

## **Special Debate Section**

### **Will renewed attention and investment in African agriculture ensure sound nutrition?**

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#### **Introduction**

Africa is home to just over 12% of the world's population. This represents just over that of Europe's and a fifth of Asia's population. Africa has the fastest growing population, with an average population growth rate over the past 15 years of 2.3% (estimated from FAO, 2012). At this rate, it is predicted that Africa's population will double from 856 million estimated in 2010, reaching 2 billion people by 2045. This will make Africa home to a third of the world's population by 2050, despite high maternal mortality (57% of global maternal mortality cases occur in Africa), infant mortality (49% of global infant mortality occurs in Africa) and HIV infections (Africa accounts for 67% of cases world-wide) (The Economist, 2011).

Demand for cereals in Africa (for both food and animal feed), is projected to reach some three billion tonnes by 2050 (Rabin, 2011). To keep pace with population growth, annual cereal production will have to increase by almost a billion tonnes - currently 2.1 billion tonnes- and meat production by over 200 million tonnes to reach a total of 470 million tonnes in 2050. Current production statistics show that African food production has kept pace with

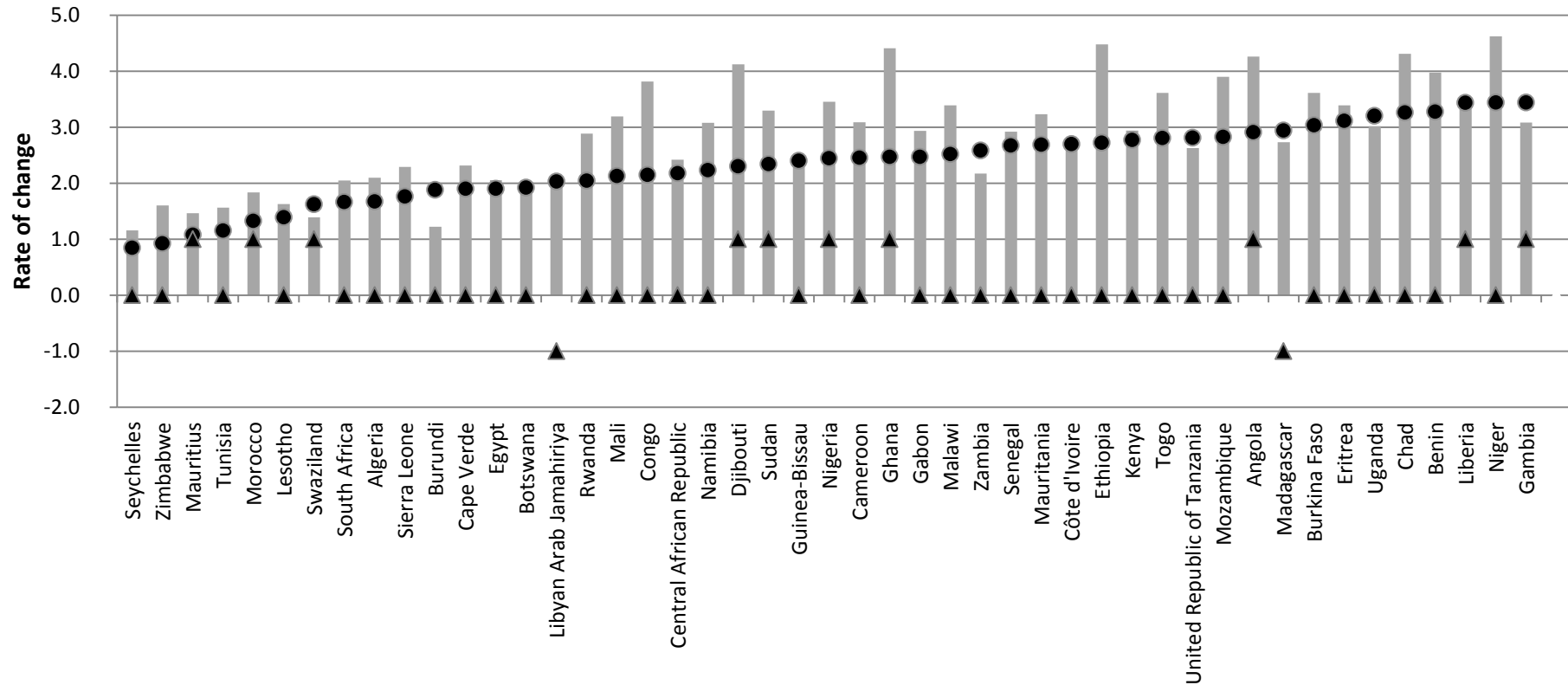
population growth since the 1990s and is likely to continue doing so given current African agricultural reform measures. Moreover, Africa is unique in terms of its large tracts of under-utilised arable land, available labour and abundant natural resources for agricultural production expansion and intensification.

