

ANALYTICAL INSTRUMENTS FOR MEASURING FOOD SECURITY AT MACROECONOMIC LEVEL

MIHAELA KRUZSLIČKA

Institute of Agricultural Economics, Romanian Academy, Bucharest, Romania

kruzli@yahoo.com

Abstract: *The paper intends to present certain analytical instruments for food security measurement at macroeconomic level that are available worldwide, regionally and nationally, by which this complex process of fundamental importance can be evaluated. As food security is a concept with multiple and various definitions, its assessment is made on the basis of numerous indicators, depending on the domain we want to approach and on which we like to operationally intervene. The adequate measurement of food security is of utmost importance, from economic and social standpoint, for food availability and distribution, from the point of view of the economic access for food, in quantitative and qualitative terms, of nutrition and governmental policy.*

Key words: *food security, agriculture, measuring instruments*

INTRODUCTION

The importance that should be attached to food security stems from the fact that this represents a theme of increased interest for all the actors implied in decision-making, mainly due to the consequences that food insecurity has for each aspect of the society. One can even speak about the key role of food security in maintaining political stability, if we remember, for instance, the crisis of food prices during the recession period. Out of the Earth's total population of more than 7.2 billion people, at present there are about 900 million who eat fewer calories than needed, so that the consequences associated to public health make the importance of food security an incontestable issue. Thus, the projections for the future period based upon the present estimations of food insecurity should be important drivers of the public policies. As an ill-nourished population is less productive from the economic point of view, food security also counts for the maximization of the economic capacity, and productivity is the key-element in meeting the food needs and poverty alleviation.

If we refer to food security at global level, we must take into consideration the fact that in the last decade, the governmental policies on food security developed in parallel with the global agricultural policies, in an increasingly trade-oriented direction. Trade liberalization can represent a modality to obtain a faster global economic growth.

The declarations of the World Summit Food 1996 were strongly influenced by this frame of thinking, to the extent to which trade growth was considered to be a main requirement for reaching food security. The argument is that the total world food production is already sufficient to meet the food demand at world level. In this context, food security can be reached by the diminution of barriers to trade, thus enabling the food surplus to move freely in case the demand exists.

STATE OF KNOWLEDGE

The definition of food security is a process that continued to evolve in time. Initially, the food security concept consisted of a relative simplistic approach, i.e. the measurement of food availability in a given country. The collection of data on the consumption availabilities began after the First World War. Data collection at national

level was materialized into the Food Balance Sheets, which tried to construct a map of the regions with regard to the distribution of foodstuffs. By means of these data it was possible to measure the *total number of calories available for a given population*, the calorie availability consisting of both foodstuffs from the domestic production and from imported foodstuffs.

As food security is a concept with multiple and various definitions, its measurement is based on several indicators, depending on the domain we want to approach and/or in which we want to intervene operationally. This is the consequence of the multi-disciplinary and multi-sectoral nature of food security, which brings together disciplines like economy, agriculture, nutrition, sociology, etc., each discipline in part bringing its own conceptual and practical approach.

The significant challenges and the interdependencies of food security, undernourishment and chronic poverty represent complex and multidimensional problems. The priorities of the policies in this field reside in poverty alleviation, food security and nutrition improvement. In order to substantiate these policies it is necessary to supply reliable data and information that enable a cross-sectoral analysis to increase the capacity of early risk warning, the monitoring and evaluation of policy impact and finally a better targeting of interventions.

MATERIALS AND METHODS

An analysis of the specialty literature was undertaken in order to identify specific materials, articles and other documents that were published on the explicit and empirical measurement of food security. International databases were consulted, such as Elsevier, Google Scholar, CABI and Web of Science, as well as web-sites of several international organizations, including F.A.O. (*Food and Agriculture Organization of the United Nations*), W.F.P. (*World Food Program*), I.F.P.R.I. (*International Food Policy Research Institute*), U.S.A.I.D. (*United States Agency for International Development*) and of other international non-governmental organizations. The information that was considered relevant for the theme of the study was selected and processed.

