

Evaluating the impact of policy on food and nutrition security outcomes at the household level

Policy- and decision-makers need to 'take a look' into the future when formulating policies that are expected to have an impact on a population's food and nutrition security. It is difficult, however, to assess the impacts of policies on food and nutrition security outcomes because many factors that determine impacts are uncertain and interact at various scales and levels. Agricultural and food prices may change, for example, as a result of increased scarcity of fertile land, changing consumption patterns or a global macroeconomic downturn, affecting households and individuals in many different ways. Evaluating these impacts, however complicated, is crucial as it allows policies to respond better to the needs of various segments of the population and supports the development and implementation of appropriate global, regional and national strategies.



Researchers at LEI Wageningen UR have been working on developing methods that help to analyse the expected impacts of changes in policies and conditions on food markets and socio-economic groups in regions facing food insecurity. More specifically, LEI Wageningen UR, has been developing household and nutrition modules to enhance the analyses of its global economic simulation model, the Modular Applied GeNeral Equilibrium Tool (MAGNET) (Box 1), pertaining to food and nutrition security. This research project was developed jointly with the EU project 'FOODSECURE: Exploring the future of food and nutrition security', the research programme Global Food Security, and the Netherlands Assessment Agency (PBL).

Market drivers and food security outcomes

Different types of households are likely to feel the effects of economic shocks and changes in government policies in different ways because of differences in income and consumption patterns. For example, a contraction in a labour-intensive industry such as the textile industry will have a much greater impact on households deriving most of their income from this industry, compared with those engaging in, say, agricultural activities. Similarly, increases in the price of rice will typically affect poorer households that spend a larger proportion of their income on staples. Based on a careful selection of indicators on the socio-economic dimensions of food and nutrition security (for more details, see Laborde et al., 2013; Pangaribowo

BOX 1 What is the MAGNET Model?

MAGNET is a global economic simulation model used for impact and policy analysis. It can be used, for example, to examine the impacts of high food prices on food security, the consequences of a shift towards a more bio-based economy and the impacts of various trade agreements and reforms. The MAGNET model can include up to 134 countries/regions of the world, 57 commodities, including 12 agricultural commodities.

et al., 2013), such mechanisms can be used to develop quantitative scenarios for future food and nutrition security (Figure 1).

