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Approaches to Food Security in Brazil, China, India, Malaysia, Mexico, and Nigeria: Lessons for Developing Countries

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Abstract

Food security has re-emerged as one of the central issues on the global agenda since the 2008 food, fuel, and financial crisis. After decades of neglect, the crisis has refocused attention of national governments and international organizations on investments in agriculture, food, and nutritional security. This paper provides a synthesis of the experiences of six countries (Brazil, China, India, Malaysia, Mexico, and Nigeria) in enhancing food security of their population. Approximately 46 per cent of the undernourished people in the world live in these six countries, which together account for 43 per cent of world's population. The paper underscores the diversity in country experiences in terms of the timing, pace, and forms of agricultural reforms as well as the major public policies and programmes adopted for improving social and economic access to food and nutrition and draws lessons for other countries. Brazil and China stand out as clear leaders in increasing availability, access, and utilization of food. Malaysia and Nigeria have done well over the past decade. In Mexico, the outcomes of market-oriented reforms were not entirely in line with expectations. India emerges as the country facing some of the greatest challenges pertaining to food security based on a range of relevant indicators, including food availability, prevalence of undernourishment, and poor anthropometric indicators of child malnutrition.

***JEL Classification**: Q18, O13.*
***Keywords**: Food security, agriculture, emerging economies.*

Executive summary

This paper provides a review of the national experiences of six emerging and developing economies, two from Latin America (Brazil and Mexico), three from Asia (China, India, and Malaysia), and one from Africa (Nigeria) in enhancing food security of their populations. The paper draws on the six country studies, presented at the agriculture, food security and livelihood session of the ICRIER-IDRC emerging economies research dialogue, "***Emerging Economies in the New World Order: Promises, Pitfalls, and Priorities***," 12-13 April 2010, New Delhi. Whilst the country studies provide a comprehensive assessment of the country's agricultural performance, this piece reviews the performance of these countries from the perspective of food security, in terms of augmenting availability of food, providing economic access to food, especially for weaker sections, ensuring improved absorption of nutrition, and reducing vulnerability in the food systems for long-term food security.

Ensuring availability

Globally, per capita availability of calories increased by approximately 550 kilocalories (kcal) per day between (Triennium) TE1963 and TE2007. One of the sharpest increases in availability was recorded in China, where per capita calories increased by over 1400 kcal over the same period. The rapid increase in agricultural output after 1978 and a slowdown in the growth of population together contributed to the improvement in per capita food availability in China. The Latin American countries, Brazil and Mexico, also recorded impressive increases in food availability although the availability stagnated in the case of Mexico during the 1990s. Nigeria experienced large improvements in food availability from the 1990s. The increase in availability was the lowest for India, where per capita availability of calories increased by less than 290 kcal between TE1963 and TE2007.

The differences across countries in food availability are reflected in the production performance of the agricultural sector. Brazil and China experienced the most robust and sustained growth in agricultural output since the late 1970s. During 1978-2009, agricultural output grew most rapidly in China (4.4 per cent per annum), followed by Brazil (3.2 per cent) with India, Malaysia and Mexico registering growth rates of approximately 3 per cent, 2 per cent, and 1.5 per cent per annum respectively.

Ensuring access

Economic access to food or the ability to acquire available food from earnings and transfers is the second important pillar of food security. Access to food depends on a variety of factors including national income, distribution of income/consumption and land holdings, share of expenditure on food, and the contribution that agriculture makes to GDP, and employment as well as income and food transfers. China, which began with favourable initial conditions in terms of equitable distribution of land holdings,

has made considerable progress in reducing the prevalence of undernourishment from 18 per cent in 1990-92 to 10 per cent in 2005-07. India comes out as the worst performer on this account, being home to the largest number of undernourished people in the world. The Latin American countries, Brazil and Mexico, have higher levels of per capita income as well as land and income inequalities in comparison to the Asian countries. Agriculture contributes a larger proportion of the GDP and employment in the Asian countries and Nigeria. In China, rural industrialization and off-farm employment played an important role in improving access to food. Social policies and safety nets played an important role in other countries. Brazil and Mexico have placed particular emphasis on conditional cash transfers (CCTs) to improve food and nutritional security although the CCTs are part of much broader social protection and food security programmes. India also uses an extensive variety of instruments, including in-kind transfers and public works programme to tackle food security albeit with disappointing outcomes.

Ensuring utilisation

Anthropometric measures of child nutritional status show that India has among the highest prevalence of child malnutrition in the world with over 43.5 per cent and 47.9 per cent of the children under 5 years of age estimated to be underweight (low weight-for-age) and stunted (low height-for-age) in 2005-06. Trends in child malnutrition show that whilst India made progress in reducing the prevalence of underweight among children under 5 from over 67.3 per cent in 1974-75 to 41 per cent in 1996-97, the proportion of underweight children rose to 44.4 in 1998-99 and remained almost unchanged at 43.5 per cent in 2005-06. The Sub-Saharan African countries have also lagged behind. China, on the other hand, made remarkable progress in reducing malnutrition. The Latin American countries have also done well in addressing malnutrition. However, obesity is emerging as an important challenge in these countries.

Ensuring stability

Agricultural production is subject to yield variations largely on account of variations in the weather. Over the past few years, global food prices have witnessed high levels of volatility. However, differences were observed in domestic price volatility across countries. Domestic price volatility was found to be lower in China and India due to domestic price stabilization policies including price support policies and managed trade environments. The increased integration of global commodity and financial markets has nonetheless enhanced the need for greater transparency, global coordination, regulation, and monitoring of these markets for ensuring stability.

Conclusion

The national experiences of these countries in enhancing food security suggest that increasing per capita availability is a pre-condition for ensuring food security. Growth in agricultural output needs to be accelerated and made more inclusive by focusing on the differential requirements of smallholders. Safety nets may still be required for ensuring economic access to food. Investments in health care and women's education are important along with agricultural output growth to improve nutritional outcomes. There is a need to establish better commercial intelligence to check food price volatility.

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Approaches to Food Security in Brazil, China, India, Malaysia, Mexico, and Nigeria: Lessons for Developing Countries

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1. Introduction

Food security has re-emerged as one of the central issues on the global agenda since the 2008 food, fuel, and financial crisis. Global food commodity prices rose steeply between 2006 and 2008, reaching a peak in mid-2008. Although prices declined subsequently, they continue to remain volatile. The United Nation's Food and Agriculture Organization (FAO) estimated that the number of food insecure people in the world increased from less than 800 million during 1995-97 to over 1 billion in 2009 in the aftermath of the crisis.[1] The crisis has refocused attention of national governments and international organizations on investments in agriculture, food, and nutritional security after decades of neglect. The volume and share of official development assistance for agriculture have registered an increase since 2007. A United Nations High Level Task Force (UNHLTF) on the Global Food Security Crisis was set up in 2008 when food prices were near their peak. The UNHLTF developed its Comprehensive Framework for Action (CFA) on Food Security in 2008 and updated it in 2010. The Madrid meeting on Food Security for All in January 2009 and the November 2009 summit on World Food Security called for the revitalization of the Committee on World Food Security (CFS). Agriculture and food security were the focus of discussions at the G-8 2008 Toyako, Japan Summit and the 2009 L'Aquila, Italy Summit at which the initiative on food security was launched with a pledge of US$22 billion support over three years for agriculture and food security. The G-20 group of leading economies put improvement in information on food stocks and production projections as an important component of the Action 2 (mitigate risk in price volatility and enhance protection for most vulnerable) on Food Security Pillar of G-20 Multiyear Action Plan on Development. The French presidency of the G-20 in 2011 put the food security pillar at the top of the informal grouping's global governance agenda for 2011.

