

Review

Food crisis in the Asia-Pacific region

Katinka M Weinberger PhD, Warwick J Easdown PhD, Ray-yu Yang PhD,
John Donough H Keatinge PhD

AVRDC – The World Vegetable Center, Tainan, Taiwan

The Asia-Pacific region was on track to achieve the Millennium Development Goal of halving the prevalence of extreme poverty by 2015, but recent dramatic rises in the price of rice and other staples have pushed millions of people back into hunger and poverty. This indicates that the region's food supply system is more fragile and imbalanced than what was previously believed. Proximate causes of the rise in staple prices can be found in market forces such as export restrictions and rising energy prices but the ultimate causes are policies that have led to under-investment in agricultural research and emergency mitigation. Large numbers of people in the Asia-Pacific were already undernourished prior to the recent price rises, relying on monotonous diets dominated by a few staples. Pushed into reducing their dietary diversity even further, many more millions are now suffering from hunger and deteriorating health. The most fundamental food crisis in the Asia-Pacific is one of poor diets, and this affects the obese just as much as the undernourished. The solution lies in a food system that focuses on producing balanced diets, developing safe production practices, increasing food supplies by reducing losses, and investing in the research that make it all happen. Improving food systems is a fundamental community expectation and can be a matter of government survival, but if the urgency to improve food supplies overrides improving diets, the long-term impact on national health will be severe. Proactive policies, regional responses, and more integrated scientific approaches are needed.

Key Words: food prices, malnutrition, research investment, food systems, Asia-Pacific

INTRODUCTION

The year 2008 will be remembered as one that gave the world an idea of what looms ahead if inertia continues to dominate political decision-making. Sharp rises in the price of staple foods are the most obvious symptoms of fundamental problems in our food supply systems, which changes in energy costs and climate will only exacerbate. Greater investment in food systems that address diets rather than simply food supply is needed.

The food crisis last year and the current global financial crisis are reversing past achievements in the fight against hunger and malnutrition. Before the onset of the food crisis in 2007, there were about 850 million chronically hungry people in the developing world. This number rose to 960 million in 2008 and is now 1.02 billion, breaking the declining trend in the proportion of hungry people in the developing world and seriously jeopardizing the goal of halving this proportion by 2015.^{1,2}

The era of cheap food may be over. Until recently, global efforts to reduce hunger and malnutrition took place in an environment of constant food prices.¹ In 2007 and 2008, however, real food prices rose dramatically and virtually every food commodity was affected by rising prices. The price of rice alone doubled during the first four months of 2008 and world maize and wheat prices more than doubled. Similar price hikes were experienced

for other commodities, such as dairy products, meat, poultry, and palm oil.⁴

Although in 2009 international prices of most agricultural commodities have fallen from their 2008 heights,⁵ most food prices remain volatile. In many countries, local prices have not reduced and major food grain prices are still well above average. In May 2009, maize was still 50 percent more expensive than its average price between 2003 and 2006, while rice prices were 100 percent higher.⁶

The events of the past 24 months have reminded us that our food supply is precarious, and stable prices cannot be taken for granted. Renewed efforts are needed to address energy use, climate change, and declining growth in agricultural productivity within a holistic food systems approach. Simply focusing on increasing the production of staples to address the food crisis misses the point that the real crisis is one of a narrow food base and imbalanced diets, and this will require more fundamental changes in policies, science, and practices to ensure good health for all.

Corresponding Author: Dr. John Donough H Keatinge, AVRDC – The World Vegetable Center, PO Box 42, 74199 Shanhua, Taiwan.

Tel: +886-6-5837801 ext 101; Fax: +886-6-5830009

Email: dyno.keatinge@worldveg.org

Manuscript received 7 July 2009. Initial review completed 31 August 2009. Revision accepted 19 October 2009.

¹ Conventional wisdom is that prices for agricultural commodities have been falling dramatically over the past 30 years, however this view is challenged in a paper by Piesse and Thirtle.³

THE FOOD CRISIS IN THE ASIA-PACIFIC REGION AND ITS IMMEDIATE CAUSES

The food crisis in the Asia-Pacific region manifested itself mainly in higher rice prices, which had a devastating effect on millions of the poorest in the region who rely on it as their major staple food. Between November 2007 and May 2008, global rice prices increased by 140 percent, despite production reaching an all-time high in 2007 and despite the absence of any significant increase in demand and fairly stable rice stocks. What happened?

World rice markets are particularly "thin" and concentrated. Most rice is consumed where it is produced and only 6–7 percent of world production is traded internationally.^{2,7} Rice prices had been increasing steadily for two years, but they changed dramatically after India imposed the first major export restriction in November 2007. As other commodity prices began to increase as well, other Asian economies began to worry and export bans subsequently were imposed by Vietnam, Cambodia, and Egypt, while the Philippines made precautionary rice purchases and imported 1.3 million tons of rice in just the first four months of 2008, an amount that exceeded their entire import bill for 2007. Only after Japan released 200,000 tons of rice to the Philippines in May 2008 did prices begin to fall almost immediately, and further declined after Cambodia lifted its export ban in June. Thus, Headey and Fan⁸ conclude that a major contributing factor to price hikes in rice were reactions of traders and hoarding by some important exporters in an already unusually thin market, as a result of politically induced export restrictions.

Increases in rice price can thus be explained by export restrictions, which make international markets smaller and more volatile. Other factors contributing to the rapid increase in food commodity prices include the rise in energy prices, diminishing rates of agricultural productivity growth, as well as the weakening of the dollar against other currencies.

