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IMPACT OF GLOBAL FOOD SECURITY INDEX ADJUSTMENTS IN THE CONTEXT OF MAJOR INTERNATIONAL CHALLENGES

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Abstract

Food security relies on interconnected social, economic, and biophysical systems to meet human nutritional requirements. Addressing risks is crucial for building resilience in food systems and ensuring long-term food security. Some major challenges include climate change, financial risks, and political instability. Resilience, the ability to bounce back from shocks, is increasingly important. To enhance long-term food security, we must build better food systems that can absorb and adapt to climate change and other risks. The proposed study aims to evaluate adjustments to the Global Food Security Index, providing recommendations for improving global food security policies. Identifying gaps in the Index and accurately reflecting the complexity of the global food system are essential outcomes. Access to affordable food is foundational for social well-being and stability. Higher-income households can better cope with temporary price increases, while low-income households require safety nets. The FAO Food Price Index reached an all-time high in March 2022, impacting developing countries facing challenges like the COVID-19 pandemic and resource inadequacy. Rising food prices before Russia's invasion of Ukraine exacerbated the situation. Financial risks, currency depreciation, conflict, and political instability threaten food access. The Global Food Security Index revealed trends, including a decline in food affordability between 2019 and 2022. Additionally, agriculture's expansion, particularly in developing countries, faces challenges due to degraded land. Soil health plays a critical role in food system resilience by retaining moisture and minimizing erosion and nutrient loss. Sustainable agricultural practices and natural resource protection are vital for long-term food security .

Key words**:** *food security, resilience, climate change, financial risks, Global Food Security Index*

INTRODUCTION

Food security relies on the ability of interconnected social, economic and biophysical systems to meet human nutritional requirements, and understanding and addressing these risks is essential to build resilience of food systems, ensuring at the same time long-term food security [13]. As consequence climate change, financial risks but also political uncertainty represent the key challenges we face in this regard. Resilience, the ability to bounce back and better overcome a shock or disaster, is becoming increasingly important in the current context [18], so building better food systems that can absorb and adapt to climate change and other risks is key to ensuring long-term food security [19]. The proposed study aims to evaluate and critically analyse adjustments to the Global Food Security Index (GFSI) to better understand how they influence the assessment and approach to food security in the context of food accessibility and other global risks, providing recommendations for improving global food security policies and programs. Expected outcomes include identifying gaps in the Index and proposing improvements to more accurately reflect the complexity of the global food system and to contribute to the development of more effective policies and programmes to ensure long-term food security in diverse contexts and places. Food security is directly related to the health of the world's productive land, necessary freshwater and wide oceans – essential elements in enhancing food productivity needed for the growing global population expected to reach 9.10 billion by 2050. However, pressures on these essential resources are increasing due to population growth, urbanisation and changing

consumption patterns [22]. Agriculture covers a significant proportion of the global land area, and its expansion, particularly in developing countries, is faced with degraded land, which adds further pressure on existing resources, and the quality and quantity of land is critical to global food production capacity [8]. The amount of land suitable for agriculture is finite and soil depletion due to intensification of agricultural practices is a major concern, thus soil health contributes to the resilience of food systems by retaining moisture and minimizing erosion and nutrient loss. Competition for agricultural land, feed and fuel [21] will continue to intensify as populations and incomes grow, putting additional pressure on the quality and quantity of land available for food production, and there is a need to adopt sustainable agricultural practices and protect natural resources to ensure long-term food security in the face of these challenges [1]. Factors contributing to food price increases include weather conditions and wider economic factors, such as fluctuations in oil prices and agricultural policy, and dependence on imports for supplies can exacerbate the impact of these price increases, particularly in lower-income countries. With regard to food security nets, it is essential to diversify methods of support, including cash transfers, vouchers and physical provision of food, so these programmes need to be sensitive to the needs and livelihoods of beneficiaries, with a particular focus on the inclusion of women in decision-making processes, and investment in food security programmes is not only a safeguard against food insecurity but also a way to promote community resilience and stimulate sustainable economic development.

