

# Assessment of Food Security in the Countries of the Visegrad Group – a Comparative Analysis

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**Abstract:** The goal of the article is to provide an overview of the food security state in the Visegrad Group (V4) countries and to identify the basic factors of security. The study is based on The Global Food Security Index (GFSI). The most important food-monitoring organizations such as the UN FAOSTAT, the IMF, the FAO, the World Health Organization, and the World Bank served as the data source. The target V4 countries (Poland, the Czech Republic, Hungary, and Slovakia) were evaluated by the time series that covered the years 2012-2021 (some analyses end in 2020 due to a lack of data). We employed the basic methods of statistical analysis of data, i.e. Pearson's correlation, trend lines, and dynamics indicators. The analysis indicated that there was a significant and not always positive development. The most positive dynamics were seen in the Availability factor of GFSI, unlike the Quality and safety which showed a decrease mainly in the case of Hungary. Therefore, exploring food security is becoming more and more important not only in national but also in a wider context international strategy.

**Keywords:** food security; food safety; GFSI; The Visegrad Group

**JEL Classification:** I32; O11; Q18

## 1. Introduction

Food is the most important product for humans. It forms the basis and provides conditions for growth and development. As it was defined in the Maslov's pyramid, there is a strict dependence in the hierarchy of meeting human needs. It is impossible to go further, if basic needs, such as oxygen, food, water or sleep are not provided. It means that providing adequate nutrition is necessary to allow people to reach any higher-order needs.

Unfortunately, in the 21st century, access to food remains not only a European but also a global problem. Last year, one tenth of the global population was malnourished. That's as many as 811 million people. There are many factors that impact food safety, for example, unstable processes in the markets, the weaknesses of our food systems, more and more frequent extreme weather phenomena, or other economic slowdowns. The situation was exacerbated by the negative effects of the COVID-19 pandemic. In the very previous UN agencies' report (FAO, IFAD, UNICEF, WFP & WHO, 2021), which has been prepared by the FAO Agrifood Economics Division in collaboration with the Statistics Division of the Economic and Social Development Stream and a team of technical experts from FAO, IFAD, UNICEF, WFP and WHO it is said that world hunger levels began to rise rapidly (FAO, IFAD, UNICEF, WFP & WHO, 2021). Moreover,

the global rate of increase in hunger has outpaced world population growth, with an estimated nearly 10% of all people being malnourished. Therefore, it is important to monitor food safety indicators and take appropriate steps to minimize the problem.

Due to the FAO definition, food security is a kind of special situation when some factors need to be ensured. First of all, people have economic, physical, social, and continuous access to a safe and nutritious amount of food. That food needs to meet their needs and preferences so they are able to live an active and generally healthy lifestyle. On the other hand, food safety means all groups of products that are free from containing any bad substances that could harm people's health or even life. It is becoming a more and more popular topic of science disciplines. The main purpose of its direction in science studies is to use only food which is safe to eat. Therefore, food security is also defined as a process or action (Szczepaniak, 2018). It is taken into account of important political decisions and has an impact not only on food issues but also on the direction of climate change.

All things considered, food security is an important research area of interest of economists all over the world. That is why one of the biggest global agriculture companies focused on it. Corteva Agriscience is publicity that provides farmers the most complete portfolio in the industry such as mix of seeds, protection of crops and even many innovative digital solutions. The agency sponsored the Economist Impact team who designed the unique Global Food Security Index (GFSI). It considers four important food issues (The Economist Group, 2021a). First of all, the availability criterion which measures aspects of the national food supply sufficiency. It cares about the risk, capacity to disseminate food, and efforts to expand agricultural output. Secondly, the affordability criterion which weighs the human ability to purchase food. It also checks the sensitivity to any implemented policies and programs supporting clients in the price shocks. The third factor is quality and safety. This one is a combination of dietary nutritional quality and its safety at the same time. Last but not least is natural resources and resilience aspect. It is about a country's susceptibility to natural resources. Moreover, it checks how countries adapt to risk as it occurs.