This piece provides a review of the experiences of six emerging and developing economies, two from Latin America (Brazil and Mexico), three from Asia (China, India, and Malaysia), and one from Africa (Nigeria), in enhancing food security of their people. The paper draws on the six country studies, which were presented at the agriculture, food security and livelihood session of the ICRIER-IDRC emerging

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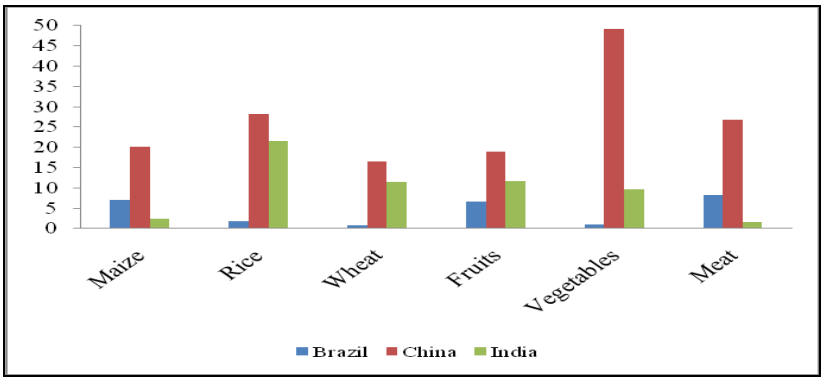
[1] FAO, 2010.

economies research dialogue, "***Emerging Economies in the New World Order: Promises, Pitfalls and Priorities***," 12-13 April 2010, New Delhi.[2] The country studies provide a comprehensive assessment of the country's agricultural performance in terms of growth in production, productivity, exports, and policies and programmes for enhancing food security as well as the roles of technology, institutions, markets, and infrastructure in influencing performance. This paper reviews the performance of these countries from the perspective of food security, in terms of augmenting availability of food, providing economic access to food, especially for weaker sections, ensuring improved absorption of nutrition, and reducing vulnerability in the food systems for long-term food security.

Approximately 46 per cent of the world's undernourished people live in these six countries, which together account for 43 per cent of world population. These countries account for a large proportion of global production of food commodities, including staple crops such as wheat, rice, and maize as well as horticultural, dairy and meat products (Fig. 1). Brazil is among the largest producers and leading exporters of several agricultural commodities, including sugarcane, coffee, cocoa, soybeans, citrus fruit and meat products. The country has contributed and benefited tremendously from improved access to other emerging economy food markets, especially Russia, China, the Middle Eastern countries, Chile, and Indonesia. Moreover, the three large emerging economies together accounted for 19 per cent and 47 per cent of global and developing world public sector agricultural research and development (R&D) expenditures respectively in 2000 (Beintema and Stads, 2010). China, India, and Brazil rank third, fourth and fifth in terms of total public investments in agricultural R&D in the world after the United States and Japan. China has the world's largest public agricultural R&D system in terms of research staff numbers. However, private sector investment spending on agricultural research was found to be limited in emerging economies as compared to the industrialized countries. In developing countries as a group, only 6.4 per cent of agricultural R&D was private with disparities in the private share among regions (James et al, 2008). In the Asia and Pacific region, around 9 per cent of the agricultural R&D was private compared to 1.4 per cent throughout Sub-Saharan Africa.

Figure 1: Share in global production (%), 2008



Source: FAOSTAT database.

[2] The country studies are available upon request from ICRIER.

2. Ensuring availability

Food availability, measured in terms of daily per capita calories and average grams of protein per capita, has increased steadily and substantially since the 1960s despite the increase in population.[3] Globally, the per capita availability of calories increased by approximately 550 kilocalories (kcal) per day between TE (Triennium) 1963 and TE2007. One of the sharpest increases in availability was recorded in China, where per capita calorie availability increased by over 1400 kcal over the same period. The rapid increase in agricultural output after 1978 together with a slowdown in the growth of population contributed to the improvements in per capita food availability in China. The Latin American countries, Brazil and Mexico, have also recorded impressive increases in food availability since the 1960s (Table 1). However, availability stagnated in the case of Mexico during the 1990s. Nigeria has witnessed large improvements in food availability since the 1990s. The increase in availability was the lowest for India, where the per capita availability of calories increased by less than 290 kcal between TE1963 and TE2007. More disaggregated data shows that an important feature of the increase in food supply has been the diversification of diets towards higher-value crops, including vegetables and fruits, and livestock products, which have recorded high rates of growth (Annexure 1).

Table 1: Food supply and agricultural output growth

Food supply (kcal/capita/day)	**1961-69**	**1970-79**	**1980-89**	**1990-99**	**2001-2007**
Brazil	2334.5	2500.7	2668.3	2812.7	3020.2
China	1726.9	1969.9	2433.3	2744.8	2941.3
India	1998.2	2048.0	2180.9	2303.8	2289.4
Malaysia	2463.7	2628.0	2710.0	2857.5	2869.1
Mexico	2436.3	2725.1	3132.8	3103.1	3236.5
Nigeria	1897.1	1793.0	1880.6	2468.8	2621.2
World	2292.0	2411.8	2584.7	2669.9	2752.5
Proteins supply quantity (g/capita/day)					
Brazil	59.8	60.8	64.3	73.1	82.7
China	45.6	49.0	61.8	76.4	87.6
India	50.6	50.6	53.7	55.7	55.4
Malaysia	49.5	55.0	59.7	72.7	77.0
Mexico	65.7	71.3	83.7	83.6	91.7
Nigeria	43.4	41.0	43.7	54.4	59.5
World	63.1	65.1	69.3	72.4	75.7

[3] Availability of food refers to supply from production, imports or stocks.

Fat supply (g/capita/day)	1961-69	1970-79	1980-89	1990-99	2001-2007
Brazil	42.3	54.1	68.4	83.4	103.1
China	22.0	26.9	43.8	68.0	85.5
India	30.4	31.5	36.4	42.7	45.9
Malaysia	52.8	63.2	87.8	86.8	84.7
Mexico	53.8	64.1	84.3	84.3	92.1
Nigeria	54.4	47.3	46.9	58.1	63.7
World	50.9	55.2	63.4	69.8	76.4

Average annual agricultural growth (%)	1978-2009	1970-79	1980-89	1990-99	2000-09
Brazil	3.2	4.0	3.1	3.6	3.7
China	4.4	2.2	6.1	4.2	4.4
India	3.0	1.7	3.0	3.3	2.9
Malaysia	2.0	5.3	3.5	0.3	3.5
Mexico	1.5	3.1	0.7	1.5	2.0
World	2.2	1.7	2.9	1.8	2.5

Average annual population growth (%)	1978-2009	1970-79	1980-89	1990-99	2000-09
Brazil	1.6	2.4	2.1	1.5	1.1
China	1.1	1.9	1.5	1.1	0.6
India	1.9	2.3	2.2	1.9	1.5
Malaysia	2.4	2.4	2.7	2.5	2.0
Mexico	1.7	2.9	2.0	1.7	1.3
Nigeria	2.5	2.7	2.6	2.4	2.5
World	1.5	1.9	1.8	1.4	1.2

Source: Faostat database and WDI database.

Notes: Food supply is measured as average for the period indicated; agricultural growth rate is computed using the least squares method and constant (2000 US$) price data for agriculture value added; the population growth is the exponential change in the population for the period indicated.

