



Poverty and food insecurity

A threat to billions

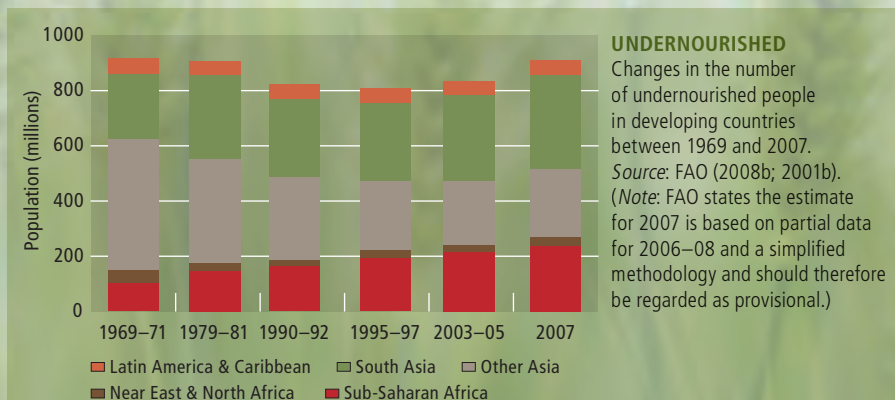
The much-heralded Copenhagen climate change summit in December 2009 offers an opportunity to tackle the plight of two billion of the poorest people who have contributed very little to the causes of climate change but will almost certainly bear the brunt of its impacts. Similarly the burdens from the current financial crisis and the negative side effects of biofuels development and agricultural subsidies all fall disproportionately on the poor. Seventy percent of the poorest two billion rely on agriculture for their livelihoods and wellbeing. Political will and resource commitments are required to tackle the threats of poverty and food insecurity and to help the world achieve the universal right to food for all its inhabitants. But will the ministers and officials meeting in Copenhagen be able to mobilize these? It seems unlikely.

Food, water, and health are recognized as fundamental human rights and yet today, a billion people are undernourished, over 1.2 billion have no access to safe water, and half the world's population is at risk of infectious diseases. The tragic situation will be further exacerbated in the twenty-first century by global change, including climate change, ecological degradation, economic inequities, and the momentum of demographic processes.

The year 2008 will be remembered as the defining moment when the reality of the interlinkages and interdependencies between food and energy came home to roost. A number of factors, including the adoption of mandatory biofuels targets, the high volatility of crude oil prices, increasing demand for food imports from major developing countries, below-average harvests in some countries, and market speculation—together with the low level of world food stocks—resulted in sudden increases in world food prices. This caused the domestic prices of staple foods in a number of countries to increase by over 50 percent in a matter of weeks. The poorest were, of course, the hardest hit.

The poverty trap

Poverty and hunger eradication is a much more complex process, involving far greater risks and uncertainty, than was imagined in 2000 when the Millennium Development Goal (MDG) of halving, between 1990 and 2015, the proportion of people who suffer from hunger and debilitating poverty, seemed feasible. For a number of reasons, eradicating extreme poverty and hunger, numerically and ethically the first of the MDGs, is now—paradoxically—the least likely to be achieved.



Poverty means lack of livelihood earning opportunities and constant struggle for survival and high susceptibility to illness. The average income of the world population has increased substantially in the last decades, but so too has the number of people falling below the poverty line. The 2.5 billion people with incomes of less than US\$ 2 a day lack an estimated US\$ 300 billion. This is equivalent to some 0.6 percent of global income, but much less than say annual spending on military, not to mention the more than US\$1 trillion made available to save broken banks. There has always been a gap between the poor and the rich in the world, but it is currently wider than ever before. In 2000 the top 10 percent of earners in the world received together 85 percent of total earnings, the bottom 10 percent only 0.03 percent, a ratio of nearly 3000 to 1.

The syndrome of poverty, undernourishment, poor health and illiteracy is governed by multiple mutually reinforcing factors: the lack of socio-economic development; high population growth; insufficient investment in infrastructure and human capital; poor agronomic progress; increasing competition for land and water resources by food production and other sectors; pollution and nutrient

mining instead of environmentally sustainable best practices; exposure to natural disasters and extreme events; and insufficient response capacity and adaptation to climate change. These threats are further aggravated by poor governance and civil conflicts.

Food insecurity

The most widely accepted definition of food security, which captures its inherent complexity, was formulated at the 1996 World Food Summit in Rome: "Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life." There is no easy way of measuring food insecurity. However, it can be broken down into three distinct but interrelated dimensions: food availability, food access, and food utilization.

