

Chapter 12

Disasters, Health, and Food Security in Cities: Adaptation Options for ASEAN

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Disasters, Health, and Food Security: Adaptation Options for ASEAN

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12.1 Disasters

Each year, millions of people are affected by natural and man-made disasters around the world. Natural disasters are of two kinds: (i) rapid-onset phenomena such as typhoons, tsunamis, floods, and volcanic eruptions; and (ii) slow-onset disasters such as droughts (Association of Southeast Asian Nations (ASEAN), United Nations Children's Fund (UNICEF), and World Health Organization (WHO), 2016). People's livelihoods are impacted by the various types of disasters, which can lead to the damage or destruction of human lives, crops, animals, fishing boats and gear, infrastructure, etc. The extent of the impact depends on the intensity of the hazard, the level of people's vulnerability, and their capacity to cope with these shocks and stresses.

The exact health effects of a disaster depend on the type of disaster, e.g. earthquakes can lead to critical multiple injuries, flooding can lead to outbreaks of diarrhoea, and droughts can lead to malnutrition. In general, children and the elderly are the most vulnerable, and disasters often exacerbate the most common causes of childhood mortality worldwide. These include acute respiratory illness, diarrhoea, malaria, measles, malnutrition, and neonatal causes. It is estimated that around 250 million people are affected each year by disasters, and this number is likely to increase to 350 million over the next decade (WHO, 2011a). Half of this number is thought to be children. Therefore, health and food security during disasters play a crucial role in building resilient communities.

12.1.1 Communicable Diseases

Communicable diseases and vector-borne illnesses are the most common causes of child mortality globally, including acute respiratory illness, diarrhoea, malaria, and measles (WHO, 2011a). These have been shown to increase when crises occur. Disasters can increase the

risk of outbreaks such as cholera because of flooding and measles as a result of overcrowding following population displacement. Communicable diseases can cause epidemics and pandemics, which have the potential to overwhelm the capacity of communities; hence, they are also considered disasters (WHO, 2011b). Morbidity and mortality from communicable diseases are exacerbated when there is:

- Population displacement
- Collapsing health services
- Lack of disease control programmes
- Poor access to healthcare in urban and/or rural areas
- Malnutrition
- Interrupted supplies and logistics
- Poor coordination amongst agencies

The last 2 decades have seen at least 1 billion people affected by natural disasters, with millions suffering infection from communicable diseases. During the last century, four influenza pandemics have occurred, resulting in excess of 50 million deaths (WHO, 2011b). The risk of communicable diseases is associated primarily with the size and characteristics of the affected population, specifically:

- Amount and availability of safe water
- Functioning latrines
- Nutritional status of the displaced population
- Level of immunity to vaccine-preventable diseases such as measles
- Level of access to healthcare services

12.1.2 Non-communicable Diseases

Some 60% of all global deaths are as a result of non-communicable diseases (NCDs), 80% of which occur in low- to middle-income countries. During disasters, essential medications may be destroyed or lost, and evacuees may forget to take them (WHO, 2011d). When critical healthcare infrastructure is destroyed, or rendered inaccessible, access to chronic care treatment and medication is jeopardised. Acute care can be compromised by inadequately controlled NCDs (e.g. orthopaedic surgery carries a much higher risk if a patient has poorly controlled cardiovascular disease) (WHO, 2011d). Disasters can exacerbate existing NCDs including cardiovascular disease, diabetes, cancer, chronic respiratory disease, blood

disorders (including sickle cell), renal disease, arthritis, and epilepsy (WHO, 2011d). Many NCDs can result from behavioural risk factors such as smoking, alcohol, lack of exercise, and poor diet; and are, therefore, preventable (WHO 2011d). People with NCDs often depend on a continuous supply of medication and/or treatments, which may be interrupted or stopped as a result of disasters. Interruption of power or safe water in an emergency can have life-threatening consequences for people who need to refrigerate medicines (insulin for diabetes) or attend dialysis (renal failure) (WHO 2011d).

12.1.3 Psychosocial Services

There is broad agreement that exposure to extreme stressors such as disasters is a risk factor for social and mental health, including common mental disorders (Inter-Agency Standing Committee (IASC), 2010). Mental health and psychosocial problems in disasters are highly interconnected. Psychological well-being is influenced by a variety of social factors such as dignified and safe provision of overall aid. Mental disorders are prevalent in all regions of the world and make major contributions to global morbidity and mortality. More than 10% of the global burden of disease, measured in disability-adjusted life years, is attributable to mental disorders. Generally, disasters result in large numbers of individuals suffering from minor emotional distress that tends to be self-limiting in nature (Bravo et al., 1990). However, some portion of the population may suffer from more severe forms of distress, especially anxiety and depression, and occasionally post-traumatic stress disorder, depending on their prior psychological state and the impact on them and their families (Siegel et al., 2000). A common error when working in this area is to focus exclusively on deficits and forget that people have resources and assets that protect against mental health and psychosocial issues (WHO, 2011c). Psychological first aid and psychosocial services to people affected by a disaster help them to recover holistically from the devastation (Box 12.1). Therefore, it is recommended to provide psychological first aid, which is a humane, supportive response for people who may need support (WHO, War Trauma Foundation, and World Vision International, 2011) (Figure 12.1).

Figure 12.1: Working with Children During Disasters



Children draw maps of their village in the Irrawaddy Delta, Myanmar. Two thirds of the children in the village were killed when Cyclone Nargis swept across the delta in May 2008.

Photo: Tina Salisbury, Save the Children.

Source: WHO (2011a).

Box 12.1: Floods in Sri Lanka, 2016

On 15 May 2016, Sri Lanka was hit by a cyclonic storm, causing extensive flooding and landslides across 22 districts. More than 400,000 people were affected by the floods, which destroyed homes and entire villages. More than 200 people lost their lives or remain missing. The floods had a considerable impact on the health sector – 90 healthcare institutions were either directly or indirectly affected. The World Health Organization, with the Ministry of Health, coordinated the public health response, maintaining critical services and surge capacity and providing urgent assistance and relief to those affected. Delivering mental health and psychosocial services to the people affected by the floods was a key priority. Mental health workers were trained and deployed as part of the mobile teams to provide psychological first aid and strengthen support services for the affected people.

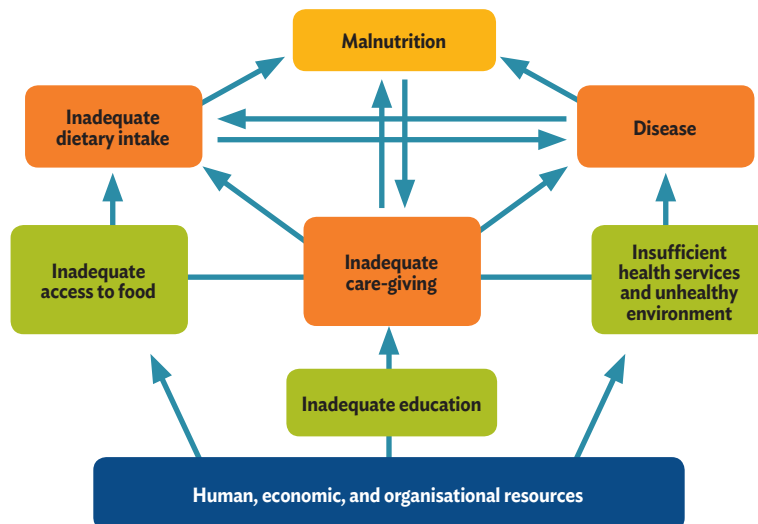
Source: WHO (2017).

12.1.4 Health Risks for Children

Children, especially those under the age of five, are particularly vulnerable to disasters as they depend on others to escape a hazard. They are more likely to be injured, lost, unable to access help or healthcare, or exposed to greater danger through separation from their families or caregivers. Globally, more than 86% of neonatal deaths are due to three causes: infections, prematurity, and birth complications. Many of these deaths could be prevented with healthcare before, during, and after delivery (WHO, 2011a). In a disaster, however, between a third and a half of the dead are children. Furthermore, disrupted access to healthcare increases the chance of complications for both mothers and newborn children (WHO, 2011a).

Malnutrition and micronutrient deficiencies have a significant impact on child mortality. This is not only because of the direct effects of the deficiency but also the reduced resilience caused by nutritional deficiencies, which makes children more susceptible to infections (ASEAN, UNICEF, and WHO, 2016). Babies separated from their mothers are of particular concern during disasters, as they are often unable to access breast milk, which leaves them at risk of diarrhoeal illness and infection (WHO, 2011e) (Box 12.2). The UNICEF conceptual framework of the causes and determinants of malnutrition mapped these risk factors to demonstrate how one vulnerability would exacerbate others (Figure 12.2).

Figure 12.2: UNICEF Conceptual Framework of the Causes and Determinants of Malnutrition (1998)



Source: United Nations System Standing Committee on Nutrition (2004).

Box 12.2: Indonesian Earthquake, 2006

Initial responses to the 2006 earthquake in Indonesia included large quantities of poorly regulated breast milk substitutes (BMS). Some 32% of infants aged less than 6 months had never consumed BMS before the earthquake compared with 43% afterwards. Diarrhoea prevalence was 25% amongst those who received BMS donations against 12% amongst those who did not. Responding to these problems, the Ministry of Health, with the support of the international community, devised a 'cascade' system of support for young mothers: front-line counsellors each supported six local lactation counsellors, who in turn supported five mothers. This led to improvements in breastfeeding practices.

Source: Assefaya et al., 2008.

12.1.5 Persons with Disabilities

People with disabilities make up at least 10% of the population (WHO, 2011f). The prevalence is increasing because of population ageing, e.g. more than 40% of people 65 years and older experience chronic illness or disability which limits their daily activities (WHO, 2011f). Disasters can also be a cause of disability, e.g. if injuries are not effectively managed. Disasters can make older people and people with existing disabilities more vulnerable (Box 12.3). Emergencies can severely disrupt social structures and ongoing formal and informal care of persons with pre-existing disorders. Therefore, the Convention on the Rights of Persons with Disabilities (Articles 11 and 32) mandates that all necessary measures, including those taken through international cooperation, ensure the protection and safety of persons with disabilities in situations of risk and humanitarian emergencies.

Box 12.3: Vulnerable Populations

In a disaster, everybody can be at risk but some groups are particularly vulnerable:

Infants: malnutrition amongst infants is a huge issue in disaster situations. Suboptimal breastfeeding is estimated to be responsible for 1.4 million child deaths and 44 million disability-adjusted life years.

Young children are highly dependent on others to escape and survive in disaster situations, and rapid growth and development requires an adequate diet to achieve full physical and mental potential. Severe acute malnutrition causes 1 million to 2 million deaths per year.

Pregnant and lactating women: nutrition impacts both maternal and child health, e.g. maternal folate supplements decrease the risk of infant neural tube defects.

Older people or those with **HIV, tuberculosis**, or other underlying chronic conditions. A major issue is the lack of medication during disasters. However, even small changes in hydration or nutrition can have major impacts on pushing them beyond their limits into a significant health risk.

Persons with disabilities have limitations on mobility during disasters, making them more vulnerable.

Source: WHO (2011f).