The Covid-19 pandemic affected greatly the consumers` perceptions of food security, safety and hygiene which led to changes in their purchasing behaviour and the need to understand the stakeholders` awareness and knowledge on food safety indicators in their online shopping experience [2]. Climate change, characterized by changes in long-term weather patterns, is emerging as a complex and pervasive threat to global food security. The diverse effects of climate change, including severe weather occurrences, alterations in rainfall patterns, increasing temperatures, and shifts in the frequency and severity of climate-related disasters, present considerable obstacles to global agricultural practices and food production [14].

The impact of food waste is far-reaching. In addition to inefficient use of resources, it results in increased greenhouse gas emissions, greater pressure on water and land resources, reduced overall productivity, and negative impacts on local and global economies. Addressing this challenge is critical not only to alleviate hunger, but also to reduce the environmental footprint of food production, a high priority within the framework of the circular economy model [15].

The workpaper's originality lies in its detailed examination of the multifaceted and interconnected factors affecting global food security. It uniquely combines economic, geopolitical, environmental, and systemic perspectives to highlight how issues such as income disparity, conflict, climate change, and infrastructure vulnerabilities collectively influence food accessibility and affordability. The necessity of addressing this theme is emphasized by the urgent need for globally coordinated strategies to mitigate these risks, promote equitable food distribution, and strengthen the resilience of the food system against future shocks. This comprehensive analysis is essential to address the urgent and complex challenges that threaten food security worldwide.

MATERIALS AND METHODS

The Global Food Security Index indicators measuring risk and resilience, provide a general overview regarding each country state concerning food security. Identifying vulnerabilities for selected countries and the resilience of their food systems is essential for developing effective policies, investments and interventions, so recognising the unique characteristics of each country and collaboration between governments, the private sector and the non-governmental sector are vital to building resilience and ensuring long-term food security. The

proposed methodology for assessing the impact of adjustments to the Global Food Security Index on the assessment and approach to food security includes:
(a)collecting and reviewing relevant GFSI data on food security and identifying and selecting indicators and sub-indicators used in the GFSI to assess multiple dimensions of food security.
(b)comparing the 2022 edition of the GFSI with previous editions to identify and assess changes and adjustments made by analysing the evolution of indicators and sub-indicators over time and identifying relevant trends in food security.
(c)assessing how the new GFSI adjustments influence the perception and management of food security in the specific context by identifying similarities and differences between how different countries interpret and use the Global Food Security Index.
The paper aimes at assessing the impact of adjustments to the Global Food Security Index on the approach each country adopt for food security, of the extent to which the new indicators and sub-indicators introduced in the GFSI [9] are effective in measuring food security in relation to food affordability and other global risks and the degree to which the adjustments to the GFSI reflect the diversity and complexity of the global food system [10].
The database used in the study includes sources such as Food and Agriculture Organization (FAO), Food Price Index 2022, International Fund for Agricultural Development (IFAD), United Nations International Children's Emergency Fund (UNICEF), World Food Programme (WFP) and World Health Organization (WHO) 2021and Global Food Security Index 2018-2022.

RESULTS AND DISCUSSIONS

Food security is essential for social well-being and stability, and access to affordable food is the foundation of this food security. Households with higher incomes and that allocate a lower proportion of their expenditure to food are more likely to cope with temporary price increases, whereas low-income households require short-term safety nets to ensure that food remains affordable, especially in the face of food price shocks (Fig. 1).



Fig.1. FAO Annual food price indices
Source: World Food Situation- FAO Food Price Index [5].

The FAO Food Price Index [5] reached an all-time high in March 2022 and, although it subsequently declined, remained significantly above the level recorded in the previous year, these shocks come in a context where emerging countries confronts with various problems, like viral outbreaks, insufficient resources and increasing social disparities [20]. Food costs is the most important challenge next to food affordability, both

inducing undernourishment or malnutrition for a part of the world population. The COVID-19 pandemic has driven up food prices, direction continued by the war caused by Russia.

