



Food and Agriculture
Organization of the
United Nations

2016

Asia and
the Pacific

**REGIONAL
OVERVIEW
OF FOOD
INSECURITY**

**INVESTING IN A ZERO
HUNGER GENERATION**

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FOREWORD

The year 2015 marked the end of the global Millennium Development agenda and 2016 heralds a transition to the new 2030 agenda for Sustainable Development. This new global compact recognizes the unfinished agenda of eradicating poverty and hunger and embraces a much bolder and wider agenda for sustainable development. The progress made by countries in this region in reaching the Millennium Development Goals (MDGs) was assessed in our 2015 report on Regional Overview of Food Insecurity. The news was very good. The region as a whole not only met the MDG target of halving the proportion of people suffering from hunger but was also the region with the largest reduction in the number of undernourished people in the world.

While we should take pride in our achievements, we must remain cognizant and committed to the equally daunting agenda ahead of us. Twelve percent of the region's population still remain hungry and there continue to be large disparities among sub-regions and countries in this regard. The analysis in this report shows that many countries in the region would need to pay more attention to agriculture sector growth, supporting diverse food systems, as well as public investment in quality health care, nutrition education, and sanitation if the goal of a hunger-free Asia and the Pacific by 2030 is to become a reality.

Our vision however needs to go beyond just the elimination of hunger. We must strive towards building a society that is healthy and well nourished. Unfortunately, and shockingly, about 30 percent of children under five years of age in the region are stunted due to inadequate nutrients intake. This represents a colossal human loss given the association between stunting and poorer cognitive performance in schools that leads to significant economic consequences. At the same time, many countries in the region are beginning to increasingly suffer from overweight and obesity. The report shows that despite good progress being made by many countries in tackling malnutrition, the overall rate of progress is less than desired, and there are several countries and subregions where the prevalence rates are still very high. Most governments are taking concrete actions to address the problem and there is a clear recognition of strengthening agriculture and food systems in a manner that brings more affordable, healthier and diverse food options within everyone's reach.

This report also introduces a special section which will focus on a different selected key issue or trend affecting food security and nutrition in the region each year. This year, the focus is on the importance of milk and smallholder dairy in view of the remarkable growth in the production and consumption of milk and milk products in the region. The section concludes that the promotion of milk consumption and small-scale dairying offers potential for triple wins in nutrition, rural livelihoods and the environment. However, the sector needs enabling policy and institutional support for smallholder dairying to be competitive in the marketplace, improving the safety and quality of milk, and managing the expansion of dairy farming such that negative impacts on the environment and public health are minimized.

In conclusion, as we transit this year to the 2030 agenda for Sustainable Development, we should recognize and celebrate the remarkable progress made by this region in sharply improving food and nutrition security. At the same time, we must renew our commitment to tackle the unfinished agenda of eradicating hunger, poverty and under-nutrition and addressing new challenges such as the growing pressure on natural resources, climate change, and the newer dimensions of malnutrition such as obesity and hidden hunger. In this quest for a better future, we must learn from our past successes and failures, question the conventional wisdom and ask new questions. This report does not provide all the answers but I hope that some of the analysis presented in the report and some of the questions raised will help encourage dialogue and shape a new public narrative towards eradicating hunger and malnutrition and creating a transformative change for sustainable development.



Kundhavi Kadiresan

Assistant Director-General and Regional Representative

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KEY MESSAGES

Many countries in the region met or exceeded the Millennium Development Goal (MDG) on hunger several years before the deadline. Going forward, to meet the 2030 hunger target of the Sustainable Development Goals, the challenge will be to fully eliminate the prevalence of undernourishment across the region and to achieve substantial reductions in other forms of malnutrition.

Progress in defeating hunger has slowed and we must pick up the pace. For many countries of the region, there was a slowdown in the rates of reduction in the prevalence of undernourishment during the past five years compared to the two decades prior; progress will need to accelerate in order to meet the zero-hunger goal by 2030.

A new tool to measure food insecurity is at hand. The *Food Insecurity Experience Scale* is a new and innovative approach to measuring the prevalence of food insecurity. It is based on direct responses of individuals about their access to food. This promising new tool permits a more disaggregated analysis of food insecurity by place of residence, gender and other factors.

The paradox of hunger and obesity side by side. Many countries in the region face the challenge of a triple burden of malnutrition whereby an inadequate intake of calories, micronutrient deficiencies and obesity prevail simultaneously. Obesity has been increasing rapidly in parts of the region.

Diets are shifting to more protein-rich foods, but that shift has consequences. Diets in Asia and the Pacific are undergoing rapid transition. Per capita rice consumption has declined and consumption of livestock products, fish, fruits and vegetables has grown rapidly. This trend requires that foods other than rice receive more investments in agricultural research and heightened policy attention.

Eliminating malnutrition means bringing everyone to the table. A more wide-ranging holistic and integrated approach is needed that involves more nutrition-sensitive interventions that bring agriculture, food security and nutrition interventions into the same space.

Meeting the challenges of feeding a hungry region by 2050 quite literally means putting more money where our mouths are. Most countries in the region are spending a smaller proportion of government budgets than is commensurate with the share of agriculture in their economies. Underinvesting in public agricultural research, according to commonly accepted indicators, is holding us back from making the changes required now and feed our families in the years to come. To meet the increasing demands upon agriculture and ensure food sustainably in the face of resource scarcity, climate variability and persisting malnutrition, more investment is vital.

More people are drinking milk and buying dairy products, but not everyone is benefitting. Milk consumption and smallholder dairy farming offer triple win potentials for nutrition, rural livelihood support and the environment. Public support (in the form of policies and institutions enhancing smallholder access to technology and markets) will be needed to enable small dairy producers to be competitive in the marketplace, to improve the safety and quality of milk marketed, and to manage and reduce some environmental concerns.

ABBREVIATIONS

AARR	Average Annual Reduction Rate	IUU	Illegal, Unregulated and Unreported
AOI	Agricultural Orientation Index	JETRO	Japanese External Trade Organization
APAARI	Asia Pacific Association of Agriculture Research Institutes	Lao PDR	Lao People's Democratic Republic
ARI	Agricultural Research Intensity	LKR	Sri Lankan Rupee
ASTI	Agricultural Science and Technology Indicators	MDG	Millennium Development Goals
BMI	Body Mass Index	NDP	National Dairy Development Plan of India
DALY	Disability Adjusted Life Year	NTFP	Non-timber Forest Product
EA	Eastern Asia	OECD	Organisation for Economic Co-operation and Development
ENSO	El Niño-Southern Oscillation	PSMA	Port State Measures Agreement
EMPRES	Emergency Prevention System	PoU	Prevalence of Undernutrition
EU	European Union	SDG	Sustainable Development Goals
FAO	Food and Agriculture Organization of the United Nations	SA	Southern Asia
FBD	Food-borne Disease	SEA	South-eastern Asia
FIES	Food Insecurity Experience Scale	TPP	Trans-Pacific Partnership
GDP	Gross Domestic Product	UN	United Nations
GHG	Greenhouse Gas Emissions	UNICEF	United Nations Children's Fund
GoB	Government of Bangladesh	UNIDO	United Nations Industrial Development Organization
GSSE	General Support Services Estimate	USA	United States of America
HHI	Hidden Hunger Index	US\$	United States Dollar
IDE	Institute of Developing Economies	WHA	World Health Assembly
IFPRI	International Food Policy Research Institute	WHO	World Health Organization
ILSI	International Life Sciences Institute	WPR	Western Pacific Region
INR	Indian Rupee	WTO	World Trade Organization

THE MDG EXPERIENCE AND THE ZERO-HUNGER CHALLENGE

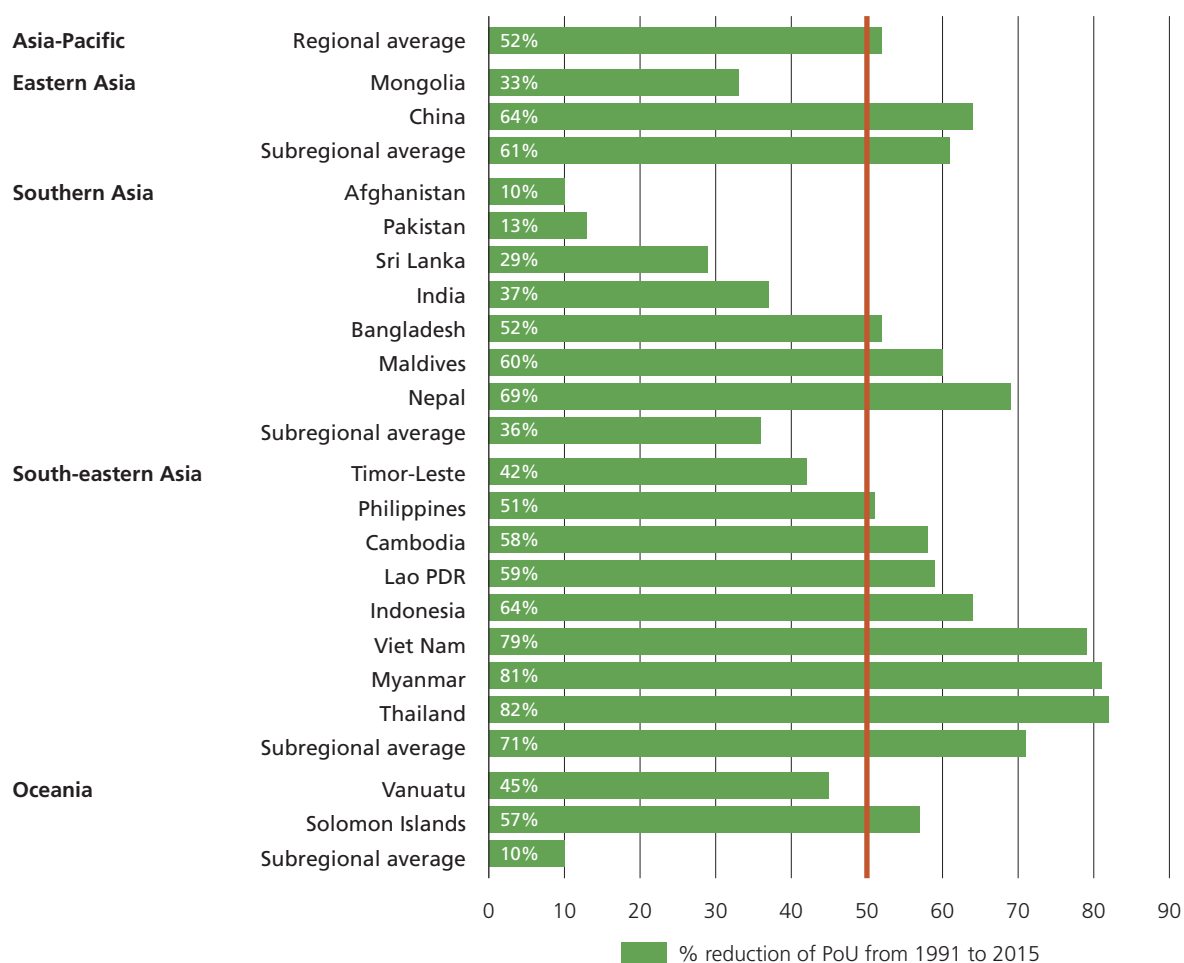


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Achievements in the Asia-Pacific region have had a strong bearing on global progress made towards the Millennium Development Goal (MDG) of reducing hunger. The region as a whole achieved the MDG on hunger (MDG Target 1C), halving the prevalence of undernourishment (PoU)¹ from 24.3 percent in 1990-92 to 12.3 percent in 2014-16. Nineteen of the 26 countries in the region attained the goal. Figure 1 shows reduction rates for individual countries and subregions (50 percent being the goal). By subregion, Eastern Asia and South-eastern Asia achieved the goal

but not Southern Asia and Oceania. Various analyses have shown that reduction rates are determined by several factors such as economic and agricultural growth, natural resources for food production, infrastructure, macroeconomic and sector policy environments, internal peace and security situations, and institutional stability. It is generally held that the better performance of countries in Eastern and South-eastern Asia was because of higher agricultural productivity growth, among other factors.

¹ The FAO PoU indicator was used to monitor progress towards MDG Goal target 1C of halving, between 1990 and 2015, the proportion of people suffering from hunger. Estimates of the number of undernourished people – calculated by multiplying the PoU with the size of the reference population – were used to monitor progress towards the World Food Summit goal of reducing by half the number of people suffering from undernourishment. The PoU indicator is defined as the probability that a randomly selected individual from the reference population is found to consume less than his/her dietary energy supply requirement (measured in calories) for an active and healthy life.

Figure 1 Percentage reductions by 2014-16 of the proportion of undernourished population from the level in 1990-92


Notes: Of the 26 countries monitored for Asia and the Pacific region, the figure shows data for 19 countries. The situation for the remaining seven is as follows: For three countries (Brunei Darussalam, Malaysia and Republic of Korea) the levels of the PoUs were already below 5 percent in 1991; three more countries (Fiji, Kiribati and Samoa) reached the target between 1991 and 2002; for the seventh, the Democratic People's Republic of Korea, the prevalence of undernourishment increased.

Source: FAO Food Security Indicators. The horizontal line shows 50 percent reduction rate, which is the MDG target.

A closer review of the trends in PoU showed that most countries made reductions. The performance over time varied markedly in most countries. Only some countries experienced sustained reductions with no reversals, including China,² Myanmar, Thailand and Viet Nam, while the paths taken by many more countries were a combination of short-lived rapid declines and slower reductions, with frequent reversals in between. For example, Bangladesh and Cambodia experienced reversals (increases in PoU) for some years early on in the 1990s, followed by periods of rapid declines and marked slowdowns since 2006. Indeed, for several countries, the prevalence rate worsened initially for some years after 1990-92, with the effect that the overall

rate of decline was lower for the decade of the 1990s than for the 2000s.

Table 1 summarizes the rate of reduction of the PoU for two periods – the best five years during 1991–2015 and the latest five years (2010–15). The results show that the rate of reduction for the best period was typically twice as good (or more) than performance over the past five years. This is reassuring in that a large proportion of the countries had indeed made impressive performances in one period or the other. On the downside, the results also show that the rate of progress could easily lapse to low levels or could even become negative, resulting in erosion of gains made in the

² Statistics for China used throughout this report are for the mainland only, i.e. excluding those for Taiwan Province and the Special Administrative Regions of Hong Kong and Macao.

good years. Attaining the SDG hunger target will not be possible without reversing these recent slowdowns. A simple extrapolation exercise of these trends showed that only nine countries would reach the target of eliminating hunger by 2030 even with their best historical rates; and it will take more than 25 years for six countries to achieve that goal (Table 2).³ The outlook looks worse with the most recent (2010–15) experience considering that the recent performance did not match their best performance in a large number of countries. In this scenario, only two countries would achieve the target in the next 15 years and 12 countries would require more than 25 years.

The purpose of the simple extrapolation exercise in Table 2 is to simply highlight the challenges that lie ahead. The fact that there is substantial variability in performance (both across countries and across time within any given country) also means there is ample opportunity to build on experiences within the region to accelerate progress. There is now fairly robust evidence to suggest that while economic growth is a necessary condition to deliver improved nutritional and other social outcomes, it is certainly not sufficient (FAO, 2012). In general, growth in agriculture is far more important for reduced undernourishment than growth of industry or services. In addition, public investment in provision of primary education and quality health care,

Table 1 Average annual rates of reduction of the prevalence of undernourishment during 1991–2015

Countries	Best five-year rate of reduction		Recent rate of reduction 2010–2015	
	Period	Rate of reduction (percent per annum)	Period	Rate of reduction (percent per annum)
Eastern Asia				
China	1992–1997	6.4	2010–2015	5.7
Mongolia	2006–2011	6.3	2010–2015	4.6
Southern Asia				
Afghanistan	2003–2008	8.7	2010–2015	-1.6
Bangladesh	1997–2002	10.9	2010–2015	0.9
India	2005–2010	5.8	2010–2015	0.6
Maldives	2008–2013	12.8	2010–2015	12.3
Nepal	2007–2012	10.5	2010–2015	5.2
Pakistan	1992–1997	3.2	2010–2015	-0.3
Sri Lanka	2010–2015	3.3	2010–2015	3.3
South-eastern Asia				
Cambodia	1999–2004	8.9	2010–2015	3.5
Indonesia	2008–2013	14.3	2010–2015	10.9
Lao PDR	2002–2007	7.0	2010–2015	4.1
Myanmar	2006–2011	11.8	2010–2015	6.8
Philippines	2004–2009	6.9	2010–2015	-0.8
Thailand	2002–2007	9.9	2010–2015	4.5
Timor-Leste	1999–2004	5.2	2010–2015	3.5
Viet Nam	1998–2003	8.9	2010–2015	5.4
Oceania				
Solomon Islands	1993–1998	8.8	2010–2015	-0.7
Vanuatu	1995–2000	7.6	2010–2015	-1.3
Simple Average		8.3		3.5

Source: FAO data. The rate of reduction is computed with a compound growth rate formula based on the PoU values for the start and end years of a given period.

³ Elimination of hunger was assumed to correspond to the PoU of 3 percent. Although this figure is to some extent arbitrary, it is identical to the target established by the World Bank Group for the global headcount ratio of extreme poverty in 2030 (World Bank 2013a). This does not represent an official definition of Zero Hunger, as FAO does not report country-specific PoUs below 5 percent due to the high degree of uncertainty surrounding estimates in the neighbourhood of that level. The SDG target is zero hunger by 2030.