Although the problem is global, the Visegrad Group countries were selected as an area of research in the presented study. Poland, Slovakia, Hungary, and the Czech Republic are neighbored countries with similar geopolitical conditions, traditions, culture, social values, and shared history. They work together in many fields of common interest within the all-European integration (Kowalska & Gurkova, 2020). Because of plenty of similarities, it is worth checking if such symptoms as the problem of food proper distribution to consumers, the problem of food losses or the increasingly serious problem of improper nutrition, leading to obesity are familiar in those countries.

The aim of the article is to show the state of food security in Visegrad Group countries and to identify the basic elements of this security. There is enough of research and analyses concerning the conditions, categories and level of value of food security issues. All of them covered a long time period. Namely, regarding Poland, we can follow Kraciuk (2018), Walaszczyk and Mnich (2021); in Czechia Slaboch and Kotyza (2017), Matkovski et al. (2020); in Slovakia Kádeková et al. (2020), Kádeková et al. (2017); in Hungary: Kovács (2020), Szabó-Bódi et al. (2018).

## 2. Methodology

The study used statistical materials published in the form of The Global Food Security Index. The GFSI considers the issues of 113 countries, both developing and developed, and it is related to 58 unique and dynamic indicators (The Economist Group, 2021a). Those indicators are strongly connected with the FAO's definition of food security (Figure 1).



**Figure 1.** Food safety conditions (Source: own based on (World Food Summit, 1996))

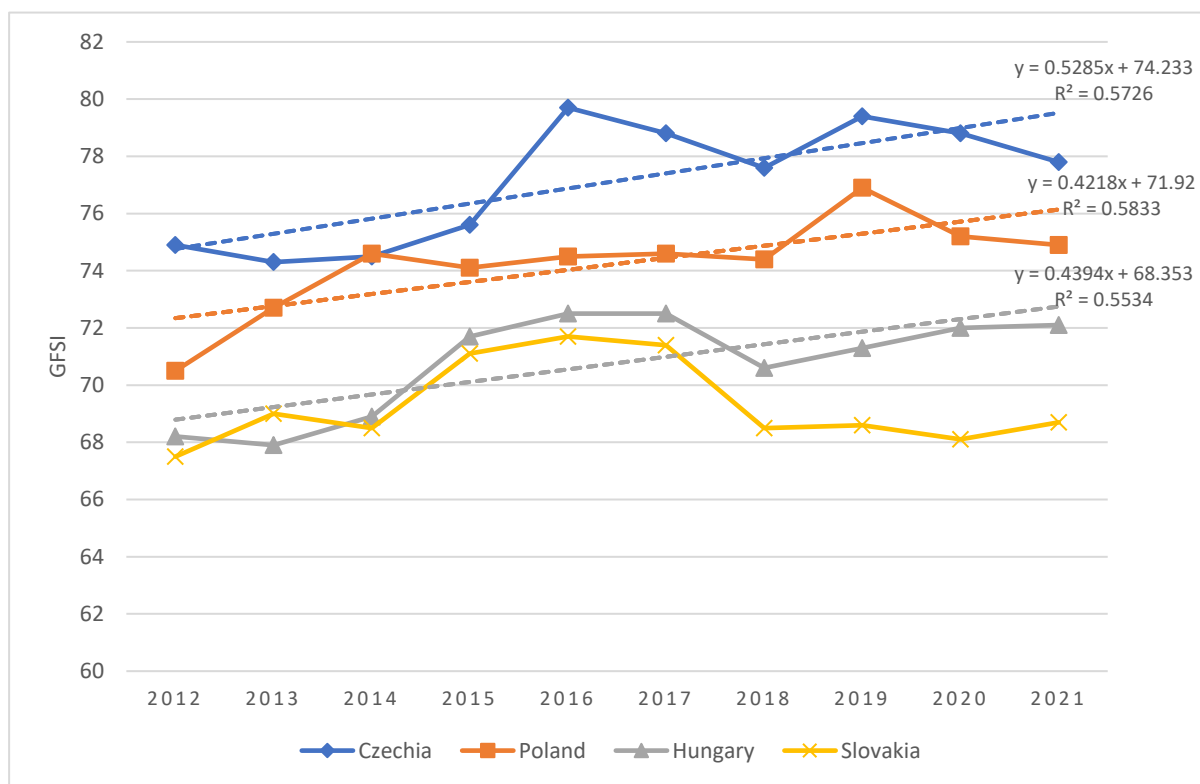
All data came from the most important food organizations in the world incl. the UN, the IMF, the FAO, the World Health Organization, and the World Bank. Because the model is quantitative and qualitative, it is a base to analyze the problem of food security. Moreover, the 2021 edition is the tenth. As the Economist Impact team updates it annually, year-on-year, this decade is the main time of the analysis. Furthermore, data from the FAOSTAT database were also taken. The subject of the analysis included data on food security from Poland, the Czech Republic, Hungary, and Slovakia. All things considered, the basic time range of data covers the years 2012-2021 (some analyses, due to lack of data, end in 2020). The article uses the basic methods of statistical analysis of data, i.e., Pearson's correlation, trend lines, and dynamics indicators. Time series of the GFSI, its value in each country, and prevalence of undernourishment were presented for the countries of the Visegrad Group. A trend function line and a determination coefficient  $R^2$  was determined for them. It is generally accepted that  $R^2 \geq 0.70$  fits the data well.

