

How to produce healthy food for 9.5 billion people within planetary boundaries

Gunhild A. Stordalen

The key to reconciling global population growth and planetary boundaries is in our own hands.

The UN's mid-range projection is for the global population to peak at about 9.5 billion in 2075. In a world of finite resources, how do we feed another 2.5 billion people?

As a medical doctor and an environmental activist, I have become acutely aware of how the food we eat and the way we produce it threaten both human health and the global environment.

Today's global food system generates enough food energy for the current world population. Nevertheless, it fails to deliver adequate and affordable nutrition for all. Nearly 30 per cent of humanity faces hunger or malnutrition, and the subsequent risk of disability and stunted mental and physical growth.

At the same time, more people die from overeating than from starvation. Industrialisation, urbanisation, economic development and globalisation have brought about a simultaneous shift towards less healthy lifestyles, with a corresponding growth in diet-related chronic diseases and obesity. And these are increasing fastest among the poor.

Unhealthy lifestyles and diet-related diseases have outstripped infectious diseases and now account for 63 per cent of annual global deaths. Unless action is taken, non-communicable diseases will be the commonest cause of death even in poor countries by 2030.

The result is a worrying paradox. In many low- and middle-income countries, under-nutrition, malnutrition and obesity now often exist side by side. While these nations continue to deal with the problems of infectious disease and under-nutrition, they face a rapid increase in chronic lifestyle-related diseases driven mainly by alcohol and tobacco use, inactivity and unhealthy diet. As a result, macroeconomic development is strangled and the 'bottom billion' is locked into chronic poverty.

An unsustainable food system

The global food system is currently unsustainable. Not only is the human cost unacceptable, but we are also destroying the environment upon which the livelihood of future generations depends.

Global food production accounts for some 20–30 per cent of all human-generated greenhouse gas emissions, and consumes 70 per cent of all fresh water used by human beings while being a major source of water pollution. Agriculture is also the leading cause of deforestation and loss of biodiversity. And unsustainable fishing practices deplete stocks.

Globally, we produce about 4 billion tonnes of food every year. Owing to poor harvesting, storage and transport practices, combined with waste, however, 30 to 50 per cent of this food never reaches a human stomach. Squandering land, energy, fertilisers and water on producing wasted food is a tragedy we cannot allow to continue.

The whole food chain, from farming to transport, cooking and waste disposal,

contributes to these problems. However, agriculture remains the chief culprit.

With economic development, dietary patterns change. People consume more meat, milk and eggs at the expense of staple foods. With the recent decline in prices, developing countries eat more meat at much lower levels of gross domestic product than the industrialised countries did some 20–30 years ago.

Urbanisation speeds up this trend by stimulating improvements in infrastructure, including cold chains, which in turn encourage the trade in perishable goods. That allows city dwellers to consume a varied diet rich in animal proteins and fats, with more meat, poultry and dairy products.

This is to a certain extent good news. As diets become richer and more diverse, the high-value protein, minerals and vitamins offered by livestock products improve the nutrition of the vast majority of the world's people.

But rearing livestock for meat, eggs and milk generates some 14.5 per cent of total global greenhouse gas emissions and utilises 70 per cent of agricultural land. Grazing animals and producing feed crops combine to make up the main drivers of deforestation, biodiversity loss and land degradation.

With the global population growing steadily larger, wealthier and more urbanised, demand is increasing for more resource-intensive, energy-rich foods – especially from animals. Current consumption trends mean that global meat production is expected to double by mid-century to meet the growing demand. That poses further threats to the environment while exacerbating problems of obesity and chronic diseases. Without action, these problems are set to become acute.

These interconnected problems are increasingly well recognised. Policy-makers, non-governmental organisations and the business community all agree that the global food system needs to change if we are to address our environmental problems, adapt to climate change, tackle the epidemics of non-communicable diseases and obesity, and create a more secure, nutrition-enhancing dietary future. However, less agreement prevails about *what*, exactly, should be done.

What can be done?

