

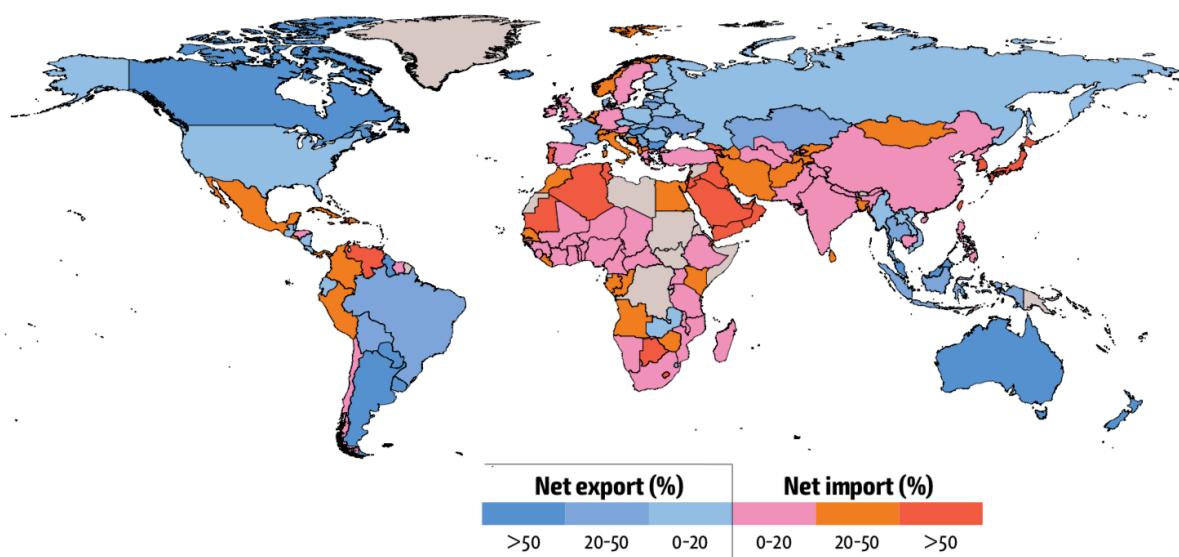
# Food And Agriculture

## Definition

Economic progress, notably in the emerging economies, and demographic rise will lead to increasing demand for food. At present, 795 million people suffer from undernourishment,<sup>1</sup> particularly in Sub-Saharan Africa and South Asia<sup>2</sup>. Future agricultural production will need to be more productive and sustainable while concurrently working to meet the needs of those suffering from hunger and the future increase demand.

## Key Insight

- **There will be growth in global production levels but this will not necessarily translate to greater access to food**



Source: FAO Global Perspectives Studies, using 2011 food balance sheets from FAO, 2016a.

Percentage of net food imports in domestic food supply in total calories. Source: FAO (2017). The future of food and agriculture – Trends and challenges.

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<sup>1</sup> FAO, IFAD, WFP (2015), The State of Food Insecurity in the World 2015. Meeting the 2015 international hunger targets: taking stock of uneven progress. *Food and Agriculture Organization Publications, Rome*.

<sup>2</sup> Alexandratos Nikos and Bruinsma Jelle (2012) [World agriculture towards 2030/2050: the 2012 revision](#), United Nations, Food and agriculture organization, ESA Working paper No. 12 -03.

While a continued increase in agricultural productivity are expected to fulfill the growing food demand, it will require sustained investments. There is also a growing imbalance between production areas (e.g. the Americas, Eastern Europe, and Southeast Asia) and areas of demand (e.g. sub-Saharan Africa, the Middle East, and South and East Asia).<sup>3</sup> International assistance will be needed to face potential shortages that can strongly affect more fragile countries particularly the ones that are highly dependent on foreign supplies.

## Changes by 2030

### ➤ A strong global growth for food demand:

Since 2000, global average food demand per person has increased due to demographic growth and improvements in standards of living. It is projected that this growth will continue at a rate of 1.1% per annum between 2006 and 2050<sup>4</sup>. By 2050, this would represent an increase of 60% of the global demand compared to the 2005-2007<sup>5</sup>. Even more than demographic growth, the pace of economic development and diet change in emerging countries will be crucial in determining the evolution in global food demand.

Unequal geographic repartition of arable lands, yield variability, and food demand will result in major production deficits in Africa, the Middle East, and Asia. North America, Europe, and Latin America will likely continue to be major exporters. These dynamics will be reinforced by the effects of climate change.

