Rapid economic growth and increased agricultural productivity over the past two decades has resulted in a drop by almost half in the proportion of undernourished people around the world. This is a significant achievement. However, extreme hunger and malnutrition remain a huge barrier to development in many countries: 795 million people were estimated to be chronically undernourished in 2014-2016. (Fig 1)

The adopted Sustainable Development Goals\(^1\) are aimed at ending by 2030 all forms of hunger and malnutrition, making sure that all people – especially children and the more vulnerable – have access to sufficient and nutritious food all year round. Making those goals a reality will involve promoting sustainable agricultural practices: improving the livelihoods and capacities of small-scale farmers and allowing equal access to land, technology and markets. It also will require international cooperation to ensure investment in infrastructure and technology to improve agricultural productivity.

2.1 Hunger

Considerable progress has been made in reducing hunger in the Asia-Pacific region. However, an estimated 11.9 per cent of the population are still undernourished; Sustainable Development Goal 2 on eradicating hunger by 2030 therefore poses particular challenges in Asia and the Pacific, the most populous region of the world.

**Nearly 795 million people are undernourished globally; an estimated 490 million of them are living in Asia and the Pacific**

There has been notable progress in the fight against hunger since the early 1990s when more than 1 billion people worldwide, or 18.6 per cent of the global population, were
undernourished. The estimated proportion of the global population undernourished has fallen to less than 11 per cent of the global total in the period 2014-2016; despite a population increase of nearly 2 billion people globally over the last 25 years, 218 million fewer people now suffer from undernourishment than was the case in 1990. The Asia-Pacific region has been the major contributor to the global improvement. In the period 1990-1992, nearly 1 in 4 people (23.8 per cent) in the region suffered from undernourishment compared with fewer than 1 in 8 (11.9 per cent) in the period 2014-2016. Although more than 1 billion people were added to the regional population over the period, 241 million fewer people now suffer from undernourishment – equivalent to more than the total global reduction due to increases in undernourishment in Africa.

However, regional improvements in tackling hunger vary across subregion and country. The proportion of the undernourished population in South and South-West Asia decreased from 22.9 per cent in the early 1990s to 14.9 per cent in the period 2014-2016, but due to large population increases in the subregion, the number of people affected by hunger has remained at nearly 300 million. The rate of decrease in South and South-West Asia has also been somewhat slower than in other affected regions. In East and North-East Asia, during the same time period the proportion of the population that was undernourished has more than halved (from 23.1 to 9.6 per cent). The same proportion has been cut by two thirds in South-East Asia (from 30.5 to 9.5 per cent). At the country level, the proportion of people affected by hunger in 2014-2016 has increased from the level that existed in the period from 1990-1992 in the Democratic People’s Republic of Korea (from 23.3 to 41.6 per cent) and Tajikistan (from 28.1 to 33.2 per cent). Furthermore, only limited improvements have been made in some other countries: Afghanistan (a decline in the percentage of people affected by hunger, from 29.5 to 26.8 per cent); Mongolia (from 29.9 to 20.5 per cent); India (from 23.7 to 15.2 per cent); Pakistan (from 25.1 to 22 per cent); and Sri Lanka (from 30.6 to 22 per cent). Despite improvements in Timor-Leste, the proportion of undernourished is still 26.9 per cent, which is much lower than the 45.2 per cent so affected in the period 1990-1992. (Fig 2)

Malnutrition contributed to the stunting of 70 million children in Asia and the Pacific in 2013

Long-term insufficient intake of nutrients and frequent infections can cause stunting, or low height for age among children. Stunting generally occurs before age 2, and the effects are serious and largely irreversible: delayed motor development, impaired cognitive function and poor school performance, among others. The proportion of stunted children (under age 5) in Asia and the Pacific was at 19.6 per cent in 2013 compared with 27.9 per cent in 1990. Stunting remains a preoccupying issue, particularly in South
and South-West Asia where more than 1 in 4 children are affected (27.8 per cent in 2013 compared with 39.3 per cent in 1990). Stunting rates are high in a number of countries in the subregion, including India (47.9 per cent in 2006, the latest year for which data are available), Pakistan (45.0 per cent in 2013), Bangladesh (41.4 per cent in 2011) and Nepal (40.5 per cent in 2011). (Fig 3)

While progress has been made in South and South-West Asia, it has been slower there than in other subregions. The proportion of stunted children dropped by more than two thirds between 1990 and 2012 in East and North-East Asia (from 14.2 to 4.2 per cent). Modest progress has also been made in South-East Asia (from 39.3 to 27.8 per cent from 1990 to 2013), but the proportion of children that are stunted remains above 40 per cent in Cambodia, the Lao People’s Democratic Republic and Timor-Leste.