## 3. Results and Discussion

Both in the modern world and EU economy, as well as in the Visegrad Group countries, the issues of food security are extremely important and up-to-date. The strong agriculture sector is essential for the highly competitive food industry, which in turn is an important part

of the economy and trade. It also has a significant impact on international markets. All decisions taken at the international or European level respond to the challenges posed by food security, climate change and the needs of rural development.

The analysis of the Global Food Security Index in the Visegrad countries, over the past ten years, indicates that it has changed significantly. However, in each of these countries, those changes were more or less intense. Even if the analyzed countries were selected for the comparative analysis due to the multiplicity of similarities between them, there is a clear differentiation in the level of food security between these countries. The GFSI developed most dynamically in Czechia, where also it was the highest (for the most part of the studied period). The worst situation has been noticed in Slovakia, as it recorded in the ranking, the lowest values of the GFSI for most of the studied period (Figure 2).



**Figure 2.** Values of Global Food Security Index in Visegrad Group countries in years 2012-2021– scale from 0 to 100 (Global Food Security Index, 2021b)

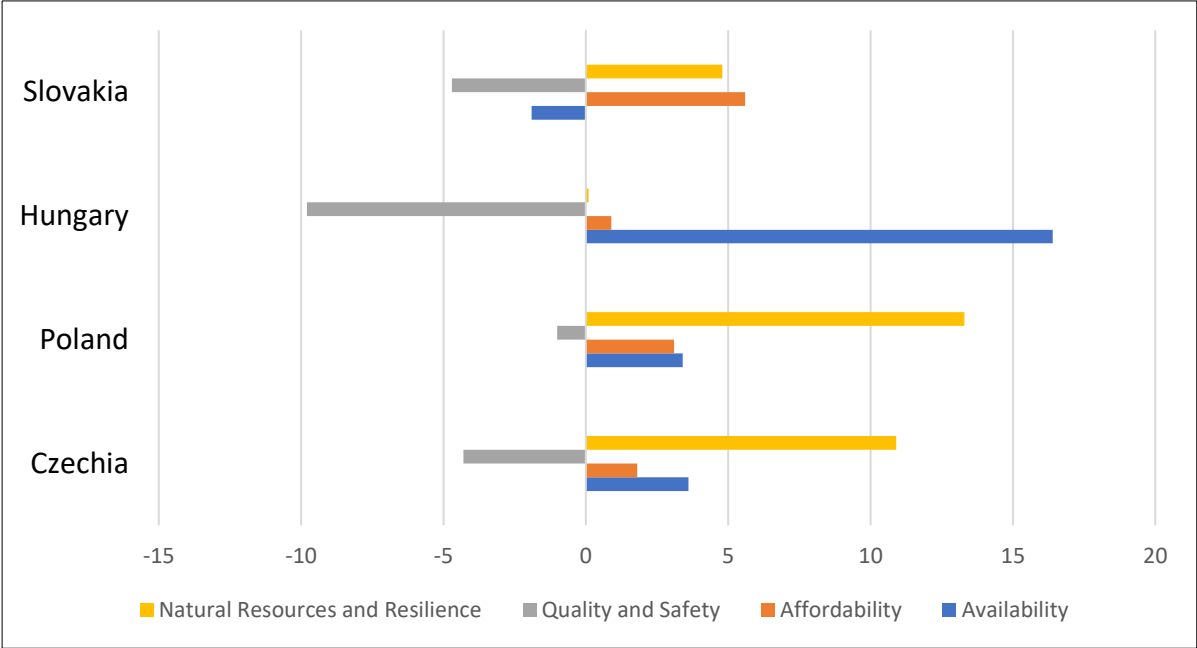
In Czechia, in 2012-2021, the value of GFSI increased by almost 3 points, however, the largest increase, by over 4 points (from 75.6 to 79.7 points) was recorded in the years 2015-2016. After this period, there was a decrease in the area of food security (by almost 2.5% in the last 5 years, i.e., from 79.7 points to 77.8 points) and this trend continues. Despite the decrease in the value of GFSI in Czechia after 2016, the average annual growth rate throughout the entire period studied was the highest compared to other countries of the Group. In Czechia, on average, in 2012-2021 the GFSI increased annually by over 0.5 points, with a good fit at  $R^2 = 0.57$ .

Czechia is the only country in the Group in which the GFSI has decreased so much. Other countries of the Group recorded an increase or slight fluctuations in GFSI throughout the