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nutrition education, and providing sanitation, sewage and safe drinking water are also crucially important. Available evidence further suggests that higher food prices can also significantly increase the rate of undernourishment as low-income people at risk of undernourishment generally spend a large share of income on food, and most of them buy more food than they sell (Warr, 2014). Hence, it is essential to invest in measures to enhance food production and availability at similar or, preferably, declining food prices. This means investment in sustainable improvements in agricultural productivity (especially on smallholder and family farms) must become an essential component of government programmes and policies aimed at food and nutrition security.

Finally, as is often the case with a number of social indicators, as the prevalence rate falls to low levels, it becomes increasingly difficult to reduce them further. This relationship also applies for the PoU. For 42 episodes of the reduction rates analysed, the relationship between the initial PoU and the reduction rate is positive and statistically significant. This means that those countries with lower levels of the PoU in 2015 will need to make extra efforts compared with the past to eliminate hunger by 2030. Among other things, this will require explicit recognition of hunger goals in national development plans and improved coordination of resources and actions across the concerned ministries.

Table 2 Distribution of countries based on expected time of achieving a target of 3 percent PoU based on historical rates of reduction

	Number of countries that will reach the target			
	by 2030	between 2030 and 2035	between 2035 and 2040	after 2040
With best reduction rate	9	2	2	6
With recent reduction rate	2	3	2	12



FOOD INSECURITY AS EXPERIENCED BY PEOPLE: THE FOOD INSECURITY EXPERIENCE SCALE



This section presents the results of the application of the *Food Insecurity Experience Scale* (FIES) through the “Voices of the Hungry” project.⁴ FAO collected the FIES data through the Gallup World Poll in more than 140 countries and territories for the first time in 2014, and plans to do so annually until 2018, with the aim to establish the FIES as a global standard for measuring the food insecurity of households or individuals (FAO, 2016a). As the FIES has recently been endorsed by the United Nations Statistical Commission as one basis for measuring progress against indicator 2.1.2 (*Prevalence of moderate or severe food*

insecurity in the population) of SDG target 2.1, the ultimate objective is that all countries will collect and analyse their own experience-based food insecurity official data and use them for national, regional and global reporting.

This is the first attempt at applying this concept globally, and one purpose of disseminating the results is to demonstrate how this innovative approach to measuring the extent of food insecurity can be applied at a very limited cost throughout the world.

⁴ Further details on this project can be found at <http://www.fao.org/in-action/voices-of-the-hungry/en/#.V8Zfkl96V4>

The Food Insecurity Experience Scale

Unlike many current indicators of hunger and food insecurity that are derived from food consumption or similar data, the FIES establishes a metric for the severity of the food insecurity condition of individuals. The metric is calculated based on people's direct responses to questions regarding their access to food of adequate quality and quantity. The FIES is an experience-based indicator and aims to become a key complement to the existing suite of food security indicators by better capturing the access dimension of food security. Compared to other indicators of food security, experience-based indicators stand out because of their ease of administration, comparatively low cost and timeliness of reporting. The FIES based indicators also have the advantage of being formally comparable across countries.

The FIES Survey Module is composed of eight questions with simple dichotomous responses ("yes"/"no"). Respondents are asked questions such as whether anytime during a certain reference period they have worried about their ability to obtain enough food, their household has run out of food, or if they have been forced to compromise the quality or quantity of the food they ate due to limited availability of money or other resources (see Box 1 for specific questions). Based on the responses, two prevalence rates are derived using two appropriately selected thresholds: the *Prevalence of Experienced Food Insecurity at moderate or severe levels* ($FI_{mod+sev}$)⁵ and *Prevalence of Experienced Food Insecurity at severe levels* (FI_{sev}).

One question that readers might ask is: Why is FAO proposing an additional indicator of access to food? The answer stems from the innovations brought about by the new 2030 Agenda for Sustainable Development. In moving from the MDGs to the SDGs, there have been two developments that call for a need to go beyond the level of information that can be provided by the PoU, the main MDG indicator for hunger. First, the ambition now is no longer to reduce the number of those who suffer from hunger, but to *eradicate* hunger, which means indicators are needed that can potentially capture even very low percentages. Given the type of data used, PoU estimates are considered reliable for measuring hunger above a level of 5 percent, below which the degree of uncertainty surrounding the estimates is generally too large to draw inferences on further reductions. The PoU alone is thus clearly insufficient to monitor a goal of zero hunger. Second, and related to the "leave no one behind" approach to development that inspires the 2030 Agenda, indicators need to be disaggregated at the subnational level to the maximum possible extent, identifying not only the number of people with food insecurity, but also who they are and where they live. The FIES is capable of providing this type of information, particularly when administered in national surveys of households or individuals. The survey module is simple to administer at a low cost, and the results for diverse population groups are comparable.

Box 1 The eight key questions of the FIES survey

During the last 12 months, was there a time when:

- 1 You were worried you would not have enough food to eat because of lack of money or other resources?
- 2 You were unable to eat healthy and nutritious food because of lack of money or other resources?
- 3 You ate only a few kinds of foods because of lack of money or other resources?
- 4 You had to skip a meal because there was not enough money or other resources to get food?
- 5 You ate less than you thought you should because of a lack of money or other resources?
- 6 Your household ran out of food because of a lack of money or other resources?
- 7 You were hungry but did not eat because there was not enough money or other resources for food?
- 8 You went without eating for a whole day because of a lack of money or other resources?

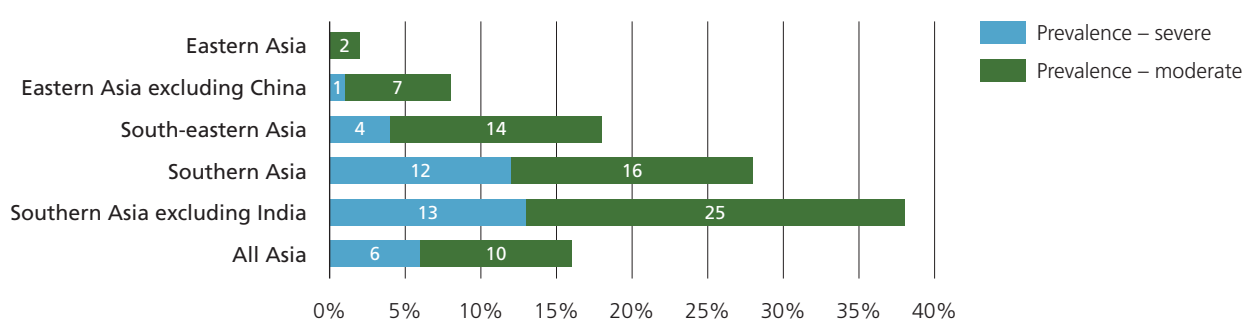
⁵ *Prevalence of Food Insecurity at moderate or severe levels* refers to combined estimates of both the percentage of the population in a situation of moderate food insecurity plus the percentage with severe food insecurity.

The prevalence rates for experienced food insecurity in Asia

The first global FIES survey by FAO covered only 18 countries from Asia (FAO, 2016a) (none from the Oceania region).⁶ Based on those data, Figure 2 shows the provisional estimated prevalence rates for three subregions of Asia (weighted by population size). It shows that the estimated prevalence rate is highest for Southern Asia. Excluding India, which weighs heavily in the average, the prevalence rate for

the rest of the Southern Asian countries increases markedly. For South-eastern Asia, the prevalence rate for $FI_{mod+sev}$ is much lower than that for Southern Asia due to a much lower rate for FI_{sev} . In contrast to these two subregions, the prevalence rate for Eastern Asia is very low, just over 2 percent for $FI_{mod+sev}$. Overall, the FIES survey found large variations across countries in the estimated prevalence rates – from 2 percent to 53 percent in Asia and from 2 percent to 92 percent at the global level.

Figure 2 Estimated prevalence rates for experienced moderate and severe food insecurity for Asia (2014-2015 averages)



Source: FAO. The subregional aggregates include the following countries: China (mainland), Mongolia and Republic of Korea in Eastern Asia; Afghanistan, Bangladesh, India, Nepal, Pakistan and Sri Lanka in Southern Asia; and Cambodia, Indonesia, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Viet Nam in South-eastern Asia.



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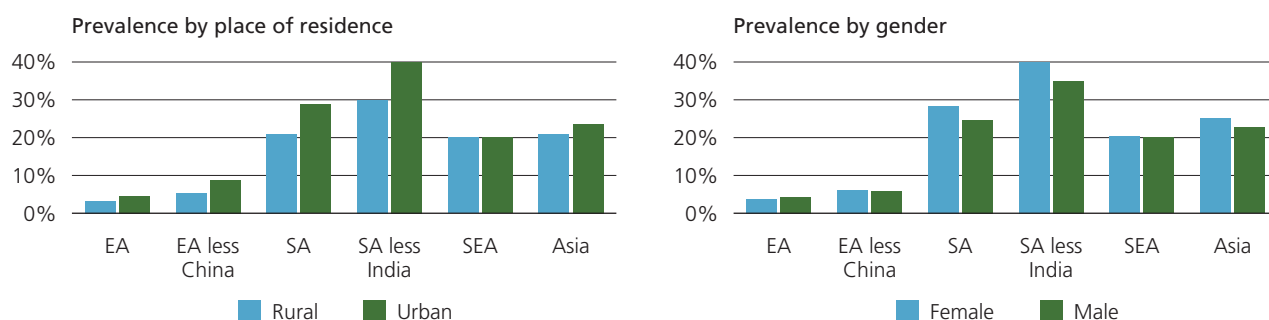
⁶ The Gallup World Poll reaches about 150 countries annually, with the aim of representing 90 percent of the world's population. For this reason, the Pacific Island States are not included due to the combination of their limited population size and the relatively higher cost of surveying in those countries.

The Gallup World Poll that generated the FIES data is based on interviews with an individual in a household, and thus the respondent could be male or female. It also identifies the location of the household. Thus, the data enable disaggregating the prevalence by location (rural/urban) and gender (male/female) of the respondent. To illustrate the nature of the results, Figure 3 shows estimated prevalence rates for $FI_{mod+sev}$ by location and gender. By place of residence, respondents in urban areas seem to feel more food insecure than in rural areas. The difference is about 3 percentage points for Asia as a whole (21 percent in rural areas versus 24 percent in urban areas) but much higher for Southern Asia (a difference of 8 percentage points). The greater “experienced insecurity” in urban areas may be surprising to some, as food insecurity is often measured as higher in rural areas. It may be possible to explain this apparently counterintuitive result in terms of stronger

informal social protection networks in rural areas, rural-urban differences in the price of food or less direct access to land in urban areas. Such an analysis would, however, require FIES data to be part of larger surveys that collect data on income and other relevant variables; and hence, FAO is recommending that the countries include the FIES module as part of their national household surveys.

By gender, the results show that the prevalence rate as experienced by females is slightly higher than that felt by males, but the difference is small and indeed almost none for Eastern and South-eastern Asia. The difference is more substantial in Southern Asia, however. These are results from the first-ever surveys, and there is much analytical work that needs to be done to understand and explain these variations.

Figure 3 Estimated prevalence rates for experienced moderate and severe food insecurity by place of residence and gender of the respondent



Source: FAO. The subregions in the figure are Eastern Asia (EA), Southern Asia (SA) and South-eastern Asia (SEA).





Relationship between experienced food insecurity and the prevalence of undernourishment

The FIES and the PoU are conceptually different, and therefore, the two indicators should be looked at in combination and not confounded with each other. While the PoU measures food insecurity based on the availability of food in a country, it has more difficulty capturing other aspects, particularly access to food. The FIES provides more direct evidence on the access dimension of food security. There are also other differences.⁷ At the same time, and as expected, the two measures are strongly correlated. For 135 datasets, Spearman's rank correlation coefficient between $FI_{mod+sev}$ and PoU was 0.76. Comparable figure for the 18 Asian countries was 0.52. The data also showed that, as expected, the prevalence of $FI_{mod+sev}$ exceeded the PoU levels for 13 of the 18 countries.

Because the two indicators refer to different concepts and the estimates come from completely different data and methods, differences are expected. However, values of PoU larger than experienced food insecurity at moderate and severe levels and large differences between the FI_{sev} and PoU should raise concerns. The FAO analysis of the data (FAO, 2016a) provides plausible reasons for a number of countries, which include six from Asia. The explanations given include, for some countries, a lack of recent food consumption data to reliably assess the extent of inequality in food distribution, which creates more uncertainty in PoU estimations. In other cases, questions have been raised about the accuracy of food availability data as estimated from food balance sheets. In a couple of cases, there are known issues

with the results of the FIES survey due to the relatively small size of the samples used in the Gallup World Poll, e.g. very few affirmative responses to the most severe items in the scale to estimate the severity of those items and therefore to conduct a reliable equating (thus possibly underestimating FI_{sev}).

The FIES indicator is promising, but its success will depend on many more countries adopting the indicator in their own household surveys

In conclusion, the results from the first ever application of the FIES at global level is encouraging. Even though all necessary steps were taken to ensure that the best possible methodologies for data collection, validation and analysis were used, and therefore the results should be reliable, these results are – for most countries – based on the relatively small samples of data collected through the Gallup World Poll. Thus the results are still subject to relatively wide margins of error. It will probably require two to three years of data collection and analyses before some of the extant issues are resolved and clarified. FAO is encouraging statistical agencies in all countries to adopt the FIES at a similar scale within large-scale surveys. With more countries engaging in similar work, and, upon further refinements, it is hoped that future official FAO assessments of food insecurity in the world will be based, to the maximum possible extent, on official national data. The FIES can be easily applied within large-scale individual or household surveys that are representative of subnational population groups, and therefore yield reliable estimates of very low national level prevalence rates.

⁷ The differences are highlighted at length in the material available through the Voices of the Hungry webpage at <http://www.fao.org/in-action/Voices-of-the-Hungry>. See in particular the Frequently Asked Questions.

THE TRIPLE BURDEN OF MALNUTRITION



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According to the Rome Declaration of the International Conference on Nutrition in 2014, progress has been made in recent decades on food security and nutrition, but this has been modest and highly uneven, as summarized below:

- ▶ While the PoU has declined, the absolute numbers of those who suffer from chronic hunger remain unacceptably high (805 million people in 2012-2014).
- ▶ While chronic malnutrition as measured by stunting has declined, some 161 million children below five years (under-five children) were still affected in 2013.
- ▶ Acute malnutrition, measured by wasting, still affected 51 million of under-five children in 2013.
- ▶ Undernutrition was the main underlying cause of death among under-five children, responsible for 45 percent of all child deaths globally in 2013.
- ▶ Over 2 billion people suffer from “hidden hunger”, or micronutrient deficiencies, particularly vitamin A, iodine, iron and zinc.
- ▶ Overweight and obesity among both children and adults have been increasing rapidly in all regions, with 42 million under-five children also affected by overweight in 2013 and over 500 million adults affected by obesity in 2010.
- ▶ Dietary risk factors, together with inadequate physical activity, account for almost 10 percent of the global burden of disease and disability.

The prevalence of various forms of malnutrition, namely undernutrition, micronutrient deficiencies, as well as overweight and obesity is aptly characterized as the triple burden of malnutrition. Most countries suffer from this triple

burden, with many lower-income countries in particular beginning to suffer from rapidly rising trends in overweight and obesity even before malnutrition is reduced to low levels. This presents a unique challenge.

This section reviews the state of the triple burden in three subsections. The first two subsections review undernutrition among under-five children and micronutrient deficiencies (hidden hunger), while the third subsection focuses on overweight and obesity.

Undernutrition among children under five years of age

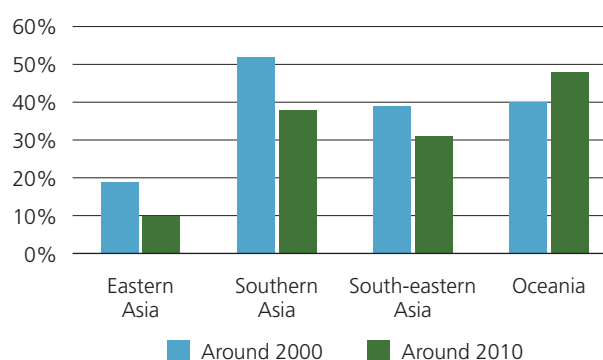
The three most commonly used indicators of child undernutrition are stunting (low height for age), wasting (low weight for height) and underweight (low weight for age). The latter was used by the MDG while the SDG includes targets on stunting and wasting. Among the three indicators, stunting is increasingly being given more prominence by programme planners as the indicator of choice for measuring under-five malnutrition and an important risk marker of poor child development. Stunting, particularly before two years of age, has been shown to predict poorer cognitive and educational outcomes and has significant educational and economic consequences, including increased risk of degenerative diseases.

Globally, the prevalence rate of stunting is estimated to be about 25 percent, or 165 million stunted children, 80 percent of whom are living in just 14 countries, with Sub-Saharan Africa and Southern Asia home to three-fourths of the total. The prevalence rate declined from 40 percent in 1990 to 26 percent in 2011 (36 percent reduction). The steepest decline was recorded for Eastern and South-eastern Asia, mainly due to substantive improvements made in China. Elsewhere, stunting reduced by half in Latin America and the Caribbean region, and by over one-third in South Asia, the Near East and North Africa regions. As for wasting, 52 million under-five children are estimated to be moderately or severely wasted at the global level in 2011. The prevalence of underweight was about 16 percent globally in 2011.