Rising energy prices have contributed to the increased cost of agricultural production, and to enhanced competitiveness of biofuels that were produced in only small quantities before 2000.⁹ With strongly rising energy prices, biofuels have become more attractive,³ thus providing some rationale for increasing prices across different food commodities, especially maize, as well as some oilseeds and soybeans. Through substitution effects increases in maize prices have contributed to increases in global wheat and rice prices;⁸ it is estimated that overall, increased biofuel demand from 2000 to 2007 contributed 30 percent of the weighted price increase of cereals.⁴

Global production growth has been slow and will be too low to cope with increasing demand if current trends continue.⁴ Between 1950 and 1990, world grain yield per hectare climbed by 2.1 percent a year, ensuring rapid growth in the world grain harvest. From 1990 to 2007, however, it rose only 1.2 percent annually.¹¹ Productivity

increases are largely impeded by land and water constraints, because the yield response to the additional application of fertilizer is diminishing, but also because of underinvestment in agricultural innovation.

At the same time, world cereal stocks fell by 40 percent between 2002–2007, indicating that growth in consumption of grains for all purposes has been in excess of growth of production. One popular explanation for the reduction in stocks is weather shocks. In particular, the recent drought in Australia has captured much attention. However, governments around the world have reduced stock levels because they were inefficiently high before.¹² Low stock levels have probably magnified the impact of production shortfalls as markets worried about the lack of a buffer.

Some of the increases in commodity prices can also be considered as a result of exchange rate movements, specifically the weakening of the US dollar against the Euro. A weak US dollar leads to increased commodity demand from countries whose currencies have appreciated (e.g. the Indian rupee or the Thai baht), because it is cheaper in domestic currency terms to buy the commodity. A weak US dollar also leads to lower supply as farmers in countries whose currencies have appreciated receive fewer units of domestic currency per unit produced. Mitchell¹³ has calculated that the depreciation of the dollar has increased food prices by around 20 percent.

While these arguments help to understand what drove food prices up, other arguments are needed to explain why the increase in food prices had such devastating effects on millions of people. After all, the incidence of poverty had reduced dramatically in Asia and the Pacific over the past decade and the region as a whole was on track to achieve the Millennium Development Goal (MDG) of halving the prevalence of extreme poverty by 2015.¹⁴ Nevertheless, in 2005–2006, on average 16 percent of the population of Asia and the Pacific, 542 million people, were going hungry—and that number is thought to have increased to 582 million as a result of the sudden price rises in 2007/2008.¹⁵

INDIRECT CAUSES OF THE CRISIS

Decline in agricultural research funding

Although agricultural research is one of the best available development investments,^{16,17} global and national failures of markets and governance have led to serious underinvestment in Research and Development (R&D), and in innovation systems in general, particularly in agriculture-based countries. Globally, the share of official assistance to agriculture in developing countries has fallen by two-thirds in the past 20 years.¹⁸

In the Asia-Pacific region the bulk of agricultural R&D is still financed by governments, and China, Japan, and India account for more than 70 percent of this spending.¹⁹ Although regional expenditures grew by 3.4 percent per annum from 1981 to 2002, investments were very uneven. Most growth was due to China and India, where expenditures tripled and there was a shift from funding traditional areas of agricultural research to a greater focus on biotechnology. The 11 low-income countries in the region (excluding India) accounted for only 5 percent of the region's public agricultural R&D expenditures. Public

²Thailand, Vietnam, India, US, and Pakistan (in order of their share of rice exports) provide nearly four-fifths of available supplies.

³Parity prices for biofuels and fossil energy sources differ based on crop and location, but biofuels can be more competitive than oil at prices starting at US\$35 barrel for cane ethanol in Brazil.¹⁰

investment in agricultural R&D as a proportion of overall agricultural GDP (investment intensity) for the region is well below the international average. It did increase over the previous decade, but by 2002 expenditure had risen to only \$0.43 per \$100 of agricultural output, as compared with \$0.65 in sub-Saharan Africa and a generally recommended international goal of 1 percent of agricultural GDP.¹⁹

A combination of highly uneven national investments in agricultural R&D across the region, low investment from the private sector and small and declining investments in international agricultural research have had a particular impact on the poorest communities within the Asia-Pacific region.

More emergencies but less funding available

Disasters that devastate agricultural production are both natural and man-made, including severe weather events such as flooding or drought, or war. Natural disasters and complex international emergencies have increased dramatically since the early 1990s, and emergency disaster relief is now the dominant form of food aid.²⁰ In 2002 almost 60 percent of the United States' PL 480 food aid program—the world's largest—was used for emergencies. In 2003 the World Food Program (WFP), the world's largest multilateral food aid program, distributed 68 percent of its food aid for emergencies.²¹ The volume of emergency assistance depends primarily on the geopolitical interests of donors and the presence and strength of humanitarian stakeholders in recipient countries as well as the intensity of media coverage an emergency receives.²²

Disaster risk management is a core development issue. Although developed countries often are exposed to the same degree of hazard as developing countries, mortality rates from natural disasters are many times lower. A global risk analysis of natural disaster hotspots found that East and South Asia are particularly vulnerable to geophysical and hydro-meteorological hazards. Seven of the 15 countries most exposed to three or more hazards were in the Asia-Pacific; with Taiwan ranking globally among the most at risk, with 73.1 percent of the population exposed to four major disaster risks.²³ Despite its high exposure to natural disasters Taiwan is well prepared and even has publicly organized vegetable stocks to reduce price fluctuations following disasters such as typhoons. Less developed countries have a lower capacity to prepare contingency food stocks or emergency funds to cope with natural disasters, and can be highly reliant on international emergency food distribution. Immediate pressures caused by hikes in imported energy costs, currency fluctuations, and loan repayments can easily take priority over preparations for vague future crises.

