

Urban food security:

Feeding tomorrow's cities

Urban food riots have already destabilised governments. Can the world's cities be fed? **Paul Teng, Margarita Escaler and Mely Caballero-Anthony** say that city-dwellers may have to grow more of their own food.

Century of cities

The twenty-first century will be the century of urbanisation. So says UN-HABITAT, the UN agency for human settlements. The year 2008 saw, for the first time in history, the world's urban population overtake its rural population (see Figure 1). Most of the global human population is now living in cities, with all the effects and consequences that accompany urban life. In particular, patterns of food consumption of city-dwellers are very different from those who live in the countryside. Can these new and growing cities be fed?

In Latin America and the Caribbean, 75% of the population now live in cities; this figure will climb to 83% by 2030. Comparable figures for Asia and the Pacific are 37% and 53%; for Africa, 38% and 55%¹.

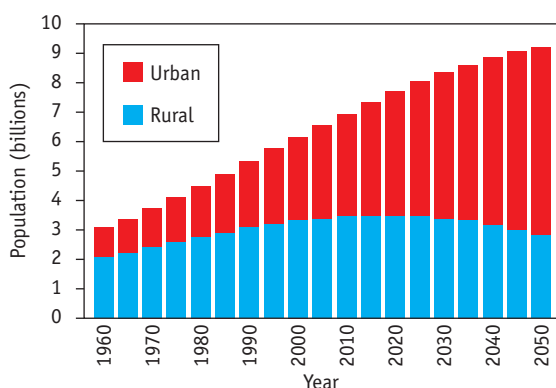


Figure 1. World population 1960–2050 separated into urban and rural. Source: FAOSTAT²

It is projected that by 2050, two-thirds of humanity, or 6 billion people, will be living in towns and cities compared to only 33% in 1960³. In 2025, nine urban agglomerations will have over 20 million inhabitants, with Tokyo having over 30 million inhabitants. Twenty of the 25 largest urban agglomerations will be in the developing countries of Africa, Asia and Latin America.

The scale and pace of this migration is creating unprecedented social, political, cultural and environmental challenges. Supplying urban inhabitants with sufficient food – but also, more importantly, with affordable food – will put an enormous strain on the food supply and distribution chain. We have seen this already. In 2007–8 we witnessed a crisis, with food riots in 43 countries, from Bangladesh and Brazil to the Philippines and Russia. This year's events in Tunisia, the forerunner of the tumultuous changes which are shaking the Arab world, were sparked by food riots. In Egypt surging food prices, although not the main cause of the fall of President Mubarak, have the potential to complicate fragile political and social conditions, and this is also true elsewhere, most especially in developing countries. Food supply, food consumption, and food stability in cities are very different from traditional rural patterns, as some governments have learned to their cost.

A predictable outcome of this massive population shift is urban poverty; and the link is strong between poverty and hunger (as well as malnutrition and undernourishment). While most of the world's poor still currently live in rural areas, the numbers of the urban poor are substantial and continue to grow at an alarming

rate. World population is expected to grow from its current 6.8 billion to 9.1 billion by 2050. Virtually all of this population growth will take place in the urban areas of developing countries; the locus of poverty will shift to cities. Most of the current growth is already being absorbed into life-threatening slums⁴.

In 1993, there were 1.3 billion people living in extreme poverty (i.e. on less than US\$1 per day), of whom 19%, or 242 million people, lived in urban areas. By 2002, though the population in extreme poverty declined to 1.2 billion people, the urban share increased to 25 per cent, and the number of poor urban residents had increased to 292 million⁵.

The “absolute number” of slum dwellers has actually increased from 776.7 million in 2000 to some 827.6 million in 2010⁶. This means that 55 million new slum dwellers have been added to the global urban population since 2000.

Factors affecting urban food security

Food security is defined by the United Nations’ Food and Agriculture Organization (FAO) as “a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life”. It has become one of this century’s key global issues.

Here the urban environment presents several challenges that differentiate it from the countryside. To put it simply, city-dwellers eat differently. First and most obviously, they do not grow their own food, they buy it. And the food they buy is different. They have a higher consumption of meat. (It takes about 7 kilograms of grain to produce 1 kg of beef.) They eat more dairy produce, fruits, vegetables and processed foods. They eat a wider variety of foods. And they are more vulnerable to changes in the global market. In the urban context, supermarket chains are increasingly becoming major stakeholders in the control of access to food. High food prices have greater adverse effects: in developing countries, most of the urban poor spend 40–60% of their income on food per year. They live in crowded conditions with poor-quality housing, poor to non-existent garbage disposal systems, unsafe drinking water, and non-functional or non-existent sewage systems; and they hold jobs that are casual, insecure, uncertain, low-paying and vulnerable to outside forces. These

differences potentially render urban residents more vulnerable to disruptions in the global food supply chain, and to fluctuations in the price of food.