RESEARCH RESULTS

Food security measurement

The food security measurements can focus on certain instruments that have values at national, regional, household level and/or individual level, and they mainly consist of:

- **Availability of foodstuffs**, which require a sustainable agri-food chain, agricultural production intensification, international trade and regional integration development. In this respect, the support provided to small agricultural holdings is essential, as the rural areas are mostly affected by scarcities (we refer here to support to losses management, to storage, to soil use, etc.);
- **Access to food**, through support to working places, to income increase and social mechanisms to compensate these, in periods of crisis inclusively;
- **Nutritive value of food intake**, mainly for pregnant and breastfeeding women and for children less than five years old; this needs training and education actions, as well as a higher diversification of agricultural production;
- **Crisis prevention and management**, through the association of different humanitarian aid and development organizations and putting into practice certain strategies that encompass the emergency aid, rehabilitation and development

(EARD) and disaster risk diminution (DRD). At the same time, the strategy has to contribute to regional integration and price volatility control – through production increase and stability of food commodity stocks, (Kruzslicika, 2013).

The diversity of instruments that measure food security available at present provides for an extremely wide range of options, so that the validity of a measurement instrument is inseparable from the purpose for which it was designed so as to be adequately used.

1. Importance attached to undernourishment by FAO.

The *Food and Agriculture Organization* of the United Nations, through the “Food Balance Sheets” periodically evaluates the world food situation, and make a detailed examination and appraisal of the food and agricultural situation in a country; and this process implies three stages, namely: collection of data on the available food supply per capita by dividing total deliveries by the number of persons; the calculation of calories and of certain nutrients available per capita. FAO and U.S.D.A. (United States Department of Agriculture) is based on data aggregated at national level as food security measurement tools, representing the availability of foodstuffs based on the Food Balance Sheets, for instance the supplied foodstuffs, total quantity of produced and imported food, animal feed, production used as planting seeds, production processed for food and non-food purposes and losses during storage and transport.

2. Global Hunger Index - GHI has been developed by I.F.P.R.I. (*International Food Policy Research Institute*) and it is calculated each year in order to measure “hunger” at global level, by regions and countries.

Three indicators of equal value are used, namely:

1) undernourishment, which reflects the share of population with insufficient calorie intake (for instance, the share of undernourished people in total population);

2) underweight children – the share of children aged under 5 years who are underweight represents an undernourishment indicator for children;

3) infant death rate: death rate in children aged under 5. The data on infant death rate and on undernourished children come from studies and databases of UNICEF (the United Nations International Children's Emergency Fund - UNICEF) and FAO.

The GHI indicator, for the year 2014, was calculated at world level for 120 countries, and it ranks countries on a 100 point scale, with 0 being the best score (“no hunger”) and 100 being the worst (Figure 1); thus, the group of countries with an *extremely alarming situation* has values under 30, the category *alarming* has values between 20 and 29.9, values between 10 and 19.9 indicate a *serious situation*, values between 5 and 9.9 points reflect *moderate hunger*, while values less than 4.9 reflect *low hunger*.