12.2 Role of Food Security

Every man, woman and child has the inalienable right to be free from hunger

The Universal Declaration on the Eradication of Hunger and Malnutrition, Rome, 1974

Eradicate extreme poverty and hunger

First Millennium Development Goal, United Nations, 2000

Food is different from other commodities in that there is no substitute. All humans require adequate food for survival. Security over the next meal is essential. The 1996 World Food Summit defined food security as existing ‘when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life’ (Asian Development Bank (ADB), 2013: 8). Food security, according to the WHO, rests on three pillars (ADB, 2013):

1. Food **availability** covers the supply side. Is there enough to feed people? Food availability is determined by food production and technology, inventory, efficiency of supply chains, and local and international trade.
2. Food **access** is the ability to obtain adequate quantities of food, the purchasing power needed, and adequate delivery mechanisms, including social safety nets.
3. Food **utilisation** refers to the need to meet dietary needs and cultural preferences.

Food security also means certainty about future meals. Not knowing where the next meal will come from alters economic behaviour. Providing for future meals takes precedence over other expenditures, such as education, health, and shelter (ADB, 2013). Beyond household concerns, food price inflation can trigger demand for wage increases, igniting a vicious inflationary cycle that could discourage private investment and slow economic activity in general. This reduces investment in human and physical capital, and can damage a country’s long-run growth prospects.

Therefore, food security is a multidimensional issue. It has become increasingly complex and challenging with the impact of economic growth, changing demographics, consumption patterns, international trade, and environmental change all interconnected globally. In addition, public policy responses to these challenges can sometimes exacerbate problems (ADB, 2013).

A confluence of factors has contributed to the drastic rise in global food prices. Rapid income growth, along with growing populations in developing countries, has been a key driver behind increasing global demand (ASEAN, UNICEF, and WHO, 2016). In addition, the rising middle class is varying its diet with higher protein intake from a wider array of sources, increasing pressure on the livestock and feed industries (ADB, 2013). This growing demand highlights the reshuffled use of agricultural resources – such as land, water, and feedstock – not to mention the potential for increased damage to the environment.

On the supply side, the world must meet escalating demand for food on less land with limited access to water. Increased costs of fertiliser and fuel for storage and transport add further pressure. The only sensible solution is to enhance agricultural productivity through higher yields, using scarce natural resources better, and increasing the efficiency of product use – e.g. improving the efficiency of product delivery and minimising waste (ADB, 2013).

12.2.1 Impacts of Food Security

Climate Change

Climate change and its impact on agriculture is a challenge that cannot be ignored. Increasingly integrated global food supply chains imply that any regional shock could easily ignite ripple effects globally (World Food Programme, 2012). With more than 60% of the population relying on agriculture and food production as a source of income, the Asia and Pacific region is particularly sensitive to the potential damage caused by climate change (ADB, 2013). Agriculture, fisheries, and livestock will all suffer direct impacts, which could lower productivity and food output. Climate change threatens to exacerbate existing threats to food security and livelihoods because of a combination of factors that includes the increasing frequency and intensity of climate hazards, diminishing agricultural yields and reduced production in vulnerable regions, rising health and sanitation risks, increasing water scarcity, and intensifying conflicts over scarce resources, which would lead to new humanitarian crises as well as increasing displacement (Intergovernmental Panel on Climate Change, 2007). This is illustrated by the case study of crop yields, calorie consumption, and numbers of malnourished children in Pacific Island countries (Box 12.4). Thus, the need to address the effects of climate change on food security is urgent – requiring an immediate and appropriate response.

Box 12.4: Food Security and Climate Change – The Special Case of the Pacific

According to ADB (2013), the projected yield reductions in major staple crops resulting from climate change in the Pacific are substantial (Table 12.1). The very large effects on cassava yields are particularly serious, considering that cassava is a staple of the poor.

Table 12.1: Projected Impact of Climate Change on Crop Yields
(% reduction by 2050)

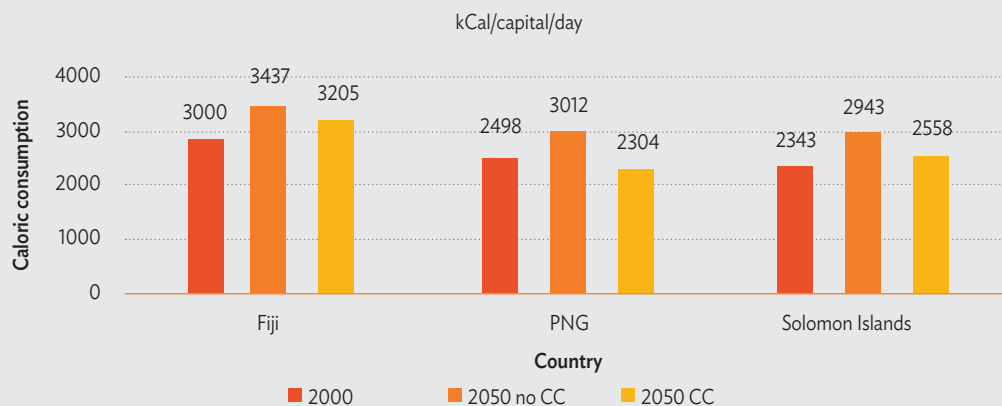
Crop	Fiji	PNG	Solomon Islands
Sugarcane	8	n.a.	n.a.
Rice	4	8	15
Taro	15	13	16
Cassava	37	30	28
Sweet potato	n.a.	11	15

n.a. = not applicable, PNG = Papua New Guinea.

Source: Rosegrant (2013).

These yield effects will, in turn, reduce caloric consumption in the Pacific island countries (Table 12.1 and Figure 12.2). The impact on Papua New Guinea and the Solomon Islands is especially large. In addition, reductions in caloric intake increase the number of people at risk of hunger (Table 12.2) and the number of children at risk of malnutrition (Table 12.3).

Figure 12.3: Projected Levels of Caloric Consumption in Pacific Island Countries



CC = climate change, kCal = kilocalorie, PNG = Papua New Guinea.

Source: Rosegrant (2013).

Table 12.2: Population at Risk of Hunger
(‘000)

Country	Fiji	PNG	Solomon Islands
PNG	2000	2050 no CC	2050 CC
Solomon Islands	45	114	165

CC = climate change, PNG = Papua New Guinea.

Note: Data on Fiji are not available.

Source: Rosegrant (2013).

Table 12.3: Population of Malnourished Children Under Age 5
(‘000)

Country	Fiji	PNG	Solomon Islands
PNG	172	138	217
Solomon Islands	9	6	10

CC = climate change, PNG = Papua New Guinea.

Note: Data on Fiji are not available.

Source: Rosegrant (2013).

If nothing is done to reduce the impact of climate change, agricultural productivity in Asia and the Pacific will drop, heightening the problem of food security. However, given the geographical heterogeneity of the expected effect – and the scientific uncertainty surrounding them – policy flexibility in adapting to climate change will be extremely important (ADB, 2013). Proactive adaptation policies and investments may include developing more drought- and heat-resistant crop varieties, using moisture-conserving tillage methods, and improving irrigation efficiency. Several adaptations could help cope with these daunting challenges (Aggarwal et al., 2012):

- (i) better land and water resource management;
- (ii) improved risk assessment and management, reflecting the increased risk from both floods and periodic drought;
- (iii) adaptations that provide benefits from reduced greenhouse gas emissions; and
- (iv) improved governance, including regional cooperation.

These will require new technologies, reclamation of degraded agricultural land, and community management of soil and water resources. What is clear is that doing nothing is not an option. Countries such as the Philippines may require untenably large shifts in seasonal agricultural activity. Investment in the knowledge base required for these location-specific adaptations must start now.

Disaster Risk Reduction

The concept of disaster risk reduction (DRR) was promoted by the United Nations Office for Disaster Risk Reduction (UNISDR) to address natural hazards (van 't Wout et al., 2014). According to the UNISDR (2009: 10), DRR is 'the concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events'. DRR interventions aim to avoid (prevention) or limit (mitigation and preparedness) the adverse impacts of hazards, thereby minimising vulnerabilities and disaster risks as well as facilitating early recovery after the shock (van 't Wout et al., 2014). In addition to being effective in terms of saving lives and livelihoods, DRR is also efficient and cost-effective: it is calculated that for every dollar spent on DRR, \$2–\$4 are saved which would otherwise be spent on disaster relief and rehabilitation (Department for International Development of the United Kingdom, 2006). DRR is a key concept for agriculture since the majority of the people vulnerable to natural hazards and disasters are the food-insecure and the poor, who derive their livelihoods from agriculture and its subsectors.

In this regard, the FAO (2014) has developed a DRR for Food and Nutrition Security (FNS) Framework Programme to strengthen capacities to absorb the impact of and recover from disasters. The programme aims to guide the implementation, scaling up, and acceleration of the FAO's DRR work at the local, national, regional, and global levels; and consolidate its technical cross-sectoral expertise on DRR in the wider context of resilience building. 'The goal of the FAO's DRR for Food and Nutrition Security Framework Programme is to enhance the resilience of livelihoods against threats and emergencies to ensure the FNS of vulnerable farmers, fishers, herders, foresters and other at risk groups' (FAO, 2013: viii) (Box 2.2, Figure 12.2.2). Modules such as these provide a supportive structure which can assist countries in becoming better equipped to be disaster-resilient.

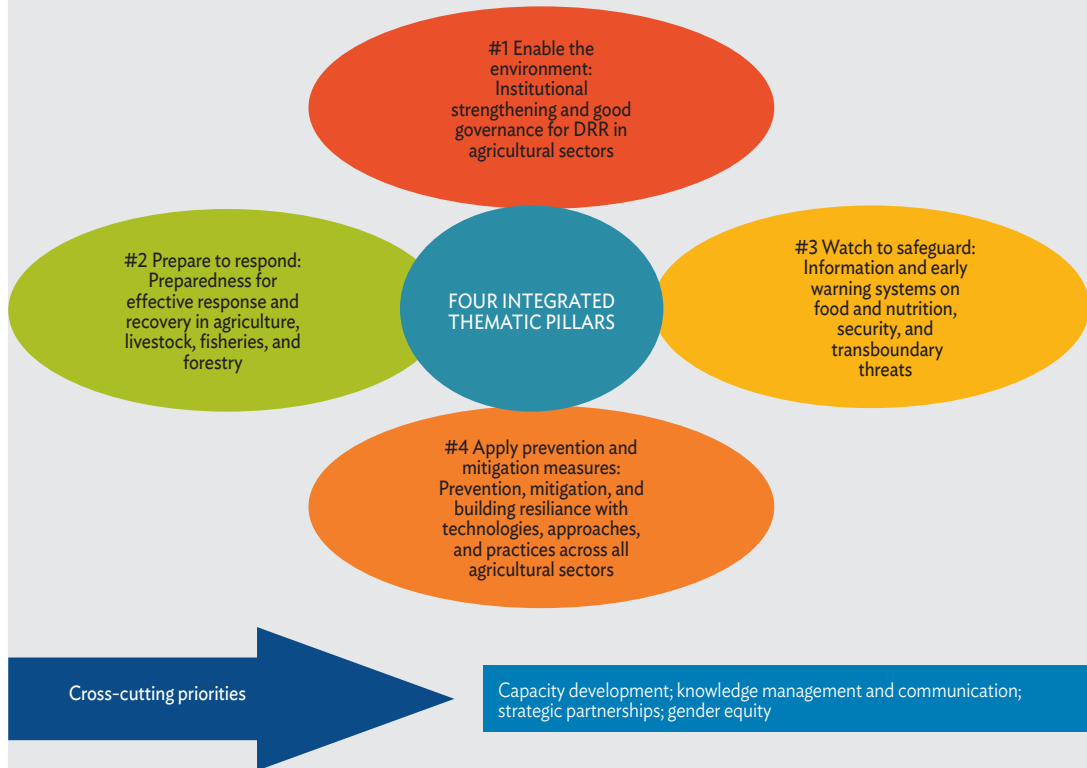
Indigenous Knowledge

Box 12.5: Food and Nutrition Security Framework Programme

The FAO (2013) FNS Framework Programme consists of four pillars, which integrate all agricultural sectors and promote cross-sectoral collaboration.