Many countries of the Asia and the Pacific region made impressive progress in reducing the prevalence of under-five stunting, but the prevalence rate still remains too high

Approximately 30 percent of children under-five in the Asia and the Pacific region are stunted, with the burden increasing to 38 percent in Southern Asia⁸ and 48 percent for Oceania⁹ (Figure 4). Between 2000 and 2010, the prevalence of stunting decreased from 41 percent to 30 percent, with declines for 18 of the 24 countries (Table 3). Based on annual average reduction rates (AARR),¹⁰ China, the Democratic People's Republic of Korea, Maldives, Mongolia, and Viet Nam recorded the most impressive performance in reducing the prevalence of stunting. The AARR in these countries exceeded 5 percent per annum. These were followed by Bangladesh, Nepal, Cambodia, Malaysia and India with AARRs between 2 and 5 percent. Despite the impressive reductions, however, prevalence levels remain high, and given the region's large population, it still accounts for a very large share of the global burden of stunting.

Figure 4 Prevalence rates of stunting among under-five children in 2000 and 2010, Asia and the Pacific region



Source: UNICEF-WHO-WB database.

⁸ The very high prevalence rate of 48 percent for India is based on the 2006 survey results. India's new 2014 survey shows a prevalence of 39 percent, which markedly reduces the Southern Asian average to 38 percent

⁹ Because the regional averages are weighted by population size, Papua New Guinea plays a dominant role in figures for Oceania, even larger than that played by China in Eastern Asia and India in Southern Asia.

¹⁰ AARR is a compound growth rate computed with data for two periods. Many studies on malnutrition, e.g. from the World Health Organization (WHO) and United Nations Children's Fund (UNICEF), as well as IFPRI's Global Nutrition Reports, use this measure for assessing progress.

Table 3 Country-level prevalence rates for stunting among under-five children

Sub-region	Countries	Prevalence (%)	
		Around 2000	Around 2010
Eastern Asia	China	17.8	9.4
	DPR Korea	51.0	27.9
	Mongolia	29.8	10.8
South-eastern Asia	Cambodia	49.2	32.4
	Indonesia	42.4	36.4
	Lao PDR	48.2	43.8
	Malaysia	20.7	17.2
	Myanmar	40.8	35.1
	Philippines	38.3	30.3
	Thailand	15.7	16.3
	Timor-Leste	55.7	57.7
	Viet Nam	43.4	18.4
Southern Asia	Afghanistan	53.2	40.9
	Bangladesh	59.9	36.1
	Bhutan	47.7	33.6
	India	54.2	38.7
	Maldives	31.9	20.3
	Nepal	57.1	37.4
	Pakistan	42.5	45.0
	Sri Lanka	18.4	14.7
Oceania	Fiji	7.5	–
	Papua New Guinea	43.9	49.5
	Solomon Islands	–	32.8
	Vanuatu	25.7	28.5
Asia and the Pacific		40.7	29.5

Given recent rates of progress on reducing stunting, only six countries in the region are likely to meet the 2025 global target on stunting

The International Food Policy Research Institute's (IFPRI) Global Nutrition Report 2014 (IFPRI, 2014) assesses prospects of individual countries meeting the 2025 target on stunting set by the global World Health Assembly (WHA). The global target is to reduce the number of stunted children by about 38 percent, from 162 million in 2012 to about 100 million by 2025, thus lowering the prevalence

to 15 percent. Targets for individual countries were derived from this global target and the prospect for reaching the target assessed by comparing required AARR to the observed AARR for the recent period. The study finds that, at the global level, only 21 of the over 100 countries assessed were on course to meet their own target, and that the global target of reducing stunting by 40 percent would not be met as recent progress, when extrapolated, would only result into a 20 percent reduction.

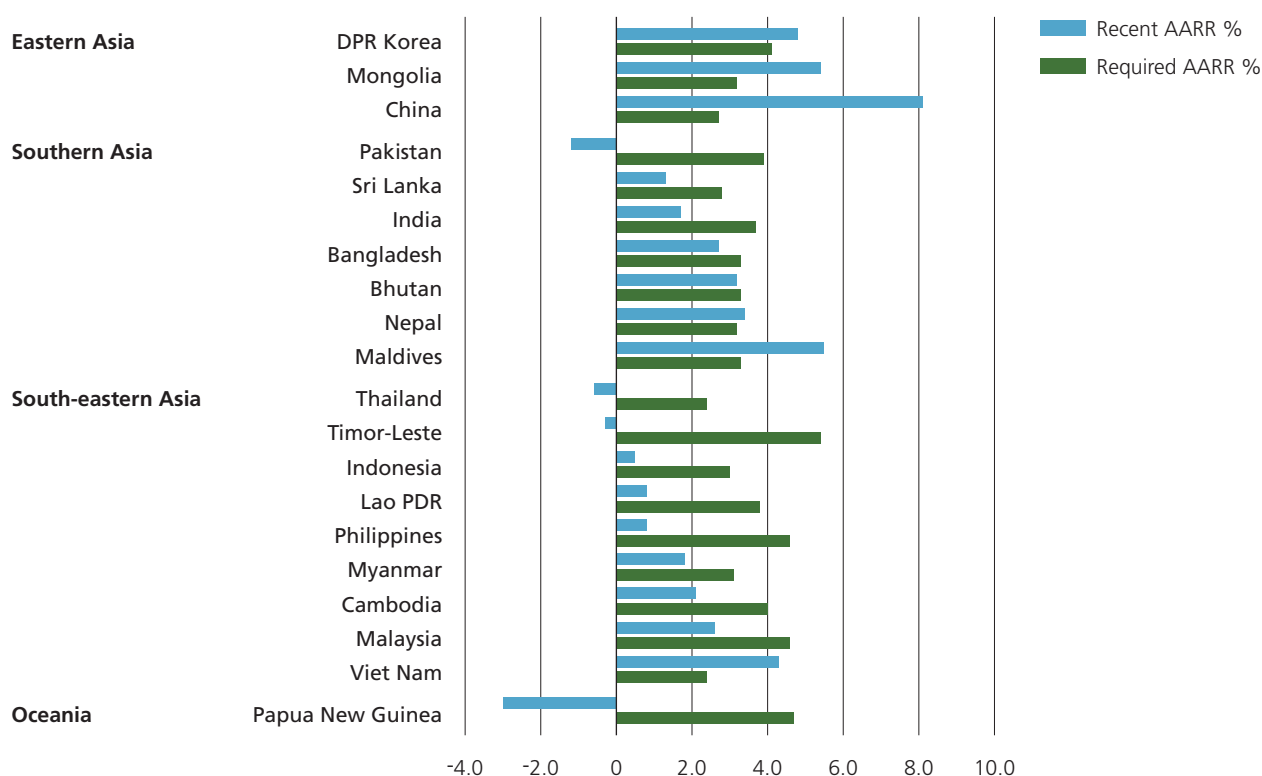
Figure 5 presents these assessments for 20 countries of the Asia and the Pacific region. It shows that only six countries are projected to meet the 2025 target, as their recent observed AARRs exceed the required rates. They are China, the Democratic People's Republic of Korea, Maldives, Mongolia, Nepal and Viet Nam. Bhutan is off course but only marginally, while results from a fresh 2014 survey (not incorporated in the figure) show that Bangladesh also will be on course. New surveys also show considerably lowered prevalence for stunting for Cambodia, India and Indonesia, but not adequate enough to meet the 2025 target.

Responding to stunting and other forms of child undernutrition

As noted earlier, economic growth alone is not sufficient to improve nutrition outcomes. Non-income determinants, such as public investment on sanitation, availability of safe drinking water, primary education, maternal education, etc. also play an important role. For example, an analysis by the World Bank shows that most Southern Asian countries underperformed on undernutrition given their achievements on poverty reduction and income growth (World Bank 2013b). For this reason, most recent recommendations for public policy stress two categories of interventions: nutrition-specific and nutrition-sensitive. The former are actions that have a direct impact on the prevention and treatment of undernutrition (such as targeted supplementary feeding, breastfeeding, distribution of micronutrient powders, etc.). The latter pleads for ensuring that different programmes with a direct bearing on access to adequate, safe and diversified foods all year long, such as those in agriculture, education, social protection and gender incorporate nutrition considerations. Nutrition now attracts a great deal of attention in development policy. Yet, the subsector continues to be grossly underinvested. The World Bank estimates that US\$10.3 billion per year is required to fund the scaling up of effective nutrition programmes globally (World Bank 2013b). The global Scaling Up Nutrition movement, initiated in 2010 with over 30 countries from Africa, Asia and Latin America in the movement, has contributed to raising the visibility of nutrition.¹¹

¹¹ From the Asia and the Pacific region, the countries that have joined the SUN movement include Bangladesh, Cambodia, Indonesia, Lao People's Democratic Republic, Myanmar, Pakistan, Papua New Guinea, the Philippines, Sri Lanka and Viet Nam.

Figure 5 How many countries are on course to meet the WHA stunting target for 2025?



Notes: The graph shows the following: If recent AARR exceeds the required AARR, the country is on course to meet the WHA target for 2025 (e.g. the six left-most countries); otherwise, the country is not on course.

Source: Based on the data in Appendix 3 of IFPRI's Global Nutrition Report 2014 (IFPRI 2014).

In addition, with FAO and WHO as lead, the UN has also declared 2016–2025 the Decade of Action on Nutrition, which aims to mobilize actions for reducing hunger and improving nutrition globally.

Micronutrient deficiencies: The hidden hunger

Micronutrient deficiency is a form of undernutrition that occurs when intake or absorption of vitamins and minerals (such as vitamin A, iron, iodine and zinc) is too low to sustain good health and development, leading to mental impairment, poor health, low productivity and even death. This is referred to as hidden hunger because it is invisible with a lack of overt and evident symptoms of one or more deficiencies. Many factors cause hidden hunger, including inadequate dietary intake, infectious disease, impaired nutrient absorption, and inadequate micronutrient intakes during certain life stages such as pregnancy, lactation, and infancy.

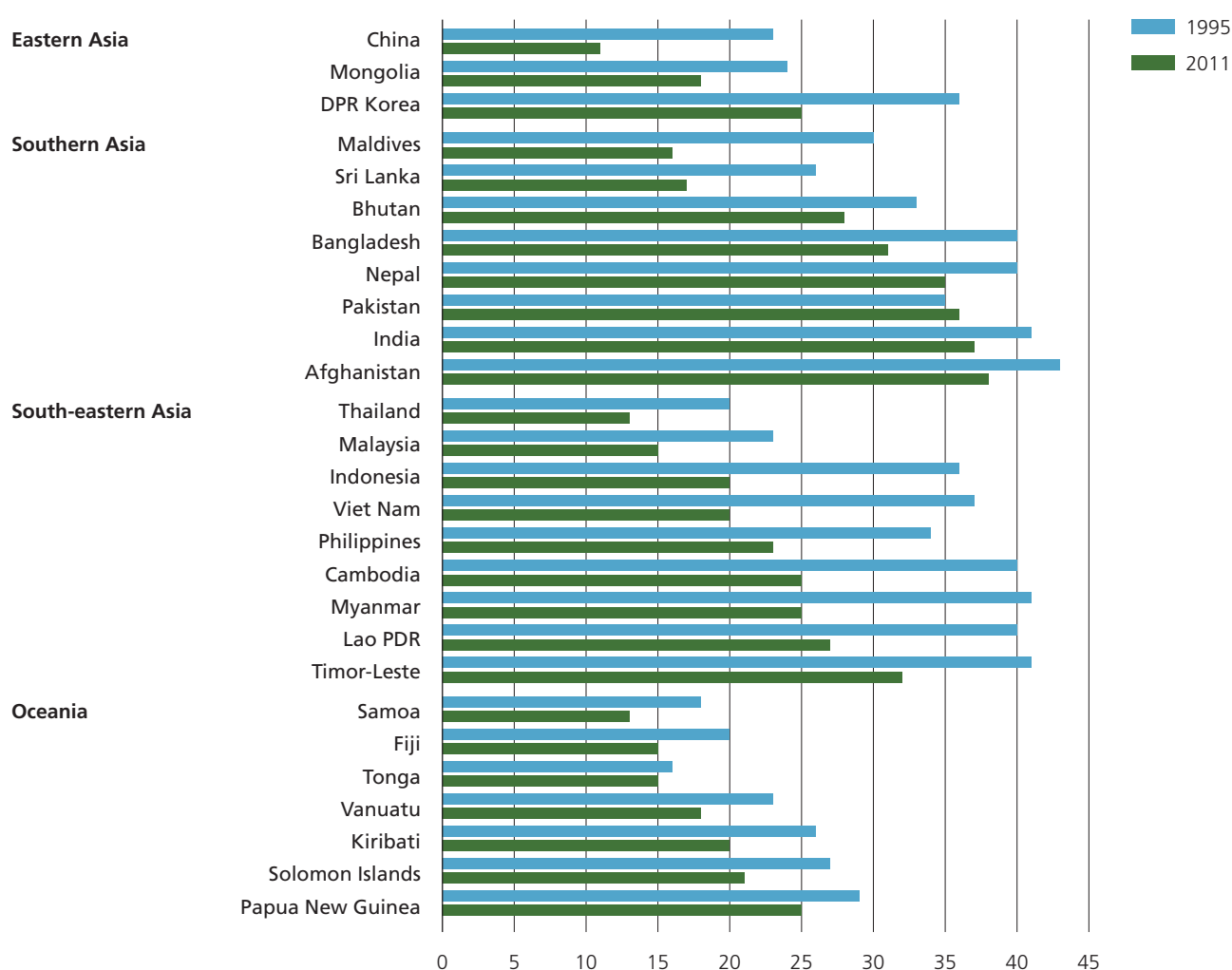
Micronutrient deficiencies afflict over 2 billion individuals globally (FAO, 2013), with pregnant women and young children affected the most. Iron deficiency is among the most widespread nutritional deficiencies in the world, affecting 1.62 billion people of all life stages (Ruel-Bergeron *et al.*, 2015). Although zinc status is difficult to measure accurately, 17 percent of the world's population is estimated to be at risk of zinc deficiency, as measured by the availability of zinc in the national diet. It is also estimated that 190 million preschool children and 19 million pregnant women suffer from subclinical vitamin A deficiency.

Many countries in the region markedly reduced hidden hunger between 1995 and 2011, but progress has been uneven across countries

The current state of hidden hunger and the recent progress in reducing the phenomenon is reviewed here based on the global Hidden Hunger Index (HHI),¹² which is a composite

¹² The HHI is a composite index that weights equally three micronutrients: iron-deficiency anemia, vitamin A and zinc deficiency, which are proxied by the prevalence of stunting among under-five children. The HHI is available for 138 countries and covers 16 years (1995–2011). After rescaling, the HHI scores are grouped in terms of severity as follows: mild between 0 and 14.9, moderate between 15.0 and 24.9, severe between 25 and 39.9, and alarmingly high between 40 and 100. Country-level data on HHI for 1995 and 2011 are available in the public domain in Table S1, as part of the paper published by Ruel-Bergeron *et al.* (2015).

Figure 6 Hidden Hunger Index (HHI) in 1995 and 2011, Asia and the Pacific region



Source: Ruel-Bergeron *et al.* (2015).

index of the prevalence of three common micronutrient deficiencies: iron-deficiency anaemia, vitamin A and zinc. The results show that globally, the HHI declined in 100 countries over the 16-year period but increased in 38 countries. The average net change in HHI during 1995 and 2011 was a decline of 6.7 percentage points. Africa was the only region to experience an overall increase in hidden hunger, while the Eastern Asia and the Pacific regions were the top performers, with a net change of -13 percentage points. Improvements in HHI were mostly due to reductions in zinc and vitamin A deficiencies, while anaemia due to iron deficiency persisted and even increased.

Figure 6 shows the results for 27 countries of this region for two periods, 1995 and 2011. Three highlights in particular may be noted. First, eight countries had, in 1995, an HHI of over 40, classified as “alarming” (Afghanistan, Bangladesh, Cambodia, India, Lao People’s Democratic Republic, Myanmar, Nepal and Timor-Leste) and none under 15 (“mild” category); by 2011, none were in the “alarming”

group, while three graduated to the “mild” category (China, Samoa and Thailand). Second, 9 of the 27 countries reduced their HHI by 10 percentage points or more from 1995 to 2011 (in order, Viet Nam, Indonesia, Myanmar, Cambodia, Maldives, China, Lao People’s Democratic Republic, Democratic People’s Republic of Korea and the Philippines). At the other end, reduction rates were five points or lower for 11 countries. Third, the data also reveal (not shown in the figure) that for 25 of the 27 countries, the rates of reduction were faster during the first eight years (1995–2003) than during the last seven years (2004–2011), although the “deceleration” was marked for only about nine of them. While deceleration of the rate of growth is fairly common to many series in food and nutrition security indicators, this is also an indication that more efforts than previously are needed to maintain the momentum.

The analysis by Ruel-Bergeron *et al.* (2015) of the components of the HHI shows that the relative contribution of the individual micronutrient deficiencies to the HHI score

depends on the severity of the hidden hunger. Thus, where it is severe (HHI>25), zinc and vitamin A deficiencies generally contributed relatively more to the HHI score than iron deficiency anaemia. As countries improve on HHI, anaemia due to iron deficiency accounted for a greater – and often increasing – proportion of the HHI than zinc or vitamin A deficiencies. This pattern demonstrates that much of the progress in the reduction of hidden hunger over time is attributable to reductions in zinc and vitamin A deficiency rather than in anaemia. An example is Bangladesh where, between 1995 and 2011, the prevalence of zinc deficiency declined from 65 to 38 percent, the prevalence of vitamin A deficiency declined from 37 to 31 percent, but the prevalence of iron-amenable anaemia increased from 19 to 24 percent.