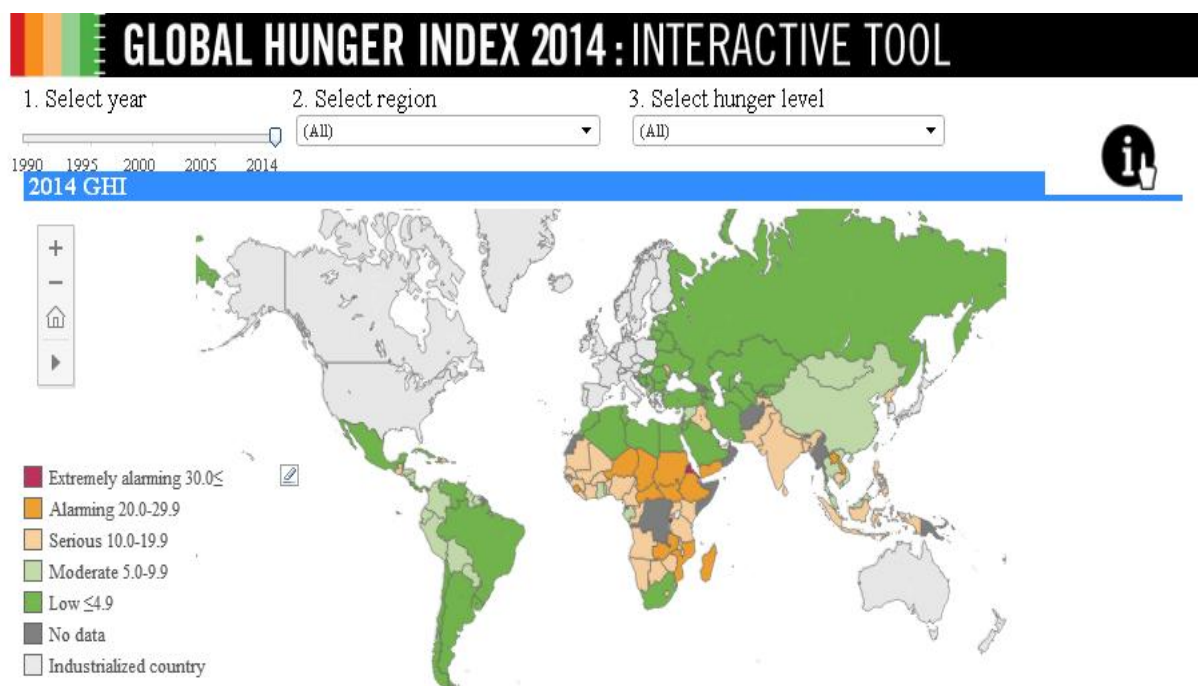


Figure 1. Hunger Map in the year 2014, calculated on the basis of Global Hunger Index

Source: IFPRI *International Food Policy Research Institute, 2014.*

In the period 1990-2014, the Global Hunger Index calculated for Romania has a value less than 5 points, the score representing a low hunger level (Figure 2).

