

## Food security: current challenges

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Food security exists when “all people have, all the time, physical, social and economic access to enough, innocuous and nutritive food for satisfying their daily energy needs and food preferences, in order to have an active and healthy life”. This way, food security has four main bases:

1. Physical availability of food
2. Economical and physical access to food
3. Appropriate and healthy use of food
4. Stability of these factors over time

### Current situation

Nowadays, the world produces enough food for the entire population. Around 30% of the food produced is even wasted. Nevertheless, with population growth and its increasing demand, the production needs to be doubled over the next 30 years.

The current problem of hunger in the world is mainly caused by lack of access to food. There has been an improvement during the last two decades, due to the reduction of the extreme poverty.

There are problems of undernourishment due to lack of balanced nutrients because of the inadequate use of food, but there is also prevalence of obesity, at the same time and in the same countries.

There are high challenges also in stability. In the last decade, higher variability in availability and access has been noticed due to physical lack of food, like price

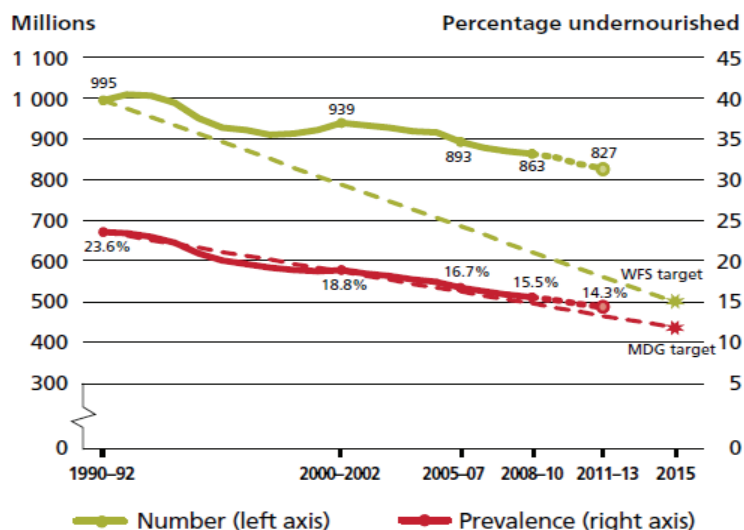
volatility because of, for example, extreme climatic events.

The number of hungry people in the world has slightly decreased to 842 millions in 2013. Considering the population increase, it is foreseen that up to 2015, the first of the millennium goals should be fulfilled at global level, which is to reduce to half the percentage of hungry people between 1990 and 2015. Nevertheless, the goal of the Food World Summit, held in 1996, will not be fulfilled, which suggested reducing to half the number of hungry people until 2015. It is also alarming that 98% of undernourished people live in developing countries.

### Food Security and its challenges

*Prices.* The first challenge is food prices. Since 2000 food prices generally tended to increase. This could be good news for farmers and food producers, but it makes the access of poor and vulnerable population to food difficult. Besides, it causes problems to the economies of countries which, like Cuba, highly depend on food imports.

A higher volatility of food prices has been reported in the last years. The soaring food price crisis of 2007/08 and 2011 directly affected the food security of 105 and 44 million of people, respectively. High price volatility seems to be a phenomenon, which will not disappear soon because it results from the circumstances that characterize our world:



Note: Data for 2011-13 in all graphics refer to provisional estimates.  
source: FAO.

Rate of FAO prices for food, 2005.2013



Source: FAO

1. Incidences of droughts, flooding, plagues and diseases as a consequence of high climatic variability, due to the climate change.

2. There are strong and fast growing demands of emerging markets- many growing economies have very big internal markets-, and every change in them affects the world market.

3. Measures of trade and agricultural policies, many times as a response to volatilities.

4. Energy prices volatility, which has its direct effects on costs of food transportation and production, but also directly on food prices through the markets of bio-fuels.

5. Speculation with food prices in the stock market.

This volatility of prices affects food security. It reduces the security of planning in the agricultural production, and this leads to a reduction of investments in the market. Agriculture can no longer be considered as a safe and calculable investment. However, there are also direct effects of price volatility on food security, like a sudden rise of food prices in the world market could endanger the food security of food importing countries with weak economies, while a drop in food prices could risk the subsistence of small producers that depend on the food sale incomes for their survival.