The most commonly identified response measures fall under four categories: (i) diversifying diets; (ii) fortifying commercial foods; (iii) supplementation and iv) biofortification

Diversifying diets is the most effective way of sustainably addressing malnutrition, including hidden hunger and obesity. Income growth is strongly associated with dietary diversity, but the experience with increasing obesity indicates that switching to healthier diets also requires other food-based interventions as well as awareness and education. While income-induced dietary diversity takes time, the fortification of staple foods is pursued by most countries to address acute deficiencies due to proven high cost-effectiveness. A successful example of this is the spread of iodized salt. Wheat fortified with B vitamins is also available in many places. The 2012 Copenhagen Consensus on Hunger and Malnutrition ranked food fortification among the top three global development priorities (Sight and Life, 2012). In many cases, however, commercially fortified foods do not reach all households and target groups, especially in rural areas, and the direct provisioning of micronutrients through supplementation becomes essential. The distribution (as opposed to the production) of supplements can be expensive, however. As a result, biofortification, which is the breeding of food crops, using conventional or transgenic methods to increase their micronutrient content – has potential for reaching rural areas in a more cost-effective manner. Examples of biofortified crops in the region include iron-fortified pearl millet in India, zinc-fortified wheat in India and Pakistan, zinc-fortified rice in Bangladesh and India, and golden rice (high in vitamin A precursors, but not yet released to farmers). None of these are transgenic, with the exception of golden rice. Where biofortified crop varieties are accepted and produced in large scale, this becomes a steady source of certain micronutrients for people not reached by other interventions, especially those from rural areas. These are not mutually exclusive responses, and so all four interventions are found to exist in most countries.

Responses to micronutrient deficiencies in the region include promoting safe and diversified food consumption, integrated home food production systems, school gardens and food fortification programmes

As mentioned, all governments promote availability, affordability, accessibility and consumption of diverse, safe, culturally appropriate foods and diets as one key objective of national food and nutrition programmes. Examples of specific interventions in this area include the promotion of integrated home food production systems and school gardens linked to school feeding programmes. For example, the Philippines' National Plan of Action for Nutrition promotes Food Always at Home (FAITH) – a concept introduced by Baptist missionaries in Pagsalang, Davao del Sur using a technology that demonstrates that even with a 1 square metre garden, a variety of vegetables and fruits can be grown and made available year round. This helps institutionalize home gardens as an effective strategy for improving nutrition.

Dietary transitions have been taking place in most Asian countries, especially where income growth has been rapid (Mazzocchi *et al.*, 2012). However, dietary diversification has not necessarily always been positive, as shown by rising incidences of obesity and overweight linked to the consumption of unhealthy food (see below the subsection on overweight and obesity). Thus, nutrition education and awareness programmes supported by necessary policy and legislative support have an important role to play (see, for example, Box 2 on Mongolia). Similarly, the Government of Bangladesh has formulated the National Nutrition Policy (NNP, 2015), whose main objective is to improve the nutritional status of people through ensuring availability of adequate and safe food as well as the diversification of diets. The NNP adopts a multi-sectoral approach, and nutrition is incorporated into agriculture extension, social protection and food security. As part of this new policy, two nutrition-related programmes have been launched and are being implemented since 2015: nutrition specific/direct interventions and nutrition-sensitive indirect interventions. Nutrition direct interventions target children and aim to promote breastfeeding during the first six months. On the other hand, indirect nutrition interventions are aimed at promoting food-based dietary guidelines, increasing investments in nutrition-sensitive agriculture, etc. (FAO, 2016b). With emphasis on promotion of indigenous, nutrient-rich fruits and vegetables, as well as small animals and fish, there is increasing evidence of an impact on improving diets. Yosef *et al.* (2015) tracked agriculture-nutrition pathways in Bangladesh and highlighted a number of positive outcomes of such interventions in improving nutrition status in general and reducing micronutrient deficiencies in particular.

Box 2 Institutionalization of nutrition sensitive interventions in Mongolia

The “Enhancing Food and Nutrition Security of Vulnerable Segments of the Population of Mongolia through Capacity building in Small-Scale Vegetable Production” project was implemented between 2010 and 2013 in Mongolia, with financial support from the European Commission (EC) and FAO. The project aimed at enhancing the food and nutrition security of the poorest through social mobilization, technical capacity development, promoting dietary diversification and assisting the Government to improve its food and nutrition security policies and programmes. According to the baseline survey, about one out of every two households in the target population ate only one meal a day. Flour, flour products and meat dominated the food basket with little consumption of fruits and vegetables.

One major aspect of the project was the promotion of production and consumption of vegetables not generally grown by local farmers. For this purpose, the project provided seeds of 26 different vegetable varieties to farmers and the necessary knowledge and technologies to cultivate and process them. As a result, the number of generally planted vegetables increased from three to eight. To promote a more diverse and balanced diet among farmers, the project organized several sensitization and nutrition education events, which led to the number of vegetables routinely consumed increasing from three to seven.

The next challenge was to scale up and institutionalize this experience at the national level. Before the project began, there was no single management and institutional system to plan, coordinate and assess food and nutrition security activities and programmes in Mongolia. Separate issues (production, processing, consumption, health awareness, etc.) were managed and monitored separately by separate agencies with little coordination, if any. To bring more coherence to food security interventions, the Mongolian Ministry of Industry and Agriculture, the Mongolian Food Producers’ Association and FAO jointly organized a national forum and shared the experience from the project with a range of stakeholders including policy-makers.

This forum was followed up by a high-level discussion on food and nutrition that involved the Parliamentary Standing Committee on Nature, Environment, Food and Agriculture as a joint organizer. The purpose was to raise awareness among policy-makers about the economic and health benefits of nutritional, micronutrient-rich food and the economic benefits of promoting the production of micronutrient- and fibre-rich vegetables and cereal crops to address micronutrient deficiencies in Mongolia. This event also shared international best practices that reduce micronutrient deficiency and introduced nutrition-sensitive agriculture concepts for the first time in Mongolia.

Subsequently, a task force was appointed to provide technical support to the drafting of the Food Law and Food Safety Law. These laws were approved by the Parliament in December 2012. The Food Law includes a separate article on nutrition, including a new definition of the term. The law also defines the rights and duties of the newly established National Food Security Council to better coordinate intra- and inter-sectoral cooperation and collaboration for promoting nutrition-sensitive interventions in pursuit of national food and nutrition security goals.

Food fortification programmes are quite prominent in the Asia-Pacific region, as elsewhere. Besides the iodization of salt, which is a mandatory requirement in many or most countries, fortification with iron and vitamin A are most prominent, followed by folic acids and B vitamins. For instance, the Government of Pakistan is implementing the Universal Salt Iodization Programme with the assistance of development partners, targeting almost 174 million people with iodine deficiency. The National Food Fortification Alliance was re-established in 2015 at the Ministry of National Health Services, Regulation and Coordination to restart the food fortification programme, which was abandoned due to devolution. Hence, wheat flour fortification with iron and folic acid is being revitalized to overcome micronutrient deficiency disorders, with the support of United Nations agencies and nutrition development partners (FAO, 2016c). Similar policies and

programmes exist in other countries as well. As an illustration, Table 4 shows the regulatory status on fortification for selected countries in South-eastern Asia.

Note that these are regulations, and are not necessarily enforced at all times. For example, one study found that use of iodized salt was just 70 percent in Mongolia in 2010, despite the banning of non-iodized salt. However, it should be noted that Mongolia made substantial progress, with use having increased from just 45 percent in 2000 due to regulations, public awareness campaigns and other activities (Tran, Hetzel and Fisher, 2016). This serves to highlight that laws are not enough – public awareness activities and favourable incentives for the private sector are also essential (e.g. sometimes food fortification may raise costs and prices so that people are discouraged from purchasing the fortified product).

Table 4 Illustration of regulatory status of micronutrient fortification in selected countries in South-eastern Asia

Countries	Iron		Vitamin A		Folic acids and B vitamins	
	Mandatory	Voluntary	Mandatory	Voluntary	Mandatory	Voluntary
Indonesia	Wheat flour, Cooking oil		Wheat flour, Refined sugar	Wheat flour		
Philippines	Rice,* Wheat flour	Processed foods**	Cooking oil***	Processed foods**		Processed foods**
Thailand			Condensed milk, Margarine		Vitaminized rice	Wheat flour
Viet Nam		Wheat flour		Sugar, Vegetable oil		

Notes: * All rice except brown rice and locally produced glutinous rice.
 ** Processed foods that contain at least 40 kcal per normal serving.
 *** Cooking oil for human consumption.

Source: Compiled from International Life Sciences Institute (ILSI 2011).

Overweight and obesity

Overweight and obesity¹³ are serious global problems with grave health risks to all age groups. Obesity increases the likelihood of non-communicable diseases such as diabetes, hypertension, coronary heart disease, certain cancers, obstructive sleep apnoea and osteoarthritis. According to a recent review of global trends (Ng *et al.*, 2014), the worldwide prevalence of overweight and obesity combined rose by 27.5 percent for adults and 47.1 percent for children between 1980 and 2013. About 2 billion people are estimated to be either overweight or obese. The data show that not only is obesity increasing, but also no national success stories have been reported in the past three decades (Ng *et al.*, 2014).

The prevalence of overweight and obesity is very high in the Oceania subregion and is increasing rapidly in Asia

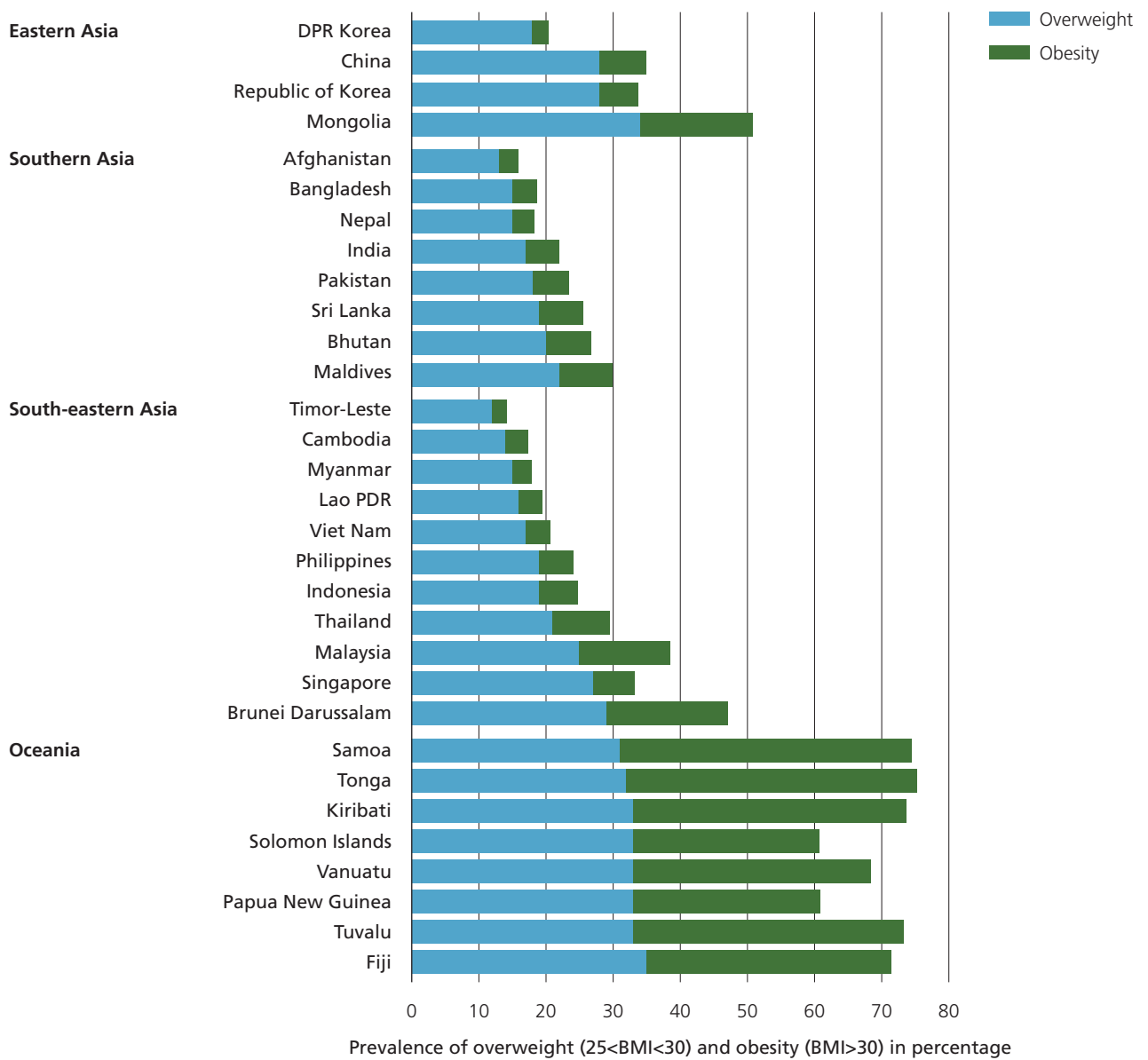
Figure 7 shows age-standardized prevalence rates for overweight and obesity among adults, counting both sexes, for 2014 in Asia and the Pacific region. Prevalence rates for obesity, for which the consequences are much more damaging than for being overweight, are high in the Oceania subregion, ranging from 28 percent for both Solomon Islands and Papua New Guinea to 43 percent for Tonga, with over 40 percent for Kiribati, Samoa and Tuvalu.

In contrast, the simple average of obesity prevalence for the 23 Asian countries is only 7 percent, with 5 percent or lower rate for 10 of them (Afghanistan, Bangladesh, Cambodia, Democratic People's Republic of Korea, India, Lao People's Democratic Republic, Myanmar, Nepal, Timor-Leste and Viet Nam). Ten countries had a prevalence rate of between 5 and 10 percent, and the remaining three (Brunei Darussalam, Malaysia and Mongolia) had a prevalence rate of over 10 percent.

What is worrisome, however, is that the prevalence of overweight and obesity increased between 1990 and 2008 in 29 of the 30 countries covered from Asia and the Pacific region (Stevens *et al.*, 2012). Figure 8 shows the picture for the four main subregions. During 1990–2008, the prevalence of both overweight and obesity increased most rapidly in South-eastern Asia. Seven countries from this subregion appear among the top ten countries in the region with the highest rate of growth in obesity. The data further show that obesity has been rising much faster than overweight in most countries. For the region as a whole, the respective growth rates have been 2.1 percent per annum for overweight and 4.3 percent per annum for obesity, with obesity growing at the rate of 4 percent per annum or more in 22 of the 30 countries. The data also show that with the exception of the Southern Asia subregion, obesity has increased faster during 2000–08 than in 1990–2000.

¹³ Overweight is defined as a body mass index (BMI) ≥ 25 and < 30 and obesity as BMI of ≥ 30 ; thus overweight and obesity combined together is indicated by BMI of ≥ 25 .

Figure 7 Prevalence of overweight and obesity in Asia and the Pacific region in 2014



Source: Statistics from WHO (Global Health Observatory data repository).

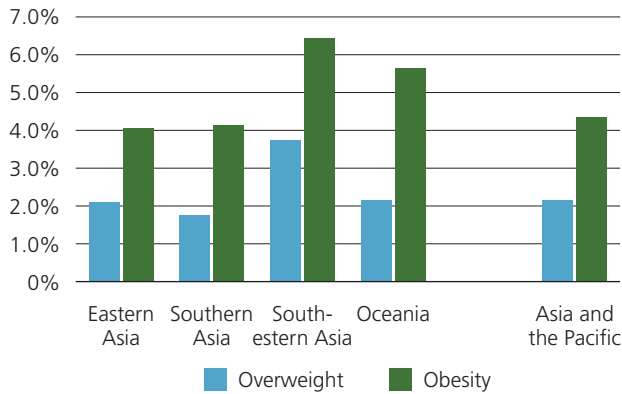
Responding to increasing overweight and obesity

Most experts agree that the growing prevalence of overweight and obesity is due to increased consumption of unhealthy diet and inadequate physical activity. Modern food environments are rife with nutrient-poor, energy-dense foods and drinks. In a study done in the Philippines, increasing urbanization with association to increasing Westernized food habits such as high fat diets, processed foods and consumption of refined carbohydrates; trade liberalization making available a wide variety of processed and fast foods; increased frequency of eating away from home; influence of mass media and sedentary lifestyles have

been implicated in the rise of overweight and obesity (Pedro and Benavides, 2006). As effective drugs for weight loss have yet to be identified, public health initiatives are considered to be the most important response to obesity control and prevention. Effective prevention of adult overweight and obesity also requires the prevention and management of childhood overweight and obesity in an integrated approach, involving actions in all sectors of society.

Pacific Island countries in particular face a unique nutrition challenges. Unlike a few decades ago, when the communities in the Pacific Island countries had a diet of readily available and abundant root crops, fish, fruit and

Figure 8 Average annual growth rates of the prevalence of overweight and obesity during 1990–2008



Source: Growth rates computed for this report with statistics provided in Stevens *et al.* (2012). The subregional averages are population-weighted, using population data provided in this source.

vegetables sourced locally through environmentally sustainable farming systems, virtually all Pacific island countries are now relying heavily on food imports to feed their population. They are exceptionally vulnerable to fluctuations in food availability and the excessive price volatility of food imports. Further, the increased availability of processed foods has resulted in consumers having become accustomed to foods and beverages dense in dietary energy with a high content of sugar, salt or fat. These changes have led to a so-called “nutrition transition”, associated with altered disease patterns with an alarming increase in the prevalence of non-communicable diseases (with up to three-quarters of all deaths in the Pacific Island countries now related to non-communicable diseases). The real health care expenditure per capita is rising at a faster rate than the real increase in gross domestic product (GDP) per capita in some countries.