In 2013, 70 million children in Asia and the Pacific were stunted, nearly double the 36 million stunted children in Africa.

2.2 Sustainable agriculture

The population of the Asia-Pacific region has grown by more than 1 billion people over the past 25 years. By 2030, nearly 500 million people are expected to be added to the population, thus magnifying the challenges to the fragile food security situation that exists in parts of the region. Increasing food production to satisfy food requirements is likely to exacerbate pressure on natural resources, such as land and water, and will require sustainable productivity gains.

Agricultural production in the Asia-Pacific region has nearly doubled since 1990

Agricultural production in Asia and the Pacific has been increasing steadily since 1990. Measured in terms of constant prices (average 2004-2006 United States dollars), the food produced in the region increased in value from $736 billion in 1990 to $1,351 billion in 2013, an 84 per cent increase. This is greater than the global average increase of 68 per cent over the same period, and growth in the region more

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**The Global Hunger Index**

The Global Hunger Index (GHI) provides a summary measure of the hunger and food security situation at national levels. The undernourishment indicator measures only food deprivation in terms of calories ingested. It does not capture malnutrition due to low intake of micronutrients, such as minerals and vitamins. GHI is calculated on the basis of three components; in addition to undernourishment, it also includes components on child undernutrition (wasting and stunting) and child mortality. GHI goes beyond availability of calories and addresses consideration of the quality of diet, in particular for children who are especially vulnerable to nutritional deficiencies. GHI also offers the following severity scale: values lower than 10 are considered “low”; between 10 and 20, “moderate”; between 20 and 35, “serious”; between 35 and 50, “alarming”; and above 50, “extremely alarming”.

Based on the Global Hunger index in 2015, the food situation was considered as “alarming” in Timor-Leste (40.7) and Afghanistan (35.4), and “serious” in Pakistan (33.9), Tajikistan (30.3), India (29.0), DPR Korea (28.8), Bangladesh (27.3), Sri Lanka (25.5), Myanmar (23.5), Cambodia (22.6), Nepal (22.2), and Indonesia (22.1).
than the population during the same period, (by 31 per cent). (Fig 4)

During the period 1990-2013, the value of agricultural production was stable for high income economies, at about $1,200 billion. The largest percentage increases were in the middle-income countries where the value of agricultural production more than doubled for both lower middle-income countries, from $227.2 billion to $485.9 billion, and upper middle-income countries, from $293.3 billion to $722.7 billion.

From a subregional perspective, the value of agricultural production declined in North and Central Asia during the 1990s, from $87.8 billion in 1992 to $63.2 billion in 2000. However, this decline has been reversed since 2000, and the value reached $91.4 billion in 2013. For the Central Asian area, excluding the Russian Federation, agricultural production grew at an annual rate of 3.9 per cent during 2000-2013, which was faster than the regional average of 3.1 per cent and the fastest in the region as a whole.

**The Asia-Pacific region accounts for 70 per cent of the world’s irrigated agricultural land and uses more than half the world’s total chemical fertilizers**

Increases in agricultural production can be attributed to the introduction of improved cereal varieties, higher use of agricultural inputs, such as fertilizers and pesticides, higher levels of mechanization and the development of land irrigation (Fig 5). For example, the average cereal yield in the world was 1,421 kg per hectare in 1961 and reached 3,861 kg in 2013, which was 2.7 times greater than previously. In the Asia-Pacific region, 16 countries achieved even higher growth in cereal yields over the same period, notably China (4.9 times), the Lao People’s Democratic Republic (4.7) and Indonesia (3.3).

The Asia-Pacific region accounts for 70 per cent of the world’s irrigated agricultural land.