### ➤ A constant but insufficient decrease in hunger, particularly in least developed countries

The number of undernourished<sup>6</sup> people is projected to decline from 795 million in 2016 to only 653 million in 2030 under a business as usual scenario, leading the FAO to call

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<sup>3</sup> FAO (2017). *The future of food and agriculture - Trends and challenges*. Rome.

<sup>4</sup> Alexandratos Nikos and Bruinsma Jelle (2012) [World agriculture towards 2030/2050: the 2012 revision](#), United Nations, Food and agriculture organization, ESA Working paper No. 12 -03.

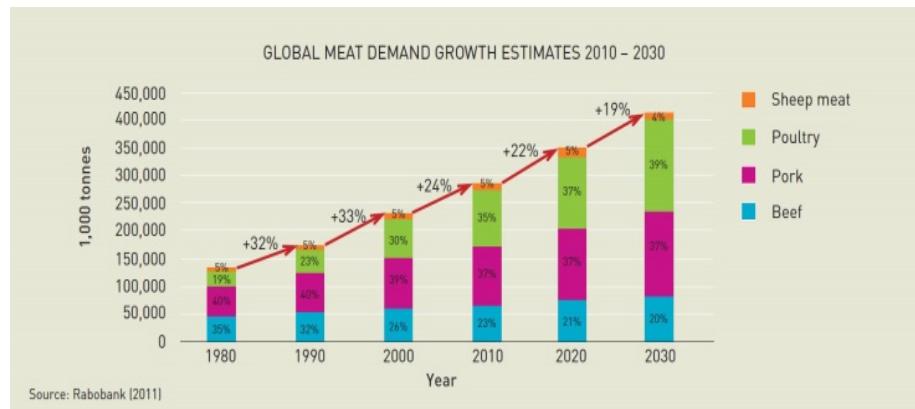
<sup>5</sup> Many studies, from various organisms such as USDA and IFPRI corroborate this increasing demand trend. However, assumptions made by each organism reveal different results regarding increasing demand intensity. In the central scenarios of ten modeling exercises analyzed in the context of AgMIP, global food demand increases from 62% to 98% by 2050. Other assumptions vary from 40 % increase from 2000 to 2050 for the more sustainable transition scenario of Agrimonde to 50% for the European project Global IQ, quantification of Global Changes central scenario. These differences can be explained by the difficulties in the socio-economic hypothesis at the base of demand change.

<sup>6</sup> Undernourishment is "defined as percent of population in each country that is below a Minimum Dietary Energy Requirement – (MDER)" Alexandratos Nikos and Bruinsma Jelle (2012) [World agriculture towards 2030/2050: the 2012 revision](#), United Nations, Food and agriculture organization, ESA Working paper No. 12 -03, pp.5. Hunger is often "defined as being synonymous with chronic undernourishment". FAO, [FAO term portal](#) retrieved on 05/05/2017

for more sustained pro-poor development<sup>7</sup>. By 2030 the undernourished population in will represent 7.9% of developing countries population decreased from 19.7% in 1990/1992.<sup>8</sup> Despite this forecasted reduction, many challenges will remain. The 1996 World Food Summit target to reduce the number of hungry people by half from its 1990-92 level (815 million) by 2015 will not be met even by 2030. **Sub-Saharan Africa and South Asia are areas of particular concern with the highest concentration of undernourished people who will still represent 14.5 % and 10.5 % respectively of their total population.** By 2030, these areas will likely only experience a small reduction in absolute number of chronically undernourished people with 15 million fewer undernourished people in Sub-Saharan Africa and 5 million fewer undernourished people in South Asia compared to the current level<sup>9</sup>.

#### ➤ Global nutrition shifts towards a “western diet”

A shift of global consumption towards a “western diet” with more meat and dairy products has been observed over the past few decades<sup>10</sup>. Rising standards of living and urbanization have drastically changed eating behaviors, both qualitatively as well as quantitatively. The “nutrition transition”<sup>11</sup> which took centuries in developed countries is happening rapidly in developing countries, particularly in urban centers. This nutrition transition is characterized by a decrease in the consumption of cereals and an increase in the consumption of animal-based products such as meat, eggs and dairy. Meat consumption is projected to rise from 39kg per person and per year in the 2005-2007 periods to 45kg per person per year by 2030. In 2030, cereals will still represent almost half of total calorie intake (47%), particularly in developing countries, its proportion in the diet, as compared to



Source: The Australian chicken meat industry: An industry in Profile, Global context, Meat forms an important part of the diet for most people around the world (Rabobank 2011); web; October 17, 2016

<sup>7</sup> FAO (2017). *The future of food and agriculture - Trends and challenges*. Rome.