Yet, Africa is home to just over a quarter of all undernourished children. While food supply has largely kept pace with population growth in most African countries since the 1990s (see Figure 1), high levels of under-nutrition pose threats to productivity and efficiency of the agriculture and food system. Ensuring food security for all in Africa in the future will require more than simply increasing aggregate food supplies.

Future agriculture and food security strategies, policies and investment in Africa will need to consider the unique dynamics of Africa's population growth and balance the need for a very significant and rapid increase in food demand with careful consideration of dietary requirements to ensure healthy and productive lives. Three key considerations include the changing dynamics of urban migration, changing age demographics and consumption behaviour changes associated with economic development and increases in incomes.

Around 70 percent of the world population will live in cities or urban areas by 2050, compared to the current proportion of 49 percent. This will shift the proportion of producers and consumers of food and lead to consumption changes that could undermine sound nutrition. Estimates of food supply are typically based on average calorie requirements for adults and ignore the comparatively high macro and micronutrients of children relative to adults (see Figure 2). As 40% of Africa's population are children under 15 years of age, who

**Figure 1: Rates of change in population, dietary energy provision and Vitamin A availability (Author's calculation from FAO, 2012).**



**African countries in ascending order by population growth rate change between 1990-92 and 2006 - 08**

■ The average annual rate of change of total dietary energy consumption for total population (kcal/day) from 1990 -92 to 2006 -08

● The average annual rate of change of population from 1990-92 to 2006 -08

▲ Rate of change in category of Vitamin A ( $\mu\text{g REA}$ ) available for human consumption between 1990 - 92 and 2005-07. A one point change = 300  $\mu\text{g REA/person/day}$

have yet to enter their reproductive years, current estimates of food demand do not consider the disparate needs of adults and children.

After decades of neglect of investment and focus on African agriculture, a new optimism has emerged. There is broad agreement that African agriculture has enormous potential for growth thanks to its abundant natural resources, namely land and water (FAO, 2009). But, will the renewed attention and investment in African generate the exponential growth necessary to feed the continent's growing population in a manner that ensure sound nutrition?

## **Food supply versus food security in Africa**

### *Past and Present*

Post-colonial development efforts have focussed almost exclusively on stimulating production and supply – largely of a limited number of global staple foods (particularly maize, wheat and rice). Increased food supply has reduced the number of devastating famines in Africa over the past decade. Indeed, the four major catastrophic famines in the last decade - Ethiopia between 1999 and 2000, Malawi between 2001 and 2002, Niger between 2004 and 2005 and the Horn of Africa in 2011- cannot be attributed only to covariate shocks. In each case, erratic weather was the tipping point for extremely vulnerable populations and exacerbated problems caused by continually low production, poor governance and a dire lack of investment in agriculture.

Food security efforts in Africa have largely focussed on increasing food supply, neglecting the notions of food access introduced by Sen in the 1980s and the more recent emergence of the nutrition agenda in the 1990s. As illustrated in Figure 1, although the rate of increase of

energy per capita (production) has kept pace with the rate of change of population growth in most African countries since 1990, the aggregate availability of vitamin A has not increased significantly. In 11 countries, the per capita availability of vitamin A increased by at least 300µg per capita between 1990-92 and 2005-07, but the available vitamin A was above 600 µg/person/day in only 8 countries in 2005-07 (FAO, 2012). This crude estimate is obtained by converting the amount of food available for human consumption (as estimated by the FAO Food Balance Sheets) into the equivalent of Vitamin A as micrograms of retinol activity equivalent or RAE. The estimate does not take into account the bio-available quantities per person but illustrates the lack of improvement in availability over time. The recommended dietary allowance (RDA) for adult males over 19 years of age is 900µg/person/day and 700µg/person/day for the same group of non-pregnant women (National Academy of Sciences, 2006). In Madagascar and Libya, a corresponding decrease in availability of at least 300 µg/person/day was reported over this period. Iron availability over the same period shows virtually no change, with annual rates of change ranging from -0.3 to 0.4mg per capita, with an average rate of change of 0.1mg per person per year. Data for other nutrients are not so readily available.