The effects of these changes over the next two decades are expected to be as consequential as natural disasters and climate change. Addressing this challenge requires an arsenal of policies and initiatives that takes an integrated food economy approach to strengthen the entire food systems, combining (i) nutrition education to promote balanced diet and positive health outcomes, (ii) efficient domestic markets that can bring affordable food to consumers, (iii) efficient food production from island, atoll and aquatic resources that takes advantage of innovative technologies and practices developed for, and in, islands and atolls, and (iv) natural resource management practices that protect and enhance the fragile terrestrial and aquatic resources that are the bases for food production and other economic sectors.

The 2014 WHO Report lists a number of agendas for attaining the WHA target on overweight and obesity (and diabetes) which include multi-sectoral population-based policies to influence production, marketing and consumption of healthy foods, fiscal policies to increase the availability and consumption of healthy food and reduce consumption of unhealthy ones, including implementation of restrictions on marketing of foods and beverages that are high in sugar, salt and fat, policies and interventions to increase physical activities, and education and social marketing campaigns focused on impacting lifestyles, i.e. food consumption and physical activity patterns in both children and adults.

Responses are often categorized under three categories: population-wide policies, settings-based interventions and interventions focused on individuals (WHO, 2014). Population-wide policies include subsidies and taxation to encourage the production and marketing of healthy foods. There are some evidences that such policies, e.g. taxation of “junk foods” such as soda and sugar-sweetened beverages, have worked in different parts of the world. Nutrition labelling has also been found useful in orienting consumers to products that contribute to a healthier diet. In the first *Lancet* Series on obesity in 2011, the globalization of food systems that promote “passive overconsumption” of energy-dense, nutrient-poor foods and beverages was identified as a major driver of the obesity pandemic. Policy and regulatory actions were identified as the most effective means of tackling the problem. Settings-based interventions have also been judged to be effective in preventing and controlling obesity. Such interventions reach families and communities where they live, work and play, e.g. schools, universities, workplaces, communities, and health care and religious settings. Interventions targeting individuals to change their behaviours/lifestyles, e.g. counselling on diets and physical activities through primary health care (see, for example, Box 3 on the Pilipinas Go4 Health campaign). Nutrition labelling is also now mandatory in the Philippines with the Food and Drug Administration requiring all processed products to provide the nutrition facts at the back panel and voluntary front-of-pack labelling for caloric content. There are also school-based interventions to prevent obesity. The Department of Education in the Philippines has existing guidelines that allow healthy foods to be sold in school canteens and ban the sale of soft drinks. Health, nutrition and physical education are also integrated in the school curriculum, and nutritional assessment is mandated at the start and end of each school year to monitor the weight of school children.

Box 3 Pilipinas Go4Health

The Department of Health in the Philippines launched its nationwide healthy lifestyle movement, Pilipinas Go4Health, which encourages Filipinos to commit to a healthy lifestyle through physical activity, proper nutrition, and the prevention or cessation of smoking and alcohol consumption. The campaign aims to inform and engage the youth and young adults in forming healthy habits through the promotion of physical activity and proper nutrition. This is complemented by a Belly Good for Health programme, which promotes recommended waist circumferences among its employees through the monthly monitoring of its employees and providing incentives to those who achieve ideal waist circumference.

In conclusion, the problem of overweight and obesity in developing countries is occurring at a time when undernutrition remains a significant problem. Strategies need to be put in place to deal with this triple burden of malnutrition, particularly when dealing with children whose growth may be stunted. Overall, for a vast majority of the

developing countries, undernutrition/malnutrition remains a much bigger challenge than overweight and obesity, and so our priorities must be consistent with the relative scale of the two problems. However, the rapid rise in overweight and obesity, even if from a low base, also signals the need to respond to this issue before the problem gets out of control.



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THE CONTINUING QUEST FOR FOOD SECURITY IN ASIA AND THE PACIFIC REGION: NEW AND EMERGING ISSUES

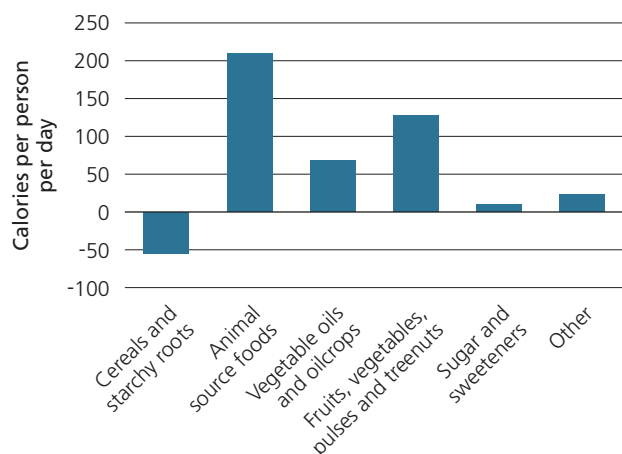


Dietary diversification and implications for food production systems

Largely driven by decades of robust economic growth, diets in the Asia and the Pacific region are undergoing rapid transitions. Between 1990 and 2011 (the most recent data available), the contribution of cereals and starchy roots declined by more than 50 calories per person per day, while the contribution of animal source foods increased by more

than 200 calories per day, and that from fruits, vegetables and pulses by more than 125 calories per day (Figure 9). These consumer demands are leading to changes in food production systems, namely rapid growth in livestock, fisheries and horticulture. Nevertheless, rice remains the largest single food product by far in terms of gross production value in the region, and the largest single crop in terms of area harvested.

Figure 9 Change in contribution of various food groups to diets in Asia and the Pacific region between 1990 and 2011



The El Niño weather anomaly adversely affected rice production in several Asian countries in 2015, but with a return to neutral El Niño-Southern Oscillation (ENSO) conditions, production is forecast to rise modestly in 2016

Rice is essential for the region's food security. It is the most important expenditure item and provides the bulk of dietary energy for the poor, as well as providing income for a large number of farmers. In 2015–16, rice production was affected by one of the strongest El Niño events in history, which led to reduced rainfall around much of the region. As a result, according to FAO estimates, total paddy output in Asia in 2015 fell compared to 2014, but it is important not to overstate the impact – the decline was less than 1 percent. The largest reductions in absolute terms were in India and Thailand. Unseasonably dry conditions persisted into early 2016, causing poor harvests in parts of Indonesia and higher rice prices, as well as serious droughts in the Philippines, Timor-Leste and Viet Nam, with saltwater intrusion in the Mekong Delta affecting the latter. With an expected return to a neutral ENSO or mild La Niña by June 2016, the total harvest in 2016 for Asia is forecast to rebound, although ending stocks are likely to decline. Given the relatively high global level of stocks, however, the impact on the world market is likely to be minor.

The role of rice in the region is changing, policies must too

While rice remains of crucial importance to the region's food security, it is important to recognize that structural changes over the past two to three decades have substantially altered the role of rice in Asian agricultural economies. As mentioned above, rapid economic growth has resulted in higher per capita consumption of livestock products, fish, fruits and vegetables. Indeed, the income elasticities of rice

have, in many countries, already turned negative, and as a result, per capita consumption of rice has been declining in many, if not most, countries. Farmers have the potential to increase their incomes by growing non-rice crops, which are often more profitable. Additionally, affordable supplies of animal products, fruits and vegetables are important for consumers seeking to diversify their diets. Thus, continued policy emphasis on maximizing rice production does not serve food security, nutrition or poverty reduction objectives.

This is not to say that rice no longer deserves public policy attention in Asia. Indeed, rice continues to shape the lives of millions of poor people in the region and plays a major role in societal stability. However, policy objectives need to shift away from maximizing production through trade policies geared towards self-sufficiency and forcing farmers to grow rice. Instead, there should be more emphasis on higher productivity, adaptation to climate change, ensuring domestic rice price stability in a cost-effective manner, sustainable intensification of production systems and using rice as a vehicle to improve nutrition through biofortification (e.g. high iron and high zinc rice as in India and for Bangladesh). Deeper regional and international integration can help provide more effective delivery of these new policy objectives. Foods other than rice must receive more investments in agricultural research and heightened policy attention.

The livestock sector has grown rapidly and can contribute to food security and nutrition, but also requires policies that can balance seemingly conflicting goals

Animal source foods provide high quality protein and a variety of micronutrients (vitamin A, vitamin B-12, riboflavin, calcium, iron and zinc) that are difficult to obtain in adequate quantities from plant source foods alone (Murphy and Alleny, 2003). Thus, the presence of animal source foods in the diet can make an important contribution to diet quality, especially when requirements are high (pregnancy, lactation, early infancy and childhood, and adolescence). Evidence also suggests that the consumption of foods from animal sources are associated with improved child growth and can play an important role in prevention of child stunting (Marquis *et al.*, 1997; Dror and Allen, 2011).

At the global level livestock products provide about 34 percent of protein and 16 percent of the energy consumed in human diets. In Asia and the Pacific region, the livestock sector has grown rapidly and emerged as a dynamic food subsector since the early 1980s. While global meat consumption recorded a compound annual growth of 2.5 percent between 1980 and 2013, consumption in the Asia and the Pacific region grew at 5 percent per year. Global milk consumption grew 1.4 percent per year during the same period and 4.3 percent per year in the Asia and the



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Pacific region. So far, the sector has been adapting to this tremendous increase in demand in several ways including increases in livestock numbers, shifts towards shorter-cycle species, acceleration of production cycles (to a large extent due to increased use of concentrate feeds), consolidation into larger farming units concentrated near feed sources, and vertical integration into globalized supply chains. Scaling up and vertical integration has been particularly evident in pig and poultry production, whereas the dairy sector is still dominated by smallholder production system and offers unique potential to contribute to social, economic and environmental objectives.¹⁴

While the rapid expansion of Asia's livestock sectors has ensured increased supplies of animal source foods for Asia's growing and more affluent population and helped to reduce micronutrient deficiencies, this trend has also brought with it risks of environmental degradation, heightened use of antibiotics that may exacerbate bacterial resistance to anti-microbial drugs, loss of biodiversity and genetic resources, acceleration of climate change through livestock-associated emission of green-house gases, the loss and genetic dilution of local and adapted breeds due to the import of commercial exotic breeds, and the marginalization of smallholder livestock keepers, for whom livestock rearing remains a key livelihood and risk-mitigation activity. To develop the full potential of the livestock sector in ensuring benefits for the poor and a more responsible use of increasingly scarce inputs and natural resources, the region needs to invest in enhancing capacities to analyse livestock related trade-offs between social, environmental and economic objectives, and to design and negotiate smart policies to manage multiple objectives and balance the interests of different socio-economic groups.

Fisheries and aquaculture production continues to grow but several challenges remain

Fish contains many essential nutrients including long-chain omega-3 fatty acids, iodine, vitamin D and calcium, as well as proteins and healthy fats. Demand has been growing rapidly – consumption of protein from fish and seafood increased more than 75 percent between 1990 and 2011. Production in the region experienced robust growth during 2004–2014 with an average annual growth rate of 3.8 percent. As a result, the total fisheries production from Asia and the Pacific reached 117.6 million tonnes in 2014. During the period, aquaculture achieved much higher annual growth (6.1 percent) compared with capture fisheries (1.6 percent). The per capita food fish supply in Oceania and Asia reached 24.8 and 23.0 kg per year in 2013, respectively, much higher than in Africa and Latin America, where the figure is less than 10 kg per year. Currently, aquaculture supplies over 60 percent of food fish for the people in Asia and the Pacific.

While making an increasing contribution to the nutrition of people and employment through continuous growth, capture fisheries and aquaculture face a number of major challenges in the region. Despite significant progress, illegal, unregulated and unreported (IUU) fishing still remains a major issue with capture fisheries in the region. To address this problem, FAO helped to broker the adoption of the Port State Measures Agreement (PSMA). As of 30 August 2016, 47 countries (including the EU) have signed, ratified, accepted, approved or acceded to the agreement, including Australia, Indonesia, Myanmar, New Zealand, Palau, Republic of Korea, Samoa, Sri Lanka, Thailand, Tonga and Vanuatu. Now that the PSMA has entered into force, it is expected that an increasing number of countries will step up enforcement efforts and implement measures to eventually

¹⁴ See special section on 'Smallholder Dairy for Triple Wins'.

eliminate IUU fishing. These efforts may lead to a reduced fish supply in the short term, but over the long term, they have the potential to increase fish catch in a sustainable manner.

The rapid growth of aquaculture has greatly contributed to an increased supply of fish and support of rural livelihoods in the region. However, the growing demand for feed and feed ingredients has resulted in rapid increases in feed costs, which in turn are putting pressure on the economic viability of aquaculture enterprises. Epidemic diseases of some important commodities such as shrimp are still major threats to farmers. Problems associated with extreme climate events such as drought, high temperatures and high salinity are now becoming threats to fish and aquaculture farming in some countries.

Consumption of fruits and vegetables has increased substantially, but not for pulses

As with livestock and fish, per capita consumption of fruits and vegetables has increased substantially in the region over the past 20 years, with strong increases in all subregions except for Oceania (where economic growth has been weaker).

Unlike fruits, vegetables and animal source products, however, per capita consumption of pulses has been stagnant over the past 20 years in the Asia and the Pacific region. Indeed, if compared with the early 1960s, per capita consumption in Southern Asia, the region's major producer, has declined substantially. Southern Asia now accounts for over half of the region's total production, but Australia and Myanmar are also major producers and exporters. The lack of increase in consumption of pulses is unfortunate from a nutritional perspective because pulses are rich in iron, protein and essential amino acids. Furthermore, they also contribute to enhancing soil fertility and reducing

greenhouse gas (GHG) emissions by fixing nitrogen from the atmosphere. These multiple benefits are being celebrated in 2016 all over the world as part of the International Year of Pulses.

But over the past decade, production of pulses in Southern Asia has increased by more than 40 percent, with most of the increase due to increased area harvested (an increase of about 30 percent). However, yield increases have been relatively low, even though yields are the world's lowest. Imports into Southern Asia have also increased substantially in recent years, and the world's four largest importers in 2013 were all in Asia: India, China, Bangladesh and Pakistan.

Forests need better recognition in the debate on food and nutrition security

The contribution of forestry to food security has not received the recognition it deserves, especially in Asia and the Pacific, which accounts for more than 80 percent of global food consumed from forest resources (FAO, 2014a). Communities living around densely forested areas, particularly tribal and indigenous groups, depend for their livelihoods and food security directly on plants and animals from forests. A number of forest based food items (leaves, fruits, seeds and nuts, roots and tubers, etc.) are excellent sources of vitamins, protein and micronutrients, which are particularly important for nutritionally vulnerable remote rural communities that have difficulty accessing these essential dietary inputs from other sources. As a category, non-timber forest products (NTFPs) – in the form of food, medicine and other products – contribute a large share towards people's livelihoods. Resin, medicine and food collection from forests in Cambodia (Schmidt and Theilade, 2010), food for the indigenous tribes in India (Aiyadurai, Singh and Milner-Gulland, 2010) and edible insects in Lao People's Democratic Republic are some of the examples of NTFPs.



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Food policy developments in the region

Despite profound structural changes, rice remains closely tied to the region's food security, both in terms of dietary energy supply and as a source of farm income, as well as being a leading user of land and water resources. Not only is the region the global leader in rice exports, but it is also home to several major importers. For all these reasons, as well as the fact that the global rice market is thin and volatile, governments in the region continue to employ an array of policy instruments to balance multiple objectives in this sector.

The sustained declines in world prices of food products triggered responses by several governments in the form of increased tariffs and adjustments to farm support measures

Management of world market price fluctuations can be challenging for policy-makers as they strive to stabilize domestic markets. Over the past few years, there have been broad declines in world prices for a range of food commodities – the FAO (world market) food price index declined by 24 percent from the first quarter of 2014 to the second quarter of 2016. Given these widespread declines, many governments have raised tariffs or reduced export taxes, in an effort to reduce pass-through of prices from the world market to domestic markets.

As rice imports by the private sector surged due to low world prices, coupled with improved availability from good harvests in 2014/15, Bangladesh imposed a tariff on rice of 10 percent in May 2015, which was doubled in December 2015. Sri Lanka also raised its tariff on rice by 43 percent (from 35 Sri Lankan rupees (LKR) per kg to LKR50 per kg), effective 1 February 2016. The new specific rate could amount to as high as a 90 percent tax on an *ad valorem* basis, depending on the import price. The Islamic Republic of Iran resorted to increased protection for domestic rice producers, which culminated in suspension of the issuance of import licences in October 2014. The declining world prices of rice and other foodstuffs have also caused difficulties for China in managing farm support prices, public procurement and reserves. In response, in part due to falling world prices, some farm policies were changed fundamentally (see below).

In March 2015, Pakistan replaced an import ban on wheat and wheat products imposed earlier in February with a 25 percent regulatory duty, in part due to the non-compatibility with the World Trade Organization (WTO) obligation. Pakistan also imposed a 30 percent regulatory duty on maize as stocks were abundant and the growing gap between domestic and import prices posed a threat to domestic producers. As sugar prices in the world market were falling, Pakistan also decided in December 2015 to grant a subsidy for sugar export.

In September 2015, India raised tariffs on refined palm oil (from 7.5 to 12.5 percent) and soybean oil (from 15 to 20 percent) as global price slumps triggered a surge in imports that hurt both farmers and oil refiners (who faced sharp falls in capacity utilization). The processing industry asked for higher tariffs on refined oils so as to discourage refined oil imports while encouraging crude oil imports for domestic processing. On the exporters' side, as palm oil prices fell, Malaysia removed its export duty on crude palm oil in May 2015, extending this provision on a monthly basis until April 2016 when the duty was reintroduced at a rate of 5 percent. One expectation from the export tax was that this would encourage Malaysian producers to sell crude to downstream domestic refiners for adding value locally. In October 2015, Indonesia and Malaysia established the Council of Palm Oil Producing Countries for coordinating palm oil production, stabilizing prices and managing stocks. Thailand was also invited to join the Council.