Over the last decade there have been major changes in how international emergency food aid is funded and distributed. In the 1990s much food aid was supplied as a form of bilateral aid, and over the last ten years more than half of global food aid shipments have been converted to cash by recipients.²⁴ Food aid is primarily provided by large cereal producers in the OECD; principally the USA and the EU, and has been complicated by an awkward marriage of conventional food trade and its subsidy programs, geopolitical considerations, as well as humanitar-

ian motives to respond to emergencies. There is increasing evidence that food aid only sometimes helps poor people and over the last decade there has been a major shift from bilateral food aid programs to multilateral emergency food responses. The WFP is the world's dominant multilateral food aid organization, responsible for more than 90 percent of multilateral food aid and about 30 percent of all food aid worldwide.²⁵

Despite growing demands for multilateral food assistance, the WFP's ability to respond has been constrained by budgets. The US is overwhelmingly the largest contributor to the WFP, providing more than ten times as much funding as the EU, the next largest donor, but US donations are almost entirely in kind—primarily as food grains.²⁴ Between 1994 to 2004 the US food aid budget—the world's largest—fell by more than half, from nearly \$3 billion to \$1.2 billion.²¹ The WFP is also especially short of multilateral contributions that make up a third of its total funding.²⁶ Thus the funding for the WFP has not kept up with demands from increasing international disasters,²⁷ and this has impacted the level of emergency food stocks it can carry.

It can be easy to underestimate the importance of such targeted food aid. This aid represents less than 5 percent of global overseas development assistance, less than 2 percent of commercial international food trade and less than 0.2 percent of total world food production.²⁰ But well targeted food aid can make a major difference to the lives of poor and most marginalized²⁵—precisely those most affected by the current food crisis.

THE REAL CRISIS IS ONE OF UNBALANCED DIETS ***Poor people under financial distress reduce their food intake to cope***

A large proportion of the Asia-Pacific population already was undernourished before this crisis and price rises have exacerbated this. Undernourishment affects large population groups particularly in South and Southwest Asia, where 21 percent of the population is affected. The problem is most acute in Afghanistan, where more than a third of the population is undernourished. But levels of undernourishment are also high in other countries in Asia and the Pacific, including Tajikistan, the Democratic People's Republic of Korea, Mongolia, Bangladesh, Cambodia, Pakistan, Armenia, Sri Lanka, India, and the Solomon Islands.¹⁵

Poor households have little room for adjustment when under financial crisis. Food accounts for between 50 to 70 percent of total household expenditures in South and Southeast Asia²⁸ and comprises 30 to 50 percent of the consumption basket of the average household in East Asia.²⁹ A large proportion of this is spent on staple foods. For instance, in Bangladesh, rice accounts for 30 percent of total household expenditures and 48 percent of total food expenditures of the poor.⁴

Experience from previous financial crises in Asia and Africa has shown that poor households first cut down on non-staple food consumption when under financial stress. Then, the quantity of food items consumed is reduced. These strategies thus affect first the diversity and quality, and then the quantity and safety of diets. Distress sales of

assets and cutbacks in health expenditures due to a temporary shock may further jeopardize the nutrition situation.³⁰

Table 1. Share of staple food in total energy consumption in countries with alarming rates of undernourishment in the Asia-Pacific region

Country name	Share of cereals, roots and tubers in total dietary energy consumption (%)		
	1990-92	1995-97	2003-05
Armenia	68	60	58
Azerbaijan	67	68	61
Bangladesh	84	82	80
Cambodia	84	82	76
Georgia	69	65	60
India	64	62	58
Indonesia	73	73	70
Democratic People's Republic of Korea	63	70	68
Lao People's Democratic Republic	84	81	75
Maldives	47	42	37
Mongolia	44	48	48
Myanmar	73	70	60
Nepal	78	76	72
Pakistan	55	51	49
Philippines	57	56	58
Sri Lanka	60	58	58
Tajikistan	62	65	66
Thailand	54	50	48
Timor-Leste	78	79	78
Uzbekistan	61	60	60
Vietnam	76	74	68
New Caledonia	39	40	37
Solomon Islands	65	67	70
Vanuatu	44	46	51