Chronic food insecurity is a widespread problem and is closely related to structural factors associated with extreme poverty. Vulnerability to food insecurity generally includes those who lack productive assets and depend on irregular income from daily wage labor. Groups such as landless agricultural day laborers, casual fishermen, and beggars fall into this category.

Calamities like floods, cyclones, earthquakes, land slides and erosion, and droughts cause extensive damage to crops, homes, and to household and community assets, decreasing the livelihood opportunities of the poor. At the same time, disasters hamper physical access to food when food stocks and crops are destroyed and markets are temporarily dysfunctional, often causing price spikes for essential food staples.

In a perfect and equitable world, food availability would be achieved by ensuring that domestic production, net food imports, and national food stocks are, together, sufficient to cover national requirements. However, even with all these factors in place, in reality poor households can be prevented from accessing food for many reasons: they have no land to grow their own food; their income is too low to afford market prices; no public welfare programs are available to enhance their capacity to acquire food.

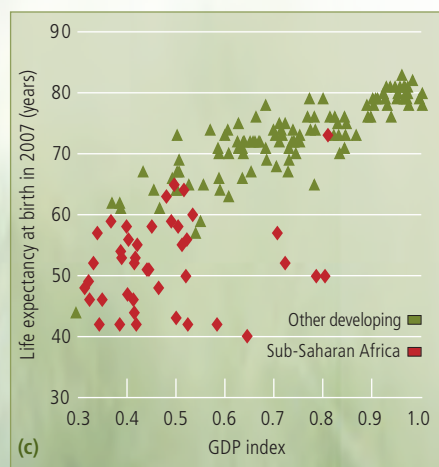
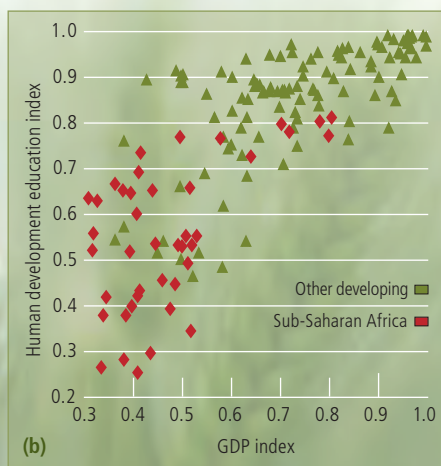
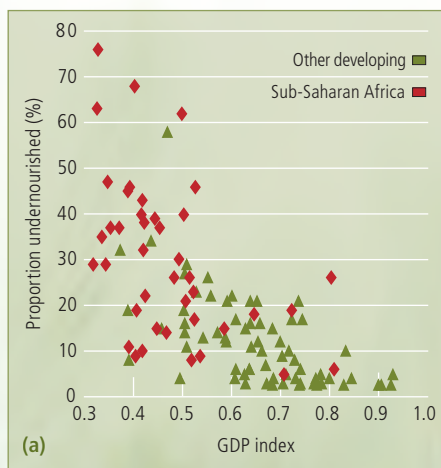
Even if enough food is "acquired," its distribution in the household is often inequitable, with women, children, the elderly, and the disabled often eating last and least. And even when there is enough food available, an individual's capacity to absorb and utilize nutrients may be deficient because other aspects are lacking such as access to proper sanitation and healthcare, education and nutritional awareness, caring practices and social safety nets.

Trends aggravating food insecurity

Demographic pressures Growing population numbers in developing countries stretch the food and water supply more thinly. The developing-country population is projected to increase by some 60 percent to about 8 billion by 2050, clearly indicating that there will be more mouths to feed, which is reflected in land use changes. The amount of new land brought under cultivation over the last 30 years has been around 5 million hectares annually. Some 1.6 billion hectares of land are currently used for crop production, with about 1 billion under cultivation in developing countries.

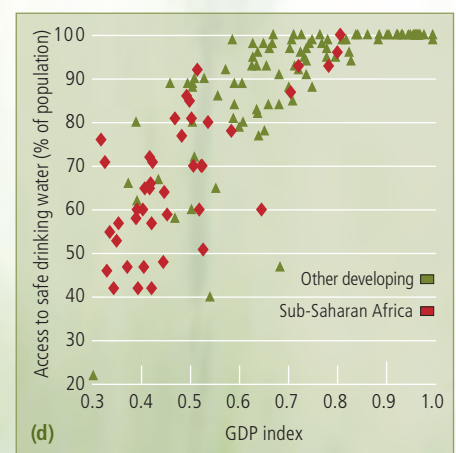
As people strive to get the most out of land already in production or exploit virgin territory to develop more agricultural land to grow food, the damage inflicted on the

