Profile of Hunger and Food Insecurity
Background paper for the
High-Level Panel of Eminent Persons on the Post-2015 Development Agenda

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According to the very imperfect measures of the Food and Agriculture Organization (FAO), there are around 850 million people who are classified as chronically hungry in the sense of not having enough food to meet their energy needs. Hunger in sub-Saharan Africa, South Asia, and East Asia account for around 90 percent of the total, and this is roughly equally divided among the three regions. These are rough estimates, based on aggregate data on national food supplies and models of how national food supplies reach individuals within the population. Within the 850 million or so hungry people, around 20 million at any time are suffering from acute hunger, meaning a temporary, extreme bout of hunger resulting from a dislocation such as war, famine, or other upheaval.

The 2012 FAO/IFAD/WFP report “State of Food Insecurity in the World” presents new improved undernourishment estimates going back to 1990 suggesting that progress in reducing undernourishment has been slightly faster than previously thought. Yet, progress in reducing hunger has slowed off significantly since the 2007-2008 food crisis. There is little chance of meeting the global MDG target of halving hunger by 2015, and certainly not without a sudden and significant scale up of help for smallholder farmers, a policy change that seems utterly unlikely given the lack of clear and accountable G8 leadership on the issue.

Figure 1 shows the FAO map of hunger prevalence (as a share of the national population) for 2006-8. We see that hunger rates are especially high in tropical sub-Saharan Africa (thus excluding north Africa and southern Africa), South Asia, and parts of Southeast Asia (e.g. Cambodia, Thailand, and Laos). Yet the situation is more serious and complicated than indicated by the aggregate FAO data on undernourishment.

In addition to the 850 million or so with caloric insufficiency, there are an additional billion or more people with serious micronutrient deficiencies, including iron, folate, Vitamin A, iodine, omega-3 fatty acids, and others. These micronutrient deficiencies can contribute to devastating under-development of the brain and other organs and to chronic diseases later in life. There are no regularly updated official maps of
these micronutrient deficiencies. Figure 2, for example, depicts estimates of iron deficiency by country, measured as disability-adjusted life years lost per 100,000 inhabitants as a result of iron deficiency. Note that the data are out of date (2002) and surely not precise.

Other indicators of under-nutrition are based on height for age, weight for age, or weight for height. Stunting signifies low height for age. Underweight signifies low weight for age. Wasting signifies low weight for height. Each condition is moderate when the deviation is between two and three standard deviations below the median. Each condition is severe when the condition is less than three standard deviations below the median.

Stunting signifies a serious health risk. It is the result of an inadequate quality, and perhaps quantity, of the diet during the first 1000 days of life starting at conception, as well as frequent illness. Stunting is associated with increased morbidity and mortality, poorer brain development, lower enrollment and performance at school, lower income earning, and increased risk of chronic disease later in life. Stunting is usually measured among children under five years of age (current estimate: 171 million under-fives are stunted), but since the consequences of stunting early in life cannot be undone later, a reasonable estimate is that 1/3 of adults, adolescents and school-age children in developing countries suffer its consequences.

Under-nutrition is therefore a complex biological and social phenomenon that is about far more than quantity of food intake. It is also about quality of the diet, nutrient needs, nutrient absorption from the diet, and food preferences and ability to make choices. The availability of nutrients to the body depends not only on diet, but also on diseases (chronic diarrhea and worm infections, for example, can deplete nutrients), the enteric micro-biota, and other individual conditions and needs. A significant part of child under-nutrition results from chronic infections. Therefore, the fight against hunger involves:

(1) Adequate caloric intake, including appropriate amount of protein and fat
(2) Adequate micronutrient intake
(3) Hygienic and safe food storage and preparation
(4) De-worming
(5) Case management of diarrhea
(6) Safe water and sanitation

Agriculture and Hunger

Agriculture and hunger are of course intimately related. A significant though unknown fraction of the world’s under-nourished people – perhaps one third to one half -- are actually rural farm families, that is, food producers whose yields are so low that they do not grow enough food, or enough nutritious food, for their own families much less for their communities and the markets beyond. Raising smallholder yields, especially in Africa, and also in Asia, is therefore a core
instrument in the fight against hunger. Recent scientific evidence, shown in Figure 3, gives hope for significant increase in yields. In the figure we see that significant parts of sub-Saharan Africa and Asia are achieving less than one-third of the potential yields, mainly because of insufficient use of improved inputs (fertilizers, irrigation, improved seed varieties). This is good news in one sense: a dramatic increase in food production is technically possible. In Figure 4 we see that yields of (a) maize, (b) wheat, and (c) rice can all be enhanced significantly through added inputs of fertilizer and irrigation.

Support for Smallholder Farmers

The major challenge in achieving these increased yields is financial: smallholder farmers are unable to finance the seasonal purchase of improved inputs. Generally they are in a finance-poverty trap. They are too poor to be creditworthy, and their lack of creditworthiness keeps them in poverty. Microfinance units have not succeeded or even tried adequately to enter the domain of seasonal agricultural financing, which is considerably riskier than most microfinance for working capital (e.g. for inventories in retail trade). Repayments on crop inputs requires an entire planting cycle, often 6 months or more, and is subject to considerable weather risk that is not easily insured. Mainstream banks have tended to stay away.