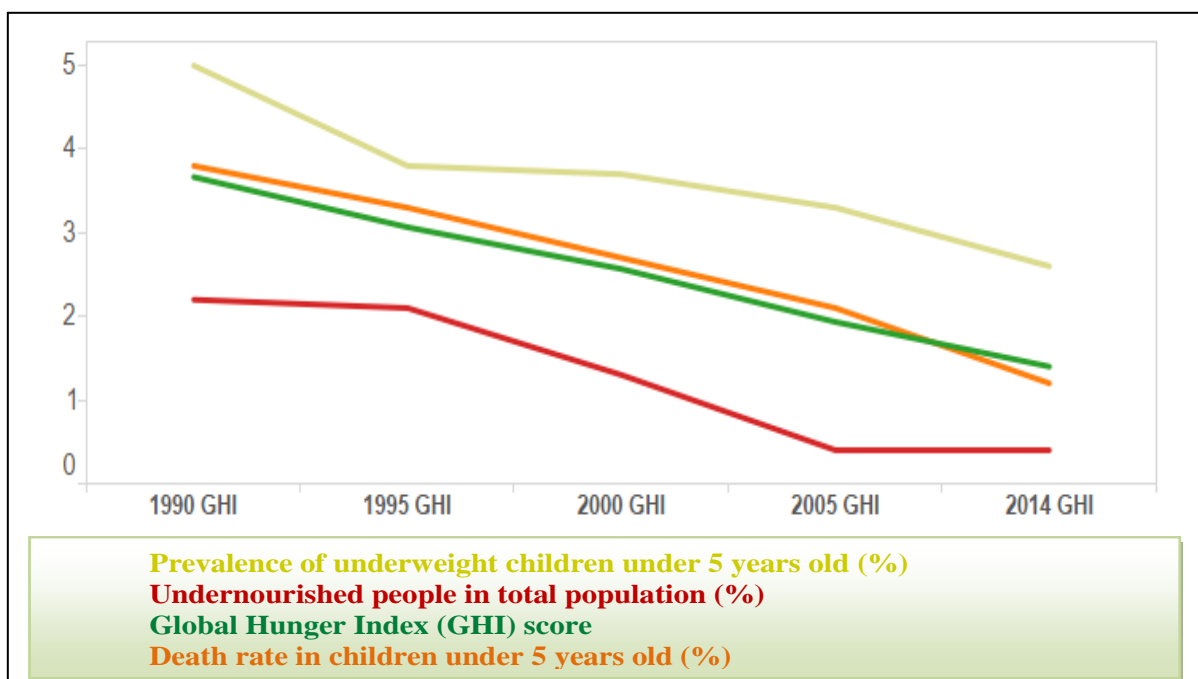


Figure 2. Global Hunger Index, Romania’s score in the period 1990-2014

Source: IFPRI *International Food Policy Research Institute, 2014.*

3. Global Food Security Index – GFSI

At world level, in July 2012, the Economist Intelligence Unit (EIU) launched the Global Food Security Index. This is another multidimensional tool to assess the food

security tendencies at country level. Among its characteristics, we can find the defining of 30 global indicators, on a set of 109 countries, which measure three food security aspects: aspects specific to affordability (6 indicators), availability, nutritional quality and food safety, both in the developed and developing countries. The general objective of EIU study is to assess the countries most and least vulnerable to food insecurity in the world, through categories of affordability, availability and quality and food safety.

In October 2012, EIU began to update the index quarterly, for adjusting the impact of fluctuating food prices. This adjustment factor is applied to the affordability score of each country and it is based on the modifications in the growth of incomes and food prices at world level and by each country.

All the scores are normalized on a scale from 0 to 100 where 100 is mostly favourable. The scores by category are calculated from the weighted average of scores at the basis of indicators. The general score is a weighted mean of scores by category¹ (Kruzslıcika, 2013).

While in the year 2013 Romania ranked 39 in 105 countries, with a total score of 64.3 out of 100 points, in 2014 it went down to position 44 in 109 countries, with a score of 61.3 points. From this indicator perspective, our country had a strong decline, being in the top 10 of these countries, by -3 points in 2014 compared to 2013 (Table 1), having before it only countries like Madagascar (with a -3.1 decline) and Myanmar (-4.1). The possible causes of this decline are represented by the changes produced in population's incomes, food prices and increase of agricultural production volatility.

Table 1

Picture of the 10 countries with the best performance and the strongest decline, 2014 versus 2013

	Countries with best performance 2014 versus 2013		Countries with the strongest decline 2014 versus 2013	
1	Uganda	+5.8	Myanmar	-4.1
2	Togo	+5.2	Madagascar	-3.1
3	Serbia	+5.0	Romania	-3.0
4	Malawi	+4.9	Egypt	-2.9
5	Benin	+4.8	Tunisia	-2.9
6	Mali	+4.7	Nigeria	-1.6
7	Sierra Leone	+4.7	Ukraine	-1.6
8	Sudan	+4.7	Salvador	-1.4
9	Azerbaijan	+4.6	Bangladesh	-1.0
10	Slovakia	+4.4	Mozambique	-1.0

Source: based on *Global Food Security Index – GFSI*, Economist Intelligence Unit (EIU) 2014.

Even in this decline context, Romania ranks in the group that has values ranging from 54.0 to 72.10, being considered to have quite a medium to good position according to this indicator.

¹ EIU (Economist Intelligence Unit) methodology.

Table 2

Global Food Security Index, Romania's profile

	Score / 100			Ranking/ 109		
	2012	2013	2014	2012	2013	2014
Total GFSI score	64.3	64.3	61.3	39	39	44
1) Food affordability	61.8	58.6	58.9	41	48	= 48 ²
2) Food availabilities	65.7	65.8	59.1	31	31	44
3) Quality and food safety	66.6	74.4	73.6	38	29	31

Source: based on *Global Food Security Index – GFSI*, Economist Intelligence Unit (EIU) 2014.

Analyzing Romania's profile, together with the other 109 countries included in the GFSI ranking, it is quite interesting to mention the fact that in the year 2014, our country ranked 48, at equality with China, as regards *food affordability*; it ranked 44 in *food availabilities* and 31 for *quality and food safety* (Table 2).

4. These are added to other analytical tools for food security assessment at macroeconomic level, as each organization uses the most adequate tool for the purpose and level of measurements, so that we can mention the following: **FEWS NET** (Famine Early Warning Systems Network) and **IPC** (The Integrated Food Security Phase Classification).