The differences across countries in food availability are reflected in the production performance of the agricultural sector with Brazil and China experiencing the most robust and sustained growth in agricultural output since the late 1970s. During 1978-2009, agricultural output grew most rapidly in China (4.4 per cent per annum), followed by Brazil (3.2 per cent) with India, Malaysia and Mexico trailing behind with growth rates of 3, 2 and 1.5 per cent per annum respectively. Growth in agricultural output decelerated sharply in Mexico from over 3 per cent in the 1970s to less than 1 per cent during the 1980s. The decline in the rate of growth of population contributed

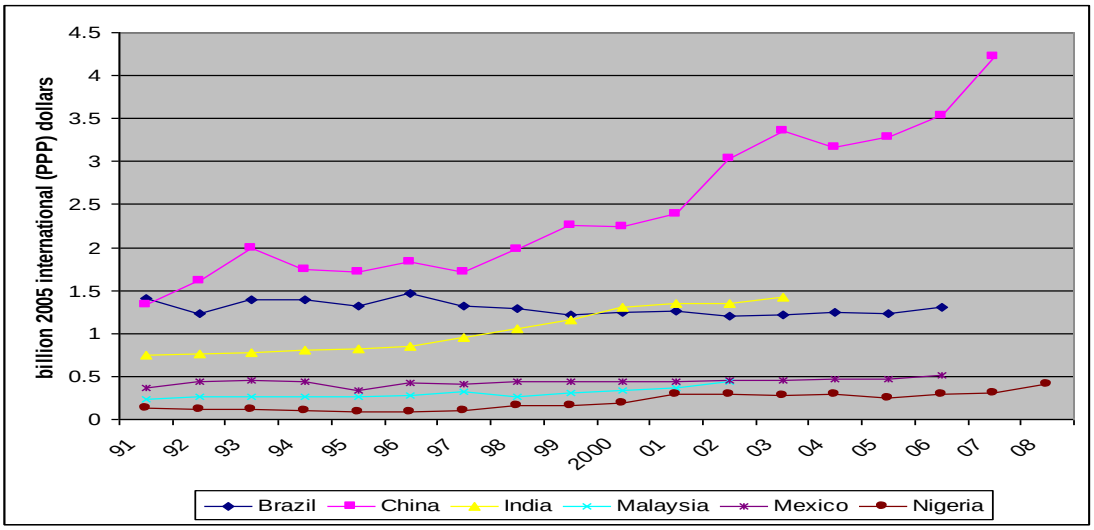
to the substantial increase in per capita availability in China. During 1978-2009, China recorded the slowest growth in population at 1.1 per cent followed by Brazil (1.5 per cent). The other countries under consideration registered higher than the world average growth in population.

Growth in agricultural output in these countries was largely driven by growth in crop yields and productivity with institutional and policy reforms, technological change, and enabling investment in agricultural research and development playing important roles.[4] The countries differ in terms of the timing, pace, and form of reforms as well as sectoral performance. For instance, China began its agriculture sector reforms with the dismantling of the commune system in favour of household-based farming during 1978-81. Market-oriented reforms were initiated in Mexico in the 1980s and included rapid implementation of constitutional amendments to enhance private property rights in communal lands, elimination of agricultural price support programmes, and multilateral and preferential trade liberalization. In India, economy-wide reforms were introduced in 1991 and although these were not focused on agriculture, they led to an improvement in agricultural terms of trade. Brazil launched the Real Plan in 1994 which combined fiscal, monetary, economic and institutional reforms, and controlled trade and financial liberalisation. Malaysia, where agriculture had been relegated to the backseat from the 1980s as the country embarked on an industrialisation drive, re-prioritized agriculture after sharp food price increase in the aftermath of the Asian financial crisis in the late 1990s. Nigeria initiated a programme of economic reforms in 2001.

China witnessed among the most impressive improvements in crop yields and productivity. Whilst the sown area under cereals did not increase in China after 1978, growth in yields contributed to increases in agricultural output. The rate of growth of GDP originating in agriculture accelerated sharply from less than 2 per cent during the 1970s to over 6 per cent in the immediate post-reform period during the 1980s. The improvements in productivity, particularly after 1984, when the effects of institutional reforms levelled off, are attributable to technical progress, enabled by investments in agricultural R&D (Huang and Rozelle, 2010). Since 2000, the Chinese government has stepped up investments in agricultural research and development to meet increasing domestic demand for food. The total public sector expenditure on agricultural R&D has increased sharply in recent years after relatively stagnant growth during the 1990s (Fig 2). According to Chen and Zhang (2010, pg. 8), private sector R&D has increased dramatically in China from less than 2 per cent of total agricultural R&D in 1999 to 22 per cent in 2006. Private sector R&D is concentrated in food processing and animal husbandry unlike public sector R&D, which is concentrated in grains.

[4] Crop yields represent a partial productivity measure whereas multifactor productivity measures express output relative to a more comprehensive measure of all measurable inputs (including land, labour and capital, as well as energy, chemicals and other purchased inputs). Total factor productivity growth itself is a combination of pure technical progress and the increase in efficiency in utilization of factors of production, the latter often being made possible by economic and institutional reforms which enhance productivity.

Figure 2: Public sector R&D investments, 1991-2008



Source: Agriculture Science and technology indicators available at www.asti.cgiar.org

In Brazil, where agriculture is treated as a strategic sector, growth of GDP originating in agriculture, including agri-business, has been higher than overall GDP growth over the past three decades. Whilst institutions, policy, and markets have all played important parts in transforming Brazil's agriculture since 1990, the role of innovation needs special mention. According to Buainain and Garcia (2010), technological development was critical in bringing new frontier land, previously considered unsuitable, under cultivation and contributing to regional growth. Introduction of new varieties and mechanisation were the leading vectors of innovation. Although consumption of agro-chemicals has also shown steady growth, the growth in fertiliser consumption is found to be closely related to the expansion of the land production rather than to intensification of fertiliser use. Further, many technological innovations, including genetically modified technologies and more efficient methods are specifically focused on reducing the use of chemical inputs. Total factor productivity growth has been high and increasing over time from 1.86 per cent in the 1980s to 2.65 per cent and 3.87 per cent during the 1990s and the first half of the 2000s.

The innovation processes and diffusion of technology in the Brazilian agricultural sector have been led by the public sector. The public sector is strongly represented in the institutional, operational and financial sides of scientific and biotechnological research. Brazil has developed a strong system of innovation in agriculture since the 1970s. During the 1990s, EMBRAPA (Brazil's main public agricultural research corporation) emerged as the most prominent institution in this area although the National System of Innovation (NIS) in agriculture, which has become strategic for the development of the country's agribusiness, includes over 200 institutions in the public, private and university sectors. EMBRAPA accounted for an estimated 57 per cent of the country's public agricultural R&D spending and 42 per cent of the research staff in

2006.[5] The work carried out by EMBRAPA played a decisive role in developing and exploiting technology in breeding and genetics, crop and soil management, and biological nitrogen fixation in increasing grain production in Brazil, particularly, soybeans, a crop hitherto grown in temperate climates. Soybean was adapted to the climatic conditions in Brazil and today Brazil is the second largest producer of the crop in the world. Large-scale mechanisation and technologies developed mainly by EMBRAPA were the keys to increasing production and productivity of frontier land. The performance of the sugar and ethanol complex was strongly influenced by the introduction of the bio-fuel car in the 2003, which itself was the outcome of publicly led research and development investments in the aftermath of the 2001 petroleum price rises.

India made considerable progress during the 1970s and 1980s, after the introduction of the Green Revolution new seed-fertilizer technology in the mid-sixties, in increasing production of food grains, particularly wheat and rice. Food grain production in the country increased from 108 million tonnes in 1970-71 to 234 million tonnes in 2008-09.[6] The country also experienced a so-called white revolution in the 1970s, based on an innovative cooperative model, in the milk sector. The country is currently ranked first in milk production globally. The more recent private-sector led biotechnology revolution has revitalized production and productivity of cotton in the country. The initiation of wide-ranging economic reforms in the country in 1991 led to an improvement in agricultural terms of trade and private investments in agriculture. However, agricultural growth decelerated in the post-reform period (Mittal, 2010). Of late, there has been a reversal in the earlier deceleration and agriculture has recorded a growth of 3.5 per cent per annum between 2004-05 and 2010-11. Food grain production touched a new peak of 241 million tonnes in 2010-11. The country faces a number of challenges to agricultural growth including technological fatigue, policy deficits, infrastructural, credit and marketing constraints and water, and soil health related ecological and environmental problems. Public sector agricultural R&D has not adequately addressed arid/dry land agriculture and the need to develop drought and pest resistant crop varieties. The composition of public expenditure on agriculture shifted away from investments in productivity improvements and extension services towards input subsidies (Sharma and Gulati, 2008). As a result, agricultural technology development and dissemination suffered. Investments in agriculture have increased recently (GoI, 2011).