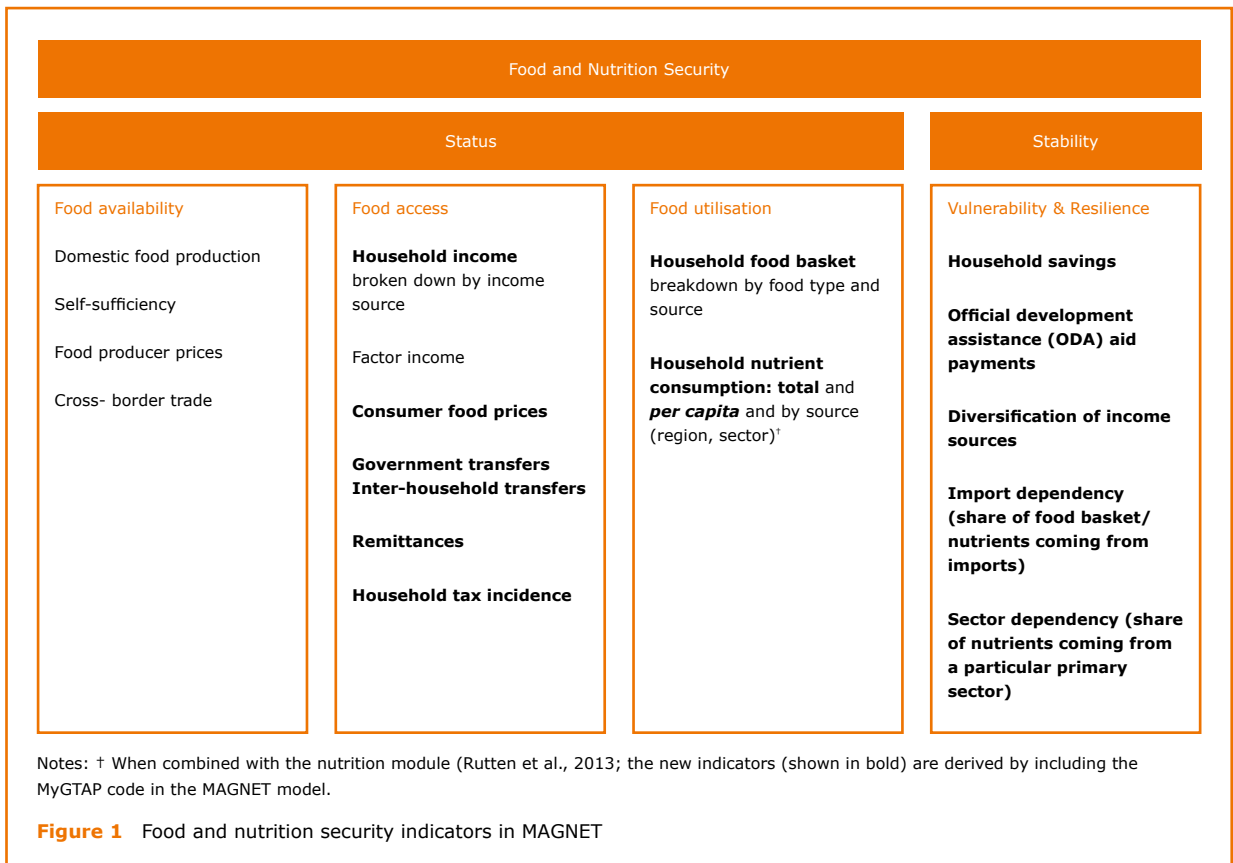
The MAGNET household module incorporates the theory and code of the MyGTAP model (Walmsley and Minor 2013; Minor and Walmsley 2013) to include multiple types of households grouped by income and consumption pattern (Kuiper and Shutes 2014). This allows the impact of economic shocks and policies to be assessed for different types of households and the identification of vulnerable household groups in selected countries. The method produces several indicators of future food security outcomes at the household level. The extended model also allows for an evaluation of the impact of government tax policies and subsidy programmes to redress undesirable social outcomes.

Naturally, there are substantial limitations to this broad-brush type of analysis. Analysts, therefore, make allowances for missing data on informal markets, gender and intra-household distribution and sanitation standards and other key factors in their interpretation of results on household-level food and nutrition security outcomes in the future.

Nutrients and the food basket

To improve the analysis of dietary change and food and nutrition security and health consequences at the global, national and household level, it is important that models incorporate more detailed nutritional impacts. For example, insufficient intake of macronutrients or micronutrients could have important negative health effects in the long term, resulting in so-called *deficiency diseases* (WHO 2004). Micronutrients, in combination with limiting fat, salt and sugar intake, have an important role to play in combating diet-related chronic diseases, such as heart and cardiovascular disease, certain types of cancers, diabetes, obesity, osteoporosis and dental disease (WHO 2004). These negative health conditions have various feedback impacts on the economy as changes in mortality and morbidity affect labour market supply, productivity, well-being (utility) and health care costs.

Agricultural economists are venturing into the nutritional domain by ‘unpacking’ the food products in the consumption basket in terms of their nutrient content – both macronutrients and micronutrients.





Opening up the consumption basket in terms of nutrient content can signal in advance whether the nutrient adequacy of diets will be affected by changes in the wider economy, and if so, where policy action may be needed. Most models, however, narrowly focus on macronutrient (i.e., calorie and sometimes protein) intake, which signals potential deficiencies (or affluence) in quantities consumed, ignoring micronutrient intake. These approaches also do not capture where nutrients come from, i.e., the linkages between agricultural production, food processing, food-related services, trade and food consumption. The newly developed nutrition module in MAGNET (Rutten et al., 2013) traces the macronutrients of proteins, fats, carbohydrates and calories from farm to fork, taking into account trade, and is thereby able to calculate in more detail nutrient content

associated with the private household consumption of food for all regions (Figure 1). It is set up for the inclusion of micronutrients in the future.