- Pillar 1 – ‘Enable the environment’: good governance and institutional strengthening
The objective of pillar 1 is ‘to support the enabling environment of FAO’s member states, with appropriate legislation, policies and institutional frameworks for DRR for FNS in agriculture, livestock, fisheries/aquaculture, forestry and natural resource management and to strengthen the institutional capacities to implement these initiatives’.
- Pillar 2 – ‘Watch to safeguard’: information and early warning systems
The objective of pillar 2 is to ‘strengthen and harmonise food and nutrition security information and early warning systems to better monitor the multiple threats and inform decision-making in preparedness, response, policy, advocacy and programming’.
- Pillar 3 – ‘Apply prevention and mitigation’: agricultural practices and technologies that prevent and reduce the adverse impact of hazards
The objective of pillar 3 is ‘to reduce the underlying risks to food and nutrition security through the application of technologies, good practices and approaches in farming, fisheries/aquaculture, forestry and natural resource management for prevention, mitigation and livelihood diversification’.
- Pillar 4 – ‘Prepare to respond’: improve preparedness for disaster response and recovery
The objective of pillar 4 is to ‘strengthen capacities at all levels – in preparedness – to improve response to, and recovery from, future threats to food and nutrition security, and to reduce their potential negative impacts on livelihoods’.

Figure 12.4: Disaster Risk Reduction for Food and Nutrition Security Framework Programme



DRR = Disaster Risk Reduction, FAO = Food and Agriculture Organization of the United Nations, FNS = Food and Nutrition Security.
Source: FAO (2013).

For generations, communities have relied heavily on their own indigenous knowledge systems in observing the environment and dealing with natural disasters (Iloka, 2016). These communities, particularly those in hazard-prone areas, have collectively generated a vast body of knowledge on disaster prevention and mitigation, early warning, preparedness and response, and post-disaster recovery (Briggs, 2005). This knowledge is acquired through observation and study, often based on cumulative experience handed down from generation to generation, and has helped to reduce disasters in local communities (Briggs, 2005). Indigenous knowledge plays a role in empowering local community members to take front-

line roles in activities aimed at DRR (Mwaura, 2008). Community-led DRR policy frameworks comprising both scientific and indigenous knowledge, which facilitate effective participation from members of the community, have been shown to yield the best long-term results (Briggs, 2005).

In flood- and drought-prone areas in Dumangas, Philippines, indigenous knowledge is combined with scientific methods to help local communities to strengthen their food security and livelihoods. Farmers are taught to read the weather forecast, interpret satellite photos, set up their own weather stations – and decide what and when to plant based on timely information. The overall goal is to reduce disaster risks and enhance the capacities of local communities, especially rural women (Dubbeling, 2013).

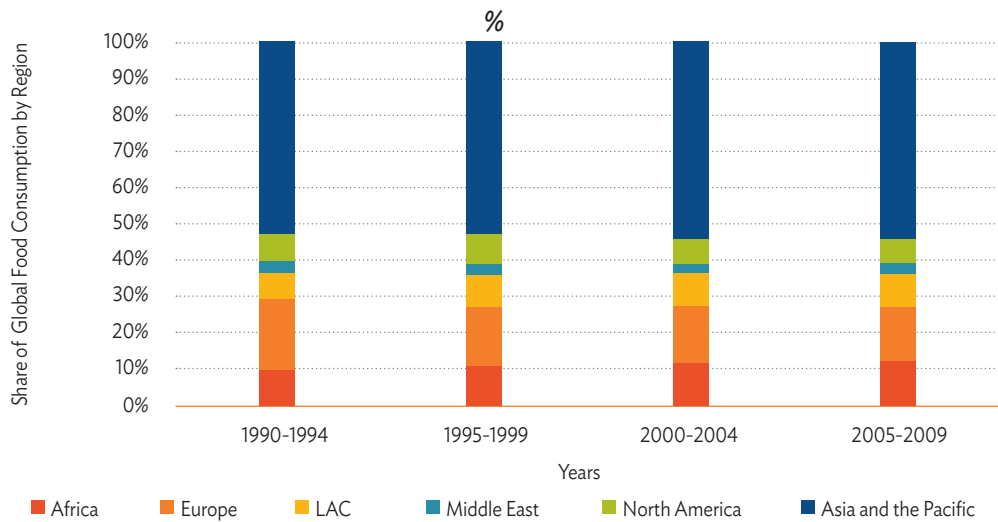
In many parts of the world, indigenous knowledge has been used in traditional medicine, agriculture and food production, engineering, and ecological management for natural resources (Domfeh, 2007). The safe and effective use of traditional medicinal practices and products to maximise the potential contribution to primary healthcare in disaster situations is increasingly being recognised as a vital resource for adaptation (Nurse, Sem, and Hay, 2001). Traditional medicine is defined as ‘the health practices, approaches, knowledge and beliefs incorporating plant, animal and mineral-based medicines, spiritual therapies, manual techniques and exercises, applied singularly or in combination to treat, diagnose and prevent illnesses or maintain well-being’ (WHO, 2002: 7). The WHO recognises this immense contribution of indigenous knowledge towards world health (WHO, 2012).

12.2.2 The Asia and Pacific Region

The Asia and Pacific region has been the epicentre of these global changes. Asia is continuing to experience a massive structural economic and social transformation, inevitably leaving a deeper footprint on global agricultural and ecological systems. Behind this curtain of prosperity and progress, however, remain more than 60% of the world’s poor, facing widening inequality (Briones, 2011). While economic advancement and structural transformation create increasingly complex constraints on the agricultural resources needed for food security, huge areas continue to struggle against poverty and food insecurity (ADB, 2013). These ‘two faces of Asia’ make achieving food security far more complex and challenging for both Asia and the world at large.

According to ADB (2013), Asia's share in global food consumption, measured in calories consumed, is increasing – from a 52.9% average during 1990–1994 to a 54.3% average during 2005–2009 (Figure 12.5). Consumption per capita in Asia and the Pacific went up from 2,379 kilocalories per capita per day (kCal/capita/day) in 1990 to 2,665 kCal/capita/day in 2009 – an average annual increase of 0.6% compared with a 0.4% growth in global per capita consumption over the same period (ADB, 2013). The region's share in global food production (crops and livestock) also increased, from an average share of 40.9% in 1990–1995 to 46.3% in 2005–2009 (Figure 12.6). Food production in Asia and the Pacific increased from 0.8 tons per capita (t/capita) in 1990 to 1.1 t/capita in 2009. This annual 1.7% growth was the fastest amongst the world's various regions.

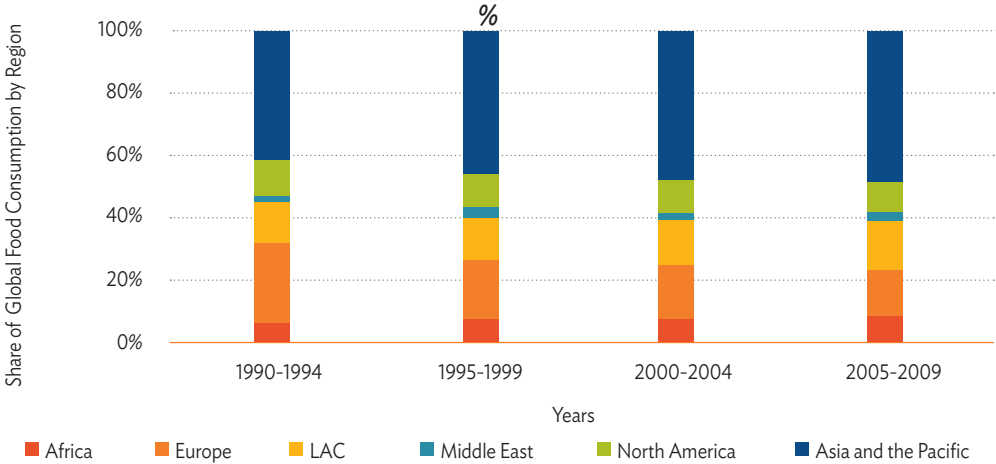
Figure 12.5: Share of Global Food Consumption by Region 1990–2009



LAC = Latin American and the Caribbean.

Source: ADB (2013).

Figure 12.6: Share of Global Food Production by Region, 1990–2009



LAC = Latin American and the Caribbean.

Source: ADB (2013).

In Asia and the Pacific, food security is being fundamentally altered as patterns of food consumption and production change with the drive for global food sustainability. These forces stem from the region’s huge population, changing demographics, and spectacular economic rise (ADB, 2013). The dramatic structural transformation economically, socially, and culturally holds important consequences for the global food system. Economic growth and food security have been mutually reinforcing throughout the history of development. However, experience illustrates that vulnerability to food insecurity cannot be fully addressed by economic success alone (ADB, 2013). Strong growth has been key to the sharp decline in poverty and undernourishment, but hunger remains stubbornly high in many countries and regions (ASEAN, UNICEF, and WHO, 2016). One in eight people goes to bed hungry at night, yet there is sufficient food to feed the world (ADB, 2013). Asia is home to more than 60% of the world’s poor and hungry (ADB, 2013). Tackling undernourishment remains a challenge throughout the region. More than half a billion – or about 14% – of Asia’s population are undernourished, more than all the undernourished in Africa (Briones, 2011). The severity of the food deficit for those undernourished is also above the global average – exceeded only by Africa (Briones, 2011). More than 40% of children in several Asian and Pacific countries

are stunted (ADB, 2013). Focusing on nutrition – rather than simple caloric intake – is essential if food security in the region is to be achieved. This underscores the fact that food security is much more than raising food production. It is also about reducing distortions in global food markets and ensuring equitable distribution, particularly to food-deficit countries and people (ADB, 2013).

12.2.3 ASEAN

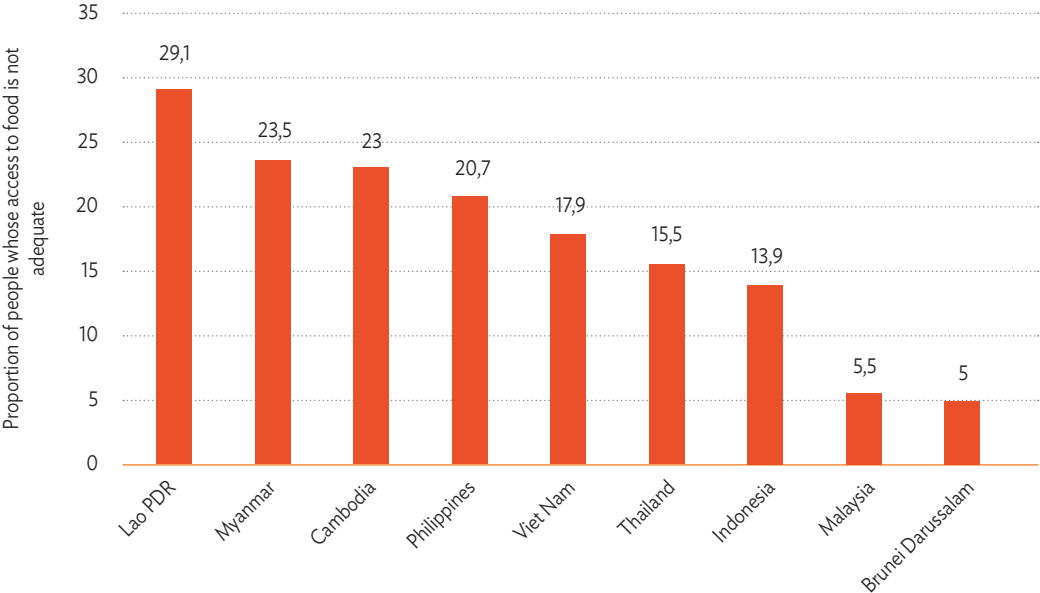
According to ADB (2013), the population in Southeast Asia will grow by 18% to more than 700 million from 2010 to 2030. The increasing population will have a long-term impact on the increasing demand for food (Figure 12.7). Thus, feeding the entire population will be a challenging task for ASEAN leaders. Nevertheless, the issue of food security is not merely giving food to people but also about reducing malnutrition amongst the population (ASEAN, UNICEF, and WHO, 2016).