According to Yunez-Naude (2010) initiation and rapid implementation of market-oriented reforms and trade liberalization from the 1980s forms the main backdrop of contemporary agricultural and food security outcomes in Mexico. The reforms ranged from constitutional amendments to enhance private property rights in communal lands, elimination of agricultural price support programmes and multilateral and regional trade liberalization. However, the outcome of market-oriented and trade reforms were

[5] www.asti.com.
[6] http://agricoop.nic.in/Agristatistics.htm.

not entirely in line with expectations. The rural land markets did not show signs development and neither did access to credit improve. Growth in domestic supply of staples like maize was found to be based on the Target Income transfers to big commercial farmers in the northwest of Mexico as well as by subsidizing transnational grains marketing enterprises and domestic maize processors with monopoly power. Instead of using public resources for provision of public goods, most of government expenditure to the rural sector has been for provision of private goods such as income transfers.

According to Ahmad (2010), the Malaysian economy witnessed a transformation of its economic structure rapidly from the late 1950s, when agriculture, mainly rubber and timber contributed approximately 50 per cent of the country's GDP. A programme was initiated to diversify agricultural output in the 1960s, leading to a successful diversification into palm oil and cocoa. The government introduced the National Agricultural Policy (NAP, 1984) to liberalise the sector and enhance the productivity, efficiency and competitiveness of the sector. Agriculture was, however, relegated to the backseat as the country began the drive to industrialise, particularly in the late 1980s and early 1990s. The sharp rise in domestic food prices in the aftermath of the 1997-98 Asian Financial Crisis, however, which led to the re-prioritization of agriculture and food security on the domestic agenda, has contributed to renewed growth in Malaysian agriculture. Malaysia has registered high growth in agricultural R&D spending since the late 1990s.

Smallholder farmers, landless peasants and hired farm workers experience a high incidence of food insecurity. It is estimated that half of the undernourished in the world, three-quarters of Africa's malnourished children and a majority of people living in absolute poverty can be found on small farms (Millennium Project Taskforce on Hunger, 2004). Nagayets (2005) estimates that 85 per cent of the farms in the world are less than 2 hectares (ha), and smallholder farmers and their families represent 2 billion people.[7] The overwhelming majority of these farms (87 per cent) are located in Asia, with China alone accounting for approximately half of the world's small farms, followed by India at 23 per cent. As of mid-to-late nineties, farm size averaged 1.6 hectares in Africa and Asia compared to 67 hectares in Latin America, reflecting highly unequal land distribution in the latter region. Historical trends suggest that small farmers will continue to dominate the agricultural landscape, particularly in Africa and Asia over the next few decades.[8] The average farm size declined from 1.8 hectares in 1980 in India to 1.4 ha during the 1990s. Average farm size in China was 0.6 ha during

[7] The concepts, current understanding and actual sizes of small-holding agriculture vary among countries. The commonly used definition of 2 hectares as the main parameter to define small-holder agriculture may be highly misleading as the holding size itself does not capture additional features that may be important considerations, such as the quality of land and other resources, organisation and social relations of production and market linkages.

[8] The food markets are also undergoing a revolution in the advanced economies in the forms of local food, slow food, and organic food movements with rising interest in small family farms.

the 1990s. These farms account for a sizeable share of agricultural output, particularly in the Asian economies. In India smallholders contributed around 50 per cent of total rice production and 43 per cent of wheat production in 2001-03 and contribute around 70 per cent, 55 per cent, and 69 per cent of the total production of vegetables, and fruits, and milk respectively (Dev, 2011).

These farmers have high potential to grow more food in a sustainable manner and to improve their livelihoods and to contribute to overall food security. However, the capacity of these farmers is constrained by insecure access to land, limited knowledge of improved technologies and management practices, and inadequate access to training, credit, extension, and appropriate group formation support and marketing services. According to FAO (2009), providing emergent small farmers with access to improved technologies for water control, crop and livestock production, control of post-harvest losses and agro-processing and access to critical inputs would boost productivity and food production significantly, particularly if accompanied by investments in infrastructure and by policies that support competitive market chains.

The experiences of the emerging economies covered in this paper suggests that supporting smallholder farming could be one of the most effective ways to alleviate poverty and hunger at the household level and to improve food security at the local, regional and national levels. The country experiences of Mexico, Brazil, Nigeria, Malaysia and the MERCOSUR regional initiative on small-holder agriculture illustrate how investments and differential public policies for increasing technological, financial and marketing support to small-holder farmers can improve productivity of small farmers and improve their livelihoods and contribute to overall food security (Annexure 2).

3. Ensuring access

Economic access to food refers to the ability to acquire available food from earnings and transfers. The experience of the emerging economies covered in this paper suggests that although economic growth and adequate availability of food at the national level is important, it may not be sufficient for achieving food security at the household and individual levels. In China, which has recorded among the highest rates of overall economic and agricultural growth and per capita availability in the world over the past three decades, 10 per cent of the country's population continues to be undernourished (Table 2). In India, where the country registered an overall economic growth in excess of 9 per cent per annum during 2005-07 and carried around 19 million tonnes of public stocks of cereals, over 20 per cent of the population did not have access to minimum dietary requirement during this time. Nearly 238 million people suffer from chronic hunger in India, making the country home to the largest undernourished population in the world. Although Brazil is one of the world's leading competitive producers and exporters of food commodities, around 6 per cent of its population was undernourished during 2005-07.

Table 2: Household food consumption and prevalence of undernourishment

Country	Share of household expenditure on food (%) (year)	No. of people undernourished (million) 2005-07	Undernourished in total population (%)			
			1990-92	1995-97	2000-02	2005-07
Brazil	20.8 (2002)	12.1	11	10	9	6
China	39.8 (2006)	130.4	18	12	10	10
India	50 (2004)	237.7	20	17	19	21
Malaysia	49.5(2004)	--	—	—	—	—
Mexico	30.7 (2002)	--	—	—	—	—
Nigeria	61 (1990s)	9.2	16	10	9	6
World	--	847.5	16	14	14	13

Source: FAOSTAT database and FAO (2010).

The economic and social access to food, the second important pillar of food security, depends on a variety of factors including national income, distribution of income/consumption and land holdings, share of expenditure on food and the contribution that agriculture makes to GDP and employment. Economic access to food also depends on food and income transfers. There exist substantial differences among the six countries and the respective regions under consideration in this regard. In general, the Latin American countries, including Brazil and Mexico, have higher levels of per capita income as well as income inequality in comparison to the Asian countries. The Gini coefficient was among the highest in Brazil at close to 0.6 in the late nineties although since 2001, it has declined steadily reaching 0.55 in 2007. In Brazil agricultural holdings less than 2 (5) ha represent 20 (35.6) per cent of total holdings and operate only 0.3 (1.1) per cent of the area in 2006 (Buainain and Garcia, 2011). In contrast, land holdings are much more equitably distributed in China although income inequality has risen sharply in recent years. China achieved a remarkable reduction in poverty rates since 1978, particularly in the immediate post-reform period, when the proportion of population living below the poverty line declined sharply. In India, data for 2005-06 shows that marginal and small farmers accounted for 83 per cent of operational holdings and operated around 42 per cent of the land.

Agriculture contributes over 10 per cent of the GDP and more than 40 per cent of the employment in the two large Asian countries, China and India, despite registration of much higher rates of growth in industry and services. Although the share of GDP originating in agriculture is around 6 per cent in Brazil, the sector continues to account for 19 per cent of the labour force and has recorded higher rates of growth than industry and services over the past three decades. Food typically accounts for 40-50 per cent of household consumption expenditure in the Asian countries. The Latin American countries spend a smaller proportion of household expenditure on food. Although GDP per capita is relatively high in Mexico, the share of food in household consumption continues to be more than 30 per cent. The African country covered in this paper, Nigeria, spends the highest proportion of household budget on food.