entire period studied. The GFSI in Poland increased very intensively. During the analysed period, the GFSI in this country became much larger, for about 6% (from 70.5 points to almost 75). In the case of Poland, the average annual increase in food security area during the period under consideration is over 0,4 points, with a good fit ( $R^2 = 0.58$ ).

Hungary also showed a good fit of the trend line ( $R^2 = 0.55$ ) over the period considered. In the case of this country, the GFSI has increased since 2012 by almost 6% (from over 68 points to 72). Despite the growing tendency, the average annual growth of the food security area in Hungary in 2012-2021 amounted to about 0.4 points. The GFSI in Slovakia was the lowest among the countries surveyed in both 2012 and 2021. It was also the country showing the lowest growth dynamics in GFSI. In the analyzed period, the value of GFSI in this country increased by only 2.2% (from 67.5 points to almost 69). The average annual rate was decreasing by about 0.2 points. Moreover, the trend line fit in this case was very low.

The 10 years change of Global Food Security Index components was also assessed (Figure 3). The obtained data shows that in the Visegrad countries, different factors have changed significantly. However, in each of these countries, those changes were less or more intense.



**Figure 3.** Changes of Global Food Security Index components in Visegrad Group countries in years 2012-2021 in points (Global Food Security Index, 2021)

Availability is the first component that has been considered. In Hungary, in 2012-2021, its value changed the most, it increased by more than 16 points, while in Czechia and Poland this factor almost stagnated at +3.6 and +3.4. Hungary improved very much during the last ten years, especially in the volatility of agricultural production, food security, and access policy commitments. Moreover, the food loss is on a very low level there while in both, Czechia and Poland, the value of food loss has increased. In Poland, there is a very weak level of food security and access policy commitments, which is actually similar to Slovakia, and its decreasing trend of food availability. In 2021, the food availability index in Slovakia was only 48.8 points out of a 100-point scale, which was a decrease of 1.9 points compared to 2012. The

agricultural research and development decreased there the most. Secondly, the sufficiency of supply and political and social barriers to access went worst.