Yet, nutrition will become an essential consideration in feeding the growing world population in the future. Just as the best options for increasing food supply will come from increased in productivity – improved varieties, increased irrigation, intensification and increased use of inputs, human nutrition will need analogous attention. As the growth and performance of animals and plants benefit from improved nutrition, so too, addressing malnutrition for optimal productivity is fundamental for Africa's future. The evidence in favour of improving nutrition is clear – even if based simply on the costs of not acting (World Bank, 2002):

- Underweight is the single largest risk factor contributing to the global burden of disease in the developing world, causing nearly 15% losses in total disability-adjusted life years in countries with high child mortality (Ezzati et al., 2002; World Health Organization, 2002).
- Malnutrition is directly or indirectly associated with nearly 60 percent of all child mortality and even mildly underweight children have nearly double the risk of death of their well-nourished counterparts (Caulfield et al., 2004).
- Infants with low birth weight (less than 2.5 kilograms) are at 2 to 10 times the risk of death compared with normal birth weight infants. These same low birth weight infants are also at a higher risk of non-communicable diseases such as diabetes and cardiovascular disease in adulthood (Behrman et al., 2004).
- Vitamin A deficiency compromises the immune systems of approximately 40% of the developing world's children under age five, leading to the deaths of approximately one million young children each year (World Bank, 2002).
- Severe iron deficiency anaemia causes the deaths in pregnancy and childbirth of more than 60,000 young women a year and leads to almost 18 million babies a year being mentally impaired with IQs that are at least 10 to 15 points lower than those not deficient (World Bank, 2002).
- Maternal folate deficiency leads to a quarter of a million severe birth defects every year (UNICEF and MI, 2004).

### ***Looking Forward***

This is an urgent task as Africa is home to a disproportional number of undernourished children - just under 26% of all undernourished children (FAO, 2010), even though it is home to one in eight persons in the world. Available statistics show that on average, 19.6% of

African children are underweight, 36.4% are stunted and 3.9% show signs of wasting. On the contrary, 7.7% of Africa's children are overweight (estimated from FAOSTAT, 2012).

On average, 40% of Africa's populations are below the age of 15 years (estimated from data obtained from the Population Reference Bureau, 2011). This proportion is expected to increase in developing countries before it starts to tail off after 2050. If more than a third of the future working population is undernourished, future productivity will be severely constrained at a crucial moment. Productivity losses to individuals due to under-nutrition are estimated at more than 10 percent of lifetime earnings and accounts for two to three percent of gross domestic product loss (World Bank, 2006). The resultant loss of human potential and productivity seriously constrain economic development in Africa.