A range of instruments, with different fiscal, administrative, and behavioural implications, have been deployed by national, regional and local governments to improve access to food. These include food subsidy programmes, food distribution in kind, school meals, food vouchers, and universal or targeted food subsidies, conditional or unconditional cash transfers, employment generating programmes, and financial inclusion measures etc. Social safety nets have come to play an increasingly important role as these economies have embraced market-oriented reforms although there are variations across countries in this regard as well. The Latin American countries, Brazil and Mexico have laid particular emphasis on conditional cash transfers (CCTs) to address income and food poverty and to improve nutritional and human development outcomes. However, the CCTs are typically part of much broader social protection programmes. In Brazil, the federal CCT programme (*Bolsa Familia*) is part of a broader package of social security, including the *Fome Zero* or Zero Hunger strategy. In Mexico, the CCT programme, *Progresa*, introduced in 1997 (renamed *Oportunidades* in 2002), and the Special Program for Food Security (PESA) address food security objectives in the country. Brazil and Mexico spent approximately 0.4 per cent and 0.5 per cent of GDP respectively on the CCT programmes mentioned above (Annexure 3).

In China, where initial inequality was low, particularly with respect to land ownership, economic growth and increasing economic opportunities have played a much more important role in enhancing food security than social transfers. Rural industrialization and off-farm employment played a critical role in improving livelihood and food security by increasing economic access to food. India has focused on in-kind transfers, including subsidized food distribution, food price stabilisation and public employment programmes, to improve household access to food.

According to Buainain and Garcia (2010), Brazil has made considerable progress in improving food and nutritional security and reducing inequality through a combination of factors including: (i) price stabilization and low rates of inflation after the launch of the Real Plan in 1994; (ii) minimum wage policy; (iii) implementation and scale up of universal pension benefits; (iv) economic growth and rise in employment; and (v) scale up of the conditional cash transfer programme into the federal conditional cash transfer scheme, *Bolsa Familia* (family grant). In January 2003, Brazil launched a Zero Hunger strategy (*Fome Zero*), funded by public sector resources and based on local government institutions and the mobilization of representatives of the civil society. The strategy adopted an integrated approach to food security by covering availability and access to food in ensuring a nutritionally adequate diet. It combined cash transfers to increase the purchasing power of the poor with investments in family farms to meet the resulting increase in demand for food and raise the incomes of farmers. The main elements include the following: conditional cash transfers, school meals, local food distribution programmes based on people's restaurants, community kitchens and food banks operated in partnership with the private sector and civil society, which make food available at minimal or zero cost and also provide local markets for family farmers,

programme of nutrition education in the form of a comprehensive media-based food and nutrition education programme, a health and nutrition programme through which food supplementation is provided for specific groups that require greater attention and suffer from vitamin and micronutrient deficiencies, cisterns that provide clean drinking water and water for farming in the semi-arid regions of the country are being installed, and a stimulus programme for poor family farmers (PRONAF – the National Programme to Strengthen Family Farming), which is one of the major public programmes to support family farmers. PRONAF focuses on providing subsidized credit to needy farmers and a direct purchase programme in which family farmers can sell up to pre-specified worth of produce to the government each year. The food purchased by the government is used to supplement reserves and also used for the school meals programme (PNAE-National School Feeding Programme). The country also runs the Food Acquisition Programme from Family Farming (PAA) to facilitate market access exclusively for family farmers and related categories.

According to Yunez-Naude (2010), the Mexican Special Program for Food Security (PESA), renamed the Strategic Project for Food Security in 2008, is a public sector intervention aimed at improving food security and reducing poverty in a sustainable manner in the most marginalized rural regions of Mexico. The project is being implemented by creating a decentralized Agency for Rural Development (ADR) to promote and facilitate development processes in marginalized rural communities. The PESA began as a pilot in 2002 and expanded to the national level in 2005. The project is administered by first making a diagnosis of the zone and rural communities and formulating regional intervention strategies in a participative manner. At present, 135 ADR are operating in 18 states and 655 districts including 105 districts with the lowest human development indices in the country. Over 10,000 poor families have participated directly in community-level projects, focusing on improving living conditions and productive assets (soil and water management, organic coffee, maize and beans, marketing, eco-tourism).

The Indian government has been concerned with improving economic access of its vast population to food from an early time. India runs one of the largest food stocking and public system of food and other essential commodities for distribution at subsidized prices to the poor. The public sector food distribution (PDS) system was introduced in the country in 1942 for distribution of essential commodities including rice, wheat, sugar, and kerosene at subsidized prices to improve food security at the household level. The system operates through the Food Corporation of India as the apex agency for procuring, storing and distributing food grains to a large network of fair price shops for retail to the final consumer. The PDS was universal until 1997, when it was converted into a targeted scheme with the bifurcation of beneficiary population into below and above the official poverty line along with a destitute category. The Indian PDS demonstrates the administrative burden of targeted public programmes, particularly in a poor country where the informal sector is a major source of income and employment and where overall state governance capacity, particularly at the sub-

national level is weak. The government is in the process of finalizing a new National Food Security Act, which proposes coverage of up to 75 per cent of the population, is expected to be rolled out in fiscal year 2012-13 in a phased manner.

4. Ensuring utilisation

Food and nutritional security is affected not only by availability and economic access to food but also by complementary conditions for nutritional absorption, including access to safe drinking water, sanitation facilities, healthcare and education, particularly care and education of mothers and children, which have received increasing attention as an important third dimension of food security.[9] Nutritional status is an important indicator of well being, particularly among children. Despite increased global food production since the 1960s, malnutrition remains a major public health problem, particularly in South Asia and Sub-Saharan Africa, where prevalence of malnutrition is found to be increasing.

Table 3: Prevalence of child malnutrition

Country	Year	Under-five mortality rate (Per 1,000 live birth)	Year	% of children under age 5		
				Underweight	Stunted	Overweight
Brazil	1990	56	1975	16.1	38.2	11.5
	1995	44	1989	6.1	20.4	8.5
	2000	34	1996	4.5	13.5	6.6
	2009	21	2002-03	3.7	--	--
			2006-7	2.2	7.1	7.3
China	1990	46	1987	18.7	38.3	--
	1995	45	1992	15.3	37.6	6.9
	2000	36	1998	7.9	20.7	6.8
	2009	19	2000	8.7	19	4.4
			2002	6.8	21.8	9.2
India	1990	118	1974-79	67.3	75.1	--
	1995	104	1988-90	59.5	66.2	--
	2000	94	1991-92	56.6	65.4	--
	2009	66	1992-93	48.7	57.0	2.9
			1996-97	41.1	48.5	5.0
			1998-99	44.4	51.0	3.6
			2005-06	43.5	47.9	1.9
Malaysia	1990	18	1990	22.1	--	--
	1995	13	1991	23.1	--	--
	2000	10	1992	22.6	--	--
	2009	6	1993	20.5	--	--

[9] Utilisation refers to the actual metabolisation of food by the body and absorption of nutrients for a healthy productive life.

Country	Year	Under-five mortality rate (Per 1,000 live birth)	Year	% of children under age 5		
				Underweight	Stunted	Overweight
			1994 1995 1999	19.7 17.7 16.7	-- -- 20.7	-- -- 5.5
Mexico	1990 1995 2000 2009	45 37 26 17	1988 1989 2006 1998-99	12.4 13.9 3.4 6.0	28.7 40.4 15.5 21.7	6.1 9.8 7.6 7.6
Nigeria	1990 1995 2000 2009	230 230 207 138	1983 1990 1993 1999 2001 2003	-- 35.1 35.1 27.3 22.1 27.2	-- 50.5 43.8 39.7 47.9 43.0	-- 3.2 5.5 -- -- 6.2
World	2009	61	2004-09	21.3	31.7	6.1

Source: *WDI Indicators Database; WHO (http://www.who.int/nutgrowthdb/estimates/ en/index.html)*

Anthropometric measures of child nutritional status show that India has among the highest prevalence of child malnutrition in the world with over 43.5 per cent and 47.9 per cent of the children under 5 years of age estimated to be underweight (low weight-for-age) and stunted (low height-for-age) in 2005-06 (Table 3). Trends in child malnutrition show that whilst India made progress in reducing the prevalence of underweight among children under 5 from over 67.3 per cent in 1974-75 to 41 per cent in 1996-97, the proportion of underweight children rose to 44.4 in 1998-99 and remained almost unchanged at 43.5 per cent in 2005-06. The Sub-Saharan African countries have also lagged behind although the prevalence of malnutrition is currently lower in Africa as compared to South Asia. However, child mortality is found to be higher in Africa as compared South Asia.