The war has led to large price increases, with regional supply shortfalls through disrupted supplies, stock shortages and sometimes even the creation of stocks that could not follow the delivery route and were blocked. Globally, rising fuel and other basic agricultural inputs costs have resulted in additional transportation costs and sometimes in the inability to get products to their destination [17], with shortages of some commodities contributing to food price increases that have exceeded all expectations.

Financial risks limit access to food for low-income families, and military conflicts and political instability negatively affect agricultural production due to unreliable transportation routes with various logistical limitations. In general, ensuring food security requires complex and coordinated global approaches that address risks and require that food resources distribution to be equitable and sustainable.

Even developed countries are vulnerable to these categories of risks and that is why they must manage their capabilities in a balanced way and outline clear strategies and contingency plans in order to increase accessibility to food and natural resources even in the case of situations of crisis. After registering a relative decrease, the general index of food security indicated a return as a result of the decrease of instability and the realization of agreements between countries on common protection measures.

This improvement has been underpinned by advances in infrastructure, along with increased production capacity and relatively stable food prices, however, these advances are threatened by various risks, both environmental and socio-economic (Fig. 2).



Fig. 2. Global Food Security Index for 2018-2022 within the top ranked countries
Source: Global Food Security Index 2022 report [11].

Singapore ranks first in the 2018 GFSI rankings for the first time, this performance is largely attributed to its status as a high-income economy, thus rising GDP per capita and low household spending on food contribute to this high score [11], in addition, low import tariffs on agricultural products reduce food import costs, strengthening Singapore's position in the rankings. Food security in Singapore is, however, exposed to challenges regarding climate change and variability in access to natural resources. This fact is caused by the country's high dependence on food imports (90% of the food consumed comes from imports), the country being exposed to food security risks caused by various natural, military or climatic threats.

In recent years, the United States (US) has seen a decline in its food security ranking, dropping from first place between 2012 and 2016 to second place in 2017, and now tied for third place with the United Kingdom (UK), basically this change reflects a slower improvement compared to other countries rather than a deterioration in score, however, the relatively modest progress the US has

made is threatened by a polarised political environment and growing protectionist sentiment.

Whithin the Global Food Security Index there were identified more obvious changes and directions. Food affordability decreased by 4% in 2022 compared to the reference year 2019, the determining factors being represented by the phenomenon of COVID-19 and Russia's military aggression in Ukraine which increased food costs and affected people's ability to afford food, in addition, social and political barriers reduced food availability, and armed conflict and political instability contributed to a decrease in scores in these areas. Increasing reliance on food aid has also been a concern, with an 8% decline in scores for this indicator between 2019 and 2022, however, there are also positives such as rising scores for agricultural inputs such as farmer empowerment commitments and food security strategies, which have seen significant increases, also policy commitments to adaptation and agricultural sustainability have increased, reflecting greater attention to these issues globally, however, there are still challenges such as low soil organic content and poor irrigation infrastructure.

In terms of performance by country, the top of the Global Food Security Index for 2022 is dominated by high-income countries in Europe, with Finland, Ireland and Norway at the top, in contrast, the worst performing countries are concentrated in the Middle East, North Africa and Latin America, with Syria, Haiti and Yemen at the bottom. The inequalities within the worldwide food system indicate that common strategies are needed to reduce disparities and differences in access to food (Fig. 3).

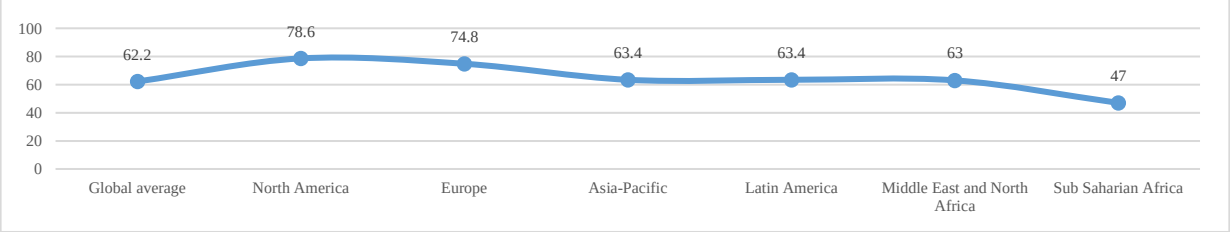


Fig. 3. Global Food Security Index by Region in 2022
Source: own calculations based on GFSI 2022 Report [11].

