2022	2023
Wheat	33.2	31.5	30.7	24.4	23.2	24.4	27.9
Potatoes	102.6	102.6	101.1	101.0	101.7	98.4	99.2
Vegetables, melons	102.5	104.7	104	103.9	105.6	102	97.4
Fruit	109.7	108.9	100.5	98.2	114.4	102	103.1
Leguminous crops	49.7	38.6	38.2	37.3	37.3	26	35.2
Vegetable oil	4.3	2.2	1.5	0.9	0.6	0.1	0
Sugar	65.2	68.6	73	38	33.9	91.2	42.8
Egg	98.2	99.5	100	100.3	98.8	99.2	98.8
Milk	91.2	86.8	84.3	82	87.7	83.4	80.2
Beef	91.5	89.2	90.4	87.3	92.2	89.9	90.7
Pork	58	53.3	55.5	45.1	53.3	47.3	48
Lamb and goat meat	138.9	128.6	113.8	100.4	100.4	100.4	106.1
Chicken	22.5	26.6	21.7	23.9	26.7	22.3	25.4
Fish	101.8	109	113.1	143.7	144.7	148	136.8

Source: database of the Statistical Committee of the Republic of Armenia, <https://armstat.am/ru/>

In international practice, the state of food security of countries is assessed by the global food security index, which consists of three components: availability, accessibility, quality and safety of food, each of which, in turn, is formed by several factors. As of 2022, Armenia's global food security index³ was 5.31 (with the maximum among all countries at 7.90), including 6.0 for food availability, 4.49 for accessibility, and 4.42 for quality and safety.

³ https://analytics.dkv.global/Global_Food_Security_Report_Q2_2022/Analytical_Study.pdf

The food security of a nation is contingent upon the degree to which its economic development ensures the physical and economic availability of food products that meet the health standards of the population and are of a satisfactory quality and safety. To ensure food availability, the primary strategic directives for food security are as follows:

- Increase expenditures on food in total expenditures,
- Increase gross domestic product per capita,
- Regulate tariffs on imports of agricultural products,
- Reduce poverty,
- Ensure food availability and the provision of nutritious food for various segments of the population.

In order to ensure access to food, the following strategic directions for food security should be considered: the availability of sufficient food reserves and a state reserve of vital foodstuffs; the prevention of possible food crises in emergency situations; balanced territorial development; the availability of necessary infrastructure for the normal functioning of the food value chain; the production, storage, and marketing of foodstuffs; and the reduction of losses.

In order to ensure the quality and safety of food products, the following strategic directions for food security should be considered:

- The establishment of standards for agricultural products,
- The implementation of standards and systems for the quality and safety of food products,
- The monitoring and control of their provision,
- The enhancement of phytosanitary and veterinary-sanitary conditions,
- The formulation of a national nutrition strategy aimed at diversifying the food products used and the provision of proteins, vitamins and trace elements through food.

The directions enumerated in the food security strategy of the Republic of Armenia have the potential to be incorporated into the aforementioned strategy and the list of measures to ensure food security of the Republic of Armenia, which is currently being developed by the Ministry of Economy of Armenia.

3. Criteria for determining critical imports from a food security perspective

In the context of contemporary geopolitical instability, both regionally and globally, the issue of determining critical groups of goods is becoming increasingly relevant. This is due to the strengthening and expansion of sanctions on the supply of goods and services by various countries.

The economic factors underpinning this phenomenon have been extensively examined in contemporary literature. In the work "Pillars of Economic Security," R. Ossa [Ossa 2023] asserts that governments must devise strategies to mitigate the reliance of nations on external shocks, which manifest as disruptions to global

supply chains. The author posits that 19% of global exports are classified as bottleneck products, characterized by their provision by a select group of exporters despite their substantial market share. The proportion of such products has increased twofold over the past two decades, indicating that global supply chains have become less diversified over time. According to Ossa, the decline in supply diversification indicates that significant sunk costs are associated with the formation of global value chains. Enterprises face considerable challenges in identifying suitable foreign suppliers, coordinating production processes, and establishing trusting relationships, which forces them to rationalize their global sourcing strategies. Upon thorough examination of the macroeconomic aspects, it is evident that the phenomenon of specialization at the country level is a natural outcome of the forces of comparative advantage. This phenomenon is widely regarded as a primary source of the benefits that are associated with trade. Trade is advantageous precisely because it facilitates access to essential products for which domestic substitutes are challenging to procure. Ossa's calculations indicate that the top 10% of critical products are responsible for 90% of the benefits derived from trade.