The Famine Early Warning Systems Network represents an important supplier of information and analysis on food insecurity. Created in 1985 by the United States Agency for International Development (USAID) and the US Department of State after the devastating famine from East and West Africa, FEWS NET is nowadays a valuable resource for our whole planet. Using an integrated approach taking into consideration the climate changes, agricultural production, prices, trade, nutrition as well as other factors, together with an understanding of local subsistence means, the NET FEWS forecasts have the most probable results and anticipate the change in advance to six – twelve months (www.fews.net).

IPC (The Integrated Food Security Phase Classification) is a set of standardized instruments that attempts to provide a "common currency" in order to classify the severity and intensity of food insecurity. This approach uses international standards so as to enable comparisons across countries and time. It is based on the consensus consolidation so as to provide the policy-makers with an accurate analysis of food security, together with the response objectives both in emergency and development context (www.ipcinfo.org).

CONCLUSIONS

The food security concept has constantly evolved. Initially starting from the approach that food security exists when a country has sufficient food availabilities until the recognition that a supply with sufficient foodstuffs does not permit *per se* reaching food security at individual and household level.

Food security is often associated to food self-sufficiency and to the need to produce more foodstuffs. For the economies with low incomes, in the case when a high share of the population lives in the rural area and incomes depend on agriculture, the increase of food production might be an important element in increasing food security, from the perspective

² Rank 48 at equality with China.

of small farmers' income growth. However, food security has much closer relations with the poverty problems, labour employment and income generation. In the developed countries, there is an increased focus of food quality and safety and on the social protection of persons from the less-favoured categories.

In order to reach the food security objective, it is necessary that all the four dimensions are simultaneously applied: *availability* (national production/local production, import capacity, food aids); *access* (purchasing power, price level, market stability, and infrastructure); *stability* (permanent and sustainable access to food resources) and *health* (hygiene quality, food safety and balanced nutrition).

Reaching food security is influenced by numerous variables, being conditioned by multiple factors, starting with the sustainable management of agricultural resources, constant supply at accessible prices, together with getting aware of the main importance of balanced nutrition.

The changes in food security can be identified, in time, by the increase of food prices, which leads to an increased number of households being under the incidence of food insecurity. These modifications can be closely linked to macro-economic problems and would require a review of the basic governmental policy.

ACKNOWLEDGMENTS

„This work was financially supported through the project "Routes of academic excellence in doctoral and post-doctoral research - READ" co-financed through the European Social Fund, by Sectoral Operational Programme Human Resources Development 2007-2013, contract no POSDRU/159/1.5/S/137926.”

REFERENCES

1. **K.VON GREBMER, A.SALTZMAN, E.BIROL, D.WIESMANN, N.PRASAI, S.YIN. YOHANNES, P.MENON, J.THOMPSON, A.SONNTAG** (2014), 2014 Global Hunger Index: The Challenge of Hidden Hunger. Bonn, Washington, D.C., and Dublin: Welthungerhilfe, International Food Policy Research Institute, and Concern Worldwide.
2. **KRUZSLIČKA, MIHAELA** (2013), Piețele agricole românești în contextul european de securitate și siguranță alimentară, Ph.D Thesis, National Institute of Economic Research C. Kirițescu", Bucharest.
3. **PINSTRUP, A.** (2009), Food security: definition and Measurement, February 2009, Volume 1, Issue 1, pp 5-7, Springer Link, <http://link.springer.com/article/10.1007%2Fs12571-008-0002-y>.
4. **PRASAI, N.** (2014), Global Hunger Index 2014: Interactive Tool Web application <http://www.ifpri.org/tools/2014-ghi-map>.
5. * * * The Economist Intelligence Unit Limited 2014, Global food security index 2014 An annual measure of the state of global food security. <file:///C:/Documents%20and%20Settings/Pc/Desktop/EIU%20Global%20Food%20Security%20Index%20-%202014%20Findings%20&%20Methodology.pdf>
6. * * * <http://foodsecurityindex.eiu.com/>, 2015, Global food security index 2014.
7. * * * <http://www.ipcinfo.org/>.
8. * * * <http://www.fews.net/>.