It is clear that concerted global efforts are needed to strengthen the resilience of food systems and address systemic issues affecting food security. This involves investment in technology, infrastructure, services for farmers and the implementation of effective policies at national and global levels, only by addressing these issues and increasing resilience can we hope to successfully address the long-term challenges within food security, ensuring as equal as possible accessibility to food. Food affordability is one of the most important indicators that participates in creating the Global Food Security Index. The highest increase in this aspect, over the analyzed period (10 years), was in Tanzania (from 34.7 in 2012 to 48 in 2022) as can be seen in Figure 4.

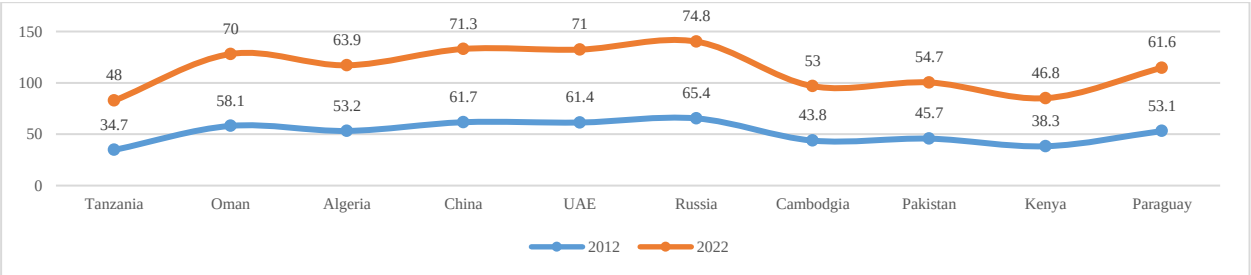


Fig. 4. Countries recording the highest increase in food security (2012-2022)
Source: own calculations using GFSI 2022 Report data [11].

The Global Food Security Index for 2022 exposes visible disparities between different countries (Fig.5). For food security in 2022, the countries from Europe, the North American continent and Australia obtained a score of over 70 points, while at the opposite pole, the vast majority of countries on the African continent recorded less than 55 points [7].