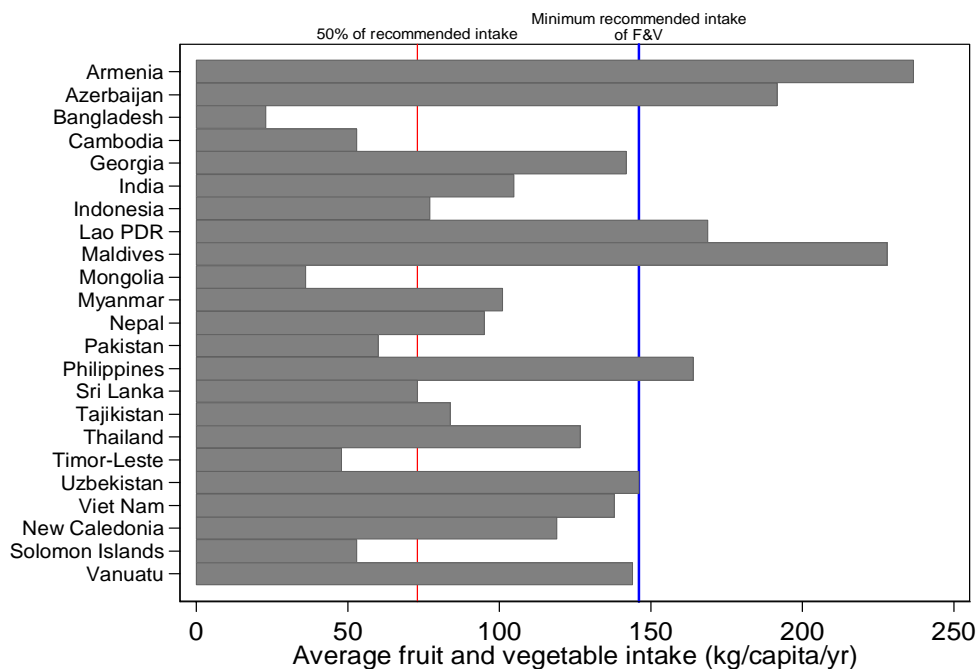
Source: ³³

HelpAge International provides a case study on the dramatic impact food prices can have on food intake. In Cambodia, with rice prices increasing from \$0.25 to \$0.62 per kg, meat from \$1.5 to \$3.5/kg, and fuel from \$0.75 to \$1.4/L, food intake reduced from three to two meals per day, families ate less meat, and only vegetables produced in home gardens were consumed.³¹

The diets of the poor are already monotonous and unbalanced

Populations in developing countries with more diverse diets have a higher nutritional status.³² A higher ratio of energy consumption from staple food to all foods consumed indicates a low diversity of diets. Table 1 compares the share of cereals, roots, and tubers in total energy consumption for countries in the Asia-Pacific region. Diets in Cambodia, Bangladesh, Timor-Leste, Lao People's Democratic Republic, Nepal, Indonesia, and the Solomon Islands are very monotonous with more than 70 percent of energy consumed from staple foods. The table also shows that the food diversity in most of these countries has not improved over the past ten years.

Figure 1 shows those countries in the Asia-Pacific region classified as food insecure, either because of undernourishment rates above 10 percent, or child underweight rates above 20 percent¹⁵ and overlays this with information on fruit and vegetable consumption. The bars show average fruit and vegetable consumption^{4,34} while the dark vertical shows the minimum recommended intake of fruit and vegetables.³⁵ Only eight of the 23 countries nearly meet or exceed recommended intake. Seven countries fall short of meeting even 50 percent of the recommended intake levels, as shown by the light vertical. These countries include Bangladesh, Cambodia, Mongolia, Pakistan, Timor-Leste, and the Solomon Islands.



Note: Countries, listed in alphabetical order, have rates of undernourishment above 10 percent, or child underweight rates above 20 percent, or both.
Source: WHO (2003), ESCAP (2009) and FAOSTAT (Accessed June 22, 2009)

Figure 1. Food insecurity in Asia and the Pacific, and fruit and vegetable consumption

Even before the crisis, diets of a large share of the population in many low- and middle-income countries in Asia and the Pacific lacked three essential micronutrients: iron, vitamin A and zinc.¹⁵ With the onset of the crisis and the shift to less nutritious food, this proportion has increased. Micronutrient deficiencies result in a greater risk of illness or death from infectious diseases and children may not develop to their full physical or mental potential. Populations with low food diversity in these countries deserve policy attention to promote awareness of healthy diets and increase access and production of nutritious food, including fruits and vegetables.

The diets of the obese are also imbalanced

Another group that need policy attention and are largely ignored are the obese. The global epidemic of excess weight and obesity—"globesity" is the term used by WHO—is rapidly increasing and is becoming a public health problem. Southeast Asia and the Western Pacific region are now at the forefront of the global diabetes epidemic. In India and China, the incidence and prevalence of type 2 diabetes among children are also increasing at alarming rates, with potentially devastating consequences, and show no sign of slowing.^{36,37} People in Asia tend to develop diabetes with a lesser degree of obesity at younger ages, suffer longer with complications of diabetes, and die sooner than people in other regions.³⁸

The increasing number of obese and overweight people has been linked to less physical activity and overconsumption of poor quality of food with diluted nutrients and dense energy.³⁹ In developed countries or economies in transition such foods tend to be more affordable and available to the poor and obesity becomes a problem that preferentially affects the poor.⁴⁰

Obesity and excess weight predispose individuals to major risks of serious diet-related chronic diseases, including type 2 diabetes, cardiovascular disease, hypertension and stroke, as well as certain forms of cancer.⁴¹ Obesity accounts for 2–6 percent of total health care costs in several developed countries. In developing countries, treating chronic diseases in the future will add tremendous costs to already overburdened national health care budgets. For example, without effective policies for cancer prevention, the cost of its treatment in developing countries will rise 25-fold between 1985 and 2015.⁴²

As a result of the food crisis, food consumption patterns have shifted the balance towards low-quality food. Policies are needed to stop the rapid growth of public health epidemics for populations in countries with a high prevalence of obesity and low vegetable consumption. Greater and continuous efforts to promote healthy eating, improve nutritional literacy, and increase the availability and affordability of fruits and vegetables in rural and urban markets are needed to encourage farmers, the private sector, and consumers to produce, distribute, and consume more diverse foods.

THE COMPONENTS OF A SUSTAINABLE FOOD SYSTEM

World population is expected to grow by 50 percent to more than 9 billion people by 2050. By 2030, projected demand for cereals will increase by 50 percent and meat

by 85 percent above current levels.¹¹ This will require more investment in agriculture and agricultural research than national governments and bilateral donors are currently providing. It will also require a shift in the way business is done. Agriculture and food contribute significantly to carbon emissions, energy consumption, biodiversity loss, and increased soil erosion. Innovations are required that contribute to more efficient use of resources and inputs and which support good agricultural practices. More attention is required to develop food systems that promote healthy eating habits, including the consumption of a higher share of fresh and unprocessed foods.