As Southeast Asian economies grow, ASEAN Member States (AMS) tend to develop large amounts of infrastructure such as roads and buildings, which require land clearing. This leads to deforestation and land degradation, thus reducing the land available for agricultural purposes (The Habibie Center, 2015).

As one of the most vulnerable regions to climate change, ASEAN is no stranger to its negative impacts, such as droughts, floods, typhoons, rising sea levels, and long periods of heatwaves. These natural disasters undoubtedly create disruptions to food production in the region (The Habibie Center, 2015).

Therefore, food security is one of the most pressing issues in the region. In the aftermath of the 2007/2008 food price crisis, the 2009 ASEAN Summit put food security as a permanent and high policy priority. On the same occasion, ASEAN formalised the ASEAN Integrated Food Security (AIFS) Framework, 2009–2013 to provide a systematic guideline for cooperation in food security amongst the AMS (ASEAN, 2009). The AIFS covers a set of measures to ensure long-term food security in ASEAN and improve the livelihoods of ASEAN farmers.

Figure 12.7: Food Inadequacy in ASEAN Member States, 2014–2016



ASEAN = Association of Southeast Asian Nations, Lao PDR = Lao People’s Democratic Republic.
Source: ASEAN, UNICEF, and WHO (2016).

The ASEAN Secretariat, in collaboration with the World Economic Forum (2015), launched ‘Grow Asia’ in 2009, which aims to achieve 10 million farmers in the region by 2020, as well as increase their productivity, profitability, and environmental sustainability by 20%. This is crucial because rice is the staple of half the world’s population, and about 70% of the world’s poor. Some 90% of the world’s rice supply is produced in Asia, much of it in ASEAN countries (Briones, 2011). Two of the world’s largest producers and exporters of rice (Thailand and Viet Nam) as well as two of the world’s largest consumers and importers of rice (Indonesia and the Philippines) are part of ASEAN (The Habibie Center, 2015). Moreover, access to food in each country can be seen from the prevalence of undernourishment indicators. Referring to data from the FAO, only Brunei Darussalam and Malaysia have a prevalence of undernourishment rate of less than 5%, which means they are close to eradicating hunger (The Habibie Center, 2015). Over the last 10 years, the prevalence of undernourishment rate in Indonesia has halved from 18.8% in 2005–2007 to 7.6% by 2014–2016. Among the other AMS, the Lao People’s Democratic Republic (Lao PDR), Myanmar, and Cambodia have a high prevalence (The Habibie Center, 2015).

Food security is also highly correlated with securing food access. One of the main determinants of access is food prices. To ensure people are able to buy food, governments should reduce price volatility. From 2005 to 2014, price volatility in most AMS was not too high. However, Cambodia and the Philippines experienced volatility in certain years. Price volatility in the Philippines hit its highest record in 2011 as a result of natural disasters affecting the country and reducing food production (The Habibie Center, 2015). According to the Citizens' Disaster Response Center (2011), the Philippines was the world's most disaster-hit country in 2011 (Box 12.6).

Box 12.6: The Cost of Natural Disasters in the Philippine Agriculture Sector

Disasters in the Philippines have a high impact on its agriculture sector. From 2006 to 2013, the government estimates that disasters damaged more than 6 million hectares of crops. During this period, the total damage and losses in the agriculture sector were estimated by the government to be \$3.8 billion, caused by 78 natural disasters (two droughts, 24 floods, 50 typhoons/tropical storms, one earthquake, and one volcanic eruption). Most of the production damage and losses were caused by typhoons/storms, amounting to \$3.5 billion or 93%. Most of the damage and losses in the agriculture sector was in the crop subsector, at \$3.1 billion.

Source: FAO (2015b).

It should be noted that food is a large part of the poor's total budget, so any increase in food prices will increase the burden on their finances. The food crisis in 2007–2008 led to thousands of people taking to the streets, demanding actions and solutions from their governments (The Habibie Center, 2015). As such lack of food supplies can create social instability, it is a major factor that can lead to social conflict and political violence (Desker, Caballero-Anthony, and Teng, 2013). Therefore, food security is undoubtedly crucial to ensuring not only human security but also regional stability.

Adequate infrastructure is also important for ensuring that people can access food. Road density is one of the indicators that provide information on the possibility of physical access to markets. Among the AMS, Singapore has the highest road density (The Habibie Center, 2015). As a result, people in Singapore have easy access to the food market. However, Myanmar has the lowest road density at 4–6 kilometres per 100 square kilometres of land area (The Habibie Center, 2015). Lack of infrastructure hinders people's ability to access the market for their food needs. Lastly, food security is not only about food availability or food access but also food utilisation. It is important to ensure that people take in adequate levels of nutrients. In addition, it is important to remember the link between nutrient absorption and food utilisation with water, sanitation, and hygiene (WASH) (The Habibie Center, 2015).

12.3 Impact on Health: (Immediate, Medium-Term, Long-Term)

One could argue a two-way relationship between long-term sustained growth and food security. Well-nourished people are likely to be healthier and less prone to illness, and therefore contribute to higher productivity and economic growth. Conversely, food insecurity can impede household investment in education and health, disrupting human capital formation and undermining long-term growth prospects. Food insecurity itself can create instability in households, communities, and nations – further impeding growth and development. Food insecurity and poverty incidence, however, differ in several important aspects.

First, poverty incidence relates to the consumption of a wide range of goods, of which food is only one, though the most important. Poverty line studies (which determine the per capita expenditure level below which one is deemed poor) particularly focus on the expenditure level which coincides with an adequate diet (ADB, 2013). A second, more basic difference is that poverty incidence refers to current circumstances, not expectations. At the time a household is surveyed, consumption levels of food and other goods either are or are not adequate (ADB, 2013). If they are not, the household is deemed poor. However, food security refers more to expectations than today's circumstances. Individuals or households may judge themselves food-insecure even if their present food consumption is sufficient (The Habibie Center, 2015).

Malnutrition can be the most serious public health problem in an emergency. According to the International Federation of Red Cross and Red Crescent Societies (IFRC), a food emergency exists if depleted food supplies are not replaced in the short term by food aid. A famine occurs in a population whose food consumption is reduced to the extent that the population becomes acutely malnourished and there is a rise in mortality (IFRC, 2007). Drought is the most common cause of food shortage in the world. Food crises may also be attributed to human causes, notably conflicts (ADB, 2013).

A nutrition emergency exists when there is the risk of or an actual rise in mortality as a result of acute malnutrition. In a nutrition emergency, where the prevalence of acute malnutrition amongst young children might be 10%–15%, and the prevalence of severe malnutrition could be 2%–3%, mortality rates can be very high (IFRC, 2007). Elevated crude mortality and under-five mortality rates are benchmarks for and definitions of a nutrition emergency (Table 12.4). Survival is at risk not only because of an inadequate and/or unbalanced diet but also because of disease outbreaks such as measles, tuberculosis, malaria, diarrhoeal diseases, HIV/AIDS, and respiratory infections – resulting in high death rates in the affected population (WHO, 2011b). There is a strong relationship between malnutrition and fatality because of these infections. Vitamin A deficiency, for example, increases the duration, severity, and complications of diarrhoeal disease in young children (IFRC, 2007). The mortality rates of displaced populations can be as high as 10 times the death rates for the same populations in non-emergencies. Peak mortality generally occurs some months into the emergency (IFRC, 2007).

Table 12.4: Benchmarks for Mortality Rates

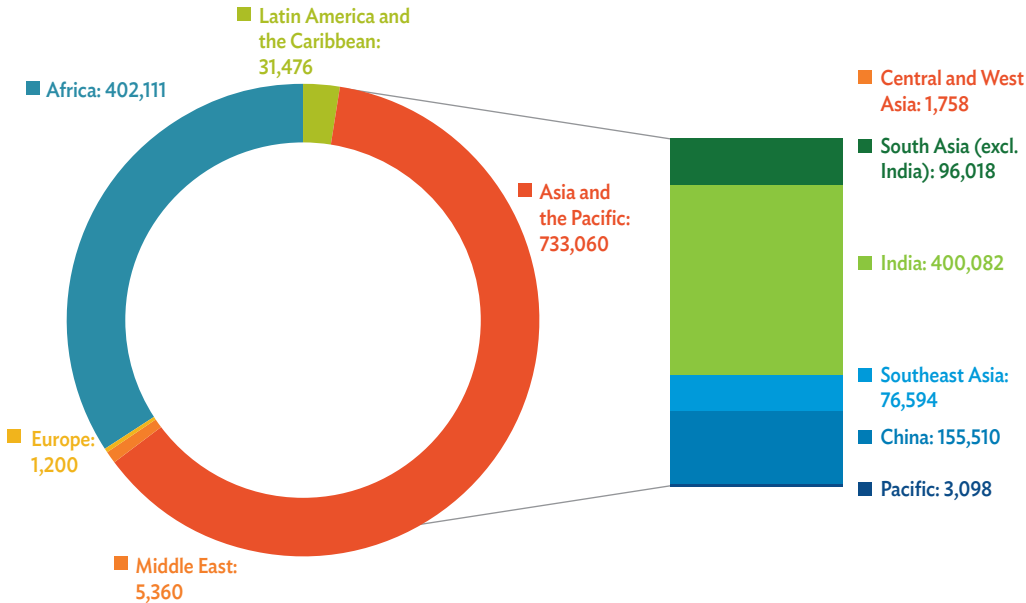
Crude mortality rate (deaths/10,000/day)	Under-five mortality rate (deaths/10,000/day)	Health and nutrition situation
0.5	1	Normal
<1	<2	Elevated
1–2	2–4	Serious
>2	>4	Very serious
>5	>10	Catastrophic

Source; IFRC, 2007.

12.3.1 Poverty and Undernourishment in Asia and the Pacific

Throughout Asia and the Pacific, poverty remains the most daunting challenge. Despite spectacular economic growth, developing Asia is home to more than 60% of the world’s 1.2 billion people living on less than \$1.25 a day (2005 purchasing power parity; Figure 12.3.1) (ADB, 2013). Two-thirds of the region’s poor (or about 42.6% of the world total) are concentrated in South Asia. While various indicators of food security show impressive progress, undernourishment remains a serious problem. The region has 537 million undernourished people – about 62% of the global total (Figure 12.8) (ADB, 2013). Within Asia and the Pacific, regional disparities are large. Of Asia’s malnourished, 299 million are in South Asia alone, more than the 237 million in Africa (ADB, 2013). The number of malnourished children is particularly alarming. Childhood stunting exceeds 40% in several Asian and Pacific island economies. This proportion is comparable with sub-Saharan Africa, but larger in absolute numbers.