Identifying groups of goods that are critical to a country's economic development has become a major policy imperative for many states in recent years. According to the UK government's Department for Business and Trade report,⁴ presented in January 2024, critical imports should be understood as the importation of goods that are critical to the security and socio-economic development of the country. Firstly, it is important to note that these goods are indispensable for the functioning of specific sectors of critical national infrastructure, including but not limited to transportation and energy. Moreover, these goods serve as the foundation for safeguarding national economic security. The authors of the report delineate critical goods as goods for which there is a high probability of moderate or catastrophic harm if their supply is interrupted. Such goods are deemed critical in the following areas:

- basic services,
- the livelihood of the population, including food, medicines, and the provision of medical care to patients,
- the economy (strategic sector of the economy or the economy as a whole, including those sectors that are of key importance),
- national security, including the functioning of the state and the maintenance of public order.

In 2022, the Japanese government established a set of guidelines with the objective of identifying goods of strategic importance. The manufacturers of these goods will receive government support as part of an economic security initiative. The initiative is designed to protect the supply chains of semiconductors, medical products, and other key

⁴ Critical Imports and Supply Chains Strategy. January 2024. UK Government, Department for Business and Trade. Available at: <https://assets.publishing.service.gov.uk/media/65a6a1c1867cd800135ae971/critical-imports-and-supply-chains-strategy.pdf> (accessed 28 April 2024).

goods.⁵ In May of that same year, Japan enacted an economic security law that delineated the government's measures to ensure the availability of critical goods. The guidelines delineated the criteria for the designation of critical goods or technologies. These goods or technologies are defined as those that are indispensable for human survival, exhibit a present reliance on external supplies, and are susceptible to supply disruptions. Consequently, measures must be implemented to ensure the stability of these supplies. These goods encompassed food, semiconductors, medical products, and rare earth metals, among others. For instance, Taiwan accounts for 90% of global production of chips utilized in smartphones, while China supplies 60% of rare earth metals used by Japan. This dynamic leaves critical components of multiple technologies vulnerable to geopolitical risks.

In the United States, as part of the President's program,⁶ aimed at reducing costs for American families, some 30 new measures have been announced to strengthen supply chains critical to US economic and national security. These measures are aimed at ensuring a stable supply of critical goods in industry, agriculture (food), etc.

Much attention in many countries is being paid to the supply of critical minerals, which provide the basis for countries' industrial development. Global economic and technological changes are leading to a long-term increase in demand for critical minerals. According to the International Trade Center,⁷ between Q4 2019 and Q2 2023, exports of critical minerals increased by 46%, while global trade volumes of all products increased by 20% during this period. Increases in critical minerals exports were seen in all regions of the world: Asia (+63%), Europe (+40%), Pacific (+42%), Americas (+38%), and Africa (+36%).

The issues of ensuring the stability of supply of critical goods, especially food, are relevant for both developed and developing countries [Dou Shiquan, Xu Deyi 2023; Vivoda, Matthews 2023; Eurostat 2024]. According to the "Doctrine of Food Security of the Russian Federation" (dated January 30, 2010), "to assess the state of food security as a criterion is defined the share of domestic... products and food in the total volume of commodity resources... having threshold values in respect of: grain—not less than 95%; sugar—not less than 80%; vegetable oil—not less than 80%; meat and meat products (in terms of meat)—not less than 85%; milk and milk products (in terms of milk)—not less than 90%; fish products—not less than 80%; potatoes—not less than 95%; food salt—not less than 85%."

Critical goods can thus be defined as goods,

- that are not produced in a particular country or are produced in quantities insufficient to meet domestic demand for them,
- violation or cessation of supplies of which will have a serious (catastrophic) impact on the economic and, in general, national security of the country.

