

A review of food security scenario studies: Gaps and ways forward

With the recent renewal of interest in agriculture and global food security issues, food security has improved – ‘food markets are becoming more balanced and less volatile in recent years’ (FAO 2013). But what about the looming challenge of feeding 9 billion people in 2050 that is now high on the policy agenda? Will the world be able to feed itself then? How can policy-makers be better equipped to make more informed decisions and develop appropriate policies to meet these challenges?



To answer these questions, more and more studies on global food and nutrition security have emerged. Several researchers have used model-based scenarios to explore the effects of the main drivers (or factors) affecting global food supply and demand in the future. These studies provide different answers, giving rise to a number of new questions. What are the main assumptions and drivers underlying these studies? What are the data limitations? Are the outcomes comparable or do they diverge, by how much and why? What are the major gaps in the food security scenario studies and how can they be improved? These were some of the concerns that prompted researchers at Wageningen UR, to set up a study to compare and evaluate global scenario studies focussing on food and nutrition security.

The researchers collected information on all major global food security scenario studies published

between 2000 and mid-2013 by international organisations, including NGOs and research institutes. The results from the 12 scenario studies (encompassing 43 individual scenarios) were combined into a database containing comparable information on major driving forces and food security related outcomes. The studies presented information on four key indicators of food security: (1) food prices, (2) calorie availability, (3) child malnutrition and (4) prevalence of undernourishment. Food prices and child malnutrition are highlighted here.

What studying the scenarios revealed

A review of the historical trends and future projections for cereal food prices illustrated that there is in particular a high level of uncertainty associated with future food price developments.

Food price estimates varied widely (cereal prices were used as proxies as they are closely linked, see Figure 1). Food price projections depend very much on the underlying assumptions of driving forces (those factors affecting the supply and demand of food). For example, prices tend to decrease or remain stable for global scenarios that take into account reduced inequality, global cooperation, lifestyle change and more efficient technologies. Prices increase under regional competition scenarios, which have typically inward-looking policies (e.g., trade barriers), resulting in slower economic growth and technical change. On average, prices are projected to increase to 227 US\$/ton in 2050 (the blue line), ranging from 175 US\$/ton (lower quartile (a quartile is a statistical term used to describe a range of data that is divided into four equal parts)) to 308 US\$/ton (upper quartile, in dark grey).

The scenario outcomes for child malnutrition are also diverse (Figure 2). Despite the marked variability in projections, the figures indicate that almost all scenarios foresee a downward trend in child malnutrition in the coming decades, reaching on average 105 million children in 2050 (blue line), ranging from 78.8 million (lower quartile) to 131 million children (upper quartile, in dark grey). It is important to note that the data used for this variable compares absolute figures of child malnutrition. These figures are difficult to compare across scenarios due to differences in assumptions on population growth. Unfortunately, data on the total number of children that is needed to calculate shares are not available.

New drivers of food security outcomes

There are several underlying food and nutrition security drivers and cause-effect relations are complex. As a result, most scenario studies tend to simplify these relationships, only incorporating some of the multiple potential driving forces in their analysis. Figure 3 gives a graphic picture of the drivers of food supply and demand used in the scenario studies as well as those mentioned

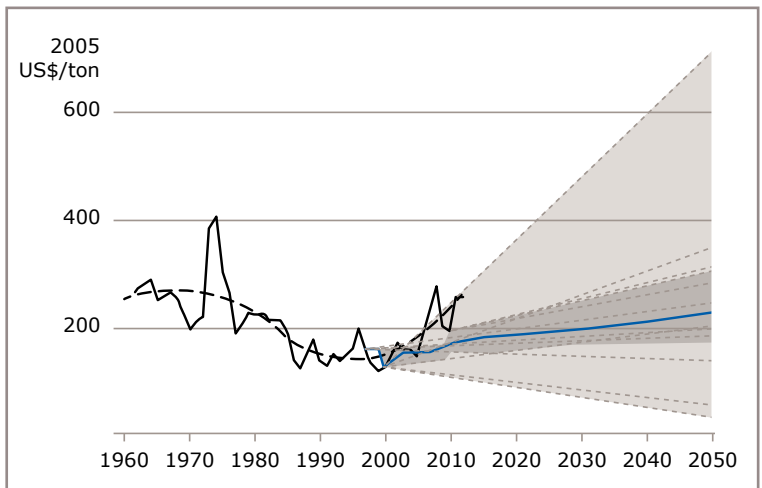


Figure 1 Cereal food prices - historical trend and future projections (Depicts information for wheat prices. For similar figures for rice and corn see van Dijk and Meijerink (2014) Historical price (solid black line), historical trend (dashed black line), scenario projections (grey dashed lines), median of all projections (blue line), total price range (light grey area) and interquartile range (dark grey area))