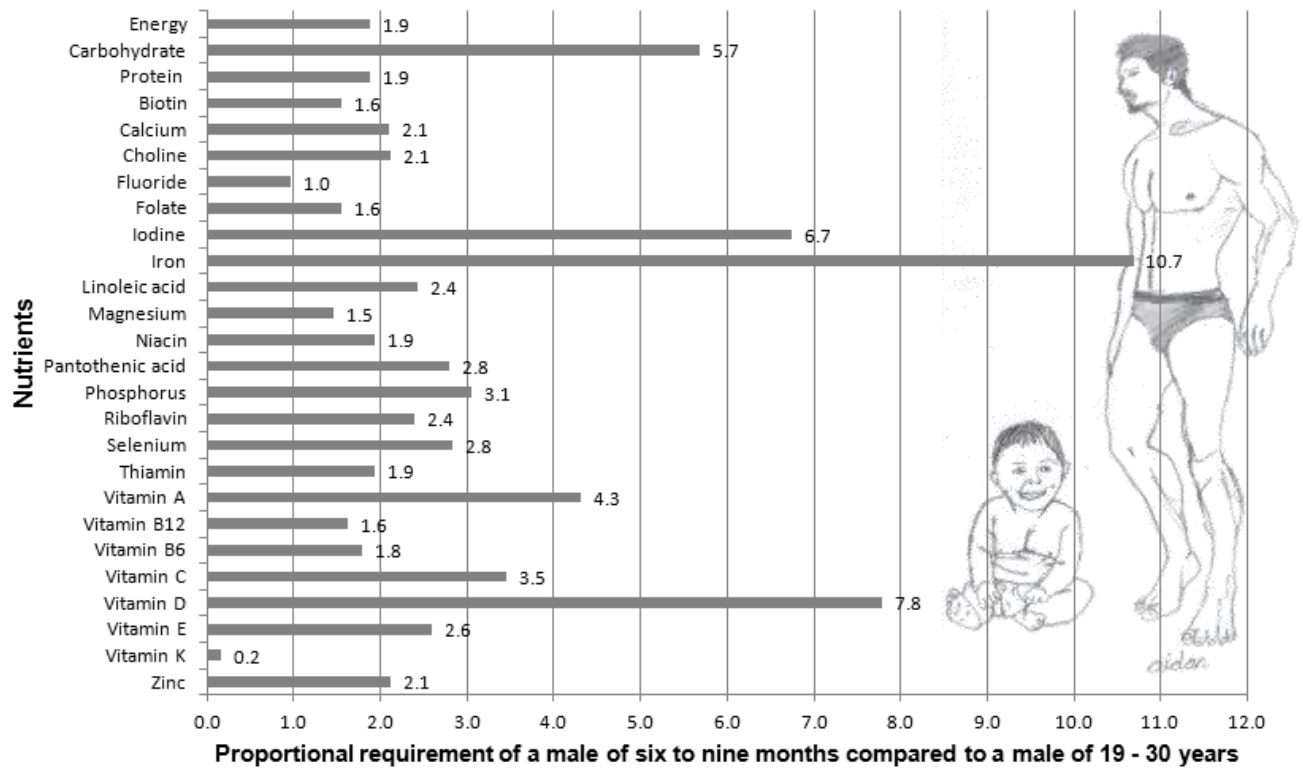
Population growth will place greater strain and competition for use on a number of crucial resources. Land, water, food, fuel (energy) and fodder will all come under severe competition as a growing population puts pressure on the environment and at the same time increases the demand for food. Urban migration will lead to a proportionally lower number of rural households, reducing the proportion of households with access to resources for producing food for themselves and the market. Although there is considerable room for expanding the area under cultivation in Africa, uneven geographical concentrations could mean that smallholder farm sizes decrease, raising questions of profitability and the sustainability of smallholder livelihoods. Clearly, considerably greater efficiency of production, consumption and public expenditure will be necessary. The growing population will put increasing pressure on already struggling health care systems in Africa. Already these systems are curative in focus, rather than preventative. The sustainability of health care will come under enormous pressure from a growing population.

Overcoming children's under-nutrition is a key element to feeding Africa's population in future. Not just for the savings on health care and the benefits to productivity, but because one of the crucial ingredients for future sustainability of food security in Africa will depend on peace and national security. Hunger is an outcome of poverty and inequality. Breaking the cycle of poverty and addressing inequalities through opportunities for increasing household income will rest on having health and happy populations, secure in the knowledge that there is enough food for people to live an active and healthy life. Special consideration will need to be given to improving early childhood nutrition (at a minimum - the first 1000 days from conception to two years and the next 1000 days to age 5) to give future generations a productive and food secure future. Interventions will need to take into account the specific needs of children whose nutritional requirements are far higher than adults per body mass unit (Figure 2). As seen from Figure 2, most nutrient requirements per unit of body mass for a baby of nine months is at least double that required for an adult male of 19 – 30 years. The challenge lies in identifying strategies for providing nutrient-dense foods that meet these requirements when children have a general dislike for vegetables.

Future food supply will need to be more nutrient dense and bio-available to improve food system efficiency. Nutrient density refers to the quantity of essential nutrients per unit of food. Fruits, vegetables, foods of animal origin (meat and dairy), nuts and fish are typically nutrient dense. Yet, little thought has been given to nutrient densities in international nutrition literature and development practice. Even less attention is given to how to make these foods more readily available and affordable to those who need to increase consumption of these foods the most. However, we know that these – often perishable – foods are high value crops for farmers and have higher growth multiplier effects for broad-based economic growth.



**Figure 2: Comparative nutrient requirement per unit of body mass for a baby relative to an adult male.**



Source: Author's own calculation based on the National Academies of Sciences (2004).

For decades, the food system has focused on providing energy in the form of staple crops. These bulky commodities are predominantly high in energy and low in protein and micronutrients – the essential elements for healthy and active people. However, many African crops are rich in these elements but technology developments have largely focused on globally traded rice, wheat and maize development. Coping with and adapting to climate uncertainties will require diversification of production. These neglected African crops may well provide solutions to this diversification as they are already well suited to a variety of African contexts and remain higher in nutrients per unit.