<sup>8</sup> Alexandratos Nikos and Bruinsma Jelle (2012) [World agriculture towards 2030/2050: the 2012 revision](#), United Nations, Food and agriculture organization, ESA Working paper No. 12 -03. p.6

<sup>9</sup> Ibid.

<sup>10</sup> Ibid.

<sup>11</sup> Laisney Celine (2015) '[Croissance de la demande alimentaire mondiale](#)' [Increasing world food demand], *Vigie alimentation report 2015*, Trend 1, Futuribles International, September 2015

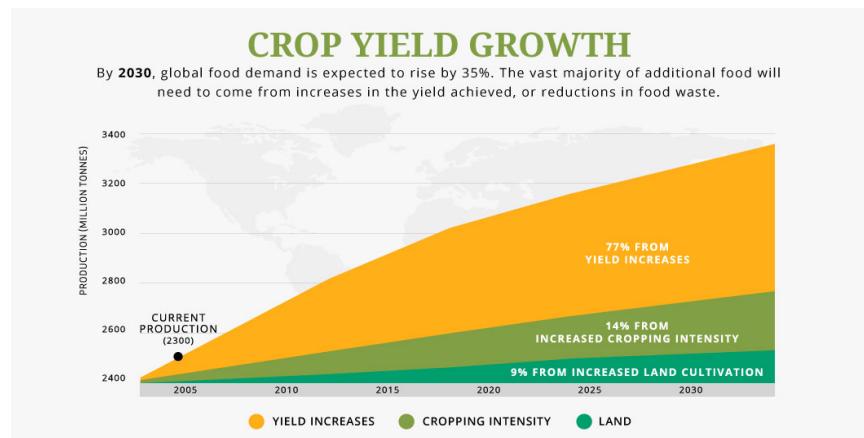
animal-based products will decline. This new diet is also much richer in sugars and is already affecting health outcomes in countries all over the world, not to mention the increased impact on climate change from animal products. Animals are extremely inefficient converters of food, that is to say it takes many more resources to feed them than the final product<sup>12</sup>. The Western appetite for meat will continue to diminish the food supply available for an increasing population, increasing food inequality.

### ➤ Regional and national resistance: maintaining cultural and traditional diets

There is a “wide diversity among countries as regards both the levels of consumption achieved as well as the speed with which the [nutrition] transformation has been taking place”<sup>13</sup>. China’s meat consumption has skyrocketed over the last decade. The pace at which this has happened is unlikely to be repeated elsewhere between now and 2030. In contrast, some developing countries such as India, still have very low levels of meat consumption due to religious restrictions (e.g. cattle and pork) and the cost of meat. Globally, the demand of poultry as a share of global meat consumption could rise sharply in the coming decade as it is a cheaper form of meat, not subject to religious restrictions<sup>14</sup>.

### ➤ Regional disparities of arable land

Agricultural production has more than tripled since the 1960’s and is still increasing. This growth has been less a result of the expansion of lands under cultivation (only 13% between 1961 and 2007<sup>15</sup>) than from yield improvements, such as those that were brought about through the Green Revolution. Future production growth could be more difficult than in the past as the constraints are likely to be greater, which include scarcity



Source: Farming First (2015); web; 31 October 2016

<sup>12</sup> Janet Ranganathan (2016) [Animal-based Foods are More Resource-Intensive than Plant-Based Foods](#), World Resources Institute, World Resources Report

<sup>13</sup> Alexandratos Nikos and Bruinsma Jelle (2012) [World agriculture towards 2030/2050: the 2012 revision](#), United Nations, Food and agriculture organization, ESA Working paper No. 12 -03.

<sup>14</sup> De Lattre-Gasquet M. , Le Mouél C., Mora O. (2016) [Agrimonde-Terra : Foresight land use and food security in 2050](#), INRA and Cirad, pp.45, June 2016

<sup>15</sup> Alexandratos Nikos and Bruinsma Jelle (2012) [World agriculture towards 2030/2050: the 2012 revision](#), United Nations, Food and agriculture organization, ESA Working paper No. 12 -03.



of land and water resources, soil degradation, salinization, from the increase of non-food agricultural products like biofuel, and the impact of climate change.