Food prices worldwide have risen dramatically since the beginning of the last decade. By June 2008, they had increased overall by 83%. The price of maize tripled, wheat prices increased by 127%, and that of rice by 170%. As a result, the number of undernourished people reached a historic high of 1.02 billion in 2009. While this number decreased slightly in 2010 to 925 million, the rise in food prices in the first quarter of 2011 could push this number back up.

According to the annual joint report by the Organisation for Economic Co-operation and Development (OECD) and the FAO, agricultural commodity prices are unlikely to drop back to the average levels of the past decade. The report predicted that the average wheat and coarse grain prices over the next 10 years will increase by 15–40% in real

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terms compared to the average levels during 1997–2006. Real prices for vegetable oils are expected to be more than 40% higher, while dairy prices are projected to be on average 16–45% higher.

Because urban and rural lives are intertwined through goods, services and people, urban food security will ultimately continue to depend on rural food security, within national borders and outside them. Many factors affect rural food security: pest outbreaks and bad weather; rising energy prices; competition from biofuels for land; policy changes and the diversion from staple crops to cash crops; underinvestment in rural infrastructure and agricultural innovation; climate change; increasing water and land scarcity; unfriendly policies towards farmers; declining number of farmers; and a slow-down of increases in agricultural productivity – this is a long list, but far from an exhaustive one. They will ultimately have an impact on urban food security as well.

Maintaining food resilience to guard against shortages

Crop yields of the major grains such as wheat, rice and maize have shown decreasing rates of annual growth in the past decade even as total production has been increasing. A reality check must also include a hard look at the production levels of grain and the surplus entering the world market. On average, only 11–12% of total corn (maize) production is traded yearly. Similar figures are: rice 3–7% traded; wheat 18–20% traded; and soybean 22–23% traded. Most countries have grain stocks equivalent to about 3 months of domestic demand to buffer any temporary supply shortages. It is difficult to obtain reliable estimates of such stocks as some are guarded national information. In the Asian region, the Asian Development Bank has spearheaded an effort to create a rice reserve stockpile for emergencies from which countries can “borrow” rice to make up for temporary shortfalls.

Extreme weather events and biosecurity factors (insect pests, diseases) which reduce the surplus production necessary for export are difficult to deal with. But it is not only bad harvests that can cause food to run short, or food prices to rise, in cities. Food is now a global commodity like any other, and price spirals result from interruptions in supply, or through speculation, or through market overreaction to bad news or rumour – in short, they are vulnerable to all the vagaries of market forces, predictable and unpredictable. When overreaction results in a nation freezing its exports, results are serious. The food crisis of 2007–8 is an example. Stocks of the major traded grains were at record lows, which triggered action by several governments to stop exports – which led to market panic and a spiral of rising prices. The riots followed. According to the FAO, urban households were the hardest hit.

A similar scenario may be unfolding in 2011. Wheat prices began to rise when Russia embargoed wheat exports in June 2010 due to domestic shortage caused by adverse weather. China recently announced that over 2 million hectares of wheat have been affected by drought. The effects of floods and droughts in various parts of the world are also being closely watched. Food fears have precipitated countries such as China, South Korea, Vietnam, Indonesia, India and Russia to take pre-emptive action such as reducing

tariffs on some imported foods, fixing prices and encouraging people to grow food. While speculation on food commodities is nothing new, the speed at which perceived near-term shortages are translated into panic buying has increased in this globalised world with instant access to news and trading portfolios. This cannot be good news for wheat prices in the latter part of 2011 and early 2012. Most experts agree that there need not be a repeat of the 2007–8 crisis: there are buffer stocks for several months in the “powder keg” countries which rely on imported grains. However, several countries remain on a tinderbox.

What will it take to feed a larger and more urban population?

We return to the United Nations projections that the world population will grow from 6.8 billion to 9.1 billion by 2050. That is an increase of a third. But productivity must increase by much more than that – because these will be city-dwellers. Feeding this larger and more urban population will require agricultural production to grow by an astonishing 70%.

The huge increase in production will not be achieved by doing “business as usual”. Global production of the major grains has been stagnating for the past decade or so. Conventional plant breeding and management research have not given the spectacular yield increases of the “Green Revolution” of the 1970s. Arable land is declining due to the competing demands from urbanisation and industrialisation, as well as deforestation losses.