One of the anomalies in the current food system is that the majority of foods consumed by the poor are bulky staples with high energy content and low densities of other nutrients. The high rates of stunting and under-nutrition in Africa can be linked to the typical foods consumed. Children need to consume five to six small meals a day, yet households typically reduce meal frequencies to cope with inadequate food availability and access. In addition, children are not physically able to consume large quantities of these typically bulky staples, leading to sub-adequate intakes. It is well documented that as incomes of the poor increase, they diversify their diets, including foods such as meat, milk, fruits and vegetables. However, the modern food system, dominated by multi-nationals, offers consumers with disposable incomes access to foods that are concentrated in terms of energy and fat and largely devoid of essential micronutrients. As incomes rise and urbanisation increases, Africa could face a devastating switch in consumption patterns in favour of such foods, swinging the balance towards greater incidence of over-nutrition. This too is a health concern and treating life-style related diseases could add significantly to the future health system, draining resources from interventions to address under-nutrition. As children who have been exposed

to under-nutrition are at a higher risk of non-communicable diseases such as diabetes and cardiovascular disease in adulthood the risks of increasing over-nutrition are high.

### **Effective policies in the future start today**

To feed Africa's population in 2050, a radical shift in thinking and practice is needed among governments and the development community. At present international debate rages over terminology related to food security and nutrition as nutrition activists attempt to get this important element onto the development agenda and try to avoid the lack of improvement in human nutrition and health seen in the Green Revolution of the 1970s. They are largely ignored by other players without an appreciation of the urgent need to reduce malnutrition to improve overall national efficiency.

New efforts to implement the Comprehensive African Agricultural Development Programme (CAADP) and the UN 'twin track' approach to development seek to bring the neglected element of deliberate nutrition focus to accompany agriculture-drive economic development. But to date, the inclusion of nutrition programmes and their implementation of part of a comprehensive development strategy have been poor, with many newly drafted national agriculture and food security investment plans ignoring nutrition interventions or including weak programmes with no inclusion of nutrition-related impact indicators. A lack of coordination among UN Agencies with distinct responsibilities for either production or nutrition, the silo specialisation mentality of higher education training, the institutional sector organisation and financing of most governments and sector-specific development strategies rolled out by the development community, prevent a coordinated and comprehensive

approach to managing competing demand for resources – set to intensify with population growth pressure.

The CAADP agenda provides guidance to countries in reform and development of policies and programmes that seek to increase public investment in agriculture to simultaneously stimulate broad-based economic growth and attain MDG one goals to significantly reduce hunger and poverty. CAADP directs investment to four mutually reinforcing and interlinked pillars:

- Extending the area under sustainable land management and reliable water control systems;
- Improving rural infrastructure and trade-related capacities for market access;
- Increasing resilience at all levels by improving the supply of affordable food, improving nutrition and linking vulnerable people into opportunities for agricultural growth; and
- Improving agriculture research, technology dissemination and adoption.

Such comprehensive frameworks are increasingly being called for as essential for sustainable food security at national levels (High Level Task Force on the Global Food Security Crisis, 2010; Committee on World Food Security High Level Panel on Food Security and Nutrition (HLPE), 2011; 2012; United Nations, undated).

## **Conclusion**

Providing the calories to feed another 500 million people in Africa in 2050 is most likely possible, given the production trends from 1990 and with the current reform and renewed investment in agriculture. But, feeding this growing population in such a way that their life-

cycle specific nutritional needs are met will not come from business as usual. A great deal more careful effort will be needed if we have any hope of breaking the cycle of poverty, low productivity and under-nutrition. The imperatives for improving nutrition and productivity are high.

Only by addressing structural poverty through broad-based and widespread pro-poor economic development will food access improve. But, with increased incomes, comes the possibility that dietary changes may undermine sound nutrition rather than promote healthy eating. Carefully designed comprehensive strategies and deliberate policy alignment across the agriculture, health (including nutrition), trade, water and education sectors will be necessary to reduce competition for resources and public expenditure and ensure a well-regulated agriculture and food system. Reducing under-nutrition, preventing over-nutrition and maximising human productivity will require deliberate attention in the design of these comprehensive policies and their implementation programmes to ensure the availability of and access to micro-nutrient-dense and healthy foods at affordable prices for all citizens to meet life-cycle specific requirements. Investment in and promotion of regular consumption of Africa's rich diversity of nutritious foods is vital for exploiting the nutritional benefits of these adaptable commodities (crop, animal and fish) and providing healthy foods for future generations.