Taking it to the next level

The inclusion of multiple household types will allow for a range of poverty, food and nutrition indicators to be calculated for each household, while adding micronutrient data to the MAGNET model will facilitate the analysis of how macroeconomic shocks and/or policies impact upon diets, nutrition and eventually health (and what the economy-wide implications are of changing diets). It is envisaged that the results will be used to enhance policy- and decision-making at the various levels. As part of a USAID-funded project, the extended MAGNET model is currently being used to evaluate the future of the poor in Ghana. In addition to this, the model is being used to assess the food security impacts of a global shift towards a bio-based economy and of reduced food losses and waste.



Contributors

Lindsay Shutes lindsay.shutes@wur.nl
Martine Rutten
Thom Achterbosch

References and further reading materials

Dijk, M. van and Meijerink, G. (forthcoming) A review of global food security scenario and assessment studies: results, gaps and research priorities. *Global Food Security*

FAO (2001) *Food Balance Sheets: A Handbook*. FAO, Rome, Italy.
www.fao.org/economic/ess/ess-fs/fs-methods/ess-fbs02/en/

Foster, F., Greer, J. and Thorbecke, E. (1984) A class of decomposable poverty measures. *Econometrica* 52 (3): 761-66.

Kuiper, M. and Shutes, L (forthcoming), Expanding the household coverage of global simulation models: an application to Ghana, FoodSecure Technical Paper.

Minor, P. and Walmsley, T. (2013) MyGTAP: A Program for Customizing and Extending the GTAP Database for Multiple Households, Split Factors, Remittances, Foreign Aid and Transfers. GTAP Working Paper No. 79, Center for Global Trade Analysis, Purdue University. <https://www.gtap.agecon.purdue.edu/resources/download/6660.pdf>

Pangaribowo, E.H., Gerber N., and Torero, M. (2013), Food and nutrition security indicators: A review, ZEF, Working Paper 108, Bonn, February 2013.

Rutten, M., Tabeau A. and Godeschalk, F. (2013) A New Methodology for Incorporating Nutrition Indicators in Economy-wide Scenario Analyses. FOODSECURE Technical Paper No 1. [www3.lei.wur.nl/FoodSecurePublications/TechPap01_FoodSecure %20Paper%20Nutrition%20Module%20MAGNET.pdf](http://www3.lei.wur.nl/FoodSecurePublications/TechPap01_FoodSecure%20Paper%20Nutrition%20Module%20MAGNET.pdf).

Walmsley, T. and Minor, P. (2013) Walmsley, T. and Minor, P. (2013) MyGTAP Model: A Model for Employing Data from the MyGTAP Data Application, Multiple Households, Split Factors, Remittances, Foreign Aid and Transfers. GTAP Working Paper 78. Center for Global Trade Analysis, Purdue University.
www.gtap.agecon.purdue.edu/resources/download/6659.pdf

WHO (2004) Global Strategy on Diet, Health and Physical Activity. Strategy Document No. WHA57.17. World Health Organization, Geneva.
http://www.who.int/dietphysicalactivity/strategy/eb11344/strategy_english_web.pdf (accessed 4 March 2014)

Woltjer, G., Rutten, M. and Kuiper, M. (2013a) Working with MAGNET: User guide. Internal document, LEI Wageningen UR, The Hague.

Woltjer, G., Kuiper, M. and Kavallari, A., van Meijl, H., Powell, J., Rutten, M., Shutes, L., and Tabeau, A. (2013b) The MAGNET model: Module description. Internal document, LEI Wageningen UR, The Hague.