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# ***Issue Brief: Inequality and inclusiveness in foresight on food and nutrition security: scenarios and policy options***

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## ***3 seconds***

Convergence between low and high income countries does not guarantee improved equality within low income countries. We find that education and demographic change are key determinants of within country equality and should be supported through relevant policies.

## ***30 seconds***

There is sufficient food produced globally to feed the world, however access to sufficient food of the right quality is not universal. We examine how equality and inclusiveness may undercut or support food and nutrition insecurity in contrasting future worlds. We focus on inequality at the national level by examining future food and nutrition security outcomes by household type including along a rural-urban gradient. We find that improved equality between countries does not necessarily translate into improved within country equality. Ghana provides a clear illustration with the more equal worlds in national terms resulting in a worsening of the within-country income distribution. Demographic change through education and urbanization is key for equality: improving income distribution and the situation of the poor. The scenario analysis highlights the need to take the wide view. To consider developments in agriculture and non-agriculture together and account for demographic and education trends. Policies that operate in this arena include investments in agricultural productivity and education as long-term policies and medium term interventions to support the poor in the form of transfers, redistributive policies and provision of school meals to support educational investments.

## **300 seconds**

### *Introduction*

There is sufficient food produced globally to feed the world, however access to sufficient food of the right quality is not universal. This paper focuses on inequality and inclusiveness and how the distribution (and quality) of food may undercut or help to strengthen food and nutrition insecurity in contrasting future worlds. Inequality is relevant at multiple scales that relate to both direct and underlying causes of hunger and malnutrition. Intra-household equality is about the allocation of food, money and power of decision-making. At the household level inequality relates to unequal access to assets such as land or fishing grounds, capital and infrastructure for livelihood activities of the household, and access to care, hygiene environment and opportunities for schooling. At the national level, there are unequal levels of wealth and rates of economic growth among countries and region, with large variation in the level of basic services that can be supported with fiscal resources. In our economic analysis we focus on inequality at the national level by examining future food and nutrition security outcomes by income decile and along a rural-urban gradient. This is a considerable scientific innovation, which allows us to explore plausible future outcomes of food availability, food accessibility and dietary diversity within one single framework. Within the FoodSecure project, stakeholders have developed a set of four future worlds defined along two axes: Sustainability and Inequality. Using inequality as a defining characteristic of future worlds draws attention to the possibility of possible futures that differ not only in terms of stress on the ecological system but also on the socio-economic system.

### *Approach*

#### *Going beyond the state of art: Adding households and nutrition to the modelling tool box*

Inequality and food and nutrition security are not easily addressed at the national level due to within-country differences. Therefore the global general equilibrium model MAGNET model has been extended in two major ways. First of all adding a module distinguishing different types of households allowing us to trace developments of income and (food) consumption for representative household groups tracking within-country differences. Second a nutrition module has been developed to compute macro-nutrients (calories, fat, protein and carbohydrates) associated with consumption at national and household level.

#### *Diverging national income developments translate in diverging quality of food consumption*

Diverging trends in inequality are translated at the national level as converging (ECO & FFANF) or diverging (ONEPW & TLTL) income per capita. Apart from GDP and population growth (translating into income per capita trends), the four worlds also differ in technological advances in crop and livestock production, regulation (or absence thereof) of conversion of land to agriculture, consumer taste preferences towards meat consumption and international trade liberalization. Of these drivers national income per capita developments dominate the outcomes. The one exception is the preference shift away from meat in ECO which lowers agricultural prices and reduces the pressure on land.

### *Results*

#### *Yield increases from technical change are only part of the yield story*

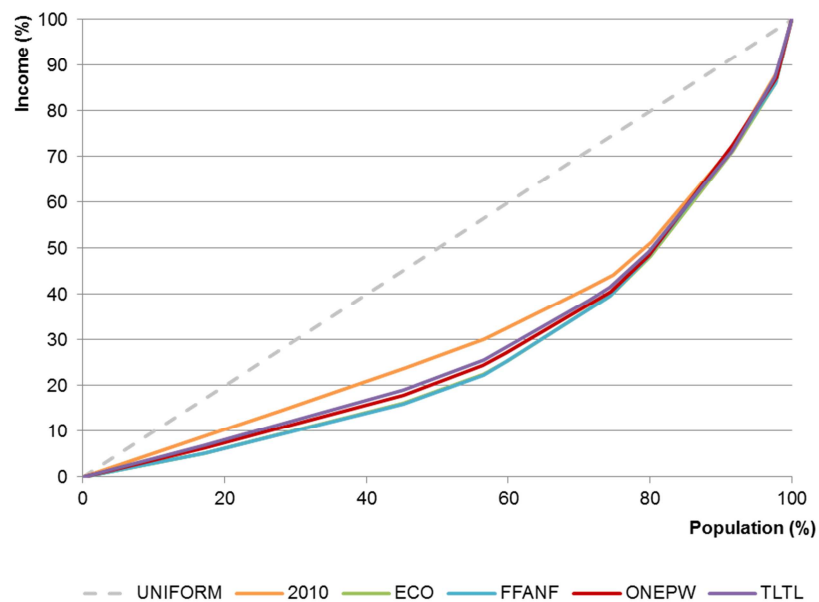
Increasing agricultural yields through changes in technology is a commonly proposed policy measure to increase food and nutrition security (FNS). This focuses on increasing the availability and affordability of food. Whether this translates into increased accessibility depends on the income sources of vulnerable groups; low agricultural prices erode the income of poor households living of

agricultural activities and may reduce their food access. Abstracting from such income effects, substantial changes in agricultural technology induce feedback effects which alter the resulting output per hectare when the input mix, among which labour and capital, responds to the new possibilities. These macro-economic feedback effects mute the different technological developments making the four worlds less different in their yield than the technical change drivers would suggest.