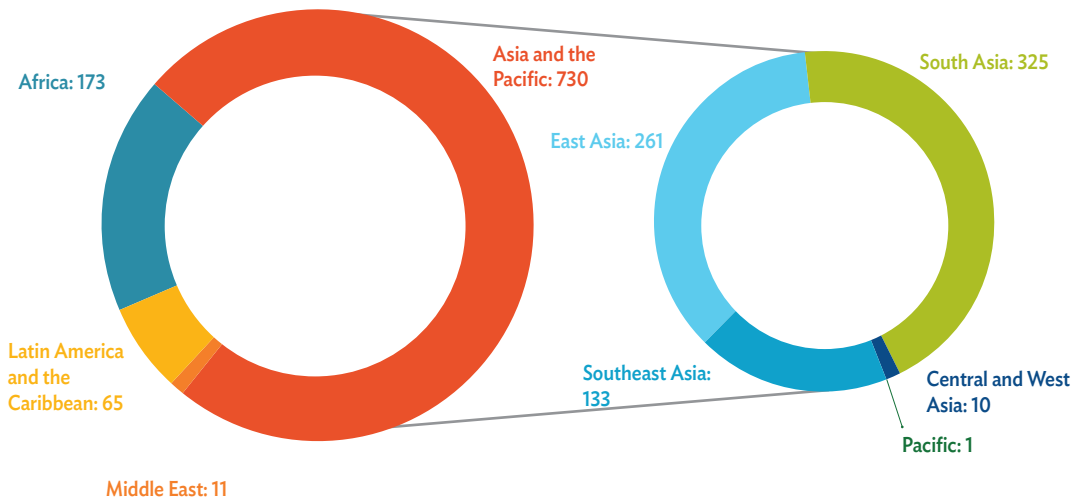
Figure 12.8: The World’s Poor, 2010 Estimates
(’000)

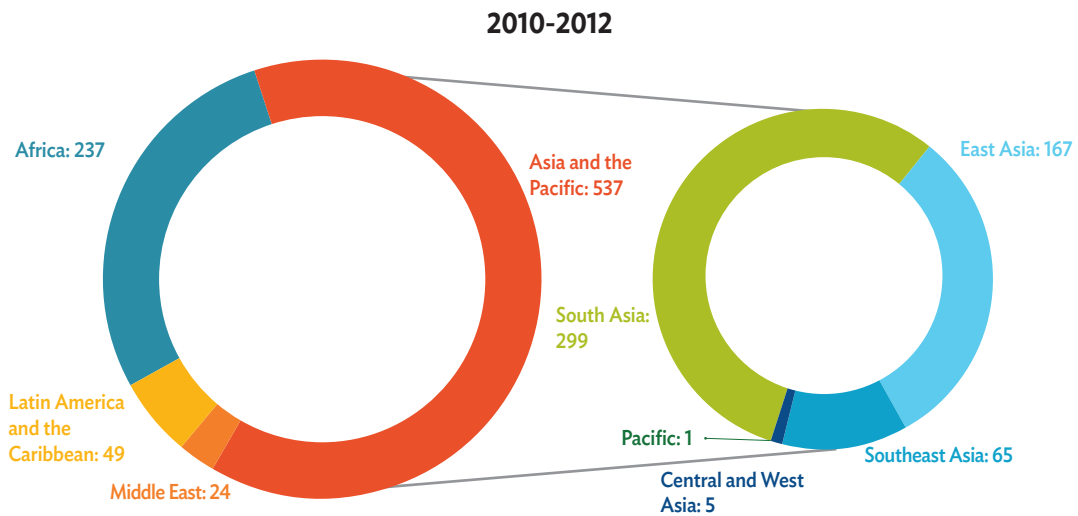


Note: The poor are those living on less than \$1.25 a day (2005 purchasing power parity).
Source: ADB (2013).

What is striking is the difference in the rate at which undernourishment has declined in different parts of the world. From 1990–1992 to 2010–2012, the number of undernourished in Asia (Figure 12.9) was reduced by 26.5% – from 730 million in 1990–1992 to 537 million in 2010–2012. This far exceeded the global decline of 13.2% from 1 billion in 1990–1992 to 868 million in 2010–2012 (ADB, 2013). In Africa, the number of undernourished increased by 37% over the same period. Results also varied widely within Asia. In Southeast Asia, the absolute number of undernourished people declined by more than 50%, with East Asia not far behind at 36%. In South Asia, the decline – 8% – was much lower (ADB, 2013). Differences in poverty reduction could be one of the reasons. Economies which show a greater reduction in poverty incidence also show a greater decline in the prevalence of undernourishment (ADB, 2013). Improved economic access to food, combined with rapid growth and poverty reduction, was key to the decline in undernourishment.

**Figure 12.9: The World's Undernourished
 (million)
 1990-1992**



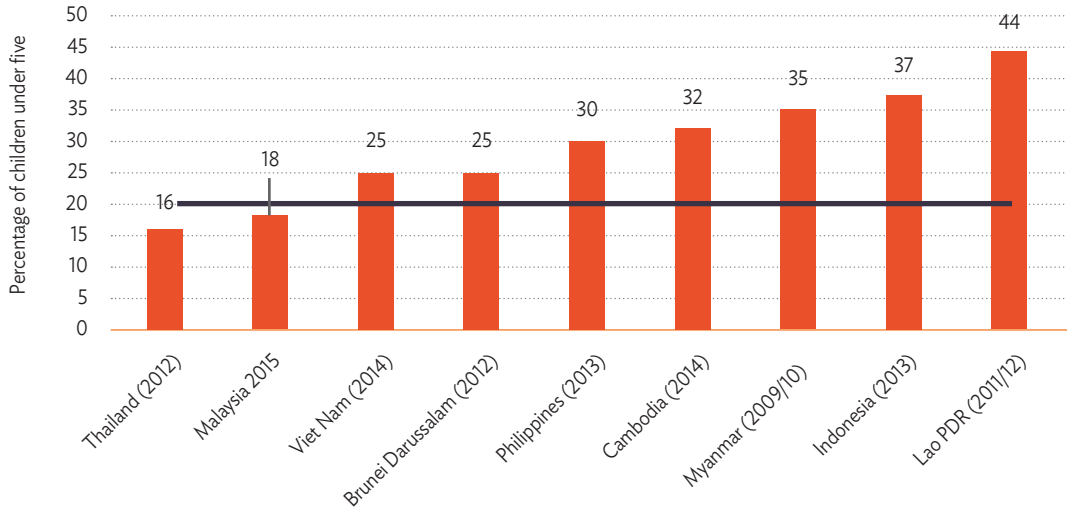


Note: The undernourished are those with a caloric intake less than the minimum daily requirement. Averages for 1990–1992 and 2010–2012 are shown.
Source: ADB (2013).

However, according to ADB (2013), there is an inverse relationship between per capita income and the percentage of stunted children aged 0–5. While nutritionists stress a proper mix of micronutrients, data on the ‘average’ nutrient intake do not accurately capture the importance of micronutrients for child development. Aside from contributing to premature death, childhood malnutrition plays a part in mental and physical impairment and a lifelong risk of chronic disease (WHO, 2011d). These cannot always be remedied by improved diets later.

While many ASEAN economies continue to struggle with maternal and child undernutrition, they also face the double burden of malnutrition – the coexistence of stunted and overweight children within the same community (The Habibie Center, 2015). Across populous countries in ASEAN – including Indonesia and the Philippines – the prevalence of undernutrition remains persistently high (ASEAN, UNICEF, and WHO, 2016). The Lao PDR shows the highest percentage of childhood stunting (Figure 12.10) while wasting is above the threshold of public health significance (5%) in eight out of 10 AMS (Figure 12.11) (ASEAN, UNICEF, and WHO, 2016). However, problems of over-nutrition are also surfacing, mainly in urban areas (FAO, 2012). It is estimated that 4.5 million children under five are currently overweight or obese in AMS (ASEAN, UNICEF, and WHO, 2016). While some ASEAN countries have low prevalence rates of overweight/obesity in children under five – Cambodia (2%), the Lao PDR (2%), and Myanmar (3%) – other countries have exceptionally high rates, such as Indonesia (12%) and Thailand (11%) (Figure 12.12).

Figure 12.10: Percentage of Children under Five who are Stunted in ASEAN Member States

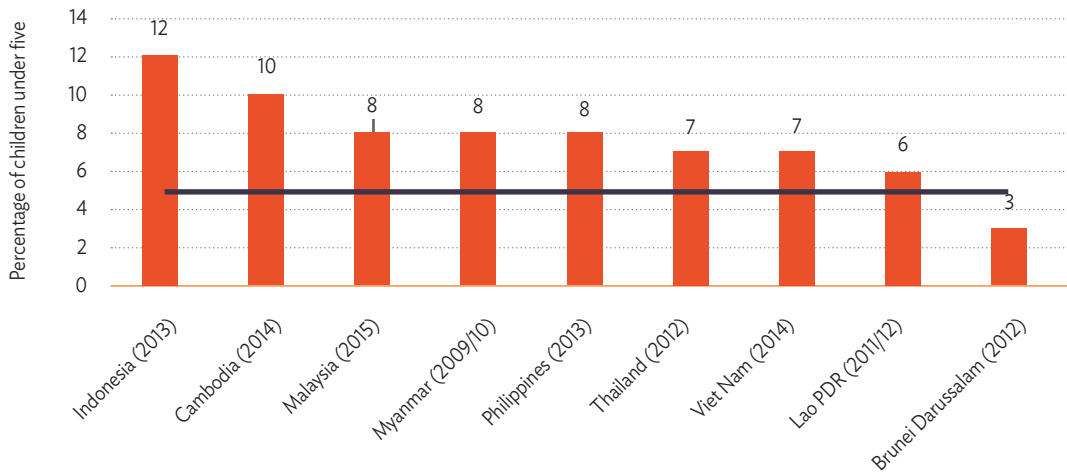


ASEAN = Association of Southeast Asian Nations, Lao PDR = Lao People’s Democratic Republic, WHO = World Health Organization.

Note: WHO cut-off values for public health significance of stunting prevalence: > 40%: very high prevalence, 30%–39%: high prevalence of stunting, 20%–29%: medium prevalence, <20%: low prevalence (dark grey line). > 40%: very high prevalence, 30–39%: high prevalence of stunting, 20–29%: medium prevalence, <20%: low prevalence (dark grey line)

Source: ASEAN, UNICEF, and WHO (2016).