⁵ Japan sets guidelines for protecting critical supply chains. Available at: <https://asia.nikkei.com/Spotlight/Supply-Chain/Japan-sets-guidelines-for-protecting-critical-supply-chains> (accessed 28 April 2024).

⁶ FACT SHEET: President Biden Announces New Actions to Strengthen America's Supply Chains, Lower Costs for Families, and Secure Key Sectors. Access mode: <https://www.whitehouse.gov/briefing-room/statements-releases/2023/11/27/fact-sheet-president-biden-announces-new-actions-to-strengthen-americas-supply-chains-lower-costs-for-families-and-secure-key-sectors/> (accessed 28 April 2024).

⁷ Trade in Critical Minerals. Available at: <https://tradebriefs.intracen.org/2023/9/spotlight> (accessed 28 April 2024).

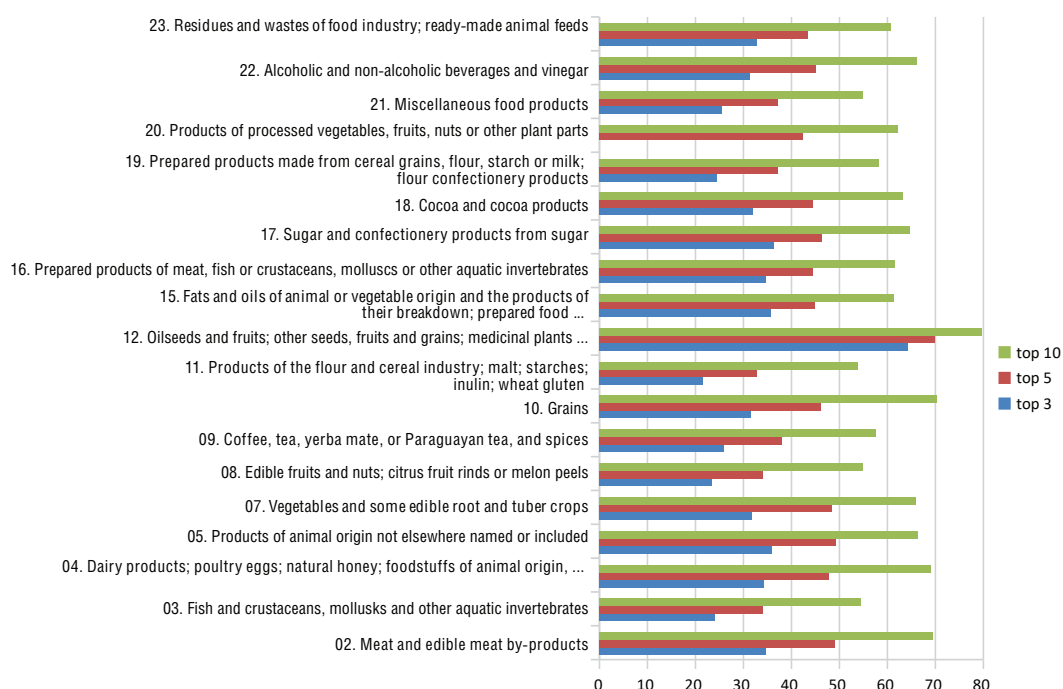
The main groups of critical goods should include, first of all, food, medicines, goods necessary for the functioning of industry (semiconductors, critical minerals, rare earth metals, etc.).

The analysis of the geographical structure of world exports of the main groups of food products (see Figure 1 on p. 104) confirms the relevance of Ossa's conclusions. The groups of goods with the most pronounced “bottleneck” effect in 2023 are:

- 12. oilseeds and fruits; other seeds, fruits and grains; medicinal plants...—the top three exporting countries accounted for 64% of world exports;
- 10. Cereals—five leading countries supplied 46% of the world market, ten countries supplied 70%;
- 02. Meat and edible meat by-products and 04. Dairy products; poultry eggs; natural honey; foodstuffs of animal origin...—the top 10 countries account for 69% of world exports for each commodity group.

In total, of the 19 commodity groups classified as food products under the Harmonized System, ten countries account for more than 60 percent of the world's supply in 13 groups. The above data are an additional fact that makes it necessary to classify food as a critical commodity.