In recent years, policy and industry debates have focused on improving the environmental efficiency of food *production*, trying to produce more with less impact by utilising inputs more effectively, managing resource use and addressing deforestation. Others challenge this perspective, arguing that production-side approaches, while necessary, are not sufficient.

I believe that we need a three-pronged approach in order to address environmental concerns and tackle the twin problems of dietary insufficiency and excess.

First, we need to address power imbalances in the food system. Throwing more food at the problem may not solve problems of affordability and access. We need to correct price and subsidy distortions, support and empower small farmers and landless workers, agree better working conditions and fairer terms of trade, and improve access to transport, storage and market infrastructure.

Second, we must reduce the proportion of food lost or wasted along the supply chain. Such wastage undermines food security and leads to a meaningless squandering of precious land and water resources while generating 'unnecessary' greenhouse gas emissions.

Third, diets will have to change. What we eat, and how much, directly affects what and how much food is produced. We therefore need diets that are healthier and more sustainable, and have a lower environmental impact.

Towards a sustainable and healthy food system

Humans can survive and reproduce on a remarkably wide variety of diets, but much has been learned about combinations of foods that maximise life expectancy and minimise morbidity. A healthy food system should provide a diet:

- rich in protein, mainly from plants such as legumes (including soya) and nuts, fish, and modest amounts of poultry (including eggs) and dairy products (especially in the form of yoghurt and cheese), with red meat consumed sparingly and processed meat avoided.
- containing healthy fats from unsaturated vegetable oils such as olive, soya bean and rapeseed, which are also rich in n-3.
- using whole grains, with minimal amounts of refined grains and sugars.
- containing a variety of fruits and vegetables.

To produce a healthy diet of this kind for tomorrow's global population of 9.5 billion will require major changes. To do so sustainably, we need to avoid fossil fuels, rely on renewable sources of water and minimise greenhouse gas emissions – all without any net increase in the total land area used.

An immediate, no-regret option would be to reduce greatly the feeding of grains to animals, especially cattle. Converting grain to beef and milk is simply too inefficient in terms of the energy spent. Instead, the production of legumes, nuts, seeds, fruits, vegetables and fish would be bolstered. Locally produced food is preferable, or food transported by rail.

New technologies can have major impacts, such as efficient solar and hydroponic systems, which enable year-round production of vegetables near urban areas, and direct production of edible fatty acids from bacterial or algal factories that use only sun, small amounts of water, and atmospheric carbon dioxide as inputs. New and efficient desalination systems can expand food production in arid areas.

The complexity of the challenges facing us, and of the solutions we can utilise, call for an integrated, holistic and cross-sectoral effort across disciplines. In recognition of the interlinked nature of these challenges, the EAT initiative and the EAT Stockholm Food Forum aim to build a worldwide multidisciplinary, cross-sectoral network of institutions and organisations as well as an arena where insights can be shared between the worlds of academia, business and politics.

In order to solve the major global challenges related to the food we eat and how we produce it, we need not only more interdisciplinary knowledge at the interface between food, health and sustainability, but also innovation in industries along the value chain from producer to consumer.

Furthermore, we need new policies and market regulations from bold and visionary politicians. Finally, we need to develop strategies that increase consumer awareness, enabling better decision-making in everyday food choices, not only for ourselves but above all to ensure a sustainable future for all.

Humanity has become a force of environmental change on a global scale. Nowhere is this more evident than in the health and environmental problems caused by the food we eat. Fortunately, the answer to these challenges is right in front of us – on our dinner plate – or could be, if we change our eating habits.

Gunhild A. Stordalen is a medical doctor from the University of Oslo, Norway, and holds a PhD in pathology/orthopaedic surgery. She is co-founder and chair of the Stordalen Foundation, founder and chair of GreeNudge, and founder and director of the EAT Initiative.



Stordalen Foundation funds and promotes initiatives and research on health and sustainability. www.stordalenfoundation.no

GreeNudge combines behavioural science and climate measures, and was awarded 'Innovation of the Year 2013' by the Norwegian Association of Psychologists. www.greenudge.no

The EAT Initiative links food, health and sustainability across science, politics and business, partnering with leading academic institutions in the US, Sweden and elsewhere. www.eatforum.org