



# Contradictions within the modern food system: Nutritional disbalance across the globe, its main drivers and possible ways out

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## Abstract

Contemporary food production, given the degree of technology being applied in it and the present state of scientific knowledge, should be able to feed the world. Corresponding statistics show that in fact the volumes of modern food production confirm this statement. Yet, the present nutritional situation across the globe leaves much to be desired: on the one hand the numbers of undernourished and malnourished people are still high and even growing in some regions, and on the other hand there is an increasing number of overweight and obese people who are experiencing (or are at risk of) adverse health impacts as consequences. The question arises how this situation is possible given the present state of food production and knowledge, and also in terms of nutrition basics when talking about the latter. When arguing about the main causes of the present situation with nutrition across the globe, it is the modern food system with its distortions that is often criticised with emphasis placed on inappropriate food distribution as one of the key problems. However it is not only food distribution that shapes inequalities in terms of food availability and accessibility – there is a number of other factors contributing to this situation including political influences. Each of the drivers of the present situation might affect more than one part and have outcomes in different dimensions. Therefore it makes sense to apply a holistic approach when viewing the modern food system, embracing all the elements and existing relationships between them for this will facilitate taking appropriate actions in order to target the desired outcome in the best possible way. Applying a systematic approach and linking various elements with corresponding interactions among them allows for picturing all the possible outcomes and hence finding the way for a better solution on global level – a solution to the present problem with nutritional disbalance across the globe.

## Introduction

These days the topic of food insecurity and world hunger attracts much attention, with fruitful discussions being held both on political levels, in the scientific field and also among common citizens.

Combating hunger in developing countries, given its first place among the Millennium Development Goals (MDG), namely MDG 1 to “eradicate extreme poverty and hunger”<sup>1</sup>, is highly prioritised with various actions

taken on the international scene promoted and initiated by the United Nations (UN), Food and Agricultural Organization (FAO) and World Health Organization (WHO). In fact, the paradox is that the modern food system is capable of feeding the world, yet about 1 billion people around the world are chronically undernourished and another 2 billion suffer from the so-called “hidden hunger” – shocking numbers considering the level of contemporary knowledge and technology (FAO, 2012).

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However, there have been some positive changes in terms of the reduced number of undernourished people worldwide, although most of them have been achieved before 2007-08 (FAO, WFP & IFAD, 2012). Nevertheless in order to halve the prevalence of undernourished people in developing countries – the goal that seems to be realistic given the progress that is already in place – there is a need for more actions, and the application of a systematic approach is required in order to have a thorough picture embracing all possible causes and interrelations. In fact, a systematic approach can be applied through various means of reaching the MDGs as well, since MDG 1 would actually go hand in hand with some other MDGs, namely MDG 3 (gender equality and women's empowerment), MDG 4 (reducing child mortality), MDG 5 (improving maternal health) and MDG 6 (combating HIV/AIDs, malaria, etc.) for basic nutrition to some extent would be a core for all these goals. More on applying a systematic approach with regard to the present situation in terms of global nutritional situation follows in the subsequent chapters. Therefore the purpose of this article is to discuss the main drivers of the present situation with nutritional disbalance across the globe and to try to apply a systematic approach aimed at linking the various drivers and determinants, and then, based on these interlinkages, to discuss possible ways out. The present paper is structured as follows: the next section, "Literature review", presents a theoretical overview of the topic discussing the present situation worldwide and drivers of existing disbalance in its separate intersections. The first intersection, "Food security and food insecurity", provides general information and respective definitions about food security and insecurity; the second intersection, "Nutritional situation in the developing world", speaks about undernourishment and hidden hunger existing in developing countries and some improvements in this regard that have been observed in some regions; the third intersection, "Nutrition transition and the double burden of malnutrition", discusses nutritional switches towards highly-processed food across the globe and a phenomenon known as "double burden" of malnutrition; the fourth intersection, "Feeding the world: modern food system and its capacities", gives a brief overview of the modern food system and changes that have occurred in it; the fifth, and last intersection, "Drivers of the present disbalance", provides insights to some of the main drivers of the present nutritional disbalance in the world. The last section of the paper "Conclusion" draws main conclusions on the topic.