Figure 1. Food exports in the world market according to the Harmonized System,⁸ groups of leading countries: top-3 (in world exports), top-5 and top-10, % of world exports, 2023.



Source: International Trade Center database.

⁸ What is the Harmonized System (HS)? Available at: <https://www.wcoomd.org/en/topics/nomenclature/overview.aspx> (accessed 7 March 2024).

Ensuring uninterrupted imports of critical goods is one of the components of a country's economic and, in general, national security. There is no single categorization of critical goods in the modern literature applicable to analyzing the resilience of economies of different countries to disruptions in global supply chains, as each country at the state level forms key parameters and indicators of economic security depending on the challenges it faces and the prevailing conditions of its participation in international and regional economic and political processes. At the same time, food commodities are always considered as critical.

4. Armenia's critical imports in terms of food security

In order to identify critical food products and assess their availability in the Armenian market, the commodity and geographical structures of the foreign trade balance and imports of the Republic of Armenia will be analyzed within the framework of this study in accordance with the above-mentioned criteria in order to study the dynamics of supplies to the domestic market of the Republic of Armenia and identify commodity groups,

- for which there is a negative foreign trade balance,
- that are ever-present in RA imports,
- which are characterized by a high level of supplier concentration (Herfindahl Index),
- for which the Import Penetration Index has maximum values.

To assess the level of import concentration, the Herfindahl Index is used, which is calculated as the sum of squares of the share of each country supplying a particular commodity to the selected market. The Herfindahl Index can take values from 0 to 1. Values close to 0 indicate a high degree of supplier diversification, while values close to 1 indicate a high degree of concentration (up to a single monopoly supplier). The International Trade Center estimates that Herfindahl indices between 0.1 and 0.18 are moderately concentrated, while indices above 0.18 are concentrated.

A high level of concentration of supplies of these commodity groups should be noted (see Table 2 on p. 106). The Herfindahl Index for supplies of individual goods to Armenia in 2023 was as follows:

- for cereals: 0.84; the main supplier is the Russian Federation (93% of all supplies for the group);
- for vegetable oil: 0.98%; the main supplier is the Russian Federation (98%);
- for dried beans: 0.57; the main supplier is the Russian Federation (74%);
- for pork: 0.56; the main supplier is Brazil (70%);
- for poultry meat: 0.22; the main suppliers are Russia, Ukraine, Brazil, and United States.

Table 2. Concentration level of food imports (Herfindahl Index), RA, 2023

	Product group	Herfindahl Index
'02	Meat and edible meat by-products	0.2
'03	Fish and crustaceans, mollusks and other aquatic invertebrates	0.15
'04	Dairy products; poultry eggs; natural honey; foodstuffs of animal origin...	0.14
'05	Products of animal origin not elsewhere named or included	0.4
'06	Living trees and other plants; bulbs, roots, and other similar parts of plants...	0.2
'07	Vegetables and some edible root and tuber crops	0.29
'08	Edible fruits and nuts; citrus fruit rinds or melon peels	0.14
'09	Coffee, tea, yerba mate, or Paraguayan tea, and spices	0.3
'10	Grains	0.84
'11	Products of the flour and cereal industry; malt; starches; inulin; wheat gluten	0.78
'12	Oilseeds and fruits; other seeds, fruits and grains; medicinal plants...	0.14
'15	Fats and oils of animal or vegetable origin and the products of their breakdown...	0.6
'16	Prepared products of meat, fish or crustaceans, molluscs or other aquatic invertebrates	0.34
'17	Sugar and confectionery products from sugar	0.34
'18	Cocoa and cocoa products	0.24
'19	Prepared products made from cereal grains, flour, starch or milk; flour confectionery products	0.26
'20	Products of processed vegetables, fruits, nuts or other plant parts	0.16
'21	Miscellaneous food products	0.22
'22	Alcoholic and non-alcoholic beverages and vinegar	0.18
'23	Residues and wastes of food industry; ready-made animal feed	0.13

Source: International Trade Center database.