Research (Svedberg, 2006; Smith and Haddad, 1999) suggests that poverty, availability of food, women's education and status and health and environmental conditions are among the major determinants of child malnutrition. The decline in stunting among children in China was matched by a simultaneous decline in rural poverty. In a situation of equitable distribution of land, growth in agricultural appears to have played an important role in poverty reduction in China. Income poverty reduction in China has been concentrated in certain periods, particularly the immediate post-1978 reform period, when the incidence of rural poverty fell from 30.7 per cent in 1978 to 15.1 (14.3) per cent in 1984 (1987) (UNDP, 2005). The pace of poverty reduction in India has been much slower than in China. The share of people living on less than 2005 PPP

$1.25 a day declined from 84 per cent in 1981 to 15.9 per cent in 2005 in China compared to a decline from 59.8 per cent to 41.6 in India over the same period (WDI indicators, 2011).

India has employed three kinds of interventions: food supplementation for vulnerable groups, particularly women and children; nutritional education and health interventions to address the physical symptoms of malnutrition, micronutrient deficiencies and child and maternal health. The Integrated Child Development Scheme (ICDS), the Supplementary Nutrition Programme (SNP) and the Mid-day School Meal Scheme (MDMS) are the major nutrition-oriented programmes that are being implemented in the country. The ICDS was introduced in 1975 and provides a package of healthcare services, including immunization, supplementary nutrition, non-formal pre-school education and advice on health/nutrition to children below six years of age and expectant/lactating women from disadvantaged sections of society. The MDMS provides cooked meals (or dry rations in some cases) to primary school children to incentivize enrolment and attendance whilst improving their nutritional status. Despite these long-standing interventions, the prevalence of malnutrition remained largely unchanged since 1998-99. Evaluations of the targeted PDS and ICDS suggest that they had little impact on malnutrition among children (Kochar, 2005; Das Gupta et al, 2005). In contrast, evaluations of the *Progresa/Oportunidades* in Mexico find positive results on the targeted children's nutritional status after controlling for initial differences in the treated and non-treated children (Behrman et al, 2005).

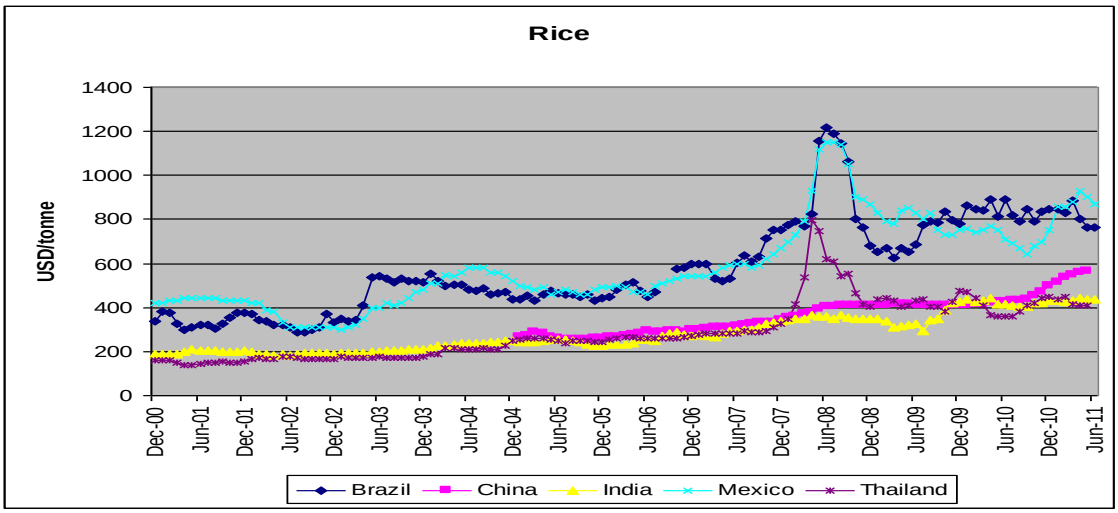
5. Ensuring stability

Agricultural production is variable due to yield variations, largely on account of variations in the weather, pest infestations or other natural disasters. Low demand and supply elasticity as well as lagged supply responses add to the degree of variability in agricultural commodity markets. Over the past few years, prices of agricultural commodities have witnessed high levels of volatility. Global food commodity prices rose steeply between 2006 and 2008, reaching a peak in mid-2008. Food prices rose by 83 per cent between 2005 and 2008, with maize prices nearly tripling, wheat prices increasing by 127 per cent, and rice prices by 170 per cent between January 2005 and June 2008 (UNCTAD, 2008). Although food commodity prices fell sharply in the second half of 2008, prices rose again between October 2010 and January 2011 and were only slightly below their 2008 peak. Between October 2010 and January 2011, sharp increases were observed in the global prices of wheat, maize, sugar and edible oils, with relatively smaller increase in rice prices.

Although international price volatility was large, a wide variation was observed in domestic price volatilities by countries (Fig. 3). In general, price volatility was substantially lower in case of China and India as compared to Brazil (OECD-FAO, 2010). The lower levels of domestic price volatility in China and India are attributed to domestic price stabilization policies, including price support policies and managed

trade environments (OECD-FAO, 2010). The responses to the 2008 food crisis also varied depending on the policy framework for agriculture and food security.[10]

Figure 3: International and domestic wholesale prices (USD per tonne)



Source: FAOSTAT database (http://www.fao.org/giews/pricetool2/)

A number of other explanations have been proposed for the 2008 global "price spike" and increased volatility in food commodity markets.[11] The food and financial crisis and the debate on the primary factors responsible for food price volatility have underscored the cross-border effects of domestic policy actions and the global public good aspects of agricultural and nutritional knowledge.[12] Global public goods not only provide direct utility but also contribute to risk reduction (disutility) and are important for development and poverty reduction. A general consensus has emerged that there were deficiencies in international coordination and response to the food crisis and that there is need for greater coordination and more effective governance of agriculture and food security at the global level.

The 2008 global price spike in staple food commodities led to national policy responses in the form of export restrictions by exporting countries and import liberalization by

[10] Please refer to the country studies.

[11] These comprise both demand and supply side factors as well as short-terms influences and long- term trends: poor harvests, particularly in Australia; low food stocks, particularly in China; increase in the prices of agricultural inputs, particularly oil; speculation in food commodity markets, particularly by institutional investors such as hedge funds, pension funds and investment banks; depreciation of the US Dollar; diversion of food crops into the production of bio-fuels; decades of underinvestment in agriculture; climate change and water depletion; rapid economic growth, particularly in China and other Asian economies; avoidable food losses in developing economies and food wastage in industrialized economies. The country studies point to the ecological challenges facing emerging economies with respect to scarce resources such as water, land and farm inputs.

[12] Global public goods are defined differently by different agencies and scholars but in general refer to goods, services and policy regimes that have substantial cross-border externalities, have public good characteristics, such as non-rivalry and non-excludability and are goods that can be produced in sufficient amounts only through cooperation and collective action of developing and industrialised countries.

import-dependent countries to temper the rise in domestic prices. Attempts by countries to insulate their own markets may transmit instability onto international markets, particularly if they are major players in terms of consumption or production. It has also been argued that bio-fuel policies in major producers, where blending mandates link fuel prices to those of crops that are also used for food and feed is adversely impacting food security globally. Moreover, increased integration of global commodity and financial markets has strengthened the need for greater transparency, global coordination, and regulation and monitoring of these markets for international stability. Inadequately regulated financial markets in one part of the world raise the risks for the rest of the world in an increasingly globalized and inter-dependent world economy. It may not be possible to insulate domestic economies from international markets in a costless and effective manner. Thus, global governance mechanisms that address such cross-border externalities have a critical role in ensuring food and nutritional security.