On rubber, reacting to the 70 percent decline in the world price of natural rubber since 2011, the International Tripartite Rubber Council (Indonesia, Malaysia and Thailand) agreed in February 2016 to limit exports during March–August 2016 so as to curb world supply.

A significant shift has been taking place in China's farm price support policies that could impact global commodity markets

China eliminated farm support price schemes backed by public procurement, first for cotton and soybeans in 2014, followed by rapeseed in 2015 and maize in 2016, leaving only rice and wheat under the scheme. For soybeans, under the new scheme, farmers are paid a subsidy based on the difference between a set target price and the market price at harvest. This will reduce the build-up of government stocks, and is being implemented in four northeast provinces (the main soybean producing areas). As for maize, the policy revision, first indicated in the *Number 1 Document* in January 2016, was announced in March 2016 by ending the floor price scheme. Meanwhile, the current policy of supporting the farm price and guaranteed procurement will be continued for wheat and rice, as self-sufficiency in these basic foods remains a priority. In another development, China designated in 2015 potatoes as a staple grain crop, in addition to rice, maize and wheat, with the goal of significantly expanding its cultivation. According to media reports, the Government wishes to encourage potato farming as a crop that can be grown in poorer quality soils across a wide range of climatic conditions, as well as being much less demanding of scarce water supplies.

These policy changes are likely to have considerable impact within China on farm income, commodity prices, production levels, public and private reserves as well as trade. Given the size of the Chinese market for these commodities, the changes should also affect global commodity markets.

Indeed, it has been reported that maize prices were already falling in China following the announcement of the new policy, which in turn was expected to cause large declines in imports of other feed grains (namely sorghum, barley, and dried grains with solubles) which had surged in recent years due to high domestic prices of maize in China. The policy revision should exert some upward pressure on the world market price of maize as domestic production is expected to shrink in response to the lower farm price.

The main reasons for these policy changes include growing budgetary costs of procurement, excessive build-up of public stocks, difficulty in managing imports as domestic and world prices persistently diverged, as well as concern over unsustainable farming practices and environmental effects. If no reversals are made in the future, this shift also marks a transition towards schemes that are less coupled to production – the type of policy that the WTO encourages.

One of the largest rights-based food security schemes in the world is being fully implemented by India in 2016

The National Food Security Act 2013 is being implemented in almost all States of India as of May 2016. The Act provides for coverage of up to 75 percent of the rural population and up to 50 percent of the urban population for receiving subsidized food grains, thus covering about two-thirds of the population. The eligible persons will be entitled to receive 5 kg of food grains per person per month at subsidised prices of US\$ 0.045/0.03/0.015 per kg (Indian rupees (INR) 3/2/1 per kg) for rice/wheat/coarse grains, respectively. For the poorest of the poor, an existing scheme will continue with 35 kg of food grains per household per month. The Act also includes other schemes such as meals to pregnant women and lactating mothers during pregnancy until six months after childbirth and nutritious meals for children up to 14 years of age. Elsewhere, Indonesia continued to maintain the scale and reach of its subsidized rice programme, the Rice for the Poor (*Raskin*) programme, and the National Food Authority of the Philippines has continued to sell rice at below market prices.

The new Trans-Pacific Partnership (TPP) agreement could have some ramifications for regional and global trade of rice and other agricultural products

The TPP agreement was concluded on 4 October 2015, its signatories from the region being Australia, Brunei Darussalam, Japan, Malaysia, New Zealand, Singapore and Viet Nam. The agreement covers trade in a range of agricultural products, as well as ethanol. Given that trade restrictiveness is more common in rice, the rice provisions in the agreement could have some market impact.

Once ratified, Japan will establish a new, duty-free country-specific quota for rice from the United States of America, initially at 50 000 tonnes growing to 70 000 tonnes in 13 years, besides re-designating 60 000 tonnes of its current WTO Tariff Rate Quota rice as medium-grain rice and improving market access terms for TPP partners. For Malaysia, TPP concessions will entail progressively eliminating customs tariffs on rice over 11 years (currently 40 percent on paddy, husked, milled and broken rice and 15 percent on broken rice used for animal feed). Because provisions have been made to maintain the current rice procurement, import and distribution regime, with *Bernas*¹⁵ continuing with its exclusive right to import rice, the impact of the tariff changes is likely to be minimal. Also under the TPP, while both Brunei Darussalam and Singapore committed to maintain import duties on rice at 0 percent, Viet Nam is to eliminate its current 40 percent tariff. The most significant change for Asian rice trade if the TPP goes into effect is that Viet Nam will gain duty-free access to the Mexican market, making Vietnamese rice more competitive *vis-à-vis* the United States of America, currently the main supplier of imports to Mexico. However, there is substantial uncertainty as to whether the TPP agreement will come into effect, given recent concerns of both political parties in the United States of America over the impacts of free trade on jobs.

Public expenditure in agriculture

Future agricultural growth will be driven by investment and most of that investment will come from private sources (FAO, 2012). However, private players (including farmers) will invest in agriculture only if their investments are profitable; and that in turn requires investment in a wide range of public goods. In particular, three key public investments are critical: (i) direct investment in agricultural research and development to increase productivity and to enhance the ability of agricultural systems, especially smallholder farms, to meet future food demands while coping with climate change and resource scarcity; (ii) investments to link the primary agricultural sector with consumers, including agricultural institutions, extension services, rural roads, ports, power, storage and irrigation systems; and (iii) non-agricultural investment to enhance the rural institutional environment and improve human well-being, such investments include education, particularly of women, sanitation and clean water supply, and health care.

The SDG framework has assigned an important role to public spending in agriculture and has set specific targets and indicators for monitoring implementation

Attaining specific targets for several SDGs will require adequate public spending on agriculture. SDG Target 2.a.

¹⁵ *Bernas* is a privatized foodgrain management agency in Malaysia involved in the procurement and processing of paddy; as well as the importation, warehousing, distribution and marketing of rice in Malaysia.



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under Goal 2 (End hunger, achieve food security and improved nutrition and promote sustainable agriculture), recognizes that it will be important to “increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development and plant and livestock gene banks in order to enhance agricultural productive capacity in developing countries, in particular in least developed countries”.

Indeed, adequate public investment in agriculture is also crucial for several other targets under Goal 2, namely ending all forms of hunger, doubling agricultural productivity and incomes of small-scale food producers, ensuring sustainable food production systems, implementing resilient agricultural practices, and maintaining genetic diversity, as well as for sustainable production under SDG 12.

Public spending on agriculture is not commensurate with the sector's importance in the overall economy

The SDGs have adopted an indicator called the agriculture orientation index (AOI) for measuring progress on public spending for agriculture. The index is calculated as the ratio of two shares – the share of agriculture in total government expenditure divided by the share of agriculture in total GDP. Thus it is an indicator of the degree to which the share of agriculture in public expenditure is commensurate with the weight of the sector in GDP. An AOI greater than one reflects public spending on agriculture more than commensurate with the economic importance of the sector, while an AOI less than one reflects the reverse.

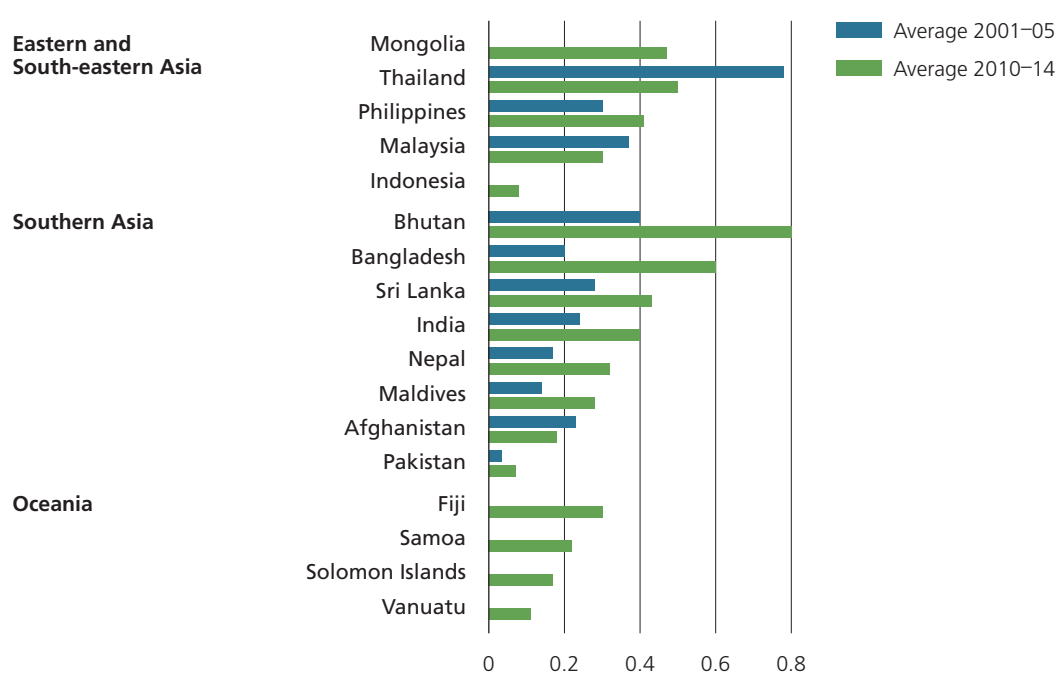
Figure 10 shows average values of the AOI for 2001–05 and 2010–14. Most of the countries showed increases (8 out

of 11 with available required data), including a tripling in Bangladesh and a doubling in Bhutan. Thus, spending on agriculture generally increased in the aftermath of the world food crisis in 2008, as this event reminded countries of the importance of stable food supplies. On the negative side, however, the AOI has been less than one in all countries during both periods.

However, it is not just the quantity of agricultural spending that is important, but also the quality. For public spending, this means investing in public goods such as agricultural research, rural roads and health facilities that improve productivity and benefit all of society, as opposed to subsidies on private goods that merely transfer money from one group to another. Many of these subsidies benefit the largest farmers (as opposed to the poorest) because they are the largest users of inputs. Subsidies can also damage the environment when they encourage excessive or inappropriate use of inputs. Furthermore, there is an opportunity cost to subsidies because they often drain public finances, restricting the government's ability to spend more on the public goods that are essential to growth.

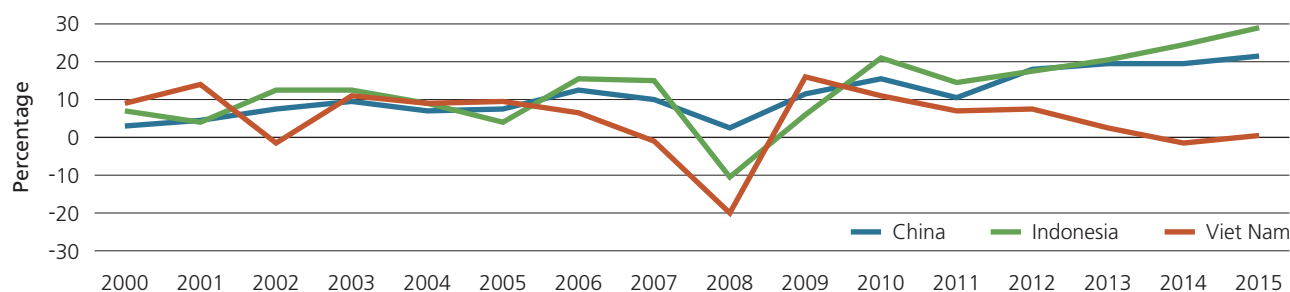
Indeed, in recent years there have been many large subsidies for private goods, some of which have been abandoned under fiscal pressure: the paddy pledging scheme in Thailand, Indonesia's fertilizer subsidy, non-targeted sales of rice at below market prices by the National Food Authority in the Philippines, and large fertilizer and electricity subsidies in India. The Organisation for Economic Co-operation and Development (OECD) estimates of producer subsidy equivalents have been more or less steadily increasing over the past decade for both China and Indonesia, although there has been no such increase in Viet Nam (Figure 11; OECD has not officially released estimates for other Asian countries).

Figure 10 Agricultural Orientation Index (AOI) in the region during 2001–05 and 2010–14



Source: FAOSTAT. Agriculture refers to the agriculture, forestry, fishing and hunting.

Figure 11 Subsidies as a percentage of gross farm receipts

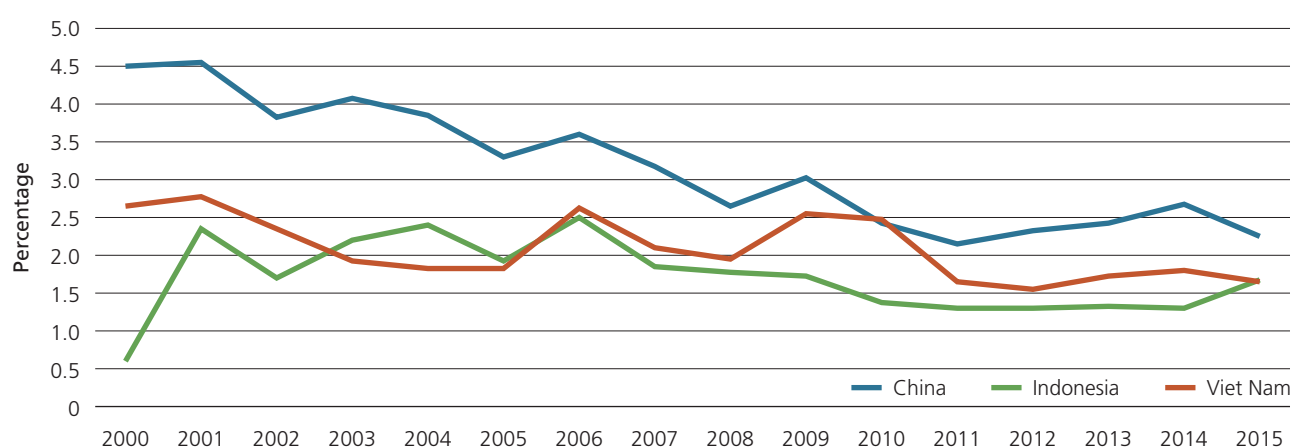


Notes: Subsidies are given as producer support estimates. See OECD (2016) for detailed definitions and raw data.

While there is often an increased use of subsidies as countries graduate to middle-income status, it will be difficult for middle-income countries to escape the middle-income “trap” and become upper-income countries if investments in public goods are not made on a sufficiently large scale. Unfortunately, in terms of general support to public goods in agriculture, those expenditures have been declining as a share of gross farm receipts over the past decade for China, Indonesia and Viet Nam, although China’s General Support Services Estimate (GSSE) is much higher than those for the other two countries (Figure 12). While the exact institutional modalities will differ within and across countries, the broad importance of spending on public goods such as agricultural research, rural roads, schools and health facilities (and the dangers of broad costly subsidies) holds for all countries. In this sense, one size does fit all.

Public expenditures on agricultural research are below recommended levels

Among the various components of public spending on agriculture, agricultural research is considered crucial in view of the proven high return of new technologies in boosting productivity and agricultural growth. One popular indicator for assessing the level of public spending on agricultural research is the agricultural research intensity (ARI), which is total agricultural research spending as a share of agricultural output. An ARI of 1 percent is usually taken as a target that the developing countries should strive for, although in prescribing this number it is stressed that investment targets should be set taking into consideration country-specific needs and capacities.

Figure 12 Spending on public goods as a percentage of gross farm receipts

Notes: Spending on public goods is given as GSSE. See OECD (2016) for detailed definitions and raw data.

IFPRI collates and maintains data on public spending on research and development under the programme called Agricultural Science and Technology Indicators (ASTI). A recent paper by Stads (2015) using the ASTI data shows the following trends and patterns for the Asian countries. First, Malaysia stands out among 12 Asian countries covered in the database in having the highest ARI ratio (0.84 in 2014), although this has been falling in recent years. Second, aside from Malaysia in 2000, none of the 12 countries have reached the 1 percent ARI target. Indeed, for 9 of the 12 countries, the ARI ratio was below 0.4 (the three exceptions being Malaysia, China and Thailand). Thus, given its strong potential for poverty reduction in both rural and urban areas (through higher productivity and lower food prices, respectively), it seems likely that Asian countries are underinvesting in agricultural research and development (Fan, 2008).

Food safety issues in the region

Food safety, nutrition and food security are inextricably linked, with food safety often considered to be the bedrock for everything else in the area of nutrition and food security. "Safe" food is stressed in the FAO definition of food security as one of the fundamental necessities for humans to live and be productive. Food safety and quality standards are also increasingly the main obstacles for boosting trade in the region, especially exports of food and agricultural products from developing countries.

In spite of this crucial role, there are no internationally comparable summary indicators for countries on the overall state of food safety. The status of food safety in the region therefore needs to be gauged using more than one

indicator. This section reviews three such statistics: the burden of food-borne diseases (FBDs) published recently by WHO, rejections of food exports for food safety reasons, and threats from transboundary diseases.