Producing more of the right foods to balance diets

Efforts to increase food supplies in a sustainable manner will need to consider a better cereal, protein, vegetable, and fruit balance. The world food supply is precariously reliant on a very small number of crops. Only three—wheat, maize, and rice—supply more than half of humanity's calories.⁴³ Good health is dependent on dietary diversity, and as poverty increases, human diets become less diverse. In impoverished countries the poor have little choice and are forced to rely on the cheapest available staples and dietary diversity and health suffer. In richer countries, changes in the food systems have made poor quality processed foods high in carbohydrates and fats more affordable, available and accessible and most impacts the diets of the poor.⁴⁴ As diets become less diverse. In both cases, vegetable consumption suffers; as a consequence, diets lack adequate supplies of essential vitamins and minerals. Simply focusing on increasing production of staples to address the food crisis misses the point that the real crisis is one of adequately balanced diets. Shifting consumption to more grain-efficient forms of animal protein, and the movement of consumers down the food chain to more fresh and unprocessed foods¹¹ all contribute to establishing more balanced food systems.

Good Agricultural Practices for better human and environmental health

Increasing food production can be at the expense of the health of producers and consumers alike. In parts of the developing world, pesticide poisoning causes more deaths than infectious diseases. Use of pesticides is poorly regulated and often dangerous.⁴⁵ Organochlorine insecticides, including DDT, are among the most commonly used pesticides in the developing countries of Asia because of their low cost and versatility against various pests. These compounds have been banned in developed nations because of their potential for bioaccumulation and biological effects.⁴⁶ Abuse of pesticides is a chronic problem in Asia, where the majority of the world's pesticide poisoning cases occur each year.⁴⁷ India produces the largest quantities of basic pesticides in Asia and accounts for one-third of all pesticide poisoning cases in the world. Excessive use of cheap pesticides by poorly educated farmers is a growing global problem affecting the health of farmers and consumers alike and causing major environmental damage. In India pesticide residues in food, especially vegetables, are extraordinarily high. Surveys show that 50–70 percent of vegetables are contaminated with insecticide residues.⁴⁸

There is a huge need to focus on good agricultural practices to maintain both good environmental health and the health of producers and consumers. Increasingly such standards are being mandated by trade requirements. Privately developed standards such as EurepGAP are becoming major determinants of international trading patterns.⁴⁹ Nationally, quality standards are also growing across Asia, and this can be to the disadvantage of small-holder producers with limited education or management alternatives to continued excessive pesticide use.

Improving food supply by reducing large postharvest losses

Another area that deserves attention in renewed efforts to increase productivity is the postharvest sector. Field observations have reported that 40–50 percent of horticultural crops produced are lost before they can be consumed, mainly due to high rates of bruising, water loss, and subsequent decay during postharvest handling.⁵⁰ On average, it is estimated that 15–20 percent of all vegetables are lost before they reach the final consumer.⁵¹ The risk to future sales from selling food past its prime has encouraged retailers in developed countries to discard excessive amounts of food, and consumers overly concerned with expiry dates also contribute to high overall levels of waste, estimated by the USDA in 1995 to account for almost a quarter of all edible food⁵². Reducing postharvest losses for fresh produce has been demonstrated to be an important part of sustainable agricultural development efforts meant to increase food availability,^{53,54} but during the past thirty years less than 5 percent of the funding provided for horticultural development efforts has gone toward postharvest areas of concern, while more than 95 percent has gone toward trying to increase production.⁵⁵

Investing in agricultural research for poverty reduction

There is an emerging consensus on the need to adopt new, sustainable agricultural models. We also know that such investments have large and measurable impacts on poverty reduction³ and that income growth originating in the agriculture sector is many times more effective in raising incomes of poor people than income growth originating outside the sector.⁵⁶ Rates of return to rice, fruit, and vegetable research are particularly high.¹⁷ Yet spending on agricultural research has been declining. In the world's poorest countries, government spending on agriculture averages only 4 percent of public expenditure. Aid from developed countries has also fallen dramatically: development aid to agriculture was only 4.6 percent in 2007, compared with 18 percent in 1979.⁵⁷

CONCERTED ACTION IS NEEDED

Much greater investments are needed to develop technologies and management systems that more efficiently use scarce resources such as land, forests, water, plant nutrients and fossil fuels; in helping protect ecosystems by reducing greenhouse gas emissions, reducing water pollution and slowing or reversing the loss of biodiversity; in controlling plant and animal pests and diseases; and in contributing to the development of sustainable food systems. Strong leadership is required to end the devastating scourge of hunger and malnutrition.

Ensuring food supplies is fundamental to government survival

Providing adequate supplies of food for balanced diets is not just a humanitarian imperative for governments. It is also a matter of national and international security and government survival. Historically famines have been major causes of social disruption and the fall of governments. Between January 2007 and June 2009, food price related protests were counted in 43 countries.^{58–61} Even price changes in non-staples have had big political impacts. In 1998, the Hindu nationalist Bharatiya Janata Party was thrown out in provincial elections in Delhi, largely because of excessive rises in the price of onions—a staple vegetable for the poor. Ever since, Indian governments have been quick to respond to any “onion crisis.”⁶²

Concerted action also is required across governments. Large and wealthy nations need to help smaller and poorer nations; states that cannot ensure sufficient food and peace for their citizens threaten the political stability of the international system. The food crisis has clarified that food security is a matter of global security. As one world leader noted, the crisis could “threaten democratization, destabilize countries and lead to international security problems.”⁵ There is no national security without global security. This has to be recognized and global efforts need to be restructured and refocused.⁶⁴

Complex problems require regional and global responses

Regional organizations, such as the Asian Pacific Association of Agricultural Research Institutes (APAARI) and the Global Forum for Agriculture (GFAR) must become more involved in setting strategic research priorities that gain the attention of donors. Agriculture Knowledge Systems are evolving toward networked forms of organization with multiple actors, multiple relations and exchanges, as well as multiple foci.⁶⁵ Organizations such as APAARI and GFAR must become involved in coherently organizing the creation of knowledge, the distribution and exchange of information, and the education and training of farmers and resource users.