However, institutional change at the global level and financing for global public goods is lagging behind the rapid pace of globalization and increasing inter-dependence in the world economy. It is unlikely that the internationally agreed upon Millennium Development Goals (MDG) with regard to food and nutrition will be achieved at the current level of deficit. Whilst the percentage of children underweight fell in developing countries from 29 per cent in 1990 to 20 per cent in 2005, it is well short of the 2015 MDG target of 14.5 per cent. Over the past five decades, the production of food has grown several-fold but millions of people worldwide, including farmers and farm labourers, continue to go hungry and food and nutritional security remains a distant goal for many. International organizations are central to the provision of global public goods in terms of resources, knowledge, science and technology transfers, and global regulatory and policy regimes.

Official development assistance is an important financing mechanism for global public goods, particularly for the low-income economies. Bilateral and multilateral assistance to agriculture, including forestry and fishing, increased during the 1970s but after a period of stagnation during the 1980s, aid to agriculture declined significantly in real terms during the 1990s and the first half of the 2000s. The share of agriculture in total official development assistance (ODA) declined sharply from around 17 per cent in the early 1980s to 8 per cent at the end of the 1990s.[13] However, there has been a notable increase in global funding for agriculture since 2007. The global volume of assistance to agriculture (commitments), expressed in 2009 prices, increased from US$5.4 billion in 2006 to US$9.5 billion (OECD, 2011). The share of agriculture in ODA increased from less than 4 per cent to over 6 per cent over the same period. The recent increase in global funding for agriculture has been accompanied by an increase in the number of actors, including bilateral and multilateral donors, private foundations, and

[13] See OECD (2001).

multinational corporations. There has also been an increase in the number of initiatives and types of funding modalities in the area of agriculture and food security.

Coordination among governments and collection, and standardized dissemination of information is a major dimension of governance of global organization in any area. In agriculture, given the variability in production, an additional need arises for well-designed and functioning early warning systems. A lot of information, particularly on agricultural production, consumption and stocks is collected and widely disseminated at the local, sub-national and national levels in most systematically important countries. However, there is greater need for such information to be transmitted and compiled in a useful and informative manner at the global level. It is also important to adequately integrate information regarding the activities of important private players into the global public domain in a transparent manner. At present, there is insufficient information and understanding of the total volumes, composition, pattern and quality of global funding for agriculture and food security and how these are changing or being impacted by the increase in funding. The existing international organization, such as the FAO, WFP, IFAD, various other UN agencies, and the World Bank already provide a substantial amount of information and statistics on agricultural production, prices, trade and consumption and nutrition. However, significant gaps exist in the availability and quality of available information on food stocks, including stocks held by private parties, futures trade in agricultural commodities, and domestic and trade policies. It is important to note that greater evidence-based analysis of the factors responsible for increased volatility in global food prices is being constrained by a lack of availability of information at the global level. Whilst better information is available on food prices, more analysis is required with regard to the causes, trends, and consequences.

6. Concluding remarks

The experience of the emerging and developing economies, reviewed in this paper, in meeting the food and nutritional security needs of their populations is instructive. The emerging economies, particularly Brazil and China, have made unprecedented strides over the past three decades in providing adequate food and nutritional security to their populations. This has been achieved not only by augmenting food supply but also by implementing institutional reforms, social policies, and programmes to improve economic and social access to food and provision of basic services for nutritional absorption. There is considerable diversity in country performance and experiences in terms of the timing, pace and degree of economic and institutional reforms, and multiplicity of approaches and instruments used to increase economic access to food and nutritional absorption. This diversity in the national experiences of major emerging economies in providing food and nutritional security to their populations and its implications for global governance of agriculture and food needs to be better appreciated, understood and communicated. The home-grown nature of country-level approaches in providing social protection and social safety nets to manage production, price and livelihood risks suggests the importance of differentiation and selection of

appropriate strategies at local, regional and national levels and a rejection of the "one-size-fits-all" approach to development. The review also points to the commonality of challenges facing many of these countries, including the issues of technology, water security, soil health and land resource management, and the need for strengthening organisations of small farmers and empowering women. The review also points out that whilst the emerging economies have made considerable progress in increasing food availability and developing comprehensive institutional and policy frameworks for managing the sector, they remain vulnerable to global financial and commodities crisis. This underlines the need for these economies to undertake more research in these areas and engage constructively with institutions of global agricultural governance.

The national experiences of these countries in enhancing food security suggest that increasing per capita availability is a pre-condition for ensuring food security. Growth in agricultural output needs to be accelerated and made more inclusive by focusing on the differential requirements of small holders. Safety nets may still be required for ensuring economic access to food. Investments in health care and women's education are important along with agricultural output growth to improve nutritional outcomes. There is a need to establish better commercial intelligence to check food price volatility.

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Annexure 1: Food supply

Food supply quantity (kg/capita/yr)								
	Cereals	*Fruits*	*Vegetable Oils*	*Vegetables*	*Eggs*	*Fish, Seafood*	*Meat*	*Milk*
Brazil								
1961-69	96.8	80.1	4.3	24.8	3.0	5.6	28.1	68.9
1970-79	102.9	89.2	8.3	26.9	4.1	7.2	32.9	71.7
1980-89	112.4	89.2	12.9	31.5	6.6	6.5	41.5	84.6
1990-99	106.0	101.7	14.2	36.3	7.3	5.8	63.2	104.6
2001-2009	111.2	103.4	16.6	43.5	7.1	6.2	78.6	117.2
China								
1961-69	116.9	4.7	1.7	61.7	2.1	4.9	8.0	2.4
1970-79	138.9	6.3	2.1	48.3	2.3	5.3	10.9	2.6
1980-89	173.5	11.4	4.4	77.7	4.2	7.6	19.2	4.4
1990-99	171.7	29.6	6.3	144.8	11.5	18.3	37.4	7.4
2001-2009	158.3	53.6	7.6	259.4	16.6	25.3	51.9	18.8
India								
1961-69	142.7	25.9	4.1	39.8	0.4	2.3	3.7	34.7
1970-79	146.4	25.0	4.6	45.9	0.6	3.0	3.6	35.5
1980-89	154.9	27.0	5.6	50.8	0.9	3.2	4.0	47.3
1990-99	156.3	33.2	7.0	55.1	1.3	4.3	3.9	57.0
2001-2009	150.8	38.2	7.8	62.7	1.8	4.8	3.4	64.1
Malaysia								
1961-69	156.0	57.0	8.3	21.3	4.1	23.5	14.2	31.1
1970-79	157.3	56.8	10.3	24.3	7.8	32.2	18.7	35.4
1980-89	133.4	55.1	17.8	24.3	10.0	44.0	28.2	41.5
1990-99	137.8	53.7	14.4	30.4	12.7	53.0	47.9	51.0
2001-2009	154.5	55.3	14.9	37.8	11.8	56.0	48.6	45.0
Mexico								
1961-69	158.2	72.0	5.7	27.2	4.1	3.1	25.2	63.1
1970-79	165.1	82.0	6.5	34.2	6.3	5.0	28.8	95.8
1980-89	178.5	99.5	10.7	45.3	9.6	10.7	39.1	105.9
1990-99	175.6	99.7	10.9	53.4	12.0	11.0	44.3	99.2
2001-2009	173.9	116.5	10.3	68.0	16.6	10.5	59.7	114.0
Nigeria								
1961-69	106.5	63.2	12.4	47.5	1.6	4.0	6.7	4.5
1970-79	94.9	65.8	10.7	45.0	2.1	8.1	7.5	9.7
1980-89	109.2	60.5	10.3	40.1	2.6	10.6	9.3	9.2

Food supply quantity (kg/capita/yr)								
	Cereals	*Fruits*	*Vegetable Oils*	*Vegetables*	*Eggs*	*Fish, Seafood*	*Meat*	*Milk*
1990-99	133.5	64.0	13.2	49.7	3.2	7.3	8.0	5.8
2001-2009	138.7	62.3	14.2	58.3	3.2	8.7	8.6	7.2
World								
1961-69	133.3	40.8	5.3	61.6	4.7	9.9	25.1	75.1
1970-79	138.3	44.6	6.5	62.3	5.3	11.5	28.4	75.6
1980-89	149.2	48.6	8.4	71.9	5.9	12.5	31.5	77.6
1990-99	150.5	55.1	9.6	87.1	7.2	14.4	35.3	76.2
2001-2009	147.3	63.9	10.6	114.8	8.3	16.3	38.9	80.7

Source: Faostat database

Annexure 2: Programmes for smallholder farming

Brazil: Brazil's National Programme for Strengthening Family Agriculture (PRONAF) is a federal programme created in 1995 to assist in a differential way the family farmers in the country. The programme finances individual and group projects that generate income for family farmers and agrarian reform settlers. It aims to strengthen family farmers to integrate them into the agribusiness chains through the modernization of the productive activities, enhancement of rural producers and professionalization of smallholders. Eligible farmers obtain financing and investments costs with conditions appropriate to small holder farming, swiftly and up to zero charge. The programme provides special lines of credit for production of staples, to women, young people aged between 16 and 25, semi-arid areas, and for forestry and agribusiness. The programme has the advantage of increasing food supply and ensuring livelihoods, dignity and improved quality of life to family farmers.