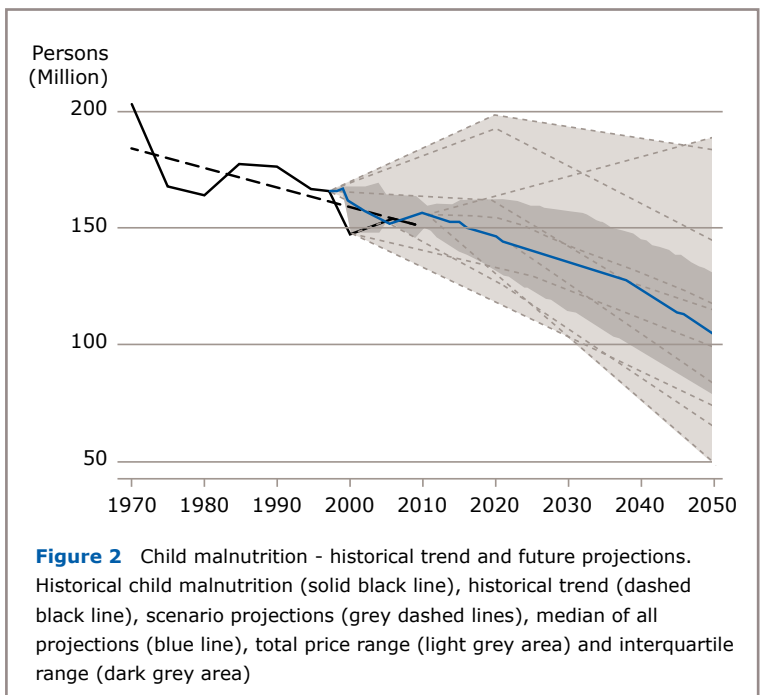
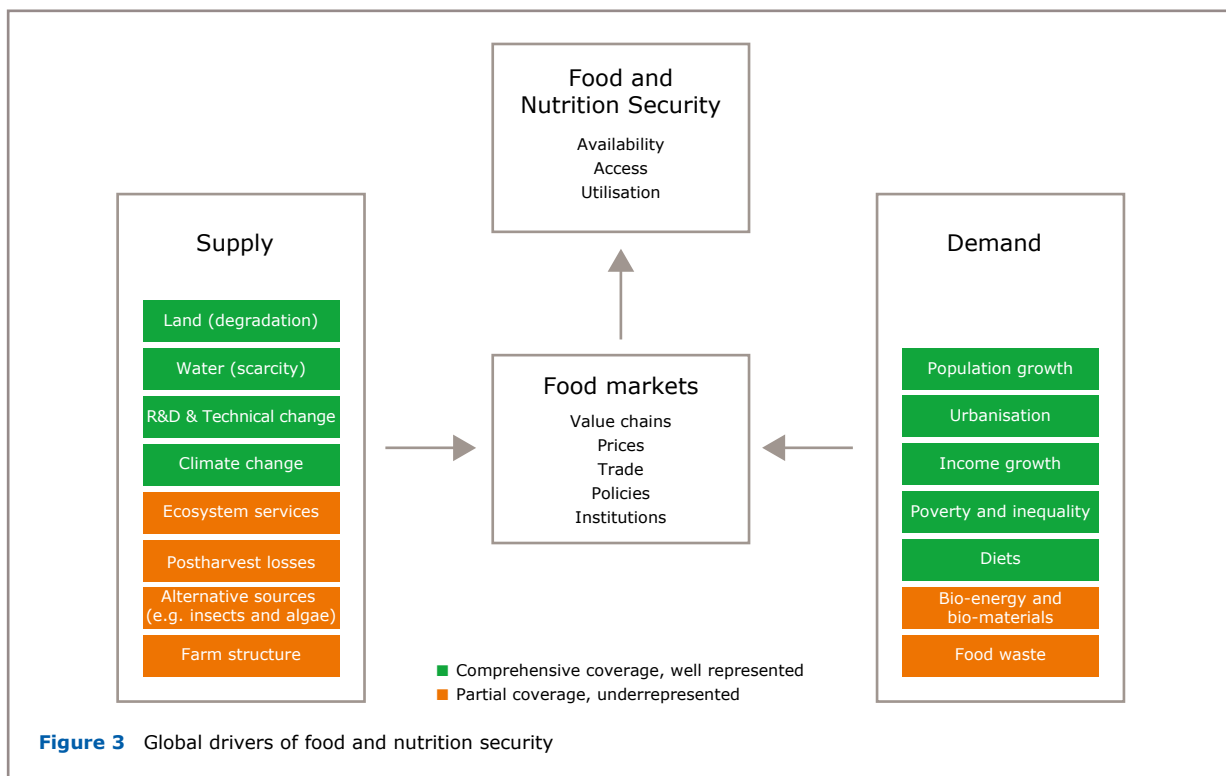


Figure 2 Child malnutrition - historical trend and future projections. Historical child malnutrition (solid black line), historical trend (dashed black line), scenario projections (grey dashed lines), median of all projections (blue line), total price range (light grey area) and interquartile range (dark grey area)

in the broader literature. The drivers highlighted in green were taken into account by most of the scenario studies, although the way they dealt with climate change, the increasing use of bio-energy and bio-materials, and the change in diets and consumer preferences was sometimes superficial. The driving forces indicated in the orange boxes have yet to be fully incorporated into scenario studies, partly because they represent new developments (e.g., alternative sources of food supply such as insects and algae) or because they represent a shift in thinking in relation to the food and nutrition security concept (e.g., the role of poverty and inequality).



The way forward

The review of the scenario studies demonstrated that the studies restricted their focus to two of the four dimensions of food security: food availability and food accessibility, while food utilisation and stability were hardly covered. The reason for this has to do with the way the models have been built – they are well developed to simulate bio-physical and market dynamics but have limited capacity to analyse the household and individual aspect of food demand and food security.

The researchers also found that several new developments that impact on food security have not yet been wholly incorporated into the scenario models. There were only a few studies that looked at emerging issues such as biofuels and changes in diets, while other important drivers, such as alternative sources of food, farm structure, poverty and inequality and food waste have hardly been considered, although several efforts are underway. New scenario studies that focus on global food and nutrition security should, therefore, make an effort to include these new developments. This is the main aim of the ongoing FOODSECURE project (www.foodsecure.eu) funded by the European Union (EU) and the Ministry of Economic Affairs and led by LEI Wageningen UR

References and further reading materials

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