On the other hand, Slovakia is the country of Visegrad Group, where the second GFSI component, which is affordability, improved the most. In the last ten years, the change in average food costs, agricultural import tariffs, market access, and agricultural financial services became better. Furthermore, again, even if Hungary improved the most in food availability, it improved its lowest indicator Food affordability only by 0.9 points. They need to focus on food market access and agricultural financial services because there was the biggest loss in that field of analysis. This does not concern Poland and Czechia. The component of food affordability changed there differently, respectively: +3.1 points, +1.8 points. Poland, in the last ten years, has improved in almost every field of food affordability. This includes indicators such as the proportion of the population under the global poverty line or food safety net programs that are very developed in these countries. Such situation is related to overall income increase rather than food prices. Prices of even basic food such as plain mixed bread were rising in a staircase pattern above an inflation rate since the summer of 2006 (Olszańska & Král, 2020). Their study also showed that it occurred in spite of the stagnating prices of an undelaying commodity – flour.

Quality and Safety is the third component that has been considered. The common thing about this indicator, among Visegrad Group countries, in the years 2012-2021, is that it decreased. In Hungary, its value changed the most, the loss is about almost 10 points, while in Czechia and Slovakia this factor was pretty similar, respectively: -4.3 and -4.7. In Hungary, nutritional standards decreased the most, for about 50 points down. It was something that decreased in Czechia also, but half as much as in Hungary. Interesting is, there is a decreasing trend in the protein quality category in Hungary while at the same time there is an increasing trend in Czechia. In Slovakia, even if the decrease was almost half much as in Hungary, both trends are similar, nutritional standards and protein quality went down. On the other hand, there is a completely different situation in Poland. This country noticed the smallest drop in point and the general situation is pretty good over there. It is the only of Visegrad Group countries where the food nutritional standards, in years 2012-2021 went up. Moreover, the food protein quality is very good in Poland. It scores 100 points in this category which is a very good result. The only thing, where the situation went worst in Poland is food safety. There were more than 15 points loss and it is something that should be considered for next years.

Last but not least, factors of Natural Resources and Resilience were analyzed. In the Visegrad countries, over the past ten years, both increased significantly. However, in each of these countries, those changes were completely different intense. The biggest development was in Poland, +13.5 points. Even if the general water condition is on a weak level there, the political commitment to adaptation is going better. At the same time, in Czechia, there was a noticeable development in water condition. This country scored almost 11 points increase, which is a good result. Almost half of it scored Slovakia. Slovakia, during the last ten years, also improved political commitment to adaptation by an outstanding margin. Unlike

Hungary in which political commitment score did not change. This made Hungary an outlier in this field with no or very little progress.

All factors displayed on a one-hundred-degree scale for the four analyzed countries resulted in scores in 2021: Czechia 77. (14<sup>th</sup> place in Global Ranking), Poland 74.9 (22<sup>nd</sup> place in Global Ranking), Hungary 72.1 (31<sup>st</sup> place in Global Ranking), and Slovakia 68.7 (42<sup>nd</sup> place in Global Ranking). We provide Global Ranking scores for the best countries to provide a context: the best country is Ireland with a score of 84 points, the second is Austria with 81.3 points score and third place is taken by the United Kingdom with 81 points overall score (Global Food Security Index, 2021). This shows that there are still significant differences not only between V4 countries but also in Europe.