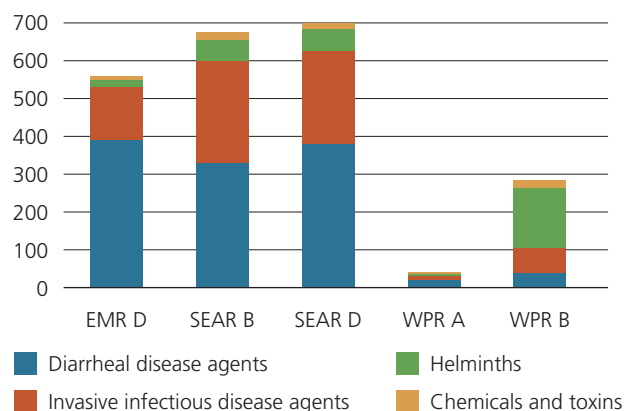
Diarrhoeal disease agents contribute the most to FBDs in large parts of the Asia region, according to the first ever global estimates

WHO published in 2015 the first ever global and regional estimates of the burden of FBDs for the year 2010. The study estimated the contribution of contaminated food and other exposure routes to human disease caused by some 31 food-borne hazards (microbial pathogens, parasites, chemical contaminants and biotoxins). It found that the global burden of FBDs is considerable, affecting individuals of all ages, and is one primary cause of malnutrition among under-five children.

Figure 13 shows the results for five WHO subregions that include countries from the FAO Asia and the Pacific region (no estimates are provided for individual countries). The highest burden of FBDs, adjusted for population,¹⁶ was observed for two WHO South-eastern Asia (SEA) subregions – SEA D (largely Southern Asia) and SEA B (Indonesia, Sri Lanka and Thailand). About 50 percent of the burden of FBDs in both these subregions was due to diarrhoeal disease agents, followed by invasive infectious diseases (viruses, bacteria, protozoa) with about 40 percent of the burden. The shares of helminths (parasitic worms) and chemicals and toxins were fairly low. The overall burden and the pattern across responsible factors were similar in the Eastern Mediterranean D subregion, which includes Afghanistan, Pakistan and the Islamic Republic of Iran, among others.

¹⁶ The burden was measured in terms of the number of disability-adjusted life years (DALYs) lost per 100 000 population.

Figure 13 The global burden of foodborne diseases (DALYs per 100 000 population) in 2010 by hazard



Notes: The labels in the x-axis indicate WHO sub-regions: Eastern Mediterranean Region –EMR D (Afghanistan, Islamic Republic of Iran, Pakistan and others); South-eastern Asia Region – SEAR B (Indonesia, Sri Lanka, Thailand) and SEAR D (Bangladesh, Bhutan, Democratic People's Republic of Korea, India, Maldives, Myanmar, Nepal and Timor-Leste); Western Pacific Region (WPR) – WPR A (Brunei Darussalam, Singapore) and WPR B (Cambodia, China, Lao People's Democratic Republic, Malaysia, Mongolia, the Philippines, Republic of Korea and Viet Nam, and 14 from the Oceania subregion).

Source: WHO Estimates of the Global Burden of Foodborne Diseases, Foodborne Disease Burden, 2015. DALY is disability-adjusted life year, with one DALY being one year of healthy life lost.

The burden of FBDs was estimated to be less in the WHO Western Pacific (WPR) B subregion, which includes all countries from Oceania as well as five South-eastern Asian countries (Cambodia, Lao People's Democratic Republic, Malaysia, Philippines and Viet Nam) and three from Eastern Asia (China, Mongolia and Republic of Korea). In this subregion, helminths that accounted for 57 percent of the

burden while the share of the diarrhoeal disease agents was only 14 percent, in marked contrast to Southern Asia. In the WPR A subregion, which includes the developed economies of Brunei Darussalam and Singapore, the burden of FBDs is very small.

Food safety issues facing Asian countries as reflected in the rejection of exports in major importing markets

A recent publication by UNIDO–IDE–JETRO (2013) provides valuable information on food safety issues facing Asian countries based on data on rejections of food exports at destination ports. This database includes exports from the top 15 exporters, including 11 countries from Asia, to four large developed country export markets, namely Australia, the European Union (EU), Japan, and the United States of America. The survey covers diverse food subgroups, namely meat, cereals, beverages, preserved foods, baking-related products, fish and seafood, edible fruits and nuts, and spices, coffee and tea.

Table 5 shows the reasons for rejection. The ranking of the reasons is based on the percentage of consignments rejected and varies by importing country. For example, while Australia and the United States of America recorded labelling as the most frequent reason for rejection, Japan reported no such cases, while for the EU only 1 percent of the rejections are on this ground. Bacterial contamination ranks among the top five reasons for all four importers. Similarly, hygienic condition/controls rank second for Japan and the United States of America but fifth for the EU. Pesticide residues rank high for both the EU and Japan. Mycotoxins are the top ranked reason in the case of the EU but are ranked lower by other importing countries.

Table 5 Reasons for import rejections in 2010

(rankings in parentheses)

Reason for rejection	Australia	Japan	USA	EU
Labelling	61% (1)	0	43% (1)	1% (13)
Bacterial contamination	11% (2)	23% (1)	10% (5)	10% (4)
Adulteration/missing document	11% (3)	1% (9)	11% (4)	7% (6)
Other contaminants	5% (4)	2% (7)	1% (7)	5% (7)
Pesticide residues	4% (5)	20% (3)	5% (6)	14% (2)
Hygienic condition/controls	0	21% (2)	15% (2)	10% (5)
Mycotoxins	2% (7)	11% (5)	0% (10)	27% (1)
Additive	1% (9)	13% (4)	13% (3)	12% (3)
Total cases (number)	1 910	1 338	13 729	2 483

Notes: The last row shows the total number of cases reported. The columns show percentage of cases rejected for various reasons, as well as their ranking. Additional reasons for rejections (ranked lower) include heavy metals, residues of veterinary drugs, microbiological and other contaminants and packaging.

Source: Compiled from data in Table 1.10 of UNIDO–IDE–JETRO (2013).

One reason for the differences could be different food safety standards and requirements of the importers, including those on labelling and packaging, with more stringent safety requirements set by some importers. Rejection patterns also depend on import structure, i.e. the type of food imported, which varies by importing country. Other reasons could be differences in the methods used to check, sample and test, as well as the frequency of inspections. Note that the rejection data analysed here only cover rejections on account of non-compliance with public regulations; private standards, considered to be more stringent, are increasingly shaping global supply chains.

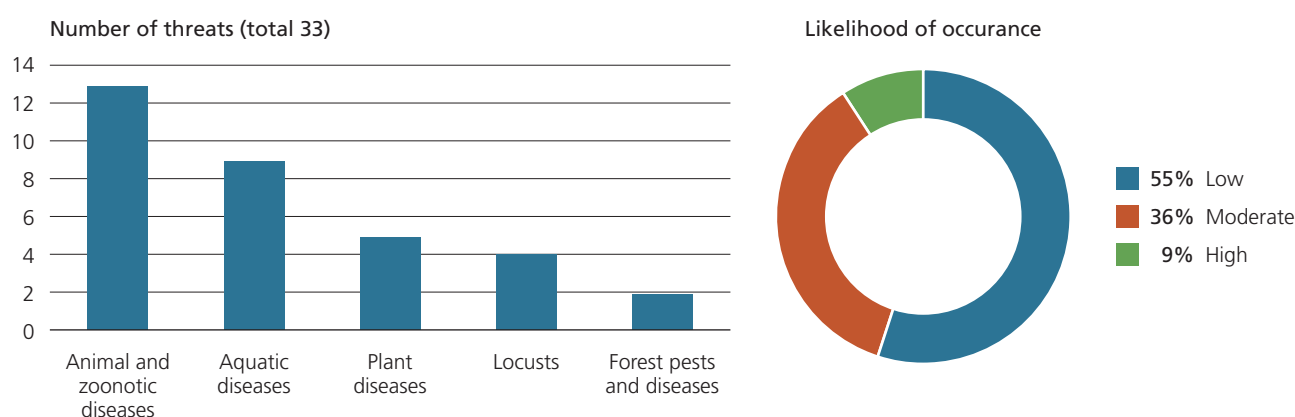
Transboundary diseases and pests are increasingly emerging as serious threats to health, life and food safety across all stages of the food chain

As trade expands, transboundary animal pests and diseases, including aquatic diseases, are being increasingly recognized as serious threats to food safety. Transboundary plant pests and diseases also impact food safety, albeit indirectly. The dynamics of the threats depend on a number of risk

factors/drivers including agro-ecological factors (e.g. intensive farming systems, deforestation, overgrazing, etc.), human behavior (e.g. cultural practices, conflicts and civil insecurity, trade, etc.) and natural disasters (e.g. droughts, heavy rains, heat waves).

FAO's *Food Chain Crisis Management Framework – Emergency Prevention System* for Transboundary Animal and Plant Pests and Diseases collates data and analyses on these threats to food chain and food security, providing this information on a periodic basis. Under this Emergency Prevention System (EMPRES), FAO also provides technical assistance as an integrated package covering prevention, early warning, preparedness and response measures. Figure 14 summarizes the threats facing Asian countries, as forecasted for the April–June quarter in 2016. There were a total of 33 threats for 13 countries covered. Of the 33 threats, 13 (39 percent) were for animal and zoonotic diseases, followed by aquatic diseases (27 percent), plant pests and diseases (15 percent), locusts (12 percent) and forest pests and diseases (6 percent).

Figure 14 Types of the threats of transboundary diseases as forecast for April–June 2016 period



Source: Based on the data in FAO Food Chain Crisis Early Warning Bulletin, April–June 2016 issue (FAO 2016d). The results cover 33 threats to 13 countries in Asia.

Of the 13 threats on animal and zoonotic diseases, six were for avian influenza and three for foot-and-mouth disease. In aquatic diseases, the threats pertained to acute hepatopancreatic necrosis disease and *enterocytozoon hepatopenaei*, both of which affect shrimp. Plant pests and diseases included wheat rust and banana fusarium wilt disease. Figure 14 also shows the likelihood of the occurrence of these threats. Thus, of the 33 forecasts, 55 percent of threat levels were considered low, 36 percent moderate and only 9 percent high.

Responding to current and emerging issues on food safety

The heavy burden of unsafe food on food and nutrition security as well as on agribusiness and trade is being increasingly documented and recognized, thus galvanizing political support to take food safety seriously. However, more effort is needed on data collection and analysis, preferably using global and regional templates such as the WHO survey of food-borne disease and the FAO EMPRES platform.



The essential elements of a national framework for food safety are well recognized. These include: a holistic approach to promoting food safety along the supply chain; use of economic incentives and taxes to encourage best practices; using science-based practices such as risk analysis; effective coordination among national agencies; regional cooperation to promote safe trade and contain transboundary threats; and harmonizing national standards to global standards.

For example, the Government of Bangladesh (GoB) has renewed its national regulation for controlling practices affecting food safety. Since the adoption of the National Sanitation Strategy (2005), the GoB has also been increasing awareness of consumers, strengthening food inspection services, establishing a central food-testing laboratory at the Institute of Public Health, strengthening the capacity of scientists and ensuring effectiveness of National Food Safety Advisory Council. Additionally, in 2013, the Parliament passed the Food Safety Act, which was a reform of the Pure Food Ordinance of 1959. The Act has been enacted in order to authorize the establishment of a scientifically based food safety authority and to regulate the activities regarding food production, import, processing, stockpiling, supplying, marketing and sales. In February 2015, the GoB set up the Food Safety Authority with the mandate of collaborating

with all food control agencies and food business operators. Despite these efforts, Bangladesh still lacks an integrated food safety framework or food control system, which reduces market access for Bangladesh exports of food products. Therefore, the Ministry of Food and FAO have started implementing a project to institutionalize food safety in Bangladesh, in order to enhance national inter-agency collaboration and facilitate the integration of national food safety control systems. (FAO, 2016b)

Overall, much progress has been made in Asia and the Pacific region on food safety, including efforts being made through regional trading blocs such as the Association of Southeast Asian Nations and South Asia Free Trade Agreement. However, there exist large disparities across countries in terms of the capacity of national systems to address these issues, especially because food safety requires a holistic response. Thus, for example, while most countries have food safety laws and regulations in place, the capacity to enforce national food safety standards is weak. In some cases, regulations do not cover the entire food chain or all the food products. Inadequate coordination among food safety agencies continues to be a weakness of the system to deliver.



SPECIAL SECTION: SMALLHOLDER DAIRY FOR TRIPLE WINS



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Milk is an excellent source of both macro- and micronutrients. It is high in energy, lipids and high-quality proteins and contains nutrients critical for growth and development, including calcium, vitamin A, riboflavin and vitamin B₁₂ (Hoppe *et al.*, 2008). Considering that 30 percent of children in the Asia and the Pacific region are stunted and levels of micronutrient deficiencies are high, even modest consumption of milk can contribute significantly to improving the nutritional status of children. In a study of over 2000 children in Malaysia, for example, the incidence of stunting was halved over a 21-month period through the provision of 250 ml of milk twice per week (Chen, 1989). A number of observational studies have also found that milk and other animal-source foods are associated with better

growth, micronutrient status, cognitive performance and motor function development in children (Weaver *et al.*, 2013; Iannotti, Muehlhoff, and McMahon, 2013).

On the production side, dairy in the region is largely a smallholder activity, as well as highly labour intensive, which means that growth in dairy production can have a more direct and greater impact on poverty reduction. If production can match the growth in demand, dairy can emerge as an engine of poverty-alleviating growth and simultaneously provide nutrition-related benefits.¹⁷ On the other hand, dairy farming is often associated with some negative environmental effects. However, emerging evidence discussed below indicates that dairy farming compares

¹⁷ This section draws liberally from a number of useful sources. Papers that provide analytical overviews of the many topics discussed here include Ahuja (2016), Staal *et al.* (2016), FAO (2013) and FAO (2014).

favourably with other livestock products on certain aspects of environmental impact, and other negative effects can be markedly reduced by supporting the adoption of new methods and practices. If some of these environmental effects can be contained, smallholder dairy farming can potentially provide a triple win by reducing poverty, improving nutrition and benefiting the environment.

The dairy economy of the Asia and the Pacific region and the outlook

The growth of milk consumption in the region has been phenomenal and production response fairly strong as well

Between 1990 and 2013, milk production in the region grew at a rate of almost 4.5 percent per annum against the global average growth rate of 1.5 percent. By 2013, the region's milk production had crossed 290 million tonnes – 37.9 percent of global production against 20 percent in

1990 (Table 6). The total value of Asian dairy production exceeded US\$110 billion and figured in the top three commodities in the region in terms of gross value of production. Despite this strong production performance, the region continues to fall short of aggregate demand and most countries are confronted with increasing dairy import bills. Asia's dairy imports have been growing steadily and touched 28 million tonnes in 2013. On a per capita basis, consumption per annum doubled from 37 kg to 74 kg between 1990 and 2013, which translates to a growth rate of 3.1 percent per annum, quite rapid considering that population has grown substantially during that period. Milk consumption per capita increased the most in Eastern Asia, from 15 to 41 kg, albeit from a smaller base, and doubled in South-eastern Asia. Consumption also doubled in Southern Asia from an already high level in 1990 (Figure 15). In terms of the total increase in milk consumption of 130 million tonnes, the contribution of India, China and Pakistan together was 91 percent (Figure 16).

Table 6 Total milk production: Asia and the world, 1990–2013

Region	Production (million tonnes)		Net Imports – milk equivalent (million tonnes)	
	1990	2013	1990	2013
Asia	108.4	292.4	9.7	27.9
Southern Asia	75.9	189.8	1.2	-0.02
Eastern Asia	17.4	50.8	2.7	14.5
South-eastern Asia	1.4	4.8	3.0	8.5
Rest of Asia	13.7	47.0	3.0	4.9
Oceania	14.0	28.5	-5.9	-19.7
Africa	21.5	49.1	4.5	6.8
North America	75.0	99.7	-0.8	-8.9
South America	33.2	69.3	0.6	-1.4
Europe	282.1	216.0	-9.6	-14.7
Rest of the world	10.0	16.9	3.8	3.9
World	544.2	771.9	42.9	110.8

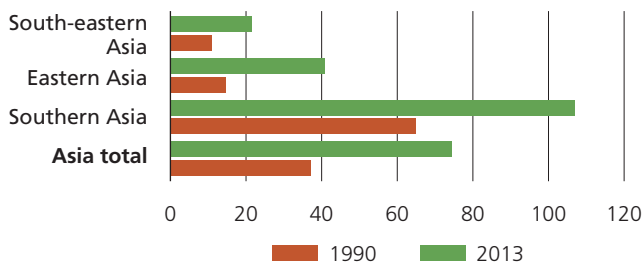
Notes: Net imports refer to Imports-exports. The global figures under 'net imports' column refer to total world trade in milk and milk products.

Source: FAOSTAT.

Rapid growth in milk consumption is particularly noteworthy in view of the often-asserted high incidences of lactose intolerance in the adult population in Asia and the Pacific. Because definitions vary from study to study and subjects are not generally representative of the whole population, the exact incidence is not known, but estimates of primary lactase deficiency – the primary cause of lactose intolerance – among various groups of adult populations in Eastern and South-eastern Asian nations vary between 60 and 100 percent (FAO, 2013). However research has also shown

that most individuals can progressively increase tolerance because colonic bacteria can adapt to regular lactose ingestion and this adaptation reduces lactose intolerance symptoms (Hertzler and Savaiano, 1996). Further, in 2010, the European Food Safety Authority Panel on Dietetic Products, Nutrition, and Allergies concluded that the vast majority of people around the world with lactose maldigestion can tolerate up to 12 g of lactose as a single dose and higher daily doses of up to 24 g if distributed throughout the day (EFSA, 2010).

Figure 15 Per capita milk supply: 1990 and 2013



Source: Computed from FAOSTAT data.