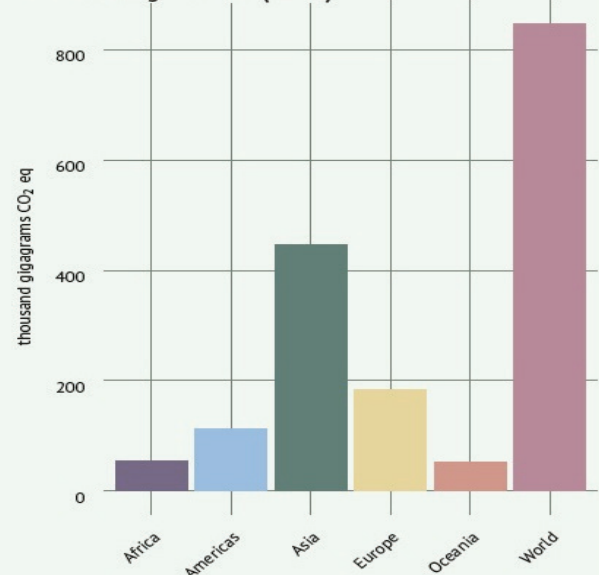
*Natural resources.* Food production depends on natural resources, like water and soils, which can be limited. Nowadays, agriculture uses 70% of the fresh water of the world, and, in many regions, water is a limiting factor for production. For doubling the production, agriculture should not use more water, since the limited resources have to be shared with other sectors with increasing demands, like drinking water for the population. An increase of agricultural production has to result from the efficiency savings of water use.

Another resource in danger is land. There is no more available land, and agricultural lands are constantly lost due to other uses. Besides, lands used for production suffer from soil degradation, which is mainly caused by mechanical soil tillage. This leads to a loss of biodiversity and organic matter in soils, which results in

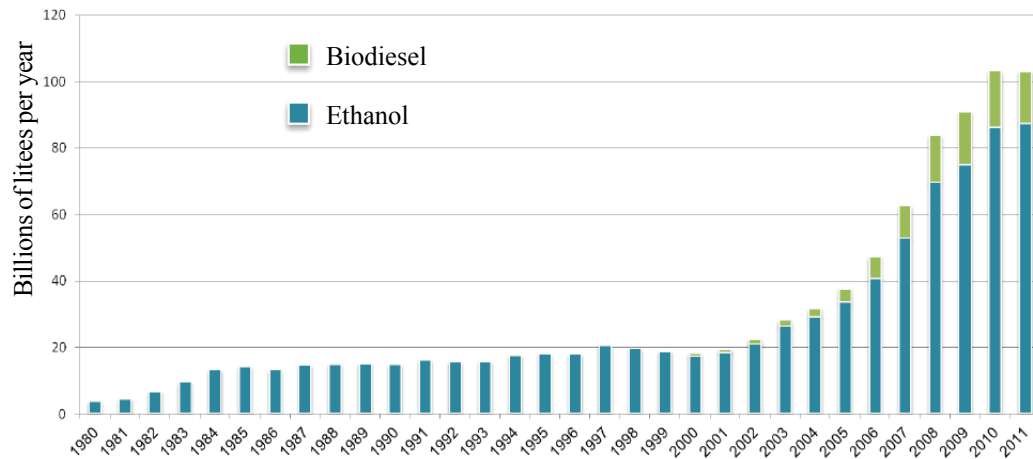
a structure loss, reduction of the potential of water and nutrient retention, increase of greenhouse gas emissions, and brings about problems due to droughts and flooding, soil losses due to erosion, and, finally, desertification.

*Climatic changes.* The agricultural production is also affected by the climatic change, mainly by extreme climatic phenomena, which has their effect on food production. Once again, the fragile ecosystems, many times with vulnerable populations, are the most affected. Agriculture not only suffers from climatic change, but also contributes to greenhouse gas emissions with the release of methane and nitrogen oxides. These gases come, for instance, from cattle production and flooded rice fields. Agriculture also, indirectly, contributes to climatic change with the changes in the land use, as in the case of deforestation. The problem is not cutting down trees, but the agricultural use of lands that follows this deforestation with the mechanical soil tillage, which

Regional greenhouse gas emissions from cultivated organic soils (2010)



Source: FAO, Statistics Division (FAOSTAT)



Source: HLPE, 2012a

leads to a mineralization of the soil organic matter, turning it into carbon dioxide emissions. With this, agriculture contributes to 30 % of the emissions causing climatic change.