Donors can support such developments by becoming more involved in advance planning, and by providing more certainty in budget allocations. Under the current funding environment, it is difficult to find adequate funds for long-term strategic research because donors are interested in immediate impact of their investments. Strategic research takes more time to produce quantifiable impacts.

A greater scientific focus on food systems, not just component parts

The current organization of knowledge, science, and technology is insufficient to adequately deal with the challenges to sustainable food systems. Information on food, health, agriculture, forestry, landscape management, rural areas, environment, climate, ecology, and policy trends continue to be held in separate “knowledge silos.”⁶⁵ Available information is difficult to integrate because data sources are built for different purposes and currently it is impossible to make adequately informed choices

⁵ The German chancellor Angela Merkel in a letter to her G8 colleagues cited in ⁶³.

among technological options on the basis of existing data on costs, price, and value. Holistic understanding of agriculture and food systems is weak. Agriculture tends to focus on food as source of rural income while the health sector is often more focused on food as a nutritional input. More interdisciplinary cooperation is required to understand and address the challenges ahead to better connect the opposite ends of the human food chain represented by agriculture and human health and nutrition. This involves an improved balance of upstream and downstream research, less focus on supply components of the food system such as individual staple crops, and greater focus on improving the food system and human diets as a whole.

CONCLUSION

The recent financial and food price crises may have been a wake-up call. The proximate causes point to topical market issues of supply and demand for particular staples, but the ultimate causes are a dysfunctional food system in which humanity relies on too few crops leading to imbalanced diets. This was creating chronic and less well-publicized health problems long before the recent rise in food prices, as evidenced by widespread long-term undernutrition in many countries in the Asia-Pacific. The era of cheap food prices is likely behind us and the challenges of volatile energy prices and climate change will make it even harder to maintain continued growth in food supply. Complacency by government and industry has led to underinvestment in agricultural research, over-reliance on a few familiar staples, and improving food supplies by simply increasing yields rather than reducing losses. We need to think and act differently. A generation that has benefited from the yield increases of the Green Revolution assumes adequate supplies of staples as a given, and governments ignore this expectation at their peril. Increasing disasters and food emergencies can easily shift the international focus of food supply to one of ensuring human survival, but the more fundamental issue is ensuring health, and this affects everyone from the rich and obese to the poor and hungry.

ACKNOWLEDGEMENTS

Excellent research assistance was provided by Christian A Genova.

AUTHOR DISCLOSURES

The authors received no funding which conflicts with the focus of this paper.

REFERENCES

1. World Bank. Global Monitoring Report 2009. A Development Emergency. Washington, DC: The World Bank; 2009.
2. FAO. 1.02 billion people hungry: One sixth of humanity undernourished - more than ever before. 2009/6/19 [cited 2009/6/26]; Available from: <http://www.fao.org/news/story/en/item/20568/icode/>
3. Thirtle C, Lin L, Piesse J. The Impact of Research-Led Agricultural Productivity Growth on Poverty Reduction in Africa, Asia and Latin America. *World Devel.* 2003;31:1959-75.
4. von Braun J, Ahmed A, Asenso-Okyere K, Fan S, Gulati A, Hoddinott J, et al. High Food Prices: The What, Who, and How of Proposed Policy Actions. Washington DC: International Food Policy Research Institute (IFPRI); 2008.
5. FAO. Food Outlook. Global Market Analysis. Rome: Food and Agriculture Organization of the United Nations (FAO); 2009.
6. World Bank. Food Crisis. What the World Bank is Doing. Topics in Development. [cited 2009/6/24]; Available from: <http://www.worldbank.org/html/extdr/foodprices/bankinitiatives.htm>
7. Timmer CP. Causes of High Food Prices. Metro Manila: Asian Development Bank (ADB); 2008.
8. Headey D, Fan S. Anatomy of a crisis: the causes and consequences of surging food prices. *Agr Econ.* 2008;39(S1):375-91.
9. Trostle R. Global Agricultural Supply and Demand: Factors Contributing to the Recent Increase in Food Commodity Prices. Washington DC: Economic Research Service, US Department of Agriculture (USDA); 2008.
10. Schmidhuber J. Impact of an increased biomass use on agricultural markets, prices and food security: A longer-term perspective. Rome: Food and Agriculture Organization (FAO); 2006.
11. Brown LR. Feeding Eight Billion Well. In: Brown LR, editor. Plan B 3.0: Mobilizing to Save Civilization: Earth Policy Institute; 2008. pp. 176-91.
12. Piesse J, Thirtle C. Three bubbles and a panic: An explanatory review of recent food commodity price events. *Food Policy* 2009;34:119-29.
13. Mitchell D. A note on rising food prices. Washington DC: The World Bank; 2008.
14. Bread for the World Institute. Hunger 2009. Global Development. Charting a New Course. Washington DC: Bread for the World Institute; 2009.
15. ESCAP. Sustainable Agriculture and Food Security in Asia and the Pacific. Bangkok, Thailand: Economic and Social Commission for Asia and the Pacific (ESCAP); 2009.
16. Alston JM, Marra MC, Pardey PG, Wyatt TJ. Research returns redux: a meta-analysis of the returns to agricultural R&D. *Australian J Agr Resource Econ.* 2000;44:185-215.
17. Sen K, Hoare G. Rates of return to research: a literature review and critique. London, UK: Department for International Development; 2005 November 2005. Report No.: CRDG&L03.
18. World Bank. World Development Report 2008: Agriculture for Development. Washington, DC: The International Bank for Reconstruction and Development/ The World Bank; 2007.
19. Beintema NM, Stads G-J. Diversity in agricultural research resources in the Asia-Pacific region. Washington, DC, USA; Bangkok, Thailand: International Food Policy Research Institute; Asia-Pacific Association of Agricultural Research Institutions; 2008.
20. Barrett CB, Maxwell DG. Towards a global food aid compact. *Food Pol.* 2006;31:105-18.
21. Lentz EC, Barrett CB. Improving food aid: What reforms would yield the highest payoff? *World Devel.* 2008;36:1152-72.
22. Olsen GR, Carstensen N, Høyen K. Humanitarian crises: What determines the level of emergency assistance? Media coverage, donor interests and the aid business. *Disasters.* 2003;27:109-26.
23. Dilley M, Chen RS, Ceichmann U, Lerner-Lam AL, Arnold M, Agwe J, et al. Natural Disaster Hotspots: A Global Risk Analysis. Washington, DC, USA: The World Bank; 2005.
24. Barrett CB, Maxwell DG. Food Aid after Fifty Years: Recasting Its Role. London: Routledge; 2005.