Among the supplies of processed food products with a high level of concentration of import supplies to the Armenian market, the commodity groups that should be singled out are:

- 11. Products of the flour-milling industry; malt; starches; inulin; wheat gluten: the main supplier is the Russian Federation (78% of total imports for the group);
- 05. Products of animal origin not elsewhere named or included (subgroup 0505). Pelts and other parts of birds with feathers or down, feathers and parts of feathers (with trimmed or untrimmed edges) (Herfindahl Index is 0.89): main supplier is Italy;
- 17. Sugar and sugar confectionery: the main suppliers are Russia (51%) and Brazil (28%);
- 16. Prepared products from meat, fish or crustaceans, mollusks or other aquatic invertebrates: the main suppliers are Russia (52%) and Canada (24%);
- 09. Coffee, tea, yerba mate, or Paraguayan tea, and spices: major supplier is Indonesia (53%).

Table 3 (p. 107) shows the volumes of production and foreign trade in food products of the RA food industry.

Table 3. Production and foreign trade in food industry products, RA, mln USD

Code	Product Name	2022				2023			
		Balance	Exports	Import	Production	Balance	Exports	Import	Production
Food consumer goods		-381	857	1238	2137	-412	715	1127	2349
Foodstuffs		-671.9	496.8	1168.7	1630	-701	338	1039	1787
02	Meat and edible meat by-products	-102.8	1.8	104.6		-102	6	108	
03	Fish and crustaceans, mollusks and other aquatic invertebrates	98.0	119.4	21.3		37	54	17	
04	Dairy products; poultry eggs; natural honey; food products of animal origin	-82.0	32.7	114.6		-70	24	94	
05	Animal products not elsewhere named....	-11.7	0.2	11.9		-13	1	15	
07	Vegetables and some edible root and tuber crops	30.4	71.8	41.4		18	50	32	
08	Edible fruits and nuts; citrus fruit rinds or melon peels	-38.4	62.5	100.9		-48	49	97	
09	Coffee, tea, yerba mate, spices	-28.3	23.6	51.9		-35	22	57	
10	Grains	-148.5	0.7	149.3		-91	0	91	
11	Flour and poultry products; malt; starches; inulin	-23.9	0.3	24.2		-18	1	19	
12	Oilseeds and fruits; other seeds, fruits and grains; medicinal plants	-17.4	3.6	21.0		-18	3	21	
15	Fats and oils of animal or vegetable origin and their breakdown products	-98.0	7.5	105.6		-65	2	66	
16	Prepared products made from meat, fish or crustaceans, mollusks or others	-10.2	11.0	21.2		-8	10	18	
17	Sugar and confectionery products from sugar	-60.5	2.5	63.1		-62	2	64	
18	Cocoa and cocoa products	-47.2	22.9	70.2		-51	21	71	
19	Prepared products made from cereal grains, flour, starch or milk; flour confectionery products	-55.7	5.7	61.4		-60	5	64	
20	Products of processed vegetables, fruits, nuts or other plant parts	37.9	84.4	46.5		2	55	54	
21	Miscellaneous food products	-37.3	20.6	57.9		-47	20	67	
23	Residues and wastes of food processing industry; ready-made animal feed	-76.1	25.6	101.7		-70	14	84	
Beverages		291.2	360.0	68.8	507	289	377	88	562
22	Alcoholic and non-alcoholic beverages and vinegar	291.2	360.0	68.8		289	377	88	

Source: databases of the International Trade Center, Statistical Committee of the Republic of Armenia, Eurasian Economic Commission.

The food industry represents the most successful sector of the Armenian economy. Despite the negative balance of foreign trade in consumer food products, domestic production in 2023 amounted to almost USD 2.4 billion (10% more than in 2022). The domestic production in 2023 amounted to almost USD 2.4 billion (10% more than in 2022). There is also a negative foreign trade balance for food products, but domestic production exceeds imports by 1.7 times. For beverages, Armenia had a positive trade balance, with beverage production in 2023 being more than six times higher than imports.