Figure 12.11: Prevalence of Wasting in Children under Five in ASEAN Member States

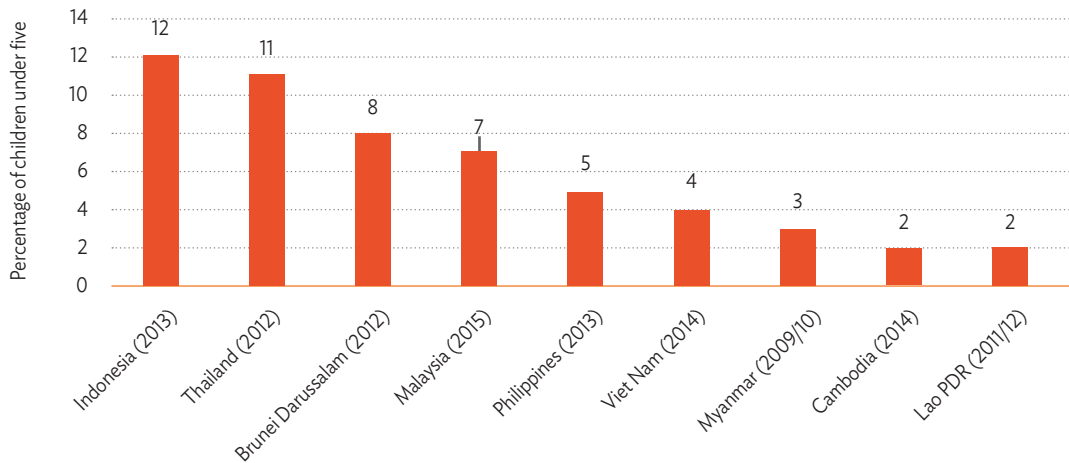


ASEAN = Association of Southeast Asian Nations, Lao PDR = Lao People’s Democratic Republic, WHO = World Health Organization.

Note: Prevalence of wasting > 5% (dark grey line): public health 10 significance.

Source: ASEAN, UNICEF, and WHO (2016).

Figure 12.12: Prevalence of Overweight Children under Five in ASEAN Member States



ASEAN = Association of Southeast Asian Nations, Lao PDR = Lao People's Democratic Republic, WHO = World Health Organization.
Source: ASEAN, UNICEF, and WHO (2016).

Changing dietary patterns in fast-growing Asian countries are worrisome. Together with accelerating growth in demand, more affluent Asians demand more protein-rich and resource-demanding food – not just meat and dairy products, but also vegetables and fruits (ASEAN, UNICEF, and WHO, 2016). While dietary diversity during the nutrition transition is welcome, ongoing dietary shifts have largely corresponded to increased fat content sourced from animal fat and oil. As such, the sharp increases in the consumption of sugar and other sweet products, changing dietary patterns, nutrition transitions, and lifestyles are contributing to growing rates of obesity, diabetes, and other NCDs (WHO, 2010).

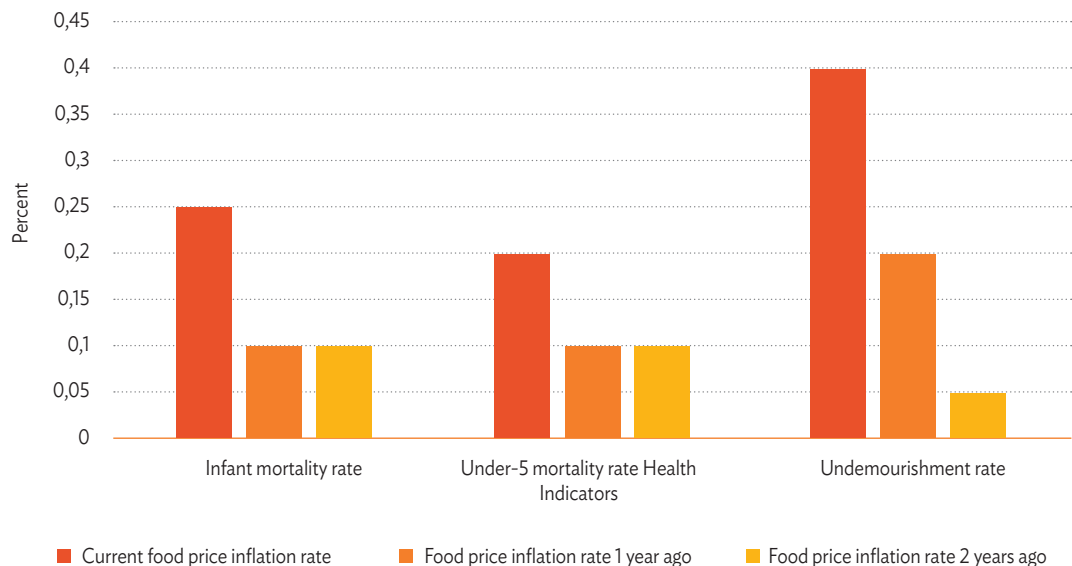
Malnutrition, whether undernutrition or over-nutrition, is a significant threat to public health. Many developing countries must combat both simultaneously. Undernutrition and micronutrient deficiencies – especially amongst children – are stubbornly high in some pockets of the region. Where problems are emerging, effective control is key. The challenge is to develop effective programs and policies that are specific to a country context (ADB, 2013). For example, reducing child and adult undernutrition and micronutrient deficiencies should remain a top priority in Thailand, Indonesia, and the Philippines (Box 12.7). However, more focused efforts should also be initiated to limit the emergence of obesity in urban areas (WHO, 2010). In countries such as Indonesia, where obesity is rising and increasingly affecting children, efforts

should be directed towards improving nutritional awareness, ensuring that healthy food options are affordable and accessible, and educating consumers about the long-term health impacts of obesity (ADB, 2013).

A comprehensive assessment of the effects of food price inflation and volatility on population health – measured by the infant mortality rate, child mortality rate, and prevalence of undernourishment – was carried out by ADB (2013). Using a panel dataset covering 63 developing countries from 2001 to 2010, the study found that a 1 percentage point increase in contemporaneous food price inflation leads to a 0.2% increase in infant and child mortality and a 0.4% increase in the prevalence of undernourishment (Figure 12.13).

Furthermore, the study showed that the impact of food prices is more severe in least developed countries, although the effect is moderated where agriculture has a greater share of gross domestic product (GDP) (ADB, 2013).

Figure 12.13: Impact of Higher Food Price Inflation on Health Indicators



Note: Figures show percentage change in health indicators for every 1 percentage point increase in the food price inflation rate.

Source: ADB (2013).

Box 12.7: The Cost of Food and Poverty – The Case of Thailand and Indonesia

Thailand is one of the world's largest food exporters. Its products include the region's dominant staple, rice. Indonesia is exactly the opposite. Most of its staple foods – rice, maize, cassava, soybeans, and sugar – are net imports. Its agricultural exports have tended to be estate crops such as rubber, copra, and coffee. Other things being equal, the balance between net consumers and net producers of food in net importers, like Indonesia, is more heavily weighted in favour of consumers than net food exporters such as Thailand. Therefore, the likelihood that food price hikes will raise poverty incidence would seem to be greater in Indonesia than in Thailand.

Warr (2010) has created general equilibrium models designed to estimate the impact of price changes on poverty incidence. The shocks applied to the two models are the percent changes in the international real prices of four commodities – rice, maize, soybeans, and sugar – from 2003 to 2008. During this period, real prices (the nominal price in United States dollars of the commodities deflated by the manufactures unit value index) increased by 212% for rice, 124% for maize, 117% for soybeans, and 62% for sugar (Table 12.5). Even though the international price shocks were large, the results show that their simulated effects on poverty incidence were small. This is because the impact is the net effect on populations, including groups that lose from price increases (net buyers) as well as those that gain (net sellers and others gaining from indirect income effects).

In Thailand, the increase in the producer price of rice benefits sellers, while the consumer price increase harms net consumers. For those close to the poverty line, net consumers outnumber net sellers, even in rural areas. Net consumers are all rural people who do not own cultivated rice land, including all landless laborers. They also include many small farmers who produce some rice but supplement consumption with purchased rice, using income derived from the sale of other agricultural products or, increasingly, non-farm sources of income. Urban poverty incidence increased marginally, from 3.2% to 3.4% of the urban population, while rural poverty incidence increased from 18.0% to 18.4%. The negative effect on poor consumers of rice outweighs the positive effect of the increased returns to fixed factors owned by poor rice producers and the small increase in unskilled wages.

In Indonesia, the estimated effects of the international rice price shock were very small. Its vulnerability to the price shock is determined by its policies on rice imports. Until the early 2000s, Indonesia was the world's largest rice importer. With the political shift to a more democratic form of government, the lobbying power of pro-farmer political groups initially led to heavy tariffs on rice imports. Then, in 2004, rice imports were officially banned, although limited quantities of imports are occasionally permitted (Warr, 2011). By 2006, this policy increased domestic rice prices relative to world prices by about 37% (Fane and Warr, 2009). The import quota on rice meant that world price increases for rice were barely transmitted to Indonesian domestic markets.

Table 12.5: Thailand and Indonesia – Simulated Effects of Food Price Shocks

Commodity		Rice	Maize	Soybeans	Sugar
Shock to international price (%)		212	124	117	62
	Before price shock	Headcount measure of poverty incidence (% of population)			
		Simulated change in poverty incidence from price shock			
Thailand					
Urban	3.22	0.202	0.000	0.000	0.000
Rural	17.99	0.443	0.014	0.015	0.000
National	13.71	0.371	0.003	0.013	0.000
Indonesia					
Urban	13.60	0.008	0.016	0.044	0.049
Rural	20.20	0.001	0.179	0.047	0.066
National	17.19	0.004	0.105	0.045	0.058

Source: Warr (2010).

The Role of Social Safety Nets

Most Asian countries use social safety nets of some kind, intended to shield poor and vulnerable groups from severe deprivation. As a percentage of GDP, social protection expenditures vary across developing Asia (ADB, 2008) from 1.3% in the Lao PDR to 1.9% in Indonesia, 2.2% in the Philippines, 4.0% in India, 5.3% in Bangladesh, and 9.8% in Mongolia, amongst others. The share is 2% or less in 10 out of 31 Asian countries. On average, poorer countries allocate lower proportions of GDP for social protection. In the United States, the share is 9%; in Japan, 16%; and in the European Union, it reaches 19%. Reviews have shown four major categories of safety net programmes (Box 12.8):

- (i) consumer food price subsidies
- (ii) food-for-work programmes
- (iii) feeding programmes
- (iv) cash transfers

Box 12.8: Social Safety Nets and Food Programmes in Selected Developing ASEAN Countries

Indonesia: Indonesia's major safety net programmes are its Raskin rice subsidy programme; a programme providing free inpatient and outpatient care to households at primary health centres and hospitals; and a non-recurrent cash transfer scheme, Bantuan Langsung Tunai, used in 2005 and 2008 to help households cope with fuel price increases resulting from fuel subsidy cuts. Other cash transfers exist in smaller social assistance programmes targeting the poor, elderly, persons with disabilities, and youth. One is a conditional cash transfer scheme based on health- and education-related conditionalities for household mothers and their school-aged children.

Philippines: The Philippines' rice price subsidy, run by the National Food Authority, is the largest food programme in the country. Almost 90% of the rice under this programme is sourced from external markets. During the food, fuel, and financial crises in 2008, when there were more than 60 social programmes in the country, the National Food Authority subsidy accounted for 70% of the total social protection budget. Other social assistance programmes are school feeding programmes, where children attending accredited

schools receive 1 kilogram of rice per day – and in selected schools are provided breakfast. A conditional cash transfer scheme (the Pantawid Pamilyang Pilipino (Filipino Family Assistance) Program (4Ps)) was initiated in 2007 with a pilot group of 6,000 households. To qualify, households must (i) be located in poor areas; (ii) be classified as poor through a proxy means test; (iii) have either a pregnant mother or at least one child aged 0–14; and (iv) meet conditions relating to education and health, such as 85% school attendance, health clinic visits, and deworming for children.

ASEAN = Association of Southeast Asian Nations.

Source: Jha, Kotwal, and Ramaswami (2013); ADB (2013).