Irrigation can produce crop yields that are two to four times greater than is possible with rain-fed farming, and it currently provides 40 per cent of the world’s food from approximately 20 per cent of all agricultural land.2

In the region, China and India each account for 30 per cent of the irrigated land. Since 1961, irrigated agricultural areas have doubled in size in the region to reach 228 million hectares. However, the rate of growth, after having peaked in the 1970s, seems to be slowing. From an average annual growth rate of 1.85 per cent between 1971 and 1981, the annual expansion of irrigated land slowed regularly to 0.8 per cent for the decade ending in 2013, an indication that much of the prime agricultural land suitable for irrigation has already been developed.3
The use of chemical fertilizers and pesticides has also greatly increased in Asia and the Pacific. From 2002 to 2013, the consumption of NPK fertilizers increased by 28.8 per cent, from 72.2 million tons to 92.4 million tons. In 2013, the Asia-Pacific region used more than half of the world’s total chemical fertilizers, largely due to consumption by China which uses 40 million tons of fertilizer annually, representing a quarter of all fertilizer used in the world and equivalent to the use of the countries in North America and Europe combined.

Average global consumption of NPK fertilizer was nearly 120 kg per hectare in 2013. Owing to important differences in farming systems (crops, land, climate, input affordability), the rates of fertilizer use to arable land range from extremely high levels, for example in Malaysia and New Zealand with respectively 1,726 and 1,578 kg per hectare to extremely low levels in some of the least developed countries for which data are available: Cambodia (14.2 kg/ha); Myanmar (16.8 kg/ha); and Afghanistan (5.1 kg/ha).

Another important indicator of agriculture intensification is the level of use of pesticides per unit of land. Expressed in tons of active ingredient per 1,000 hectares of arable land and permanent crop, selected data show a general upward trend over time and extreme variability across countries in the region, as can be seen in table 1.

A total of 90 million hectares of agricultural land was lost in Asia and the Pacific between 2000 and 2013 – three times more than the global total of 30 million hectares.

Agricultural land represents the total area used for agriculture in comparison to other uses. It includes arable land, permanent meadows and pastures, and permanent crops. A total of 90 million hectares of agricultural land was lost in Asia and the Pacific between 2000 and 2013, but this amount has been partly offset by increases in Africa, and Latin America and the Caribbean; and follows a phase of steady expansion of agricultural land from the early 1960s to 2000. (Fig 6)

Similar trends can be observed for arable land, the portion of agricultural land that can be ploughed and used to grow crops and is therefore the most productive agricultural land. From 1993 to 2013, Asia and the Pacific lost 5.3 per cent or 35 million hectares of its arable

### Table 1

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**Figure 6**

Agricultural land, major regions, 1960-2013
land due to land degradation and conversion to other uses, such as industrial parks and urban centres. For example, between 2001 and 2011, land for urban construction in China increased steadily to a total of 1.7 million hectares over the 10-year period, reaching a total area of 4.1 million hectares in 2011, an area equal in size to that of the Netherlands, and an increase of more than 70 per cent over the area at the beginning of the decade.5

As a result of these decreases, the area of arable land available to feed one person has fallen from a global average of 0.45 hectares in 1961, to 0.20 hectares in 2012. In the Asia-Pacific region, the arable land available to feed one person is even more limited; it was 0.15 hectares in 2012.

While increased productivity per unit of land has enabled increased food production, further increases will be necessary to cope with expected demographic growth and the effects of environmental pressure exacerbated by the impacts of climate change.

The availability of water is also a challenging issue for agriculture in Asia and the Pacific. Globally about 3,900 km³ of water is withdrawn from rivers and aquifers annually for human use. Some 2,710 km³ (70 per cent of the total) is for irrigation. The proportion of water withdrawn for agriculture is more than 90 per cent for 14 countries in the region, in particular in Central Asia. The rest of the water is being withdrawn for industrial and domestic use.

Furthermore, some parts of the region are facing the prospect of water scarcity. Withdrawal of more than 20 per cent of total internal renewable water resources represents substantial pressure on those resources; FAO considers any amount in excess of 40 per cent to be “critical”.