## Literature review

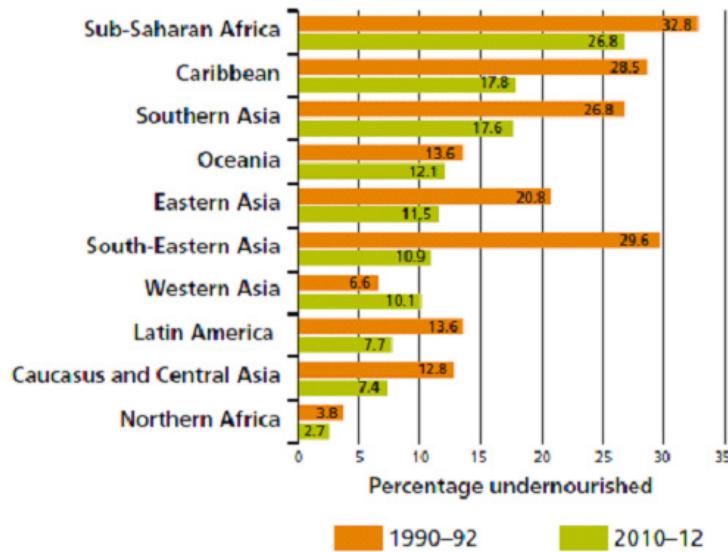
### Food security and food insecurity

Food security was most precisely defined at the World

Food Summit (1996) as a situation when "(...) all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (FAO, 1996; FAO, 2003: 28). Although there are some other definitions and interpretations of food security in place, the concept, regardless of which definition is applied, is multi-faceted as noted by FAO (2003) meaning that both the availability of adequate supplies at global and national level and also adequate nutrition and well-being are being embraced within the concept. Food security is comprised of three pillars, namely food availability, food access and food use<sup>2</sup>. While the first two as it implies deal with sufficient quantities of available food along with sufficient resources for obtaining adequate and nutritious food in place, the last one, food use, embraces aspects of basic knowledge on nutrition and care as well as adequate sanitation and water<sup>2</sup>. In order to provide enough food for all, food availability and affordability for all households should be reached (Gómez et al., 2009). Should this not be the case, one talks about food insecurity – the situation "(...) when people do not have adequate physical, social or economic access to food (...)" (FAO, 2003: 29). So, in the end, food insecurity will be about dietary intake of insufficient food "(...) to meet the needs of growth, activity and the maintenance of good health" (Sage, 2012: 210). The following section will cover the issues of food insecurity worldwide via presenting an overview of nutritional disbalance around the world.

### Nutritional situation in the developing world

According to estimations for the period 2010-12, around 870 million people worldwide are undernourished, which makes up 12.5% of global population and results in a shocking statement – one in eight people (FAO, WFP & IFAD, 2012). Sage (2012: 210) emphasised that undernourishment in children can be considered as particularly critical since even in a mild form it can result in delayed or permanently stunted growth. The number of children displaying low height-for-age worldwide is again shocking – 200 million, with almost half of South Asian children failing to reach the heights and weights that are considered indicators of healthy growth (FAO, 2006: 2008). Apart from undernourishment, there is another problem referred to as "hidden hunger" with another one to two billion people (depending on the source of information) around the world suffering from it (FAO, 2012; WWF, 2013). The majority of these people live in developing countries – 852 million (FAO, WFP & IFAD, 2012). However, the problem of food insecure people is not a concern of least developed countries solely – the developed world is also facing problems of under-



**Figure 1:** Progress towards meeting the MDG target across regions  
Source: FAO, WFP & IFAD 2012: 10.

nourishment and food insecurity, namely food poverty which represents lack of money for buying appropriate food, as described by Sage (2012: 215ff). Food poverty will result in micronutrient malnutrition with such adverse impacts on health as poor physical growth and development, impaired immune system, reduced productivity and mental capability, just to name a few (FAO, 2010). Finally, millions of people worldwide are affected by food insecurity on either a transitory or seasonal basis (Sage, 2012: 210).