ADB (2013) showed the presence of regional and ethnic biases in allocation schemes in social safety nets. There are practical problems in identifying qualifying households, as well as corruption. For example, the Public Distribution System for subsidised access to grains in India is said to have exclusion and inclusion errors of 70% (ADB, 2013). However, this does not mean that existing programmes are counterproductive, because at least some of the benefits reach the intended beneficiaries. Nevertheless, the associated wastage and corruption are major issues, which raise the question of whether programme objectives should be pursued in other ways (ADB, 2013).

12.4 Integration Strategies to Reduce Impact on Health

12.4.1 Interventions to Meet Immediate Needs

Social Safety Nets

Safety nets and social protection programmes can offer immediate relief to the poor during temporary bouts of food insecurity. However, the role of social protection for food security extends beyond providing essential assistance to mitigate the impact of short-term natural and economic shocks (Box 12.9). Properly designed and targeted, social protection can play a crucial role in breaking the vicious cycle of poverty and food insecurity, ensuring food

security for all in the long run (ADB, 2013). A wide array of instruments can be employed to address the vulnerability of people's livelihoods – from social insurance and social assistance to labour market programmes. Social protection programmes can also help address market imperfections and failures (ADB, 2013). It is critically important to target these programmes more effectively and exclusively at the poor – to maximise their impact given limited budgets. One study shows that non-targeted direct cash transfers and food aid have increased dependency and eroded local capacity to generate sustainable incomes (Gilligan et al., 2009).

Box 12.9: The Role of Safety Nets in Reducing Hunger and Malnutrition

Hunger and malnutrition are key issues that cut across poverty alleviation interventions. Food insecurity and poverty are closely interrelated. Social safety nets may have the most direct effect on the poor, helping them cope with risks such as price increases or calamities. Without requiring any financial contribution from beneficiaries, safety nets take the form of instruments such as transfers and subsidies (see below) and are more often than not targeted at specific segments of the population – the poor, children, or mothers, for example. While social protection should be available to all, resource constraints necessitate targeting to ensure programme efficiency and cost-effectiveness (FAO, 2012). Transfers to beneficiary households may be based on the minimum food basket cost which provides the required calories and nutrition to household members. This will help guarantee that limited resources are well spent – and cash transfers used to ensure the minimum dietary intake.

Features of Transfers

- Can be preventive (insurance) or palliative (response or assistance)
- Can be cash or in kind (e.g. food or inputs to agriculture); in some cases, both
- Can be unconditional (no commitment from beneficiary) or conditional (dependent on school attendance, clinic visits, and so on)
- Can be given as payment for employment in public works or construction

Features of Subsidies

- Usually implemented by subsidising the commodity for a lower market sale value
- Subsidised commodity can either be a universally consumed good or one preferred by specific groups
- Sale of good can be universal (all can avail of the subsidised good) or targeted (only specific groups are able to avail through a mechanism such as vouchers or show of proof eligibility)

Cash Transfers

The targeting failures of existing social protection systems raise the question of whether these programmes could be replaced by something better. Cash transfer systems might replace in-kind programmes altogether (ADB, 2013), although there may be initial political resistance as beneficiaries from existing corruption and inefficiency can be expected to oppose change. Cash transfers can also encourage households to adopt beneficial behaviour – e.g. they could be conditional on household participation in education, health, or nutrition services. Indonesia has already used cash transfers to compensate for economic shocks. In 2008, it reintroduced the world’s largest unconditional cash transfer system to shield households from the impact of reductions in fuel subsidies (ADB, 2013). With the assistance of the World Bank, Indonesia was able to develop a transparent system that worked. This well-documented programme could be adapted elsewhere (ADB, 2013).

Interventions Targeted at Nutrition

Poverty and limited access to food are major causes of inadequate food and nutrient intake. Tending to be more vulnerable to food price hikes and other shocks, the poor have to adjust their dietary choices to low-quality food, which might translate to lower nutrition (ADB, 2013). This damage is particularly severe amongst pregnant women and young children, given the elevated risk of both groups to malnutrition and undernourishment (ASEAN, UNICEF, and WHO, 2016). Urgent actions to improve food and nutrition security amongst the poor and vulnerable include improving incomes, providing targeted social assistance and safety nets, and promoting dietary education.

First, improving smallholder production and productivity can have a tremendous impact on food and nutrition security, not only increasing food supply but also raising rural household incomes (ADB, 2013). Smallholder farmers are responsible for the majority of domestic food production in most developing countries. Efforts to enhance farm production can also be combined with efforts to improve crop and dietary diversity to maximise the impact on nutrition security (FAO, 2003). As many smallholders are subsistence farmers, the diversification of small-scale production, cultivation of micronutrient-rich crops, and bio-fortification of staple food crops directly reduce nutrition and micronutrient deficiencies (ASEAN, UNICEF, and WHO, 2016).

Second, social assistance programmes should take into account the nutrition and dietary needs of beneficiaries. Food assistance, nutritional interventions, and safety net programmes can be designed in tandem with programmes that enhance economic opportunities and reduce poverty, such as school feeding and job creation schemes (ADB, 2013). Food assistance and related interventions can improve programme efficiency by targeting beneficiaries such as pregnant women, or lactating mothers and their children (ASEAN, UNICEF, and WHO, 2016).

Third, there has been an increasing emphasis on the role of health and education for nutrition security. National food security strategies often focus on agriculture and food supply, neglecting the importance of nutrition (ADB, 2013). However, evidence is clear that food supply alone may not guarantee that nutrition security will be achieved. In Mexico, for example, malnutrition and stunting persists despite relative food abundance (Neufeld, Chowdhury, and Ruel, 2012). Nutrition education and social marketing are essential to improving food and nutrition security, given the strong relationship between nutritional and health knowledge, and nutrition outcomes. Studies show that education and a mother's nutritional knowledge are particularly important for household food allocation and young children's nutritional status (Thomas, Strauss, and Henriques, 1991). A mother's nutrition and health also directly influence her child's nutrition and health. Pervasive gender bias is an important latent factor for malnutrition and the undernourishment of women and girls. Often, there is bias and discrimination against girls in household decisions over schooling, healthcare, and feeding. Education is critical in empowering women and reducing gender inequality (ADB, 2013).

Dietary Diversity and Nutrition: Better Income, Better Food

With affluence and urbanisation, Asians have developed an appetite for more nutritious and balanced meals. As income grows, so does dietary diversity – the relationship between the number of food groups consumed and total household per capita income is significant and positive (Hoddinott and Yohannes, 2002). Based on household surveys in developing economies (FAO, 2012), the households in the highest per capita income quintile have a more diversified diet. Nutritionists emphasise that food security is about more than just caloric intake. Nutrition security is about meeting, but not exceeding, dietary requirements across a range of essential nutrients. Nutrition insecurity can exist even in the presence of food abundance (Neufeld, Chowdhury, and Ruel, 2012). A growing number of studies suggest that the increased intake of meat and dairy products poses a public health problem in many developing economies (ADB, 2013). Adequate nutrition not only benefits individual health and survival, but also collective human capital and economic development.

12.4.2 Actions to Improve Medium- to Long-Term Resilience

Rural Development: Agriculture and Research

Poverty in Asia remains primarily rural. Thus, a rural-based growth strategy would seem to be an effective way to tackle both poverty and food insecurity. In the 1960s and 1970s, the Green Revolution was the proverbial stone that hit the two birds of poverty reduction and food security – by increasing rural incomes and lowering food prices (ADB, 2013). It showed that rural development and growth can help reduce poverty effectively. A new growth paradigm should focus on support for agriculture and increasing rural income opportunities, so they are on a par with those for urban dwellers (ADB, 2013). Rural incomes should also be diversified to improve stability, while urban–rural integration must deepen. Investment in rural roads and other infrastructure lowers transport costs, facilitates marketing, and encourages the flow of information. This can go a long way in advancing rural development. Investing in rural roads and other infrastructure. Public investment in infrastructure, especially roads, is critical for rural development. Good infrastructure lowers the cost and time for trade, and increases reliability, thus boosting flows and benefiting those who use infrastructure services more intensively (ADB, 2013). The costs of transit delays are especially high for time-sensitive goods such as perishable agricultural products. Reduced transport costs

simultaneously raise earnings from output sales and lower the cost of inputs. Investment in new drainage systems, or the rehabilitation of existing ones, must also be prioritised, as good drainage is central to resolving waterlogging and salinity problems. While profitable irrigation systems can be developed by the private sector, the construction and maintenance of drainage structures are often unprofitable, requiring additional public support (ADB, 2013). While it is important to produce more food to feed the world's growing population, it must be done with fewer natural resources – limited land and water – and less energy, fertilisers, and pesticides while coping with rapid societal change. Investing in agricultural research and development offers the most feasible long-term solution to this conundrum. Scientific research has been behind many innovations in agriculture, providing solutions to the problems of food security. It can again provide solutions in the future if people understand that investments need to be made now. The challenge for the research community is to develop resilient agricultural systems using rational, affordable strategies that not only increase production but also achieve food security for households and individuals. Research also needs to be interdisciplinary and to address the diverse needs of smaller farms. In Asia and the Pacific, it is important to increase food production by diversifying crops and finding alternatives to rice and wheat. A case in point is the potato, which has emerged as one of the more important food crops in the region. Potato crops have high yields and produce more edible energy and protein per unit area and time than many other crops. It also fits well into multiple-cropping systems prevalent in the region. Research can contribute to developing potato varieties suited to tropical climates as well as production technologies and post-harvest processing.

Urban Agriculture

Some 20% of the world's undernourished live in cities; amongst this group, those who manage to get enough food do so at record costs (Iloka, 2016). The long supply chains that provide cities with food are easily severed by natural disasters, which are becoming more frequent (Fox, 2013). Research has shown that disaster survivors rely on emergency food supplies for months although they are only intended for a few weeks (Sioen et al., 2017). This disrupts urban food supply and food infrastructure, with an impact on food and nutrition security (FAO, 2011). Therefore, over the last 20 years, many countries have started urban agriculture programmes to address the health impact of food insecurity (Box 12.10).

Urban agriculture is broadly defined as the growing of plants and raising of animals in the city (Sioen et al., 2017). By growing their food locally, cities have managed to avoid food problems common to other urban areas (FAO, 2011). In Asia, for example, 60% of the vegetables consumed by city residents are grown within the city limits of Shanghai, China (FAO, 2011). On the island of Negros, the Philippines, malnutrition amongst urban children was reduced from 40% to 25% in 2 years after the start of urban farming (Smit, Nasr, and Ratta, 2001). In summary, localised production in the form of urban agriculture is recognised as a source of food and nutrition security for households and a buffer during disaster periods (Smith, 2013).

Box 12.10: Urban Agriculture in Kathmandu, Nepal

Kathmandu promotes productive rooftop gardening, which provides an opportunity to grow food in inner-city areas in response to decreased agricultural land and a growing reliance on vulnerable food sources from other areas. The main reason for the city to develop such programmes is to ensure food and nutrition security. The city involves its engineers in the design of rooftop models suitable to the local context, trains masons in construction and building techniques, includes rooftop gardening in building codes, links gardeners to input supply and marketing enterprises, and promotes rainwater harvesting and composting of city waste. Radio programmes and information leaflets are developed to generate policy interest and encourage community participation. Case studies show that intensive rooftop production helps families to become self-sufficient in vegetables and herbs and to potentially sell some surplus produce.

Source: Dubbeling (2013).