In the region, six countries are already withdrawing more than the critical 40 per cent of their internal renewable water resources, and they cannot easily increase their withdrawal for irrigation. This is the case in particular for Turkmenistan and Uzbekistan, which are dependent on water flowing in from neighbouring countries, as well as for Pakistan (63 per cent, 2008), Tajikistan (52.6 per cent, 2006), the Islamic Republic of Iran (50.9 per cent, 2004) and Kyrgyzstan (41.45 per cent, 2006). (Fig 7)

There has been a thirtyfold increase in the consumption of meat in China from 1983 to 2014

Land and water availability challenges in the region are compounded by changing food consumption patterns as a result of economic development. Worldwide meat consumption averaged 8.3 kg per capita in 1983. In 2014, it was estimated to have increased fourfold to 34 kg per capita. The increase is particularly notable in China where meat consumption,
which was 1.7 kg per capita per year in 1983, increased by 30 times to reach nearly 50 kg per capita per year in 2014.\(^7\) (Fig 8)

Such increases in meat consumption exert tremendous pressure on land and water resources as larger amount of cereals are needed to serve as foodstuff for livestock. For example, FAO estimates that 5-7 kg of cereal are required to produce 1 kg of beef, whereas for the production of pork and poultry, the estimated conversion rates are 4 and 2 respectively.

The expansion of the livestock sector to satisfy the growth in meat consumption has had negative impacts on the environment. Total emissions from global livestock are 7.1 gigatons of carbon dioxide-equivalent per year, representing 14.5 per cent of all anthropogenic greenhouse gas emissions.\(^8\)

### Agricultural subsidies are increasing in some middle-income countries in the Asia-Pacific region

Subsidies to farmers in the developed world can have negative implications for agriculture in the developing world in a number of ways. By enabling farmers and agribusinesses to sell on the international market at prices below the cost of production, subsidies make it impossible for farmers in the developing world to compete. Agricultural subsidies can also encourage the production of excess supplies, which can lower global agricultural prices and consequently adversely affect the revenue of the agricultural sector in lower income countries.\(^9\) (Fig 9)

Under the Doha Development Round of multilateral trade negotiations, countries committed themselves to work towards eliminating agricultural export subsidies and other measures with similar effect. Progress in this area would mark an important step in overall reductions in market-distorting support for agriculture. OECD compiles data on the scale of support provided to agricultural sectors in different countries. Statistics show that total agricultural support was equivalent to $249 billion for OECD countries in 2014, similar to the levels of the early 1990s but showing a decrease of nearly 25 per cent from the peak level in 2000. The decrease has been particularly marked for Japan, which saw its agricultural subsidies cut from $73.3 billion in 2000 to $39 billion in 2014.

A more recent phenomenon is a rapid increase in agricultural subsidies in some middle-income countries in the region. Since 2008, the level of agricultural subsidies increased ninefold in China, from $26.7 billion to $244.7 billion, a level similar to that of the entire OECD group of countries. The level of agricultural subsidies also dramatically increased in Indonesia, from $5.5 billion in 2009 to $25.7 billion in 2014.
The Asia-Pacific region is facing numerous challenges in ensuring the sustainability of its agricultural sector. In this context, strengthening research and development is crucial to ensure the realization of that goal. Only limited cross-country comparable data are available to measure research and development in the agricultural sector in Asia and the Pacific. A recent publication on Agricultural Science and Technology Indicators (ASTI) provides statistical information on that topic. Based on International Food Policy Research Institute (IFPRI) estimates, total research and development spending for the agricultural sector represented $40.1 billion (2005 PPP dollars) in 2008, of which 79 per cent was from public spending and 21 per cent from private-sector research covering spending by seven agricultural input industries: seed/biotechnology, agricultural pesticides, fertilizer, farm machinery, animal health, nutrition, and breeding.

In terms of global public spending, for 2008 slightly more than half was spent in high income countries, while China accounted for 13 per cent and India 7 per cent of the total. The ASTI report notes that, following a decade of slowing growth in the 1990s, spending on global agricultural research and development increased by 22 per cent during the period 2000-2008, from $26.1 billion to $31.7 billion (in 2005 PPP dollars). Accelerated research and development spending by China and India accounted for close to half the global increase of $5.6 billion during the period 2000-2008. Similar trends seem to be confirmed from most recent data from the ASTI database, with a doubling of agricultural spending for Viet Nam between 2000 and 2010 and more than 25 per cent growth between 2000 and 2012 for Bangladesh and Nepal.

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**Research and development**

Box 2

The core indicator used to measure hunger is the prevalence of undernourishment; indeed FAO defines hunger as being synonymous with chronic undernourishment. The coverage of data required to calculate this indicator (produced by FAO) seems good; the average prevalence of undernourishment over three-year periods is available as time series from 1990 to 2015 for 42 countries in the Asia-Pacific region. Most of the countries with missing data are developed countries and small island developing economies in the Pacific for which undernourishment is not likely to be a priority issue. However, the data series are based on modelled data, relying only in part on survey data collected by or within countries, thus explaining the apparent near complete availability and timeliness of those data.