Extreme events can extensively damage crops (pp. 20–21)



HUMAN DEVELOPMENT AND WELLBEING

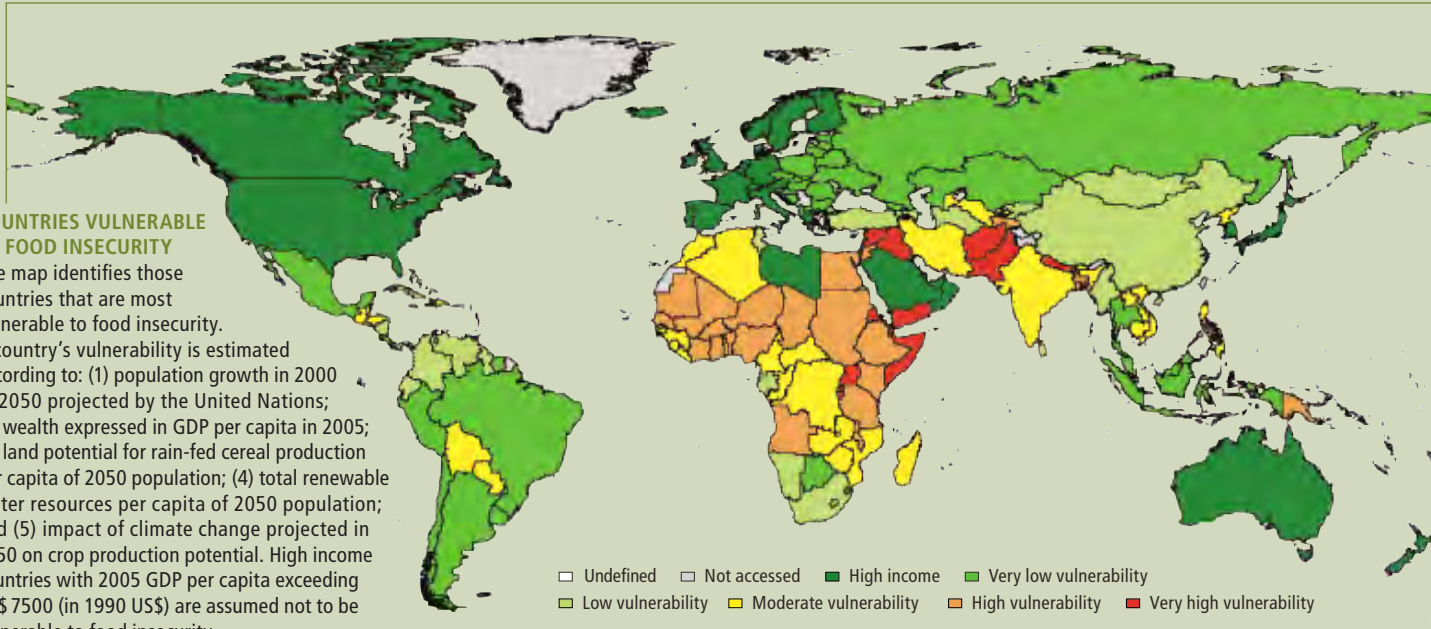
The four figures illustrate the correlation between a country's economic development and its population's (a) undernourishment, (b) level of education, (c) life expectancy, and (d) access to safe drinking water.



COUNTRIES VULNERABLE TO FOOD INSECURITY

The map identifies those countries that are most vulnerable to food insecurity.

A country's vulnerability is estimated according to: (1) population growth in 2000 to 2050 projected by the United Nations; (2) wealth expressed in GDP per capita in 2005; (3) land potential for rain-fed cereal production per capita of 2050 population; (4) total renewable water resources per capita of 2050 population; and (5) impact of climate change projected in 2050 on crop production potential. High income countries with 2005 GDP per capita exceeding US\$ 7500 (in 1990 US\$) are assumed not to be vulnerable to food insecurity.



Legend:
□ Undefined □ Not accessed ■ High income ■ Very low vulnerability
■ Low vulnerability ■ Moderate vulnerability ■ High vulnerability ■ Very high vulnerability

environment grows: arable lands lost to erosion, salinity, desertification, and urban spread; disappearing forests and loss of biodiversity. About 40 percent of the world's arable land is degraded to some degree and will be further impacted by climate change, including by expected extreme weather events and climate variability.