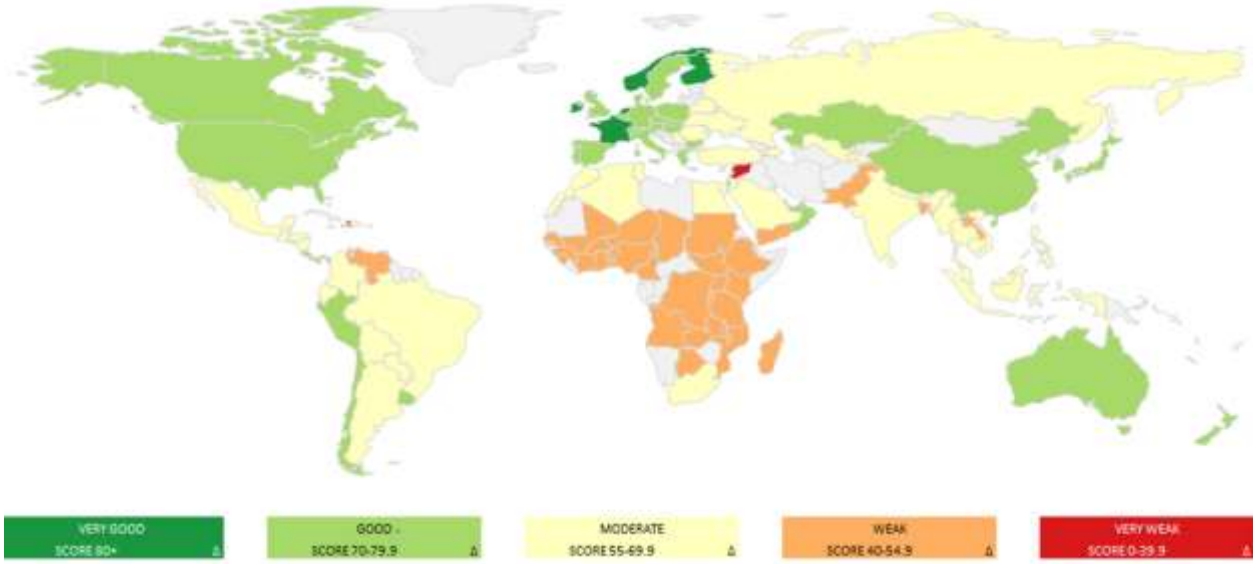


Fig.5. 2022 Country score map regarding food security environment (scores are normalized 0-100, where 100=best conditions).
Source: Own calculations based on GFSI 2022 Report [11].

In terms of food affordability, eight of the ten nations benefited most from the opportunity to reduce food prices, while for Oman and Cambodia, the launch of a safety net was key, and for the first six nations, improving market access was key to increasing food affordability. The United Arab Emirates, Algeria and Niger saw the biggest increase in food availability, thanks to tackling volatile food production and a commitment to food security policies, with many of these nations scoring better by strengthening infrastructure and investing in agricultural research and development. Increased food availability is associated with significant decreases in hunger in countries such as Bolivia, Ethiopia and Angola, which realised significant improvements regarding poverty reduction and farmer productivity, while Sudan, recorded great progress in the implementation of nutritional standards [12]. The global food system fragility was underlined by the pandemic [6] or the climate changes which generated food security gaps, manifestations that continues to appear along [16] with droughts and floods [4]. The Index values for 2022 resulted from the analysis of the global food security environment shows, the progresses in food security made by Romania [7] even if further attention is required (Fig.6). The country ranks well in affordability and quality and safety but needs improvement in both sustainability and adaptation needing security measures as part of a general risk strategy. As shown in the 2022 GFSI data food affordability decreased by 4% as related to the same indicator value in 2019.The increase in food prices is worrying given that the world is now facing the third global food price crisis in the last 15 years (Fig. 7).

The ability of the countries to face disrupting events is questioned and tested as the leader have to prepare efficient strategies in order to ensure sufficient food supplies. Vulnerabilities in the system are becoming particularly evident in the availability of and access to food, as well as the sustainability of the environment that supports this availability, so it is increasingly clear that a holistic approach to the food system is required, taking into account both the consumer side, with a focus on accessibility and quality, and the

complexities of food production impact on the entire food system (Fig. 8).



Fig.6. Romania - score regarding food security environment (scores are normalized 0-100, where 100=best conditions).
Source: Own calculations based on GFSI 2022 Report [11].

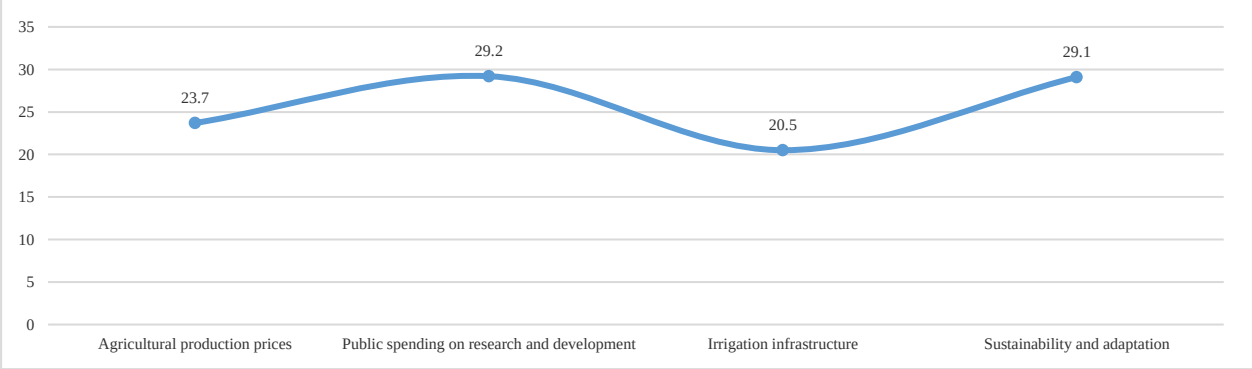


Fig.7. Indicators with the lowest score from GFSI 2022 (%)
Source: own calculations based on GFSI 2022 Report [11].