The prevalence of undernourishment is calculated over three stages: FAO first establishes per capita caloric intake at the national level using a country’s food balance sheet; it then estimates the variability of the distribution of per capita dietary energy consumption based on household consumption surveys. Finally FAO estimates the national minimum dietary energy requirement for different population age groups to further estimate the number and proportion of people below that minimum requirement.

A number of criticisms have been put forward regarding the methodology used to calculate the indicator. While FAO is working on addressing some of the weaknesses in the methodology, it stresses the importance and relevance of the indicator in capturing the evolution of fundamental elements that drive long-term nutrition in a country. The prevalence of undernourishment is an important indicator of hunger. However, many other phenomena affecting the shorter-term food situation of a...
country or of specific population groups also need to be measured. Seasonal variations, food price volatility, impact of natural disasters or irregular weather conditions on food production are just some of these phenomena which are not captured by the prevalence of undernourishment and for which additional measures can be used. For that purpose, it has been suggested to include an indicator on the prevalence of the population experiencing moderate or severe food insecurity, based on the Food Insecurity Experience Scale in the global monitoring framework for the Sustainable Development Goals. The scale is designed as an experience-based metric of the severity of food insecurity, with data collected through surveys to measure people’s access to adequate food.

Reliance on infrequent surveys to monitor stunting among children

Sustainable Development Goal 2 is aimed also at improving nutrition; in this regard, the prevalence of stunting among children under age 5 has been proposed as a measure of progress in that domain. This indicator, which has been presented in this chapter, is underpinned by reasonable coverage of data – sufficient to calculate regional aggregates satisfying the minimum availability requirement applied throughout the Statistical Yearbook.

The quality of the measurement, however, is affected by poor timeliness of the data inherent in the mode of data collection used for preparing the indicator, such as UNICEF Multiple Indicators Cluster Surveys and WHO Demographic and Health Surveys. Surveys are carried out only once every few years in certain countries, which can result in limited data availability for recent years. At the time of issuance of the present issue of the Statistical Yearbook, such data were available for only two countries in the region for 2013 and for only six countries for 2012.

Challenges in capturing the concept of sustainable agriculture in statistical terms

“Sustainable agriculture” is a nebulous concept without a clear definition and therefore difficult to measure.

In defining concepts and promoting international treaties, policies, strategies and programmes for achieving sustainable agriculture, FAO established five principles to characterize sustainable agriculture: (a) improving efficiency in the use of resources is crucial to sustainable agriculture; (b) sustainability requires direct action to conserve, protect and enhance natural resources; (c) agriculture that fails to protect and improve rural livelihoods, equity and social well-being is unsustainable; (d) enhanced resilience of people, communities and ecosystems is key to sustainable agriculture; (e) sustainable food and agriculture requires responsible and effective governance mechanisms.

Indicators selected to analyse agricultural sustainability that are presented in this chapter relate mainly to the first principle proposed by FAO; the indicators are: (a) measuring production value; (b) use of agricultural inputs; and (c) efficiency (in terms of cereal yields, for example). While measures of agricultural production value are based on near complete coverage of data for countries in the region, the availability of data on the use of agricultural inputs is more limited. For example, data on the rate of pesticide use covers only selected countries – none in the North and Central Asian subregion, and the timeliness of data is also a problem with no country-comparable data being available since 2010. Similarly, some important factors supporting an increase in labour productivity, such as the mechanization of agriculture, could not be included in this chapter due to a lack of recent and country-comparable statistics.
The “volume of production per labour unit (measured in constant United States dollars), by classes of farming/pastoral/forestry enterprise size” has been suggested for inclusion in the global monitoring framework for the Sustainable Development Goals. Such an indicator might assist in measuring progress on some of the principles proposed by FAO to define sustainable agriculture, but the indicator is of limited applicability in measuring progress on other principles, such as the conservation of natural resources, the resilience of communities and ecosystems, or the existence of an effective governance mechanism.
3 / Ensure healthy lives and promote well-being for all ages

SDG

Statistical Yearbook for Asia and the Pacific 2015