5. “Criticality” of imports of certain commodity groups for Armenia based on the Import Penetration Index

Import penetration ratio is the most commonly used indicator to assess the extent to which imports supply domestic demand. It is calculated as:

$$\text{Import_penetration_index} = \frac{\text{Import}}{\text{Internal_demand}}$$

Since the magnitude of domestic demand is defined as:

$$\text{Internal_demand} = \text{GDP} - \text{Export} + \text{Import} ,$$

then the calculation of the import penetration index can be presented as a formula:

$$\text{Import_penetration_index} = \frac{\text{Import}}{\text{GDP} - \text{Export} + \text{Import}} .$$

OECD experts note that the values of the Import Penetration Index depend on the size of the economies under consideration: large economies usually have low values, and small economies have high.⁹ The import penetration index is also calculated for individual industries/sectors of the economy, in this case, instead of GDP the volume of production by industry/sector is used (see, for example, [Fronczek 2017]).

The index can take values from 0 to 1. Values close to 0 indicate almost complete satisfaction of domestic demand through domestic production, values close to 1 indicate dependence on import supplies of this commodity.

According to the calculations (see Table 4 on p. 109), the Import Penetration Index for food products in the RA for the observed period had the following average values in 2023: 0.41 for food products and 0.32 for beverages. Considering this index in dynamics for 2022–2023, we observe a decrease in the value of the index for food products, which is due to a decrease in imports and simultaneous growth of domestic production in this commodity group.

⁹ Import penetration. Available at: https://stats.oecd.org/oecdstat_metadata/ShowMetadata.aspx?Dataset=CSP6&Coords=%5BSUB%5D.%5BIMPPENET%5D&Lang=en

Table 4. Import Penetration Index, RA

Name of product group	2022	2023
consumer food products	0.49	0.41
foodstuffs	0.51	0.42
beverages	0.32	0.32

Source: calculated by the authors on the basis of data from the International Trade Center, Statistical Committee of the Republic of Armenia, Eurasian Economic Commission.

For food products, Armenia has the lowest values of the import penetration index compared to other commodity groups. In general, the Armenian economy is characterized by high values of the import penetration index: from 0.9 and higher. This indicates that the RA economy as a whole depends on imports of almost all commodity groups. Since Armenia is a small economy, such results can be justified by the limited size of the economy, lack of opportunities to use economies of scale, etc.

6. Potential of food supplies to Armenia from EAEU countries

Armenia's participation in the EAEU (since 2015), as well as long and extensive economic relations with the Russian Federation, have led to high rates of cooperation between Armenia and the countries of the Eurasian Economic Union in all areas: from trade and investment to tourism and education. The Russian Federation is the main foreign trade partner of the RA as a whole.

The EAEU countries account for a significant part of food supplies to Armenia, with the share of the Eurasian Economic Union countries exceeding 90% for some commodity groups. For many commodity groups, the share of the Russian Federation in the total supplies to Armenia is high, as it was seen in the previous analysis.

The share of EAEU countries in the import of food products to Armenia in 2023 amounted to 40% (see Table 5 on p. 109), and for some groups the indicator was above 90%: "10. Cereals" and "11. Products of the flour and cereals industry; malt; starches; inulin; wheat gluten." The great role of the EAEU countries can be traced in supplies to Armenia of products of commodity groups "16. Prepared products from meat, fish or crustaceans, mollusks or other aquatic invertebrates" (56%), "17. Sugar and confectionery products from sugar" (52%), etc.

Table 5. Share of EAEU countries in food imports to RA, %, 2023

Product group		%
FOODSTUFFS		40
02	Meat and edible meat by-products	32
04	Dairy products; poultry eggs; natural honey; foodstuffs of animal origin...	36
05	Products of animal origin not elsewhere named or included	3

Product group		%
06	Live trees and other plants; bulbs, roots and other similar parts of plants; cuttings	1
08	Edible fruits and nuts; citrus fruit rinds or melon peels	1
09	Coffee, tea, yerba mate, or Paraguayan tea, and spices	7
10	Grains	92
11	Products of the flour and cereal industry; malt; starches; inulin; wheat gluten	91
12	Oilseeds and fruits; other seeds, fruits and grains; medicinal plants	31
13	Natural raw shellac; gums, resins and other plant juices and extracts	1
14	Plant materials for making wicker; other plant products...	3
15	Fats and oils of animal or vegetable origin and the products of their breakdown; prepared food...	77
16	Prepared products of meat, fish or crustaceans, mollusks or other aquatic invertebrates	56
17	Sugar and confectionery products from sugar	52
18	Cocoa and cocoa products	46
19	Prepared products made from cereal grains, flour, starch or milk; flour confectionery products	49
21	Miscellaneous food products	45
23	Residues and wastes of food industry; ready-made animal feed	19

Source: calculated on the basis of International Trade Center data.