25. Barrett CB, Heisey KC. How effectively does multilateral food aid respond to fluctuating needs? *Food Pol.* 2002;27: 477-91.
26. WFP. WFP's Operational Requirements, Shortfalls and Priorities for 2008. Rome: World Food Programme (WFP); 2008.
27. Wahlberg K. Are We Approaching a Global Food Crisis? [cited 2009/6/24] <http://www.globalpolicy.org/component/content/article/217/46194.html>. Available from: <http://www.globalpolicy.org/component/content/article/217/46194.html>
28. ADB. Food Prices and Inflation in Developing Asia: Is Poverty Reduction Coming to an End? Metro Manila: Asian Development Bank (ADB); 2008.
29. Brahmabhatt M, Christuaensen L. Rising Food Prices in East Asia: Challenges and Policy Options. Washington DC: The World Bank; 2008.
30. SCN. Global recession increases malnutrition for the most vulnerable people in developing countries: Pregnant women and children are hardest hit. Geneva: Standing Committee on Nutrition of the United Nations System (SCN); 2009.
31. HelpAge International. Food crisis impacts older people. In: *AgeNews Asia/Pacific*. Thailand: HelpAge International - Asia/Pacific; 2008.
32. Johns T, Eyzaguirre PB. Biofortification, biodiversity and diet: A search for complementary applications against poverty and malnutrition. *Food Pol.* 2007;32:1-24.
33. FAOSTAT. Diet composition: Food consumption pattern of main food groups: Dietary energy. In: *Food and Agriculture Organization (FAO)*; 2008.
34. FAOSTAT. Food consumption quantity (kg/capita/yr) for fruits (excluding wine) and vegetables. In: *Food and Agriculture Organization (FAO)*; 2009.
35. WHO. Diet, Nutrition and the Prevention of Chronic Diseases. Report of a Joint FAO/WHO Expert Consultation. Geneva: WHO; 2003.
36. Hossain P, Kowar B, El Nahas M. Obesity and diabetes in the developing world -- a growing challenge. *N Engl J Med.* 2007;356:213-5.
37. Chan JCN, Malik V, Jia W, Kadowaki T, Yajnik CS, Yoon K-H, et al. Diabetes in Asia: epidemiology, risk factors, and pathophysiology. *JAMA.* 2009;301:2129-40.
38. Yoon K-H, Lee J-H, Kim J-W, Cho JH, Choi Y-H, Ko S-H, et al. Epidemic obesity and type 2 diabetes in Asia. *Lancet.* 2006;368:1681-8.
39. Popkin BM. The nutrition transition in the developing world. *Devel Pol Rev.* 2003;21:581-97.
40. Monteiro C, Mourall E, Condell W, Popkin B. Socioeconomic status and obesity in adult populations of developing countries: a review. *Bull World Health Organization* 2004; 82:940-6.
41. WHO. Preventing chronic diseases: a vital investment: The WHO global report. Geneva, Switzerland: World Health Organization; 2007.
42. Gardner G, Halweil B. Nourishing the Underfed and Overfed. In: *State of the World 2000*. New York, USA: WW Norton & Company; 2000. pp. 59-78.
43. Weis T. *The global food economy: the battle for the future of farming*. UK: Zed Books; 2007.
44. Friel S, Baker PI. Equity, food security and health equity in the Asia Pacific region. *Asia Pac J Clin Nutr.* 2009;18:620-32.
45. Eddleston M, Karalliedde L, Buckley N, Fernando R, Hutchinson G, Isbister G, et al. Pesticide poisoning in the developing world--a minimum pesticides list. *Lancet.* 2002; 360:1163-7.
46. Abhilash PC, Singh N. Pesticide use and application: An Indian scenario. *J Hazard Mater.* 2009;165:1-12.
47. Gunnell D, Eddleston M, Phillips M, Konradsen F. The global distribution of fatal pesticide self-poisoning: Systematic review. *BMC Public Health.* 2007;7:357-95.
48. Karanth NGK. Challenges of Limiting Pesticide Residues in Fresh Vegetables: The Indian Experience. In: Hanak E, Boutrif E, Fabre P, Pineiro M, editors. *Food Safety Management in Developing Countries: Proceedings of the international workshop; 2000 December 11-13, 2000; Montpellier, France: Centre de cooperation internationale en recherche agronomique pour le Developpement-Food and Agriculture Organization of the United Nations; 2000. pp. 1-13.*
49. Campbell H. The Rise and Rise of Eurep-GAP: European Re(Invention) of Colonial Food Relations? *Int J Sociol Agr Food.* 2006;13:1-19.
50. Kader A. A perspective on postharvest horticulture (1978-2003). *HortScience* 2003;38:1004-8.
51. Weinberger K, Genova C, Acedo A. Quantifying postharvest loss in vegetables along the supply chain in Vietnam, Cambodia and Laos. *Int J Postharvest Technol Innov.* 2008; 1:288-97.
52. Martin, A. One country's table scraps, another country's meal. *New York Times*, 2008.
53. Kader AA. Increasing food availability by reducing postharvest losses of fresh produce. *Acta Horticulturae.* 2005;3: 2169-75.
54. Weinberger K, Genova II C, Acedo Jr. A. Postharvest Training for Supply Chain Actors in Cambodia, Laos, and Vietnam: Evaluation Report. Shanhua: AVRDC- The World Vegetable Center; 2009.
55. Kader AA, Rolle RS. *The Role of Post-harvest Management in Assuring the Quality and Safety Horticultural Crops*. Rome: Food and Agriculture Organisation (FAO); 2004.
56. Alene AD, Coulibaly O. The impact of agricultural research on productivity and poverty in sub-Saharan Africa. *Food Pol.* 2009;34:198-209.
57. IFAD. Food prices: smallholder farmers can be part of the solution. 2009 [cited 2009/6/15]; Available from: <http://www.ifad.org/operations/food/farmer.htm>
58. Wikipedia. List of riots. 2009 [cited 2009/6/22] Available from: http://en.wikipedia.org/wiki/List_of_riots#21st_century
59. Dugger CA. Bail Hearing Delayed for 2 in Zimbabwe. 2008/10/24 [cited 2009/6/24]; Available from: <http://www.nytimes.com/2008/10/25/world/africa/25zimbabwe.html>
60. UN News Center. Sudan: Food riot at refugee camp in Darfur kills one, injuries six others - UN. 2008 [cited 2009/6/24]; Available from: <http://www.un.org/apps/news/story.asp?NewsID=27933&Cr=darfur&Cr1=#>
61. von Grebmer K, Fritschel H, Nestorova B, Olofinbiyi T, Pandya-Lorch R, Yohannes Y. *Global Hunger Index. The Challenge of Hunger 2008*. Bonn: Welthungerhilfe, International Food Policy Research Institute (IFPRI), Concern Worldwide; 2008.
62. Pasricha A. Indian onion shortage causes high prices and political peril. 2005/10/30 [cited 2009/6/24]; Available from: <http://www.voanews.com/english/archive/2005-10/2005-10-30-voa3.cfm?moddate=2005-10-30>
63. Deutsche Welle. Merkel to G8: Food Crisis is Global Security Risk. 2008 [cited 2009/6/24]; Available from: <http://www.dw-world.de/dw/article/0,2144,3462743,00.html>
64. Brown LR. The Great Mobilization. In: Brown LR, editor. *Plan B 3.0: Mobilizing to Save Civilization: Earth Policy Institute; 2008. pp. 265-87.*