As of 2005, there was “7.2 billion hectares of land with rainfed production potential,”<sup>16</sup> however, only 1.4 billion hectares of this arable land is prime land that could be suitable for cultivation. The remaining 5.8 billion hectares are constituted of forests, protected areas, built areas and less suitable arable land and as a result are excluded. Though there is surplus land which could be cultivated, it is projected that only an additional 70 million of hectares will be employed in agricultural production by 2050<sup>17</sup>. This is mainly due to the difference of land production potential and expansion growth between regions. Sub-Saharan Africa, Latin America and developed countries have by far the highest land production potential with respectively 451 million ha, 363 million ha, and 447 million ha<sup>18</sup>. North Africa, South Asia and Central America on the other end have limited potential of land production expansion. Among those regions, the quality and quantity of available arable land often differs greatly with highly localized dynamics.

For some regions, the projected expansion of land production differs from the potentiality. Arable land production is expected to increase of 110 million ha by 2050 for developing countries, particularly for Sub-Saharan Africa and Latin America, while at the same time, developed countries might experience a decrease of nearly 40 million ha<sup>19</sup>.

An increase in arable land does not necessarily result in an increase in yields as the quality of land must be taken into consideration<sup>20</sup>. Some countries such as Nigeria, Costa Rica, Dominican Republic and Sierra Leone are already experiencing yield decreases. Newly cultivated areas will require significant investments to improve yields, and this may be difficult for most fragile countries.

#### > **Likely increase of human food prices in the long run and shortage risks**

Between 2010 and 2030, the price of basic commodities could more than double, half of this projected increase has been attributed to climate change and the higher frequency of natural hazards<sup>21</sup>. Changes in climate and precipitation patterns could be

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<sup>16</sup> Ibid.

<sup>17</sup> Ibid.

<sup>18</sup> Ibid.

<sup>19</sup> Ibid.

<sup>20</sup> De Lattre-Gasquet M. , Le Mouél C., Mora O. (2016) [\*Agrimonde-Terra : Foresight land use and food security in 2050\*](#), INRA and Cirad, pp.45, June 2016

<sup>21</sup> Ratcliff Anna (2014). [\*Hot and Hungry - How to Stop Climate Change Derailing the Fight Against Hunger\*](#), Oxfam International, Oxford pg 20



responsible for an increase of between 3% and 84% in food prices by 2050<sup>22</sup>. Prices of some particular crops, such as cacao and tea, are likely to be at the higher end of price increases.

The limited number of exporters for most commodities gives a comparative advantage to traditional exporters from North America, the European Union and Australia and some developing countries<sup>23</sup>. The dependency on a few countries for the provision of basic commodities increases the risks of shortage for many others. If supply from one country is disrupted due to a natural disaster or to disruptions in the commodities market, this could have major repercussions on the economic and political situation of the most dependent countries. This disadvantaging situation is of significant for countries highly dependent on foreign supplies, as illustrated by the 2011 “food riots” across North African and the Middle East.<sup>24</sup>

## Uncertainties

### Towards yield growth slowdown?

There is uncertainty in the validity of crop yield projections as the historical trends which are the foundation of these estimations are the result of likely “one-time innovations” that were rapidly adopted as part of the green revolution<sup>25</sup>. Much of the agricultural systems in more developed countries have increased yields for half a century and are now reaching yield plateaus set by the upper biophysical limit of the crops. As such, projections that ignore these constraints are likely to vastly overestimate global food production in the future. Limited yield growth in staple crops would increase the risks of food insecurity (and societal disruption) for many less economically developed and fragile countries across the globe.

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<sup>22</sup> Intergovernmental Panel on Climate Change (IPCC) (2014). [\*Climate Change 2014: Impacts, Adaptation, and Vulnerability, contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change\*](#)

<sup>23</sup> Alexandratos Nikos and Bruinsma Jelle (2012). [\*World agriculture towards 2030/2050: the 2012 revision\*](#), United Nations, Food and agriculture organization, ESA Working paper No. 12 -03 p.9

<sup>24</sup> Lagi, M., Bertrand, K.Z. and Bar-Yam, Y. (2011). The food crises and political instability in North Africa and the Middle East.

<sup>25</sup> Grassini, P., Eskridge, K. M., & Cassman, K. G. (2013). Distinguishing between yield advances and yield plateaus in historical crop production trends. *Nature Communications*, 4.