There are three approaches that have worked historically and that are being deployed on a small scale today. The first is targeted (smart) subsidies for smallholder farmers to enable them to build up household capital through several years of improved harvests, until the time that they become creditworthy on their own. The second includes public-private partnerships to engage commercial banks in the novelty of lending to smallholders. The third is for smallholder farmers to organize into farmer-based organizations that have the economies of scale and negotiating power to enter the financial markets and to make contracts with upstream suppliers and downstream customers.

The G8 started to get interested in such initiatives in 2009, but the financial crisis has largely derailed their focus. The G8 countries set up a Global Agriculture and Food Security Program (GAFSP) at the World Bank, as a financing mechanism akin to the Global Fund, in order to help low-income governments to implement some combination of the three strategies just outlined. The GAFSP has lent around $1 billion dollars, but is chronically short of funds because of the lack of G8 follow through. It remains the single best instrument available to scale up international support for smallholder farmers.

Environmental Change and Agriculture at Serious Risk

Every aspect of the global food supply is under increasing stress. As shown in Figure 5, global food prices have recently soared by around 50% from a decade ago, and have become considerably more volatile as well. These global food price increases have caused considerable suffering and instability in food-deficit, low-
income countries, such as in most of Sub-Saharan Africa and the non-oil countries of North Africa and the Middle East. They have certainly played a role in the instability of the Arab Spring.

The dramatic spike in prices reflects several basic supply and demand considerations, including:

(1) Unstable supplies from major producers, such as the US, Russia, Ukraine, and Brazil, that have been beset by serious climate shocks in recent years;

(2) The inappropriate subsidization of biofuel production, to the point of using around 40% of the US maize production for heavily subsidized ethanol;

(3) Steeply rising input costs, such as fertilizer and fuels;

(4) Depletion of fisheries and alternative food stocks;

(5) Depletion of groundwater and rising water scarcity more generally;

(6) Growing global demand for staple grains (and oilseeds), especially for feed grains for rapidly rising meat production.

All of these trends are likely to intensify, as cogently argued recently by Lester R. Brown in *Full Planet, Empty Plates* (2012):

> The purpose of this book is to help people everywhere recognize that time is running out. The world may be much closer to an unmanageable food shortage – replete with soaring food prices, spreading food unrest, and ultimately political instability – than most people realize.

Browns points particularly to the combination of growing world population, rising meat demand, diversion of grains to biofuels, widespread soil erosion, water scarcity, rising temperature, China’s booming soybean imports, and the slow growth of underlying technological advances on basic staple production.

The effects of anthropogenic (human-induced) climate change on long-term agriculture production are fraught with scientific uncertainty, though several fairly robust points can nonetheless be made. The basic points are as follows. In currently warm climates, and especially in tropical farming systems, warmer temperatures could result in severe declines in crop yields. In cold climates, notably in high latitudes, warmer temperatures could lengthen the growing season and actually increase crop production. In seasonally dry environments (such as the wet-dry tropics, the semi-arid sub-tropics, and Mediterranean climates with wet winters and dry summers), the higher temperatures and changes in long-term precipitation patterns could lead to serious water stress and declines in soil moisture. Higher CO2 could conceivably lead to “carbon fertilization” and higher yields, especially in
high latitudes and crops with C3 photosynthesis pathways, yet the magnitude of this effect is highly disputed and unclear. In summary, human-induced climate change is likely to have serious adverse effects in parts of the tropics and sub-tropics, and possible beneficial effects in certain high-latitude farm systems. In a business-as-usual emissions scenario for the 21st century, enormous dislocations would become highly likely, with hugely adverse food and livelihood consequences for vast numbers -- hundreds of millions -- of people.

In his list of recommended responses to the growing food supply instability and unreliability, Lester Brown includes the following:

**Demand-side measures:**
- Stabilize world population
- Eradicate poverty (key to population stabilization)
- Reduce excessive meat consumption
- Reverse biofuel policies

**Supply-side measures:**
- Stabilize the climate
- Raise water productivity (e.g. drip irrigation, dry rice farming)
- Conserve soils (e.g. no-till agriculture)

We would also emphasize improved crop varieties, such as crops with tolerance for drought, salinity, submergence, and high temperatures.
Figure 1. FAO World Map of Hunger Prevalence, 2006-8
Figure 2. WHO Map of Iron-Anemia Deficiency, 2002
(DALY rates from iron-deficiency anaemia per 100,000 inhabitants)
Figure 3. Actual Yields as Percent of Attainable Yields

Figure 4. Management factors limiting yield-gap closure to 75% of attainable yields for (a) maize, (b) wheat, and (c) rice.
Figure 5. Spike in Global Food Prices in the Past Decade
FAO Food Price Index (2002-4 = 100)