There have, however, been some developments which together may help humankind avoid a “food doomsday”. Foremost among these is technology and innovation in agriculture. Many parts of the world have yet to optimise the use of synthetic fertilisers, better irrigation, more targeted pesticides and the biotechnology arsenal which includes genetically modified (GM) crops and improved crop varieties using marker-aided selection. GM crops, in particular, have shown great promise to significantly increase yields and reduce pollution. Hence their widespread adoption during the last decade. By the end of 2010, GM crops were grown by 29 countries and occupied 148 million hectares worldwide, more than six times the land area of the United Kingdom. More than three-quarters (81 per cent) of the 90 million hectares of soybean

planted globally, almost two-thirds (64 per cent) of all cotton and more than one-quarter (29 per cent) of all maize grown in the world were GM. Since GM crops were first grown in 1996, the world has seen a record 87-fold increase in hectareage, making GM crops the fastest adopted crop technology in the history of modern agriculture⁷.

Second is the recovery of formerly non-arable land such as the *cerrado* (savannah) in Brazil. The *cerrado* was considered unfit for farming as the soils were too acidic and too poor in nutrients, but, with significant investment in research and innovation by the Brazilian government and the private sector, new varieties and new soil treatments have in the past four



A crop of genetically modified corn grows amidst the skyscrapers of La Defense, Los Angeles. © iStockphoto.com/Eric Hood

Urban and peri-urban agriculture

Traditionally, agriculture has been considered a rural phenomenon. With more people now living in cities, urban agriculture can help cities achieve self-sufficiency in at least some of the key food products that its inhabitants consume.

Urban and peri-urban agriculture (UPA) is defined as the growing of plants and the raising of animals within and around cities. Its striking feature is that it is embedded in – and interacts with – the urban ecosystem. It uses urban residents as labourers and urban resources – organic waste for compost and urban wastewater for irrigation – as inputs. It has direct links with urban consumers – links that rural food producers have lost – and direct impacts (positive and negative) on urban ecology. It competes for land with other urban functions, and is influenced by urban policies and plans. An estimated 800 million people are now involved in urban agriculture and contribute to feeding urban residents. Of these, 200 million produce for the market and 150 million work full-time.

UPA in *developed* countries has seen significant growth in recent years thanks to high value-added agriculture, the promotion of the “garden city” concept, the expansion of community gardens and rooftop planting. UPA in *developing* countries is less pronounced but

has great potential for growth. The success of UPA in cities such as Hanoi, Shanghai, Beijing, Mexico City, Dakar and Accra has shown how urban farming can contribute to poverty reduction, food security, improvements in nutrition, environmental protection and increased awareness of the importance of agriculture. In Singapore, the practice of UPA involves technologies such as aeroponics – the growing of plants without soil and water – fish breeding, city gardens, and agrotech parks. Political will and the appropriate support mechanisms are the key drivers of success.



Lettuce plants growing in aeroponic (soilless and waterless) conditions in which plants are suspended in air and their roots regularly sprayed with nutrient water. Pictures from a commercial aeroponics farm in Singapore, taken by the first author.

decades transformed it. Today the *cerrado* accounts for 70% of Brazil's farm output.

Third is the introduction of new land into farming. Several countries, notably Indonesia and Cambodia, have made significant efforts to enlarge their farmed area without negative deforestation effects.

A fourth contribution, perhaps strangely, is to make the cities themselves grow more of their own food. Urban agriculture is already practised in a number of cities around the world; it supplies 80% of Hanoi's fresh vegetable requirements, 50% of its pork, poultry and freshwater fish, and 40% of its eggs. Shanghai also produces 60% of its vegetables, all of its milk, 90% of its eggs, and 50% of its pork and poultry meat through urban agriculture (see box). Finally, up to 50% of what is currently harvested is lost in the food production and supply chain. Research in pre- and post-harvest loss prevention and reduction deserves much more investment than it is currently given.

Conclusion

While there continues to be a strong interdependence between urban and rural areas, the urban dimensions of food security merit distinct attention and focus from national governments. Factors of production, technologies, employment and indeed policies which were predominantly aimed at rural populations must now adapt to address urban situations. In this ever globalising world where countries are interconnected and more interdependent than ever, the global food supply chain will continue to play a key role in urban food security, and one that is as critical and as vulnerable as actual food production. Thus, safeguarding supply chains in order to stabilise the global food market remains paramount.

Will Malthus be proven right after all? Will an expanding population outstrip the world's ability to feed it? The Green Revolution

staved off mass famine in many parts of Asia. Since then the benefits of that revolution have been spread worldwide and the world has gone through several decades of food complacency. The food crises of recent years have been a rude awakening.

Responses have been rapid and are spreading; food security has become a key item on the agenda of many governments. The FAO estimates that in the near term, world food stocks and current levels of production are sufficient to avoid any mass famine scenario, but supply chain interruptions and the price spirals that go with them will bring instances of shortages. That is bad news; better news is that we expect them to be isolated. In the longer term, we are confident that humankind will show sufficient resilience to cope with food security and will continue to do what it has been doing so well for centuries, to turn towards innovation to address the food challenges of tomorrow.

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