65. SCAR. The 2nd SCAR Foresight Exercise. New challenges for agricultural research: climate change, food security, rural development, agricultural knowledge systems: EU Commission-Standing Committee on Agricultural Research (SCAR); 2008.

Review

Food crisis in the Asia-Pacific region

Katinka M Weinberger PhD, Warwick J Easdown PhD, Ray-yu Yang PhD,
John Donough H Keatinge PhD

AVRDC – The World Vegetable Center, Tainan, Taiwan

亞太地區的糧食危機

根據聯合國千禧年的發展目標，亞太地區要在 2015 年之前減少一半的赤貧人口；但近年來稻米和其他糧食價格飆漲，使得上百萬已脫離赤貧的人口再度陷入飢餓困境。這顯示亞太地區的糧食供應系統比之前認定的更加脆弱及失衡。近期糧食價格飛漲主要歸究於經濟市場因素，例如糧食出口限制及石油價格攀升；但根本的原因是因為不適當的農業政策導致農業研究投資下滑及糧食緊急應變措施的投入不足。早在糧食價格上漲之前，亞太地區已有大量人口處於營養不足的狀態，僅依賴貧乏的主食種類和單調飲食維生。價格上升迫使飲食的選擇性更受限，有更多的人口正遭受飢餓和健康的惡化。亞太地區最基本的糧食危機是膳食品質低劣，這會導致人們營養不良，包括肥胖及過瘦。有效的改善糧食體系的根本方針在於開發均衡膳食、發展糧食安全生產體系、降低農業損失以增加糧食供應，並致力投資於上述方針的研究。改善糧食體系是社會的重大期待，並且攸關著政府的存亡，但是如果只著重提高糧食供應而無視於膳食的改善，長期將會嚴重影響國民的健康。因此結合國家前瞻政策、區域的反應及綜整的科學方法是必要的。

關鍵字：糧食價格、營養不良、研究投資、糧食體系、亞太地區