However, the situation is not hopeless and the MDG target of halving the prevalence of undernourishment in the developing countries by 2015 is achievable when accompanied by appropriate actions from the national and local governments. During the last few decades there have been some positive changes in developing countries with regard to the situation of undernourishment, and these changes allow for implying that the aforementioned MDG target is actually within reach (FAO, WFP & IFAD, 2012). Here are the corresponding FAO statistics that confirm this statement, at least for the majority of developing countries given the existing differences in trends across regions and countries. For instance, the share of undernourished people has most rapidly declined in South-Eastern Asia (from 13.4 to 7.5%) and Eastern Asia (from 26.1 to 19.2%) followed by somewhat more modest achievements in Latin America (from 6.5 to 5.6%) (FAO, WFP & IFAD, 2012). On the other hand, the same statistics present completely different picture for Southern Asia, sub-Saharan Africa and Western Asia, and Northern Africa demonstrating the increase in share of undernourished people with percentages from 32.7 to 35.0%, from 17.0 to 27.0% and from 1.3 to 2.9%, respec-

tively. Furthermore, there has been a more rapid pace and more evident overall progress achieved in 1990-92 compared to 2010-12, again showing contradictions and, for some countries, bringing about some doubts regarding the likelihood of achieving the MDG target by 2015 in each of the developing countries (Figure 1).

### Nutrition transition and the double burden of malnutrition

Hawkes et al. (2009) have stressed that the process of globalisation results in changes in ways of living, including associated food demand leading to a nutrition transition. Indeed, the outcome of increasing incomes and rapid urbanisation is the situation when people living their busy lives gradually adopt lifestyles with reduced physical activity, having less time for any household work including cooking which, in turn, results in increased consumption away from home (including fast foods and street foods) as well as higher demand for convenience food (Friel & Lichacz, 2010; Hawkes, 2007). These features can be referred to as traits of the phenomenon that is known as "nutrition transition" – a shift towards the increased consumption of energy-dense foods, fats, sweeteners and in general highly processed foods compared to traditional diets accompanied by a reduced intake of complex carbohydrates (Hawkes, 2007; Popkin, 2004). The industrialised world has been undergoing the process of dietary transition towards diets high in fats, sweeteners and highly processed foods over time with an example of England, where in the course of the past two centuries the consumption of refined carbohydrates and fat per person has augmented five to tenfold and is



accompanied by a simultaneous decrease in consumption of fibre-rich foods (Friel & Lichacz, 2010). Unlike industrialised, high-income societies, the developing world adopts such changes at a much faster rate with a shift to a modern industrialised economy within a time span of 10-20 years compared to the many decades or even centuries of that of the developed world (Popkin, 2004).

Apart from nutrition transition observed in both the developed and developing world, developing countries are challenged by a phenomenon referred to as “double burden” of malnutrition which typically accompanies the process of rapid urbanisation in these countries (FAO, 2012). The term “double burden” of malnutrition is used to describe the situation in developing countries when on the one hand the percentage of chronically undernourished people is critically high, but on the other hand the contrasting prevalence of overweight, obesity and accompanying diet related non-communicable diseases occurs, often at increasing pace (Hawkes et al., 2009; FAO, 2012).

### Feeding the world: modern food system and its capacities

The question arises: is our modern food system, given its advanced technologies and knowledge, not capable of feeding the world? And what is this modern food system all about if the problem with hunger is still in place? While answering these questions it makes sense to first have a look at modern food production itself. In fact, the last several decades of the last century have seen a growth in global food production that has surpassed population growth and resulted in overall improved per capita food consumption, though differing across the regions and countries (Shapouri & Rosen, 2009). According to FAO data (2006), during the last four decades, growth rates of world agriculture (both food and non-food commodities) reached 2.1-2.3% p.a., most of this growth being observed in the developing countries (3.4-3.8% p.a.). And yet, further growth in global food production is projected during 2030-2050, albeit with a rate lower than that of the previous decades (Shapouri & Rosen, 2009). Most of the occurred gains were due to growth in yields – the tendency that will still continue in the future (FAO, 2006). This growth is the result of scientific methods applied in contemporary food production coupled by industrial technologies which allowed for surpluses in production due to altering the scale and productivity of farming and processing (Sage 2012: 1f). Of course there is a need for high productivity in order to be able to deliver a supply that could keep up with global demand of a growing population with diets transitioning towards higher energy density and increased percentage of ani-

mal based sources of protein in nutrition – the situation described in more details in the preceding intersection. The world population is projected to grow further with a possibility of reaching 8.9 billion by the year 2050 (FAO, 2006). Therefore the question arises whether the supply offered by the contemporary global food system will be able to keep pace with such demand and at prices that are currently high and are expected to remain at similar level (OECD & FAO, 2013). And how does it happen that the afore described contradictions, in terms of the nutritional situation across the globe, become possible given all the gains of modern food production and its capacities? Where are the weaknesses of the contemporary food system which fails to deliver “enough food for all”?