## **References**

Caulfield , L.E., de Onis, M., Blössner, M., and Black , R.E. (2004). Under-nutrition as an underlying cause of child deaths associated with diarrhoea, pneumonia, malaria, and measles. *American Journal of Clinical Nutrition* 80: 193–98.

Committee on World Food Security High Level Panel of Experts (CFS) on Food Security and Nutrition (HLPE). (2011). Price volatility and Food Security. Report No 1. CFS HLPE, Rome. [http://www.fao.org/fileadmin/user\\_upload/hlpe/hlpe\\_documents/HLPE-price-volatility-and-food-security-report-July-2011.pdf](http://www.fao.org/fileadmin/user_upload/hlpe/hlpe_documents/HLPE-price-volatility-and-food-security-report-July-2011.pdf). Accessed 6 August 2012.

Committee on World Food Security High Level Panel of Experts (CFS) on Food Security and Nutrition (HLPE). (2012). Social protection for food security. Report No 4. CFS HLPE, Rome. [http://www.fao.org/fileadmin/user\\_upload/hlpe/hlpe\\_documents/HLPE\\_Reports/HLPE-Report-4-Social\\_protection\\_for\\_food\\_security-June\\_2012.pdf](http://www.fao.org/fileadmin/user_upload/hlpe/hlpe_documents/HLPE_Reports/HLPE-Report-4-Social_protection_for_food_security-June_2012.pdf). Accessed 6 August 2012.

Economist (2011). Africa's population miracle or Malthus? Some Africans think they face demographic disaster, others that they could reap a demographic dividend. They will probably get neither. 17 December, on-line edition available at <http://www.economist.com/node/21541834?zid=319&ah=17af09b0281b01505c226b1e574f5cc1>. Accessed 5 August 2012.

Ezzati, M., Lopez, A., Rodgers, A., Van der Hoorn, S., Murray, C.; the Comparative Risk Assessment Collaborating Group. (2002). Selected major risk factors and global and regional burden of disease. *Lancet* 360(9343): 1–14.

Food and Agriculture Organisation (FAO). (2009). How to feed the world in 2050: The special challenge for sub-Saharan Africa. High Level Expert Panel Meeting Report. Rome 12 – 13 October 2009.

[http://www.fao.org/fileadmin/templates/wsfs/docs/Issues\\_papers/HLEF2050\\_Africa.pdf](http://www.fao.org/fileadmin/templates/wsfs/docs/Issues_papers/HLEF2050_Africa.pdf) .

Accessed 6 August 2012.

Food and Agriculture Organisation (FAO). (2010). Global hunger declining, but still unacceptably high: International targets difficult to reach. Economic and Social Development Department Report. FAO, Rome.

Food and Agriculture Organisation (FAO). (2012). Food security data and definitions.

<http://www.fao.org/economic/ess/ess-fs/fs-data/ess-fadata/en/>. Accessed 4 August 2012.

High Level Task Force on the Global Food Security Crisis. (2010) Updated Comprehensive Framework for Action on Food Security. High-Level Task Force on the Global Food Security Crisis, United Nations, Rome.

National Academy of Sciences. (2004). Dietary Reference Intakes series. Washington DC: National Academies Press.

Population Reference Bureau. (2011). World Population Data Sheet.

<https://www.prb.org/Publications/Datasheets/2011/world-population-data-sheet/data-sheet.aspx>. Accessed 7 August 2012.

Rabin, A. (2011). Population growth and food security in the horn of Africa: Changing demographics in the Horn are affecting food security. Think Africa Press, 14 September 2011. <http://thinkafricapress.com/population-matters/impact-population-growth-food-security-horn-africa>. Accessed 6 August 2012.

UNICEF and Micronutrient Initiative (MI). (2004). Vitamin and mineral deficiency: A global damage assessment report. [http://www.unicef.org/media/files/davos\\_micronutrient.pdf](http://www.unicef.org/media/files/davos_micronutrient.pdf).

Accessed 5 August 2012.

United Nations (UN). (undated). Scaling up nutrition: A framework for action. United Nations, Geneva.

World Bank. (2006). Repositioning nutrition as central to development: A strategy for large-scale action. World Bank, Washington DC.