Climate change makes a serious situation worse An already difficult food insecurity situation is being exacerbated by the overarching effects of climate change, caused by the atmospheric accumulation of greenhouse gas emissions, particularly carbon dioxide (CO₂). While current research confirms that crops would respond positively to elevated CO₂ in the absence of climate change, human activities—primarily fossil fuel burning and deforestation—are causing massive atmospheric concentrations of greenhouse gas emissions, leading to higher temperatures, altered precipitation patterns, and increased frequency of extreme events, such as drought and floods. This combination of factors will likely depress agricultural yields and increase food production risks in many world regions in the future, particularly in many of the current food-insecure countries.



Water scarcity exacerbates food insecurity Compounding food insecurity is water scarcity in the locations that need it most—water supply does not coincide with regional distribution of the world's population. Water-stressed and water-scarce countries are defined as those with less than 1,700 and 1,000 cubic meters, respectively, of available water per capita. Some 30 countries already face water shortages, and by 2050 this number could increase to over 50 countries, most in the developing world. As around 70 percent of the world's fresh water use goes to agriculture—even 90 percent in countries that rely extensively on irrigation—water scarcity is often a very serious obstacle to achieving food security.

Research from IIASA's Land Use Change and Agriculture Program indicates that both socio-economic development and climate change in this century will significantly impact irrigation water requirements. Simulation results suggest that globally the impacts of climate change on increasing irrigation water requirements could be nearly as large as the changes projected in response to socio-economic development alone: a projected growth of water withdrawals in the order of 25 percent due to socio-economic development as compared to an increase of about 20 percent in global irrigation water needs due to global warming.

Biofuels add to the competition for land and water About 80 percent of current global carbon dioxide emissions originate from fossil fuel burning, making the development of cleaner fuels, the improvement of energy efficiency measures, and adaptation of conservation practices vital. Several developed and developing countries have embraced the apparent win-win opportunity of fostering the development of biofuels to respond to the threats of climate change, lessen their oil dependency, and contribute to agriculture and rural development.

The reality, however, is complex, as biofuel development has social, environmental, and economic impacts, well beyond the national and regional setting of domestic biofuels targets. When important food and animal feed crops, including maize, wheat, and soybean, are redirected toward the production of biofuels, there is competition for land—with serious implications for food security, especially, as demonstrated in 2007/08, when the speed of biofuels development outpaced annual production increases of agriculture.

Ways forward

Commitment to sustainable agricultural development Agriculture is the dominant user of the environment and natural resources; it has the greatest impact on the sustainability of ecosystems and their services, and accounts directly and indirectly for a major share of employment and livelihoods in rural areas in developing countries. The reality for many developing countries is that no progress on reducing rural poverty and hunger can be achieved without political and resource commitment to sustainable agricultural development.

Given that 70 percent of the world's food insecure population live in rural areas, food security cannot be tackled unless the issues of sustainable agriculture and rural development are tackled first. These obviously require the highest policy and resource commitment.

However, trends over the last 30 years show a reduced allocation of national development budgets to agriculture in many developing countries, a setback that has coincided with declining multilateral lending and bilateral aid for the sector. Agriculture, it seems, has been regarded as "backward" and thus of low priority by national governments and their international partners.

The agricultural sector faces a complex challenge: producing more food of better quality while using less water per unit of output; providing rural people with resources and opportunities to live a healthy and productive life; applying clean technologies that ensure environmental sustainability; and contributing in a productive way to local and national social and economic development.

Think globally and act locally The paradox of food insecurity and hunger is that at the global level there is sufficient production to provide food for everyone at a level of nutrition considered satisfactory and yet 1 in 7 people in the world face daily hunger. Notwithstanding the global adequacy of food supplies, at the local level people in countries with persistent food insecurity problems may not have opportunities of access to the actual or potential global plenty. In many countries food security depends fully on the performance of local agricultural production. Investing in the development of agriculture will be particularly effective in those countries with high population growth. However, the natural resource base of some of these countries may not be sufficient to make significant progress. Therefore, serious thought needs to be given to the option that efforts to develop agriculture be supplemented with interventions in other sectors not dependent on agricultural resource constraints.

Focus research and development on the needs of the poor The biological sciences challenge is to combine the best of conventional breeding with safe and ethical molecular and cellular genetics research to develop nutritionally enhanced and productive germplasm. A risk of modern biotechnology for developing

countries is that technological development may bypass poor farmers. The rapidly increasing privatization and patenting of agricultural research findings is of concern as its profit priority is unlikely to focus on the needs and crops of the poor. Targeted research has the potential to overcome many environmental constraints such as infertile soils, water limitations, pests and diseases, etc., as well as to increase crop nutritional content.