Human Capital Investment: Education, Nutrition, and Awareness

Human capital investments in health, nutrition, and education – and investments in basic infrastructure like water and sanitation – are key to poverty reduction and food security (ASEAN, UNICEF, and WHO, 2016). While economic growth is a necessary condition for poverty reduction and consequently food security, the link between economic growth and food security may be weakened if the poor have limited access to human capital formation and basic infrastructure. Prioritising investment in basic education, health, and nutrition not

only directly enhances individual welfare but also builds higher average incomes in the long run (ADB, 2013). Human capital development directly improves food security by ensuring a healthy agricultural workforce and providing farmers with the skills to adopt modern and more productive farming technologies (FAO, 2012).

Further, food security policies need to ensure that people have not only sufficient food but also the right kind of food. In many developing countries, trends in dietary patterns complicate the nutrition situation (ADB, 2013). Rapid income growth and urbanisation are causing a shift in dietary patterns away from traditional starches and cereals, and increasingly toward processed foods, animal products, sugars, fats, and edible oils (ASEAN, UNICEF, and WHO, 2016). For many developing countries, this nutritional transition has been accompanied by an increasing overweight incidence and risk of obesity in urban areas, while high rates of food insecurity and undernutrition continue in rural areas. Dietary diversification – including increased consumption of total calories and animal protein – is a boost for the poor, who have monotonous diets (ADB, 2013). However, nutrition education and awareness have to be strengthened during this transition, especially for low-income urban households, as highly processed food that is low in micronutrient content poses increased health risks. Overall, public health and education must be fully integrated into national food security strategies and policies.

Crisis Prevention and Risk Management

According to ADB (2013), managing and mitigating the risks threatening food security require a three-pronged approach. The first and arguably the most crucial step is risk assessment – understanding and prioritising risks, gauging their potential impact, and identifying who will be affected. The second is to provide safety nets and other disaster relief measures to mitigate the immediate impact for vulnerable people and communities. Third, a risk management system should have longer-term prevention and adaptation measures to help people and communities adapt to the changing new environment and build resilience to risks. Identifying who is food-insecure and vulnerable to food insecurity, where they are, and why they are insecure or vulnerable should be the first step, even before discussing what measures are needed to mitigate their vulnerability. The source of food security hazards – local, national, or international – and whether they are transitory or chronic in nature must be

identified as well. Risk analysis and monitoring need to gauge the likelihood of these threats, the historical distribution of hazards, and the probable impacts on vulnerable populations (van 't Wout, 2014). Finally, all this information, once gathered and analysed, must be fed into a monitoring and early warning system which can help policymakers, firms, and households adapt to foreseeable hazards and take mitigation measures (ASEAN, UNICEF, and WHO, 2016).

Emergency Funds for Disaster Relief: Food Reserves

Building an emergency fund for communities and nations could also be considered part of the risk management system to provide a buffer during food crises. The fund could be used to finance safety nets for those suffering transitory food insecurity. The private sector can be offered incentives – such as tax deductions – to contribute to the fund, which can be run by a government agency in partnership with the private sector (ADB, 2013). The fund can be linked to insurance against natural disasters and other calamities, and used in conjunction with risk management to help mitigate the effects of crises and disasters.

As such, emergency food reserves and funding facilities can allow the rapid delivery of humanitarian aid to the most vulnerable countries or populations in the wake of a food crisis. Governments can improve emergency access to food by linking village and national stocks to regional and global stocks, and by facilitating the release of grain stocks to other countries in crisis situations. National and international food stocks, if strategically managed, can also help reduce food price volatility (ADB, 2013). The existence of market failures suggests that it may make sense for countries to maintain emergency stocks. Storage can be costly, of course. However, if these are released in a transparent, preannounced manner and only when prices are unusually high, national grain stocks can stabilise prices and help domestic food security (Briones, 2011). Nevertheless, releasing food stocks has only a limited and temporary effect on domestic price stability, if free trade allows the international price to be transmitted domestically. For example, when prices surge, an importing country might release rice stocks domestically to force the local price below international levels. Unless exports are prohibited, however, private agents would buy rice at the low domestic price and sell it internationally for profit (Briones, 2011).

After the 2007–2008 rice crisis, the AIFS framework and its implementing mechanism, the Strategic Plan of Action and Food Security in the ASEAN Region, were established. They aim to prevent or mitigate problems caused by extreme rice price volatility through regional and national food reserves, the expansion of food trade, the strengthening of market information, and an increase in food productivity (Briones, 2011; ADB, 2013). Other initiatives in the region are the ASEAN Plus Three Emergency Rice Reserve (APTERR), the ASEAN Food Security Information System project, and the ASEAN Rice Trade Forum (Briones, 2011). Designed to complement members' existing national rice reserves, APTERR helps mitigate supply shock effects using forward contracts and streamlined release procedures, helping countries respond more quickly to an emergency (Box 12.11). This multilateral effort to coordinate publicly held rice reserves – and the investment in developing rules, procedures, and the capability to anticipate rice shortages – is noteworthy.

Box 12.11: ASEAN Plus Three Emergency Rice Reserve

The Association of Southeast Asian Nations (ASEAN) Plus Three Emergency Rice Reserve (APTERR) was established in July 2011, in a ministerial agreement between the ASEAN+3 members – ASEAN (Brunei Darussalam, Cambodia, Indonesia, the Lao People's Democratic Republic (Lao PDR), Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Viet Nam), plus China, Japan, and the Republic of Korea.

APTERR is a buffer against immediate threats to food security caused by disasters and market volatility associated with calamities. Earmarked rice reserves total 787,000 tons. Voluntary donations in cash or rice comprise stockpiled reserves. APTERR stocks can be released to a member which is unable to cope with an emergency through its national reserves alone and is unable to procure needed rice supplies through normal trade. Day-to-day management is handled by a secretariat hosted by Thailand under the supervision of the APTERR Council.

Source: APTERR (2012); Clarete, Adriano, and Esteban (2013).

Coordinated Responses to Enhance Resilience

The 2007–2008 food crisis highlighted a number of weaknesses in international food markets. While fundamental and structural forces – including the growing populations, rising incomes, and increasingly constrained resources caused by climate change – have been behind recent surges in global food prices, reduced national grain stocks, export and import restrictions, and speculation in futures and commodity markets have aggravated market imbalances at times, amplifying price volatility (ADB, 2013). There is a clear need for countries to respond to global food crises in a coordinated manner and to comprehensively assess the impact of new policies and actions to prevent those that may have undesirable consequences for other countries and international food markets (The Habibie Center, 2015) (Box 12.12). The international community needs to strengthen cross-border cooperation for emergency support and better management of international food markets.

Box 12.12: ASEAN Moves Towards an Integrated Community

Each of the Association of Southeast Asian Nations (ASEAN) member states has their own strategy in responding to food crises because of their agricultural industry. Some countries such as Thailand and Viet Nam take on the role of rice exporters, while others like Indonesia and the Philippines are rice importers. Myanmar is working its way up to regain the agricultural competitiveness it had in the 1950s when the country led the region in terms of rice exports. Meanwhile, Brunei Darussalam and Singapore are rice importers but notably import only the best quality produce. Singapore has also started investing towards its goal of becoming the ASEAN centre for biotechnology. Although different in nature, these approaches are projected to achieve an ASEAN-wide framework for food security.

ASEAN has decades of experience to build on. Since the 1970s, the association has been, in fits and starts, organising and tinkering with the ASEAN Food Security Reserve – an agreement amongst members to set aside and share rice stocks in contingencies such as what is now being experienced. More recently, in 2009, members adopted the ASEAN Integrated Food Security (AIFS) framework and the Strategic Plan of Action on ASEAN

Food Security. The AIFS framework and the Strategic Plan of Action on ASEAN Food Security were set for a 5-year period (2009–2013), and the International Rice Research Institute (IRRI) was tasked to focus its contribution on agricultural innovation, which included proposing a rice action plan.

In 2013, the ASEAN Ministers of Agriculture and Forestry appreciated the IRRI's report, recognising the contribution of the Global Rice Science Partnership (GRiSP) which strives to ensure the affordability of rice for the poor while maintaining profitability for farmers. It was agreed that the Senior Officials Meeting of the ASEAN Ministers of Agriculture and Forestry would work with the IRRI to secure the resources necessary to implement GRiSP across ASEAN.

Source: The Habibie Center (2015).

Specific, urgent actions should be undertaken to address both short- and long-term issues. There is a pressing need to develop an overarching – if multi-layered – policy framework covering the array of strategic directions to address immediate, short-term needs, and to prepare for medium- to long-term issues. Priority actions are combating food insecurity and poverty, enhancing the efficiency of food market systems, promoting sustainable agriculture, and improving risk management and community resilience. In the short run, policies that focus on mitigating the immediate impact of high food prices on vulnerable groups, and that facilitate access to adequate, quality food through emergency measures – such as food assistance and cash transfers – will be most effective. In the longer run, scaling up agricultural productivity and investment, promoting rural development, and continuing to tackle the root causes of poverty can promote economic resilience and help build sustainable food security. At the same time, policies should be crafted to promote sustainable agricultural production and environmental protection. It is important to recognise that only planning and action now will be able to influence long-term outcomes. Delayed or inadequate decisions today will increase vulnerability to long-term food insecurity tomorrow. International food markets and governments must be prepared to respond to supply and demand shocks as well as the effects of climate change. These are already behind today's higher food prices and volatility.

12.5 Recommendations for ASEAN

12.5.1 Principles

- **Implementing food security** interventions and ensuring access to appropriate healthcare play a significant role in minimising the risk of undernutrition.
- Ensuring **food quality and food safety** is as important as ensuring adequate food quantity.
- **Addressing nutrition security while reducing poverty and vulnerability to food insecurity**, to ensure the ability to purchase sufficient and nutritious food; reducing the price impact on the real incomes of poor households; and providing effective social safety nets for those bypassed by rapid economic growth and poverty reduction efforts.
- **Establishing risk management systems and tools**, to provide food-based safety nets which offer immediate relief to disadvantaged groups during crises; building adequate emergency food reserves and relief systems as a buffer to natural and human-made disasters; and introducing risk management systems and tools such as crop insurance and futures contracts to help mitigate the effects of price volatility and crises.

12.5.2 Way Forward

1. ASEAN needs to strengthen its policy coordination and cooperation at the regional and global level. Global and regional cooperation can help ensure food security and reduce excessive price volatility in three broad areas: (i) establishing emergency food reserves and aid, (ii) sharing market information, and (iii) promoting trade. Food price instability often coincides with low stock levels. Multilateral cooperation is crucial to curb volatility in rice and food prices. The governments of AMS must share information on cross-country stocks and prospects that enable rational, moderate, and longer-term assessments of supplies and prices. Accurate and timely information on food markets and stocks is also critical to preventing market speculation from spiralling into a food crisis. Through regular dialogue, policymakers in the region can assess market trends and help coordinate policies in response.

2. ASEAN should strengthen its cooperation with other related stakeholders such as international organisations (the FAO, the International Fund for Agricultural Development, the World Food Programme, and the World Health Organization); the private sector; and smallholder farmers.
3. ASEAN must ensure that all components of a health system are strengthened to cope with local hazards and respond to the health needs of children following a disaster. Activities include training adequate numbers of health workers to manage the health problems of children following a disaster and ensuring that plans are in place for surge capacity; developing disease surveillance and early warning systems; and planning to ensure there are contingency stocks of drugs and other supplies which are appropriate to the needs of children. It is also important that health facilities are built safely and prepared to respond to the health needs of children in emergencies.

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