Mexico: The Mexican Programme for Direct Assistance in Agriculture (PROCAMPO) was introduced in 1994 to compensate domestic producers of crops who were expected to loose from liberalization of regional trade under the NAFTA. Direct transfers were made on a per-hectare basis, decoupled from current land use. Area planted under nine basic crops (corn, beans, rice, wheat, sorghum, barley, soybean, cotton and cardamom) in one of the three agricultural years preceding August 1993 qualified for receiving income transfers.

Malaysia: The Malaysia's organized smallholder scheme began in 1957 with the creation of the Federal Land Development Authority (FELDA). FELDA began with land development in rubber. It was extended to oil palm in 1961, which expanded rapidly to cover more than 700,000 hectares of land in 2007. The FELDA support consisted of initial subsistence payments, credit facilities and a wide range of support

services and community development services aimed at aiding rapid adaptation. The development and initial operational costs were repaid by the settlers over an extended period of time from the revenues received after which the ownership of the land was transferred to the small holders. FELDA has diversified into downstream activities like milling, refining, kernel crushing, marketing, engineering transport, trading and security. These ventures have turned FELDA into a highly integrated conglomerate and one of the largest, profitable government-linked companies in the country with domestic and international business operations.

Nigeria: Nigeria has also adopted a policy of investments in small holder farming as the main mechanism for addressing food security. In 2001, the government initiated economic reforms and a major initiative to develop agriculture: the National Special Programme for Food Security (NSPFS) with the technical support of the FAO. The NSPFS was succeeded by a National Programme for Food Security that will run through 2011. The NSPFS promoted the use of technologies that enable small farmers to diversify and increase productivity and income by introducing double and triple cropping in a sustainable manner. Production and demonstration sites are established in each local governance area to serve as models for area-wide outreach programmes. The programme also provides support for improved access to rural extension, credit and marketing services and nutrition and health education. The programme has also introduced real-time marketing information and improved linkages between the rural communities and formal banking sector.

MERCOSUR: The *MERCOSUR* regional initiative on family farms is a particularly innovative initiative for acknowledging the role of family farms in food security, climate risk management and soil health preservation. The initiative recognizes that family farms provide advantages such as agricultural diversification, satisfaction of consumer demand for organics and environmentally-friendly products and fair trade considerations. Family farms are re-defined in terms of their economic and social characteristics, including organization of production, use of natural resources, labour employed, capitalization levels and market access. The regional governments have agreed to promote production and facilitate trade of family farms products by adopting differential public policies, programmes and investments to address the needs of family farms to promote sustainable rural development.

Annexure 3: Country-wise major social safety programmes

Brazil: Programme: *Bolsa Familia* (Family transfer); Type: CCT; Beneficiaries: 12 (50) million households (people); Expenditure: 0.4% of GDP. The *Bolsa Familia* was launched in 2003 under the framework of *Fome Zero* (Zero Hunger) programme to eradicate hunger and extreme poverty, through the integration of various programmes designed to ensure security of access to food and fuel. The programme provides income support to poor families, subject to fulfilment of certain conditions, such as child school attendance, vaccinations, nutritional monitoring, prenatal and postnatal

tests. The *Bolsa Familia*, is the world's largest conditional cash transfer programme. The coverage of the programme has expanded rapidly since its creation. The number of beneficiaries tripled in four years rising from 3.6 million in 2003 to around 12 million families in 2011, corresponding to a quarter of Brazil's population and over 75 per cent of the estimated number of poor families. The programme is part of a broader package of social protection. Evaluations of the programme suggest that it has contributed significantly to reducing chronic poverty and improving the distribution of income in the country, which until the late 1990s was one of the most unequal in the world having a Gini coefficient close to 0.6. Since 2001, the Gini coefficient has however declined steadily, reaching 0.55 in 2007. The programme has also strengthened empowerment of women as benefit payments are made preferably to mothers or pregnant women. In 2005, 93 per cent of the beneficiaries were females and 27 per cent were single mothers. The programme has positively impacted financial inclusion. Benefit payments are made via the banking system, as a result of which a significant proportion of the country's poor population has gained access to a bank account and other financial services.

Mexico: Programme: *Progresa* (*Oportunidades*); Type: CCT; Beneficiaries: 5.8 million households; Expenditure: 0.5% of GDP. Mexico was the first country to introduce a nation-wide CCT, *Progresa*, in 1997. The Programme was expanded in coverage and scope and renamed *Oportunidades* in 2002. *Progresa* was introduced as a cash and in-kind transfer scheme, conditional on school attendance by the children of the beneficiary household as well as regular health checks for all household members. The transfers were made directly from the programme administration to beneficiaries without intermediation through sub-national governance institutions thereby moderating the political constraints of the programme. The targeting of recipients was carried out in a three step process: First, demographic data was used to identify most deprived communities; second, beneficiary households from these communities were selected on the basis of a household survey and finally, the list of selected households was reviewed in a local community meeting. The programme introduced a gender bias by directing the transfers to mothers and through granting higher subsidies for female students. Evaluation was made part of the programme and was to be carried out by independent and recognized researchers. Rigorous evaluations of the programme show that it has contributed to improving the health and nutritional status of children and adults in the country along with school enrolment. The programme also allowed the authorities to respond quickly in the face of the recent food crisis.

India: Programme: NREGS; Type: jobs programme; Beneficiaries: 55.6 (250) million households (people); Expenditure: 0.51% of GDP. The Indian Mahatma Gandhi National Rural Employment Guarantee Scheme (NREGS) is the world's largest public employment programme aimed at enhancing the livelihood security of rural inhabitants. The scheme regenerates the natural resource base in rural areas and creates productive assets. The scheme confers a statutory right to rural households to claim to up to 100 days of wage-employment in a fiscal year from their local government at a pre-

determined wage for unskilled manual work. The scheme is modelled on a successful scheme that was implemented in the Indian state of Maharashtra for around twenty years since 1972/73. The scheme was initially launched in 2006 in the 200 most backward districts in the country. It was scaled up to cover another 130 districts in 2007 and finally extended in 2008 to the entire country (596 districts). The NREGS has provided employment to 50 million households (250 million people) including the most marginalized groups such as the Scheduled Castes and Scheduled Tribes. Women accounted for slightly less than half the total person days as against a reservation of one-third. The expenditure on the scheme is around 0.5 per cent of GDP and 3.3 per cent of budget expenditure. The scheme is within the framework of a rights-based approach and is supported by the Right to Information (RTI) Act, which became operational in 2005. The NREGS is based on self-selection and community-based targeting mechanisms. The scheme is being used to build rural infrastructure, including roads, irrigation and water conservation structures, land development and improving soil health. It has been argued that the scheme has led to an increase in agricultural wages, reduced migration in some areas and increased agricultural labour shortages, leading to calls for dovetailing NREGA with agricultural operations. The government is also currently considering a National Food Security legislation based on a similar rights-based approach.

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