FAOSTAT data were also analyzed. The main purpose of this organization is to present the real core set of food security indicators. SDG (Sustainable Development Goals) policy and targets are becoming more and more important, especially nowadays when everything is changing very fast. The choice of the indicators has been provided by expert judgment and the availability of data with sufficient coverage to enable comparisons across regions and time was taken into consideration as well. Even if countries are more developed and food security level is higher than ever, there is still a problem with the prevalence of information about the scale of undernourishment, see Table 1. The last but not least issue in this paper is a comparison of undernourishment in Visegrad Group countries. Although Table 1 provides a three-year average value, it gives an adequate overview of the problem in the report to global indicator framework for the Sustainable Development Goals of the 2030 Agenda for Sustainable Development.

**Table 1.** Prevalence of undernourishment in percent over 3-year average (FAOSTAT, 2021)

|           | <b>Czechia</b> | <b>Hungary</b> | <b>Poland</b> | <b>Slovakia</b> |
|-----------|----------------|----------------|---------------|-----------------|
| 2000-2002 | <2.5           | <2.5           | <2.5          | 6.1             |
| 2001-2003 | <2.5           | <2.5           | <2.5          | 6.2             |
| 2002-2004 | <2.5           | <2.5           | <2.5          | 6               |
| 2003-2005 | <2.5           | <2.5           | <2.5          | 5.8             |
| 2004-2006 | <2.5           | <2.5           | <2.5          | 5.5             |
| 2005-2007 | <2.5           | <2.5           | <2.5          | 5.6             |
| 2006-2008 | <2.5           | <2.5           | <2.5          | 5.4             |
| 2007-2009 | <2.5           | <2.5           | <2.5          | 4.9             |
| 2008-2010 | <2.5           | <2.5           | <2.5          | 4               |
| 2009-2011 | <2.5           | <2.5           | <2.5          | 3.5             |
| 2010-2012 | <2.5           | <2.5           | <2.5          | 3.4             |
| 2011-2013 | <2.5           | <2.5           | <2.5          | 3.4             |
| 2012-2014 | <2.5           | <2.5           | <2.5          | 4               |
| 2013-2015 | <2.5           | <2.5           | <2.5          | 5.3             |
| 2014-2016 | <2.5           | <2.5           | <2.5          | 5.9             |
| 2015-2017 | <2.5           | <2.5           | <2.5          | 5.6             |
| 2016-2018 | <2.5           | <2.5           | <2.5          | 4.5             |
| 2017-2019 | <2.5           | <2.5           | <2.5          | 4.1             |
| 2018-2020 | <2.5           | <2.5           | <2.5          | 4               |

In three of four of Visegrad Group countries, there is the same bellow-detection level of undernourishment of 2.5%. It suggests that Czechia, Poland, and Hungary follow the

recommendation of experts gathered in the Committee on World Food Security (CFS) on hunger measurement, which was hosted at FAO headquarters in September 2011. Hence food insecurity is not something to worry about. A different situation is in Slovakia. This country has noticed fluctuations over the last ten years. The level of the index has changed significantly, from 6.1% (2000-2002 average) to 4% (2018-2020 average). It was decreasing until 3.4% in 2010-2013 and then started to increase back to 5.9% (2014-2016 average). Now the trend is decreasing again. However, it does not mean to stop monitoring the situation.

#### 4. Conclusions

All things considered, food security is a basic right. Ensuring it is essential. Moreover, it is the responsibility of every country. There should be activities aimed at improving the quality of consumed food products as well as promoting healthy eating. The processes of European integration contributed to the improvement of the economic situation of European countries, and thus the increase in the Global Food Security Index in the analyzed period of time. There are urgencies recognized for the broader food systems transformation. What needs attention is the purpose for getting back on track towards meeting SDG targets; which are: ensuring access to safe, nutritious, and sufficient food for all people all year round, and eradicating all forms of malnutrition. Governments should focus on transformation and policies that help in addressing the major drivers behind the growth in hunger. At the same time, they should start trying to slow down the progress towards reducing all forms of malnutrition. Therefore, exploring food security is becoming more and more important not only in national, but also in a wider context, international strategies. Provided using other scientific approaches it becomes a strategic plan for any future research and political decisions.

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**Conflict of interest:** none

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