Table 5 (p. 109) does not present the commodity group “22. Alcoholic and non-alcoholic beverages and vinegar,” as this is the only group among foodstuffs for which Armenia has a positive foreign trade balance not only with other EAEU countries, but also with the world as a whole.

Despite such high rates of participation of EAEU suppliers in Armenia’s imports, taking into account the geopolitical situation in the region and the world, supply chain disruptions, it makes sense to assess the possibilities of expanding the supply of food commodity groups to Armenia from the countries of the Eurasian Economic Union.

In order to identify food commodity groups for which the EAEU countries can expand their supplies to the Armenian market, such indicators as the Import Penetration Index and Herfindahl Index were calculated for each commodity group; the volumes of imports to the RA from the EAEU countries and the world as a whole were compared; the export volumes of the EAEU countries and their shares in the world trade were analyzed; the geographical structures of imports to the RA and world imports were considered.

Based on the results of this analysis, the commodity groups for which the EAEU countries can expand their supplies of food products to the Armenian market—in aggregate by USD 343 million—were identified (see Table 6 on p. 111). The supplies of meat products may increase the most—by USD 74 million. The most likely increase in supplies of meat products is USD 74 million, animal feed USD 68 million, dairy products and eggs USD 60 million, cocoa products USD 38 million, sugar and confectionery products USD 30 million, and foodstuffs USD 30 million.

Table 6. Potential for expansion of supplies from EAEU countries to the RA market, 2023, mln USD

	Product group	RA imports		Potential of imports to RA from EAEU
		Total	from the EAEU	
	FOODSTUFFS			343
02	Meat and edible meat by-products	108	34	74
04	Dairy products; poultry eggs; natural honey; foodstuffs of animal origin ...	94	34	60
10	Grains	91	83	8
11	Products of the flour and cereal industry; malt; starches; inulin; wheat gluten	19	17	2
12	Oilseeds and fruits; other seeds, fruits and grains; medicinal plants and plants for...	21	6	15
15	Fats and oils of animal or vegetable origin and the products of their breakdown...	66	51	15
17	Sugar and confectionery products from sugar	64	34	30
18	Cocoa and cocoa products	71	33	38
19	Prepared products made from cereal grains, flour, starch or milk; flour confectionery products	64	31	33
23	Residues and wastes of food industry; ready-made animal feed	84	16	68

Source: compiled and calculated by the authors on the basis of the International Trade Center database.

The analysis of RA foreign trade flows in international and Eurasian directions suggests that there are opportunities to create clusters in the EAEU space with the participation of Armenian producers in the food industry. In this sector, it should be noted that Armenia is highly dependent on imported supplies of processed food products. Taking into account the fact that ensuring food security is one of the main components of the country's economic security, the expansion of domestic production of processed food products in the Republic of Armenia within the framework of cooperation with suppliers from the EAEU countries is one of the possible ways of cooperation.

Conclusions

The research findings offer significant insights that are crucial for formulating effective solutions to address issues related to food security in Armenia.

Ensuring food security in Armenia is a very relevant problem, primarily due to the insufficient production of agricultural products in the domestic market. The second Artsakh war, in particular, resulted in the loss of territories that played a significant role in the production of agricultural products, including grain.

Concurrently, an examination of food imports to Armenia reveals a pronounced concentration in both geographical and commodity terms, which poses a significant threat to the country's food security. On the one hand, Armenia is highly dependent on

imports of nearly all essential food commodities. On the other hand, there is a significant geographical concentration of these imports, which also carries certain risks. Armenia must diversify its trade balance in general, but in terms of food supplies, this problem can be attributed to the sphere of economic security.

In this regard, it appears necessary to develop a strategy to ensure Armenia's economic security, particularly by analyzing and assessing the country's food security, including reducing its dependence on critical imports, as identified in the framework of this study.

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