*National convergence not necessarily pro-poor within countries*

By design national incomes are converging in the more equal ECO and FFANF worlds. The additional detail at household level shows that this international convergence is not necessarily pro-poor. In countries where we include additional household detail we find a worsening of the income distribution relative to the 2010 level. Ghana provides a clear illustration with the more equal worlds in national terms (ECO and FFANF) resulting in a worsening of the within-country income distribution, shown as a greater distance from the 45 degree line in the Lorenz curve below. The results suggest that the unskilled population is not mobile but locked into low-income agriculture.

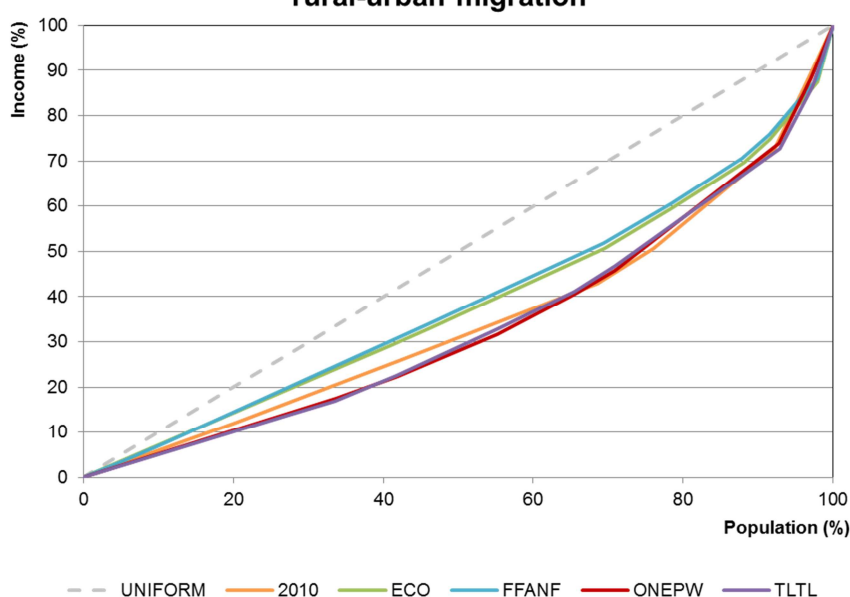
**Lorenz curve Ghana**



*Demographic changes - education and urbanization - are key for inequality*

The set-up of the worlds clearly does not do justice to the expected developments and vision of the stakeholders of contrasting developments for the poor. Two additional drivers are therefore added to better capture the inequality dimension: education and urbanization because they are important underlying factors of income and food accessibility. In ECO and FFANF countries are assumed to expand their schooling systems and outcomes from schooling in varying degrees with assumptions borrowed from Wittgenstein Centre population projections. To contrast ONEPW and TLTL have a pessimistic outlook with fixed numbers of students implying declining rates of skilled labour when populations grow. We also adjust the population shares of rural and urban households in the countries with additional household detail to reflect business-as-usual urbanization for ONEPW and TLTL and a faster urbanization rate in ECO and FFANF. Adding these drivers to the mix has a massive impact on the income distribution, where the poor are now better off in the more equal worlds and worse off in the unequal worlds relative to the 2010 distribution, as shown in the diagram below.

### Lorenz curve Ghana with education and rural-urban migration



#### *Demographic changes are also a major driver of agri-food prices*

Apart from having a major impact on the distribution of income across households, thus affecting accessibility of food, demographic change alters the key variables of the agri-food system. Education and urbanization change the supply of agricultural labour thus altering a key driver from the input side. At the same time rising incomes due to skilled labour and an increase in number of people with an urban diet change the type of food demand, generally increasing the demand for meat and processed foods. Projecting future agri-food prices thus needs to look beyond the agri-food system.

#### *Implications and recommendations*

The FoodSecure worlds with their contrasting views on the future highlighted several scientific challenges which could only be partially met in the context of this project. Introducing demographic developments into the MAGNET projections proved to be a challenging exercise. MAGNET's economy-wide coverage with many feedback loops quickly highlights inconsistencies in the multi-dimensional scenarios or model adjustment mechanisms. Specific areas where either drivers or model can be improved are in linking factors commonly thought of in projections (for example crucial assumptions about available production technologies, the ease of substitution between factors of production, economy wide technical change (TFP)), i.e. linking a technological focus, with broader economy-wide demographic changes due to education and urbanization.

The agenda for future research on food and nutrition security needs to account for societal transformations such as educational developments and rural-urban migration. These are commonly overlooked or dealt with in separation, yet affect the availability and accessibility of food by changing the structure of endowments available to an economy. In terms of policy relevance, the scenario analysis highlights the need to take the wide view: to consider developments in agriculture and non-agriculture together, along with identifying demographic and education trends. The policies that operate in this arena such as investments in agricultural productivity and education are long-term policies; medium term intervention may be needed to support the poor, such as transfers, redistributive policies and provision of school meals to support educational investments.