*Bio-fuel.* Another factor that has affected food security during the last years is the increasing market bio-fuel. Bio-fuel production increased up to 500% between 2001 and 2011 as a consequence of the increase in fuel prices and environmental considerations. In some cases, food commodities are destined directly to bio-fuel production. In other cases, biofuel is produced from non-food crops. Nevertheless, all bio-fuel production competes with the food production for resources like water, soil, workers, and technology. This way, bio-fuels can reduce food availability and the access to food due to a price increase. In both cases, food security is affected.

*Food preferences.* With the increase of the population income level, there is a change of food preferences towards products of animal origin, like meat and dairy products. This phenomenon mainly appears in growing economies, like in China and India. With the increase of the population in these countries, the income increase, urbanization tendencies and change of food preferences, it is estimated that, until 2022, 80% of the market for meat production will be in developing countries. The biggest problem is the availability of natural resources: to assure the same nutrition with a diet of animal origin, it would take seven times the resources that would be necessary for a vegetable diet. Considering that doubling of necessary food production to feed the growing population is a challenge due to the limited resources, the change of food preferences increases this challenge.

### Propositions for facing the challenges

*Food sovereignty.* As a strategy for facing the challenges of food security, countries should try to produce the necessary basic food in their own territory, in order to reduce the import dependence and market volatility.

In this sense, the family farming is a very useful agricultural production form, which is carried out

by the family unit carrying out the farm production relying mainly on family labour. This production form contrasts to investment type farm enterprises, with main purpose of investment recovery and profit maximization. Nowadays, family farming is not only the highest contributor to food production at global level, but also the predominant way of making a living in rural areas of many countries. Family farming, apart from assuring an economic income and improving the livelihood of the farmer's family, also has a long term interest. Therefore, it cares about natural resources for future generations and not only focuses on the increase of a short term economical profit, but also on the reduction of risks, for instance, with a diversified production. In times of climate change, this is a better coping strategy than specialized production and monocropping.

*Sustainable intensification.* In order to face the challenges of doubling food production, necessary for feeding future generations, like saving and protecting limited natural resources, FAO suggests a change of paradigm: from an agricultural production that follows the model of the Green Revolution to a sustainable intensification. The Green Revolution paradigm defines a production intensity through the use of inputs and considers the environmental damage as inevitable collateral effects of this production. This model does not seem to respond to future challenges. The sustainable intensification, in turn, uses natural processes for reaching a high and intensive production, and uses technologies and inputs, only in a way that they do not interfere permanently with the nature. While equal or higher levels of production are reached, compared to the Green Revolution agriculture, the environmental impacts of the new paradigm are below the threshold of natural the recovery of ecosystems. In this way, besides achieving a highly intensive production, the protection of natural resources and the improvement of environmental services are possible at the same time.

The main focus in this system is on soil, being the most vulnerable component of the agricultural ecosystem because of its extremely long time for

recovery. Therefore, the sustainable intensification is based on an agricultural system of zero tillage, known as Conservation Agriculture. It is defined by three interrelated principles with synergetic effects that are permanently and simultaneously applied:

1. Minimum disturbance of soil permanently with zero tillage and direct sowing.
2. Constant cover of soil with organic matter, for instance, plants or stubbles.
3. Crop diversity in sequence, rotation or association.

Conservation Agriculture can be applied to all crops and at all operation scales, from the small farmer that uses manual implements up to the great extensions of land where big machinery is used. This type of agriculture results in an increase of production, at reduced cost and input use, and in the increase of the biodiversity within the systems. It keeps soil and water in the watersheds, facilitates the competitiveness of agricultural production and adaptation to climate change. Compared to tillage based systems it also facilitates the integration of other production sectors, like livestock production and agro-forestry systems. It also reduces environmental impacts and vulnerability of production systems during times of climate change, compared to specialized systems, and increases agricultural production and family income of producers.

*Changes of paradigm in agriculture.* These changes not only mean the inclusion of some good practices, but rather represent a change of paradigm. An intensive production is no longer defined by the use of inputs, but by its production and sustainability. Many economical concepts, nowadays accepted, may change, like in the case economics of scale or the preference for a specialized production, in single crop or livestock production. A diversified production could be more interesting economically at a long term. It can also improve food and nutritional security and protect natural resources.

Thus the economical equation of the new paradigm does not only include yield, but also environmental cost and sustainability, in order to achieve sustainable intensification. However, without the unconditional support of science and politics, this change is not possible, because the environment and sustainability have no economic interests and “lobbies” to protect them.

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