**The IMPACT model**

The International Model for Policy Analysis of Agricultural Commodity and Trade (IMPACT) is a partial equilibrium, multi–commodity, multi-country model which covers 56 crops and livestock commodities. It includes 159 countries/regions where each country is linked to the rest of the world through international trade and 320 food producing units (grouped according to political boundaries and major river basins). Demand is a function of prices, income, and population growth. Crop production is determined by crop and input prices, the rate of productivity growth, and water availability. The model uses a system of supply and demand elasticities incorporated into a series of linear and nonlinear equations, to approximate the underlying production and demand functions. World agricultural commodity prices are determined annually at levels that clear international markets. IMPACT generates long-term projections of food supply, demand, trade, and prices that enable us to estimate the trends in global food security between 2010 and 2050.

Food security indicators such as the percentage and number of malnourished children under the age of five and the population at risk of hunger are also computed in IMPACT. The percent of malnourished children is calculated using the relationship discovered by Smith and Haddad (2000) in a cross-country study. This formula is based on the observed impact of food availability, female education where female secondary enrollment rates serve as proxy, and equal access to health and sanitation where life expectancy, and access to safe water is used as proxy. The data used to make this calculation are obtained from: the World Health Organization’s Global Database on Child Growth Malnutrition, the United Nations Administrative Committee on Coordination- Subcommittee on Nutrition, the World Bank’s World Development Indicators, the FAO FAOSTAT database, and the United Nations Organization for Education, Science and Culture (UNESCO) UNESCOSTAT database.

The share at risk is a share of the total population that is at risk of suffering food insecurity. This calculation is based on a strong empirical correlation between the share of malnourished within the total population and the relative availability of food and is adapted from the work done by Fischer et al. (2005) in the International Institute for Applied Systems Analysis (IIASA) World Food System used by IIASA and FAO.

**Source:**

Rosegrant, M.W., Magalhaes, E., Valmonte-Santos, R.A., Mason-D’Croz, D., 2015. Benefits and Costs of the Food Security and Nutrition Targets for the Post-2015 Development Agenda. Working Paper - The Copenhagen Consensus Center