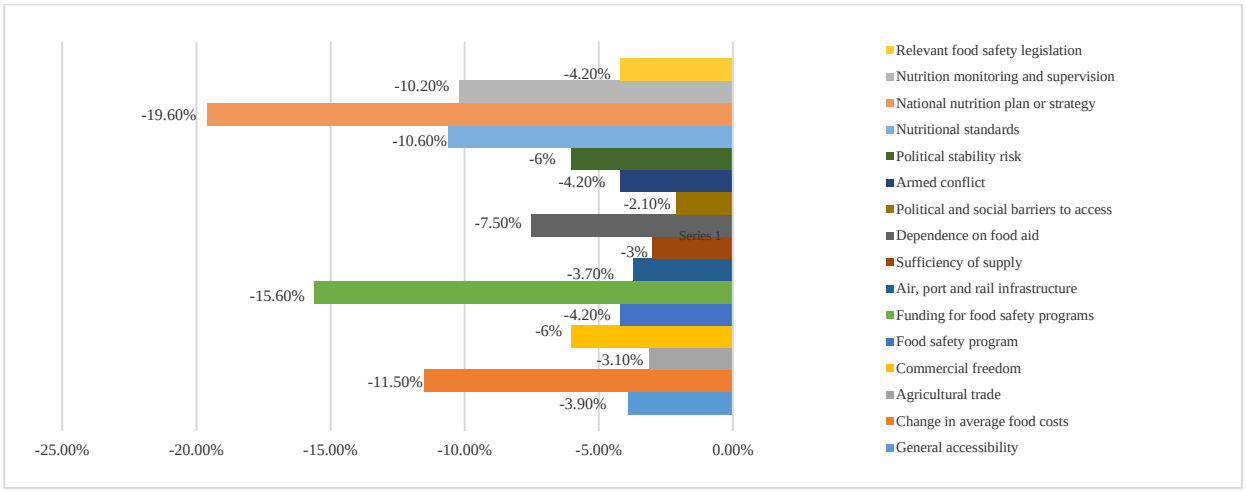


Fig. 8. Global Food Security Indices with the largest percentage decrease in scores in the year 2022 (%)
Source: own calculations based on GFSI 2022 Report [11].

Strengthening the resilience of the global food system necessitates an integrated and collaborative strategy that addresses the complex interplay of social, political, and environmental challenges. To achieve this objective by implementing timely policies that address social inequalities, climate change and environmental degradation, ensuring access to food resources is vital. These main efforts can make a difference in this area and consist in reducing the waste of resources, a collaborative approach and active participation (especially of local communities). All these efforts can lead to a healthy global food security (Fig. 9).