In answering these questions, one needs to examine the modern food system, trying to picture it in a holistic way and embracing all its elements with interrelations between them as was presented by Gómez et al. (2009). As discussed by the authors, the food system, given its complexity (with many actors and activities involved in multiple locations) and dynamism (food system as subject to constant evolution via decisions made on different levels), should be viewed using a systematic approach allowing to see and predict relationships between its elements as follows: different actors involved in the food system, activities performed along with operating environment and information flows. Indeed, all the actors starting from producer going through to the processor and all the way to the final consumer play their role in shaping the food system. And in the end, as argued by Gómez et al. (2009) food availability as well as affordability could be viewed as a result of complex interactions between the food supply chain and the demand for food, the latter being driven by various factors such as urbanisation, level of income, policies and others. As further explained by the authors, each actor does respond to a variety of factors (e.g. prices, incomes, etc.) providing some function or service to be compensated, and these are the outcomes of the actors’ decisions that link the actors. Hence any interventions intended to affect one actor will have an impact throughout the system.

On the other hand, Hawkes (2007) presented the conceptual framework demonstrating that interactions between resources and main causes have a crucial influence on food supply thereby affecting nutritional status as the final outcome. According to this framework, the availability of basic potential resources (people, food, environment and technology) to society is influenced by globalisation which acts as a political, economic and cultural force affecting society as well. Globalisation processes and corresponding policies influence a two-sided transition of these basic resources: firstly to the food





supply (including accessibility and availability, costs and desirability) and secondly to financial resources linked to people's ability to nourish themselves (through employment and income). The immediate causes such as overall dietary intake and corresponding diet-related diseases will be the effects of financial resources and the food supply shaping nutritional status as a final outcome.

Based on the concepts presented above, it becomes apparent that having in mind a systematic approach to the global food system and considering all existing relations and interactions both within the system and between the actors and elements of the system, the key solution for solving the nutritional problems and food insecurity issue on the global scale could be cooperation on all levels, with each of the actors playing his/her role. This will allow for changing the whole picture. The particular problems of the modern food system causing nutritional disbalance across the globe are discussed in the following intersection.

### Drivers of the present disbalance

When it comes to the present situation with hunger and undernourishment, inappropriate food distribution is always named as a cause. However, contemporary global nutritional disbalance is caused by a number of reasons on different levels of the chain, distribution being only one of them. For example, Friel and Lichacz (2010) negotiating about the present situation with the nutrition transition emphasised several determinants as the main drivers, namely international food trade, foreign direct investment and food distribution systems. In regard to the first driver, the authors named profound changes within international trade and food policy with increasing trade liberalisation which has changed the availability and composition of food supplies and allowed for highly processed and nutrient-poor food to be readily available in developing countries. A good example here is India, which shifted away from its commitment to self-reliance toward greater international trade liberalisation and liberalisation of foreign direct investments – the process began in the late 1980s and is resulting in the convergence of Indian dietary habits with those of the West (increased demand for refined sugars and saturated fat), depression of domestic prices caused by cheaper imports and reduced state subsidies for supporting domestic produce (Hawkes et al., 2010). Going hand in hand with the first driver, the second one has to do with multinational food corporations operating nowadays successfully in developing countries and shaping dietary shift towards more processed and less healthy food in these countries. A flood of highly processed foods in Thailand illustrates this driver in the following:

the volume of highly-processed foods such as potato chips and snack foods has increased by more than 20,000 tonnes between 1999 and 2004, with the bulk of this food coming from US-based transnational food corporations such as food distributor Frito-Lay (division of PepsiCo) (Friel & Lichacz, 2010). And finally, within the third driver, food distribution systems, on the one hand there are again the aforementioned transnational food companies organising food production, marketing and distribution on a global scale, and on the other – the overall situation at the modern marketplace with an increasingly dominating role of the retail sector including supermarkets and food service chains which is especially true for middle- and high-income societies, yet is taking over to shape the food marketplace of the developing countries as well. A good illustration of the third driver is the Mexican food retail sector, where drastic changes occurred after the North American Free Trade Agreement was signed in 1994, namely an increase in the number of supermarkets, convenience stores and discounters (from less than 700 in 1993 to 5,729 in 2004), the establishment of the US-based Wal-Mart supermarket chain and, as a result, rapid expansion of sales of processed foods at a rate 5-10 % per year between 1993 and 2003 (Hawkes et al., 2009). Furthermore, the global food situation and inequalities in terms of nutrition status worldwide are shaped by multiple factors. For instance, of particular attention is the escalating biofuels sector and its interrelations with food prices, as argued by Gómez et al. (2009). Indeed, global agricultural trade and production of food exacerbate falling food stocks (that are already in place) via production of crops for fuel which displaces crop production for human consumption (FAO, 2008). This has further implications for the situation with food prices causing price hikes (OECD & FAO, 2007). However, it is obvious that world food prices are pushed up not by fuel production solely – the causes are of a more diverse character. As stated by OECD and FAO (2007), existing import and export subsidies and tariffs lead to uneven distribution of food stocks coupled by growing population and increased demand for certain food commodities (e.g. meat and dairy) which results in impacts on both international and domestic food stocks – the ultimate factor for price hikes. Furthermore, Gómez et al. (2009) stressed that the aforementioned multinational food companies, in this case retailers, also significantly impact food prices, but not only that – also the degree of affordability for populations which is of crucial importance in developing countries. The authors further argued that since such multinational food retailers are operating on large scale and due to their sophisticated supply chains, the procurement system becomes centralised which leads to a situation in which intermediaries and smaller centres are being replaced by large distributing centres which



in turn has further implications for the local population. Finally, the presence of large multinational food retailers, apart from having some apparent advantages in terms of opening up more market opportunities, brings along shortcomings for the trade itself since encouraging food manufacturers to expand in order to access global retail leads to the situation in which more local food processing from domestic raw materials occurs, which in turn puts local food supply chains at risk (Gómez et al., 2009).

## Conclusion

The global food system is a dynamic and complex system comprised of multiple elements with interactions between them. All its dimensions – physical, economic and informational – have their part in determining overall outcomes through existing relationships and interactions between the various actors. Hence, each and every element and actor has its role to play and has an effect on the whole system. When talking about improving the nutritional situation worldwide and food security, it is of crucial importance to have a systematic view of the food system and embrace all the determinants and stakeholders. The ultimate goal, namely improved food security and nutrition status across the globe could be reached when corresponding measures are taken at all levels within the system since each and every level has its implications for the whole. Taking an action is not, and will never be, solely a matter of appropriate governmental policy or strategic company's decision – it is a task for all since the food system is not only about top-down, but also bottom-up approach. Each and every individual plays his role in shaping food system, for these are consumers who will make the ultimate decision on where and whether to purchase certain food commodities, how to consume them and so on. Combined together, such decisions shape the demand thus providing a bottom-up stream of information flow within the food system – the stream that counts more than it is believed to. Notwithstanding is of course the role of policies and stakeholders within these food supply chains – their impact is more apparent and perceivable by a regular consumer. Yet on these levels there is a need for more cooperation and reviewing of the ultimate goals with actions to be taken for embracing all the elements and considering all the interventions and possible outcomes. These should be joint efforts directed towards one final goal – food security and better nutrition status across the globe. In order to be able to bring about such drastic but necessary shift for improving the present situation, there is a need for reshaping the contemporary food system which is possible only if each actor takes an action and cooperates. Only by doing so it is possible to achieve

better living for all and contribute to a better future for the generations to come.

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## Conflict of Interests

The authors hereby declare that there are no conflicts of interest.

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<http://www.who.int/trade/glossary/story028/en/> (last access: 25.10.2013).
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1. Here and in the following regarding MDG: <http://www.un.org/millenniumgoals>
  2. <http://www.who.int/trade/glossary/story028/en/>