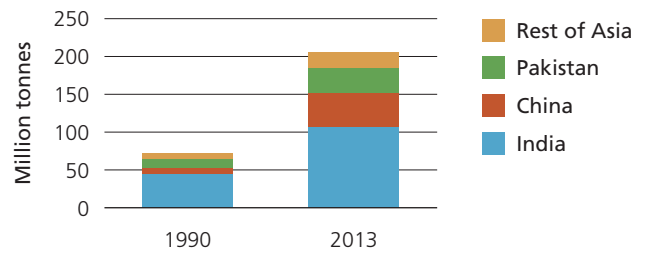
Looking forward, according to the OECD-FAO *Agricultural Outlook* for 2016–2025, world milk production is projected to increase by 177 million tonnes by 2025 from the 2013-15 base period, with about 73 percent of the growth anticipated to come from developing countries, especially India and Pakistan. Dairy cow numbers are expected to decline in the developed countries, while herd expansion in developing countries is projected to slow down. Thus, the outlook is for faster increases in yield per dairy cow, mainly in developing countries.

The “Triple Win” potential

Dairy products for nutritious and balanced diets

Milk and dairy products are nutrient-dense foods supplying energy and significant amounts of protein and micronutrients, which are essential to reduce hunger and malnutrition, particularly among the most vulnerable (e.g. pregnant women and children). Thus, a number of countries with dietary guidelines recommend dairy as a component

Figure 16 Major contributors to total milk supply, 1990 and 2013



Source: Computed from FAOSTAT data.

in a balanced diet. Cost analyses have shown that milk and dairy products are among the lowest-cost sources of dietary calcium, riboflavin and vitamin B₁₂. Recognizing the potential contribution of milk and dairy products in improving micronutrient status, and enhanced cognitive performance in young children, a number of governments (e.g. Bangladesh, China, India, the Philippines and Viet Nam) have developed programs to promote “milk in schools”. For example, Thailand has a long running National School Milk program that has improved nutritional status among children. A review of the programme by the Institute of Nutrition, Mahidol University, found that students in the programme consumed more energy, protein, calcium and vitamin B₁₂ than a typical diet in Thailand provides and that there was a suggested impact on height. Another study by the National Youth Bureau and Department of Education, Kasetsart University, found that children receiving milk in Bangkok schools were taller than those attending non-programme schools (FAO, 2013). Similar evidence is available from other selected countries (see, for example, Box 4 on school milk in China and Viet Nam).



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Box 4 School milk and nutrition: Evidence from China and Viet Nam

One well-designed study of school-based milk distribution was conducted in China from 1999 to 2001. The study participants included pre-adolescent ten-year-old girls from nine schools with comparable socioeconomic characteristics. The participants were randomly assigned to three groups. The first group received 330 ml of milk each school day for two years. The second group also received the same amount of milk but supplemented with Vitamin D₃. The third group served as control and did not receive any supplementary milk. The results showed that the girls receiving milk with or without Vitamin D₃ demonstrated significant increases in growth and bone mineral content and density compared with the control group. Those receiving milk with Vitamin D₃ also had greater increases in bone mineral content and density than those who received milk without it. A follow-up study three years after the supplementation trial ended demonstrated a sustained height effect.

Similarly, another study from a northern delta province of Viet Nam monitored anthropometrics, micro-nutritional status, faecal composition and school performance of a group of children in a school milk program against a reference group. The results showed considerable improvement in weight-for-age and height-for-age within six months of milk intervention; and underweight and stunting levels dropped by 10 percent in these groups. The incidence of anaemia and zinc deficiency improved. Children in the milk consuming groups also recorded significantly better short-term memory scores and parents reported improved health status of the children. Overall, milk consumption benefited the children in rural Viet Nam, including lower occurrence of underweight and stunting, improved micronutrients status, better learning indicators and general improvement in health related quality of life.

Source: Du *et al.*, 2004; Lien *et al.*, 2009; FAO, 2013

Smallholder dairy development is pro-poor

Dairy farming in Asia is largely a smallholder endeavour. Although recent years have seen broad-based growth of large enterprises throughout the region, nearly 80 percent of the milk in the Asia-Pacific region is still produced by smallholders. Furthermore, the poor generally tend to be much more important in smallholder dairy production than in crop production because generally the distribution of dairy animals has been found to be more equal than that of land. Smallholder dairy is also more labour intensive than crop production and provides a remunerative outlet for family labour. In addition, feed and fodder in the form of crop residues are available at low cost on many small farms, and the manure from dairying can be used for crop farming. It has been estimated that the cost of milk production is lower in Southern and South-eastern Asia than elsewhere, generally less than US\$30 per 100 kg, among the lowest costs found anywhere globally (Hemme *et al.*, 2014). These characteristics, coupled with a robust medium-term market outlook for milk, mean that the growth of smallholder dairy can be an engine of poverty-alleviating growth. Despite the low costs, poor productivity and barriers in access to markets and technologies remain major problems for smallholders. These are discussed further in the section below on challenges and responses.

Dairy farming and environmental concerns

The main environmental concerns associated with the growth of dairy production in Asia are water and air pollution, and impacts on climate change.

Water pollution in dairying results from inappropriate disposal of manure and the application of fertilizers for

forage production. Dairy cow manure is a nutrient-rich fertilizer, and when used appropriately, it is a valuable source for productivity growth. However, if not managed well, it can become a source of soil and water pollution. While mixed farming systems have traditionally matched manure output and on-farm demand, the risk of manure production exceeding recycling capacity has increased with the emergence of larger and more intensive dairy farms. Nitrogen and phosphorus, when emitted in high concentrations, can be a significant component of pollution from agriculture to surface water, groundwater and marine waters, damaging ecosystems through eutrophication. But there is scope for precision feeding of balanced diets to reduce the loss of these valuable nutrients into the environment, creating a win-win situation by reducing the environmental burden as well as the feed costs.

Water footprints are emerging as an important sustainability indicator, similar to carbon footprints for climate change, although research in this area is still weak. Available evidence suggests that, at the global level, the water footprint of milk compares favourably with other animal-sourced foods. For example, Mekonnen and Hoekstra (2012) estimated the global water footprint for milk at approximately 1 000 litres per kg, in contrast to 15 400 litres per kg of bovine meat, 8 763 litres per kg for sheep/goat meat, 4 325 litres per kg for chicken meat and 1 644 litres per kg of cereals. Mekonnen and Hoekstra (2012) also present the water footprint of selected foods on the basis of per unit of nutritional value (litre/kcal; litre/g of protein and litre/g of fat). On these parameters as well the water footprint of milk compares reasonably well with other foods, and indeed is among the lowest relative to other livestock products.



Relatively favourable water footprint notwithstanding, there are many milk producing areas across Asia that are under severe water stress and it is critical to better understand the implications of a growing dairy sector on Asia's water resources and the ways to better optimize the water footprint by adopting practices that increase efficiency of water use, reduce irrigation needs, optimize nutrient management and increase feed conversion efficiency.

Greenhouse gases: Dairy farming is also widely recognized as a source of GHG emissions and climate impact. According to FAO estimates, in 2007, the global dairy sector contributed 4.0 percent to total global anthropogenic GHG emissions, with Asia contributing around 30 percent of these emissions. At the same time, the sector has enormous potential to contribute to climate change mitigation. Improving on feeds, e.g. altering feed composition to improve digestibility of elements like phosphorus and nitrogen, is central to several of these effects. Studies have pointed out the inverse relationship between milk yields and GHG emissions, and that presents a potential win-win opportunity. Overall, there is a consensus that there are technologies and husbandry practices (see FAO, 2010 for a discussion on GHG mitigation options from dairy), which, if adopted, could contribute substantially to reducing the emission intensity from dairy farming¹⁸ (FAO, 2010; Gerber, Vellinga, Opio and Steinfeld, 2011).

Challenges and responses

The growing demand for milk, while offering renewed opportunities for contributing towards income, employment, livelihoods and nutritional benefits for millions of

households, also poses new challenges. Of particular concern are growing pressures on natural resources and the environment, augmenting feed availability, ensuring product safety and quality, avoiding smallholder marginalization, and minimizing risks associated with veterinary public health.

Asia is a land-scarce region and growing resource scarcity is already beginning to influence the food production landscape. The scope for expansion of arable land in the region is quite limited, and the quality of land is declining. Hence, it is essential to invest heavily in measures to increase dairy farm productivity. It is also essential to invest in farmer training to upgrade their skills due to growing farm labour scarcity, and in research and extension to respond to additional challenges posed by climate variability, water scarcity, and rising feed and energy costs.

Second, with the demand for dairy products expanding rapidly in the region, the value chains becoming longer and the continued prevalence of a large unorganized sector with multiple stakeholders, it is essential for governments to strengthen systems that can effectively minimize health risks and promote sector development in a manner that contributes to equitable rural development. A risk-based preventive approach is required at all levels of the dairy value chain, taking proactive measures throughout the chain, including stakeholder education. There is also a need for greater reliance on evidence-based methods of risk assessment as well as regulations, policies and risk management systems that can balance the multiple objectives of health, economic development and support of rural livelihoods.

¹⁸ Defined as GHG emissions per kg of fat and protein corrected milk.



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Rising production costs and emerging food quality and safety concerns are putting pressure on production systems. One response to this pressure has been the scaling up of dairy farms and the emergence of mega farms in some countries, especially in Eastern and South-eastern Asia. This has raised concerns about marginalization of smallholders due to lack of funds or access to credit, poor access to input and output services, poor ability of smallholders to absorb market and production risks, high costs of meeting increasingly stringent food safety and quality standards, and poor infrastructure. Policy and institutional support is needed to support smallholder producers to mitigate the downside risk and increase their capacity to raise the returns to their enterprises. There is also a need to analyse the experience of new kinds of organizational structures and forms for linking smallholders to markets. The classical models of collective action, such as cooperatives and producer groups, remain important, but new more business-oriented models have emerged such as producer companies and dairy hubs.¹⁹ Not enough is known and understood about these arrangements, so a closer understanding of newer initiatives and models can help to discover new opportunities for involving smallholders in innovative public-private partnerships and for refocusing pure public support measures to areas that may not yet be sufficiently attractive for private investors.

In view of the widespread prevalence of a number of production-limiting and trade-preventing diseases in the region and growing health concerns resulting from zoonotic and FBDs, support for development of policies and delivery systems for enhancing food safety and minimizing the animal disease burden is another area that deserves focused attention. This requires large and sustained investment from public and private sectors in building animal health capacity and promoting dialogue towards identifying and implementing options for disease control. Milk and dairy products can cause food-borne illness and rapid growth in production and consumption, if not managed adequately, can have a negative impact on public health in the region.

A number of governments in the region are conscious of these challenges and have been promoting policies and programs to address them (see Box 5 for examples). While there are no off-the-shelf solutions that can be applied in all the different contexts, there are a number of successful models and initiatives around the world that can serve as sources of lessons for formulating future strategies, policies and programmes. Asia also has a rich diversity of experiences and models to address these challenges and to ensure that the dairy sector can make a substantial contribution to enhancing nutrition, reducing poverty and maintaining or improving the environment.

¹⁹ Dairy hub mainly refers to a collection of services around a milk chilling plant. Such hubs provide services such as bulking, chilling, market access, transportation, veterinary services, advisory services, financial services, and input supply to dairy farmers.

Box 5 Selected highlights of dairy development programs and policies from Asia**India**

The National Dairy Development Plan (NDP) of India was approved in February 2012 with a financial outlay of US\$416 million and implementation period of six years from 2011–17 to meet the projected national demand of 150 million tonnes of milk from domestic production. The first phase of the plan focuses on 14 major milk-producing states that account for over 90 percent of total milk production. In 2012, the first phase of the NDP began with a set of initiatives for increasing productivity through scientific breeding and improved animal nutrition, strengthening village-based milk procurement systems, and research and extension. The implementation period of the plan has been extended for two years till 2018–19 in order to achieve key outputs.

Viet Nam

The Government of Viet Nam launched in February 2016 its milk industry development plan to improve the competitive capacity of the industry, apply advanced technologies and develop the industry in an open direction and flexible manner with diversified milk products. Viet Nam's annual milk production in the 2015–2020 period is projected to increase by 5 to 6 percent. The Government has set a target of US\$8 million during this period to support dairy industry development.

Pakistan

To mitigate the risk of losses by small livestock farmers and to incentivize farmers to engage in livestock development, the Government of Pakistan introduced in 2014–15 the Livestock Insurance Scheme with all farmers getting financing for up to ten cattle. The Livestock Insurance Scheme promotes cooperative dairy farming in the country. The scheme covers livestock insurance in case of calamity and disease.

The Philippines

The National Dairy Authority signed a Memorandum of Agreement with the Development Bank of the Philippines on 30 June 2015 as part of the Authority's commitment to develop the local dairy industry through the provision of financial and technical support for production, processing and marketing activities of dairy farmers. Under the agreement, a credit assistance programme called the Sustainable Agribusiness Financing Programme for the Dairy Industry was launched, enabling qualified beneficiaries nationwide to access credit for dairy production, processing, marketing and acquisition of fixed assets.

Sri Lanka

The Central Bank launched in April 2014 a special loan scheme to promote large-scale production of milk and dairy products. Under the scheme, loans will be provided for grass cultivation related to cattle management, construction of cattle sheds, transport of milk and other implements used for milk production.



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DATA SOURCES

The MDG Experience and the Zero-Hunger Challenge – All the data on PoU used for analyses in the section are from FAO Food Security Indicators, available in public domain. The rate of reduction in the PoU used in various tables is computed with a compound growth rate formula using the beginning and end years of the data covered.

Food Insecurity as Experienced by People – The Food Insecurity Experience Scale – All data used in this section are from FAO, including those published in FAO (2016a) on FIES. Sub-regional aggregates were computed using appropriate population weights.

Undernutrition among children under five years of age – The data on under-five undernutrition (stunting, underweight, overweight, wasting) are compiled from the Global Database on Child Growth and Malnutrition, maintained through inter-agency collaboration among UNICEF, WHO and the World Bank (available at <http://www.who.int/nutgrowthdb/estimates/en/>).

Micronutrient deficiencies – the hidden hunger – The data used in this section on Hidden Hunger Index are compiled from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4684416/>.

Overweight and obesity – The data are from WHO. The section also uses time series data available from Population Health Metrics. Valuable statistics are also made available through articles published in *The Lancet*.

Situation and outlook for rice production and prices in Asia and the Pacific – All data used in this section are from FAO, and the section draws upon most recent publications on *Food Outlook*, *Rice Market Monitor* and *Crop Prospects and Food Situation*.

Public expenditure in agricultural services and research and development – The data on public expenditure as well as agriculture orientation index (AOI) are from FAOSTAT while the agricultural R&D data are ASTI data maintained by IFPRI (also available in FAOSTAT). Agriculture refers to the agriculture, forestry, fishing and hunting.

Food safety issues in the region – Three sources of data are used in the section – data on global burden of food-borne disease are from WHO; data on reasons for import rejections are from UNIDO–IDE–JETRO; and forecasts of types of the threats of transboundary diseases are from FAO Food Chain Crisis Early Warning Bulletins.

Special Section: Smallholder Dairy for Triple Wins – The data are from FAOSTAT (Food Balance data).

2016

Asia and the Pacific

REGIONAL OVERVIEW OF FOOD INSECURITY

INVESTING IN A ZERO HUNGER GENERATION

KEY MESSAGES

- ▶ **Many countries in the region met or exceeded the Millennium Development Goal (MDG) on hunger several years before the deadline. Going forward, to meet the 2030 hunger target of the Sustainable Development Goals, the challenge will be to fully eliminate the prevalence of undernourishment across the region and to achieve substantial reductions in other forms of malnutrition.**
- ▶ **Progress in defeating hunger has slowed and we must pick up the pace.** For many countries of the region, there was a slowdown in the rates of reduction in the prevalence of undernourishment during the past five years compared to the two decades prior; progress will need to accelerate in order to meet the zero-hunger goal by 2030.
- ▶ **A new tool to measure food insecurity is at hand.** The *Food Insecurity Experience Scale* is a new and innovative approach to measuring the prevalence of food insecurity. It is based on direct responses of individuals about their access to food. This promising new tool permits a more disaggregated analysis of food insecurity by place of residence, gender and other factors.
- ▶ **The paradox of hunger and obesity side by side.** Many countries in the region face the challenge of a triple burden of malnutrition whereby an inadequate intake of calories, micronutrient deficiencies and obesity prevail simultaneously. Obesity has been increasing rapidly in parts of the region.
- ▶ **Diets are shifting to more protein-rich foods, but that shift has consequences.** Diets in Asia and the Pacific are undergoing rapid transition. Per capita rice consumption has declined and consumption of livestock products, fish, fruits and vegetables has grown rapidly. This trend requires that foods other than rice receive more investments in agricultural research and heightened policy attention.
- ▶ **Eliminating malnutrition means bringing everyone to the table.** A more wide-ranging holistic and integrated approach is needed that involves more nutrition-sensitive interventions that bring agriculture, food security and nutrition interventions into the same space.
- ▶ **Meeting the challenges of feeding a hungry region by 2050 quite literally means putting more money where our mouths are.** Most countries in the region are spending a smaller proportion of government budgets than is commensurate with the share of agriculture in their economies. Underinvesting in public agricultural research, according to commonly accepted indicators, is holding us back from making the changes required now and feed our families in the years to come. To meet the increasing demands upon agriculture and ensure food sustainably in the face of resource scarcity, climate variability and persisting malnutrition, more investment is vital.
- ▶ **More people are drinking milk and buying dairy products, but not everyone is benefitting.** Milk consumption and smallholder dairy farming offer triple win potentials for nutrition, rural livelihood support and the environment. Public support (in the form of policies and institutions enhancing smallholder access to technology and markets) will be needed to enable small dairy producers to be competitive in the marketplace, to improve the safety and quality of milk marketed, and to manage and reduce some environmental concerns.

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