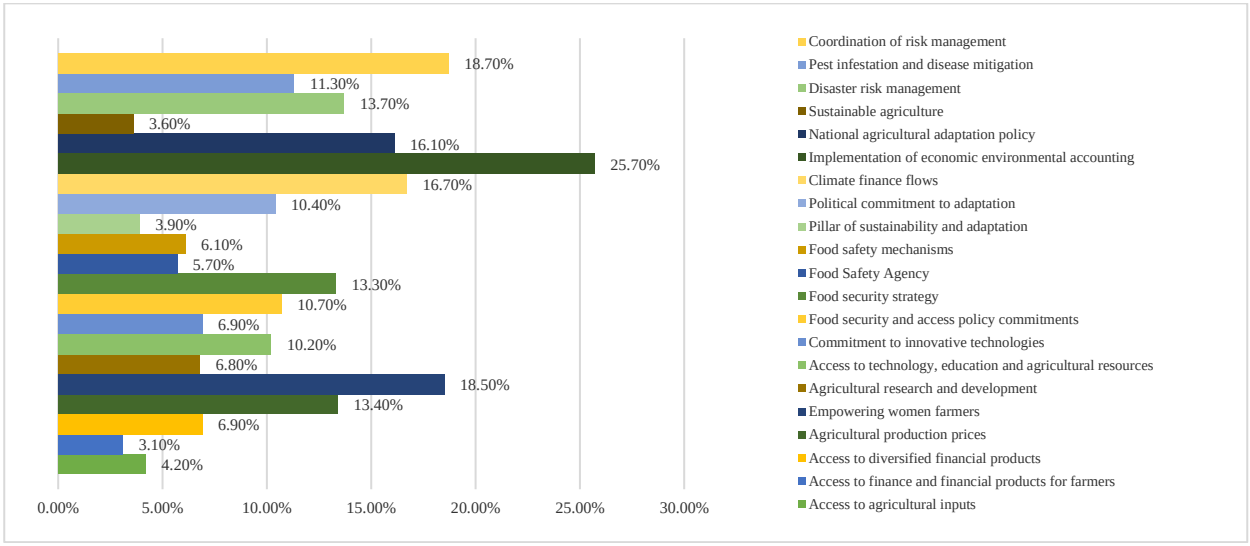


Fig. 9. GFSI indicators with the highest percentage increase in scores in the year 2022 (%)
Source: own calculations based on GFSI 2022 Report [11].

Reducing food costs requires trade freedom, support for farmers and financing facilities for large food-importing countries [23], so imposing trade or export restrictions should be avoided, and price volatility should be minimized, and building long-term systemic resilience must also be a priority and will require an approach tailored to context and specific needs [3]. The emphasis should be placed on supporting the food supply and the environment that supports it, with improvements in land management, increasing the organic carbon content in the soil, adopting sustainable sources and reducing food pollution and waste, so adapting to a changing climate and promoting resilience in agriculture will ensure sustainable and nutritious food production. It

is essential that there is a renewed commitment and action from all actors in the food supply system - governments, consumers and NGOs - to strengthen a sustainable food system and improve its ability to withstand shocks.

CONCLUSIONS

The research highlights the critical importance of addressing food security through comprehensive and scientifically informed approaches. The FAO Food Price Index reaching an all-time high in March 2022, followed by persistently elevated levels, highlights the volatility of global food prices and the need for resilient strategies to mitigate these impacts. The complex interplay of factors such as the COVID-19 pandemic, geopolitical conflicts like the Russia-Ukraine war, and systemic issues within the food system contribute to this volatility, underscoring the necessity for globally coordinated policies that can adapt to and manage such multifaceted challenges.

While high-income countries are generally more resilient, significant declines in food security are observed when adjusted for natural resource and climate risks. This indicates that wealth alone does not shield nations from food security threats and emphasizes the necessity for all countries to invest in climate adaptation and natural resource management to ensure long-term food security. Environmental and socio-economic risks are identified as the most important threats, which can only be prevented and stopped through continuous joint efforts and concrete strategies. Strategic investments can enhance the performance of countries reflected in the IGFSI indicators, with current research highlighting that ensuring food security requires an integrated approach, both in the short and long term. Promoting trade freedom, supporting farmers, and ensuring financing facilities for large food-importing countries are essential strategies. Additionally, avoiding trade restrictions and minimizing price volatility are crucial for maintaining food affordability. Building systemic resilience through sustainable land management, increasing soil organic carbon, adopting sustainable sources, and reducing food pollution and waste are vital for adapting to climate change and promoting agricultural resilience.

The findings highlight the necessity for renewed commitments and coordinated actions from all actors in the food supply system—governments, consumers, and NGOs—to create a sustainable, resilient food system capable of withstanding future shocks. This scientific approach is essential for developing effective policies and practices that ensure global food security and promote equitable and sustainable food production for all.

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