In many countries, agricultural extension and marketing services have declined due to budgetary constraints and low priority and political support for agriculture. Yet, agricultural extension services will be an essential link to inform and train farmers in the agricultural adaptation to climate change.

Land rights and tenure are indispensable Providing adequate rights of access to land and other natural resources and secure tenure of those rights are essential to fostering sustainable and progressive agricultural development. Secure land tenure empowers and enables development and is a valuable safety net as a source of shelter, food, and income, especially in times of hardship, and leads to greater environmental security. Farmers are quite naturally more inclined to invest in improving their land through soil protection measures, planting trees, and improving pastures if they have secure tenure and can benefit from their investments. Without a land title, the alternative is for farmers to exploit marginal land, abandon it when it becomes unproductive, and then move on clearing forests and other fragile land areas that are available.

Political will and the resources to act are lacking

Safeguarding food, water and energy security requires an enabling environment, which can best be established in a context of good governance, respect for and enforcement of human rights, and a broad-based non-discriminatory economic development. As stated in the Voluntary Guidelines, adopted by the UN Food and Agriculture Organization (FAO) Council in 2004 to support the progressive realization of the right to adequate food in the context of national food security “such an approach entails, *inter alia*, direct and immediate measures to ensure access to adequate food as part of a social safety net; investment in productive activities and projects to improve the livelihoods of the poor and hungry in a sustainable manner; the development of appropriate institutions, functioning markets, a conducive legal and regulatory framework; and access to employment, productive resources and appropriate services.”

Until this rhetoric is translated into real policies and actions at the national and international levels, poverty in all its myriad aspects—including chronic debilitating hunger—will remain.

Whether it is climate change, biofuels development, contra-productive subsidies, or the financial crisis, the burden of all these falls on the poor countries and unless the international community rises to these challenges, the future is likely to be bleak, not only for those directly affected but globally in a world that is increasingly interdependent.

The Copenhagen climate change summit should take note and act morally, ethically and practically to ensure worldwide achievement of the universal right to food. ■

Further information IIASA's Land Use Change and Agriculture Program at www.iiasa.ac.at/Research/LUC

Günther Fischer is Leader and **Harrij van Velthuizen** Senior Scientist of IIASA's Land Use Change and Agriculture Program. **Mahendra Shah**, Senior Scientist, is Dean of IIASA's Young Scientists Summer Program and Coordinator of UN Science and Policy Relations.

BIOFUELS AND FOOD SECURITY

Based on a global agro-ecological and socioeconomic assessment, IIASA's Land Use Change and Agriculture Program assessed the implications of an accelerated increase in biofuel production. A number of scenarios covering a wide range of possible future demand for transport biofuels for the period 2000 to 2030 were assessed in terms of their impacts on food availability, prices, trade, and worldwide use of agricultural inputs, notably fertilizer and land. Sustainability issues, competition for land use, food insecurity, and greenhouse gas savings were among the aspects addressed by the study.

The global study provided a number of robust policy-relevant research findings:

- Implementing ambitious global biofuel targets for 2020 based on current first-generation technologies is likely to put food security in developing countries at risk and may not achieve any significant reduction in greenhouse gas emissions.
- Meeting ambitious global biofuel targets for 2030 in a sustainable manner requires rapid deployment of second-generation feedstock production and conversion technologies.
- Biofuel policies need to have global scope and be implemented through international development partnerships to avoid potential risks to food security and the environment.
- Biofuels are not all equally “good” or “bad” and knowledge-based policymaking is required to ensure that the right choices are made.

The IIASA study identified the following policy-support measures as being critical for achieving sustainable expansion of biofuels:

- Renewed agricultural investment and research efforts are needed to enhance agricultural productivity.
- The poor must be protected against the impacts of rising agricultural prices.
- Poor rural agricultural communities must be empowered through good governance, participatory development and respect of human rights.
- Equitable partnerships need to be fostered with local communities.
- Second-generation biofuel technologies (i.e., using biomass consisting of the residual non-food parts of crops as well as bio-energy crops) must be promoted.
- Criteria for achieving sustainability and best land use practices as well as environmental certification must be established and adopted.

Even then, liquid transport biofuels are only one among many sources of renewable energy. Their efficiency and societal value needs to be assessed vis-à-vis other current and future energy options within comprehensive national and global energy strategies. ■

Source: “Sustainable Agriculture and Food Security: Implications of an accelerated expansion of biofuels production.” Study commissioned by the OPEC Fund for International Development.