

2014

GLOBAL HUNGER INDEX

THE CHALLENGE OF HIDDEN HUNGER



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2014

GLOBAL HUNGER INDEX

THE CHALLENGE OF HIDDEN HUNGER

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peer reviewed. Chapter 04 is based on evidence
from project work.





Everyone has the right to adequate food in a quantity and quality sufficient to satisfy their dietary needs. One of the key challenges going forward is to **shine a light on food quality, to address hidden hunger.**

FOREWORD

For decades, the global political and development agenda has failed to put the spotlight on hunger and undernutrition. While recent years have seen more ambition and action, the tragedy of hunger persists for 805 million hungry people today. This suffering—which for many is part of everyday life—cannot be allowed to continue. As the contours of the post-2015 development agenda emerge, the international community must work to ensure that food and nutrition security is at the heart of the new development framework. It is possible to successfully end poverty, but only if we successfully fight hunger.

This is the ninth year in which the International Food Policy Research Institute (IFPRI) has calculated the Global Hunger Index (GHI), analyzing and recording the state of hunger worldwide, highlighting the countries and regions where action is most needed. The 2014 GHI shows that progress has been made in reducing the proportion of hungry people in the world. Despite progress, levels of hunger remain “alarming” or “extremely alarming” in 16 countries. This year’s report focuses on a critical aspect of hunger that is often overlooked: hidden hunger. Also known as micronutrient deficiency, hidden hunger affects more than an estimated 2 billion people globally. The repercussions of these vitamin and mineral deficiencies can be both serious and long-lasting.

Effects of hidden hunger include child and maternal death, physical disabilities, weakened immune systems, and compromised intellects. Where hidden hunger has taken root, it not only prevents people from surviving and thriving as productive members of society, it also holds countries back in a cycle of poor nutrition, poor health, lost productivity, persistent poverty, and reduced economic growth. This demonstrates why not only the right to food, but also access to the right type of food at the right time, is important for both individual well-being and countries as a whole.

In this report, Concern Worldwide and Welthungerhilfe provide important on-the-ground perspectives, describing what their organizations are doing in order to alleviate hidden hunger and sustainably promote food and nutrition security. Based on these experiences and the research findings of IFPRI, this report proposes policy recommendations to help reduce the prevalence of vitamin and mineral deficiencies.

Now is the time for the global community to mobilize to end hidden hunger. We hope that this report will not only generate discussion but also serve as a catalyst for more concerted efforts to overcome hunger and reduce nutrition insecurity around the world.



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SUMMARY

With one more year before the 2015 deadline for achieving the Millennium Development Goals, the *2014 Global Hunger Index* report offers a multifaceted overview of global hunger that brings new insights to the global debate on where to focus efforts in the fight against hunger and malnutrition.

The state of hunger in developing countries as a group has improved since 1990, falling by 39 percent, according to the 2014 GHI. Despite progress made, the level of hunger in the world is still “serious,” with 805 million people continuing to go hungry, according to estimates by the Food and Agriculture Organization of the United Nations.

The global average obscures dramatic differences across regions and countries. Regionally, the highest GHI scores—and therefore the highest hunger levels—are in Africa south of the Sahara and South Asia, which have also experienced the greatest absolute improvements since 2005. South Asia saw the steepest absolute decline in GHI scores since 1990. Progress in addressing child underweight was the main factor behind the improved GHI score for the region since 1990.

From the 1990 GHI to the 2014 GHI, 26 countries reduced their scores by 50 percent or more. In terms of absolute progress, comparing the 1990 GHI and the 2014 GHI, Angola, Bangladesh, Cambodia, Chad, Ghana, Malawi, Niger, Rwanda, Thailand, and Vietnam saw the biggest improvements in scores.

Levels of hunger are “extremely alarming” or “alarming” in 16 countries, with Burundi and Eritrea both classified as “extremely alarming,” according to the 2014 GHI. Most of the countries with “alarming” GHI scores are in Africa south of the Sahara. Unlike many other countries south of the Sahara, where hunger has been decreasing, Swaziland is an exception. It suffered the biggest increase in a GHI score between the 1990 GHI and the 2014 GHI. Reliable data for the Democratic Republic of the Congo and Somalia, however, are sorely lacking.

One form of hunger that is often ignored or overshadowed by hunger related to energy deficits is hidden hunger—also called micronutrient deficiency—which affects some 2 billion people around the world. This shortage in essential vitamins and minerals can have long-term, irreversible health effects as well as socioeconomic consequences that can erode a person’s well-being and development. By affecting people’s productivity, it can also take a toll on countries’ economies.

Hidden hunger can coexist with adequate or even excessive consumption of dietary energy from macronutrients, such as fats and carbohydrates, and therefore also with overweight/obesity in one person or community.

Poor diet, disease, impaired absorption, and increased micronutrient needs during certain life stages, such as pregnancy, lactation, and infancy, are among the causes of hidden hunger, which may “invisiblely” affect the health and development of a population.

Possible solutions to hidden hunger include food-based approaches: dietary diversification, which might involve growing more diverse crops in a home garden; fortification of commercial foods; and biofortification, in which food crops are bred with increased micronutrient content. Food-based measures will require long-term, sustained, and coordinated efforts to make a lasting difference. In the short term, vitamin and mineral supplements can help vulnerable populations combat hidden hunger.

Along with these solutions that address the low content or density of vitamins and minerals in food, behavioral change communication is critical to educate people about health services, sanitation and hygiene, and caring practices, as well as the need for greater empowerment of women at all levels.

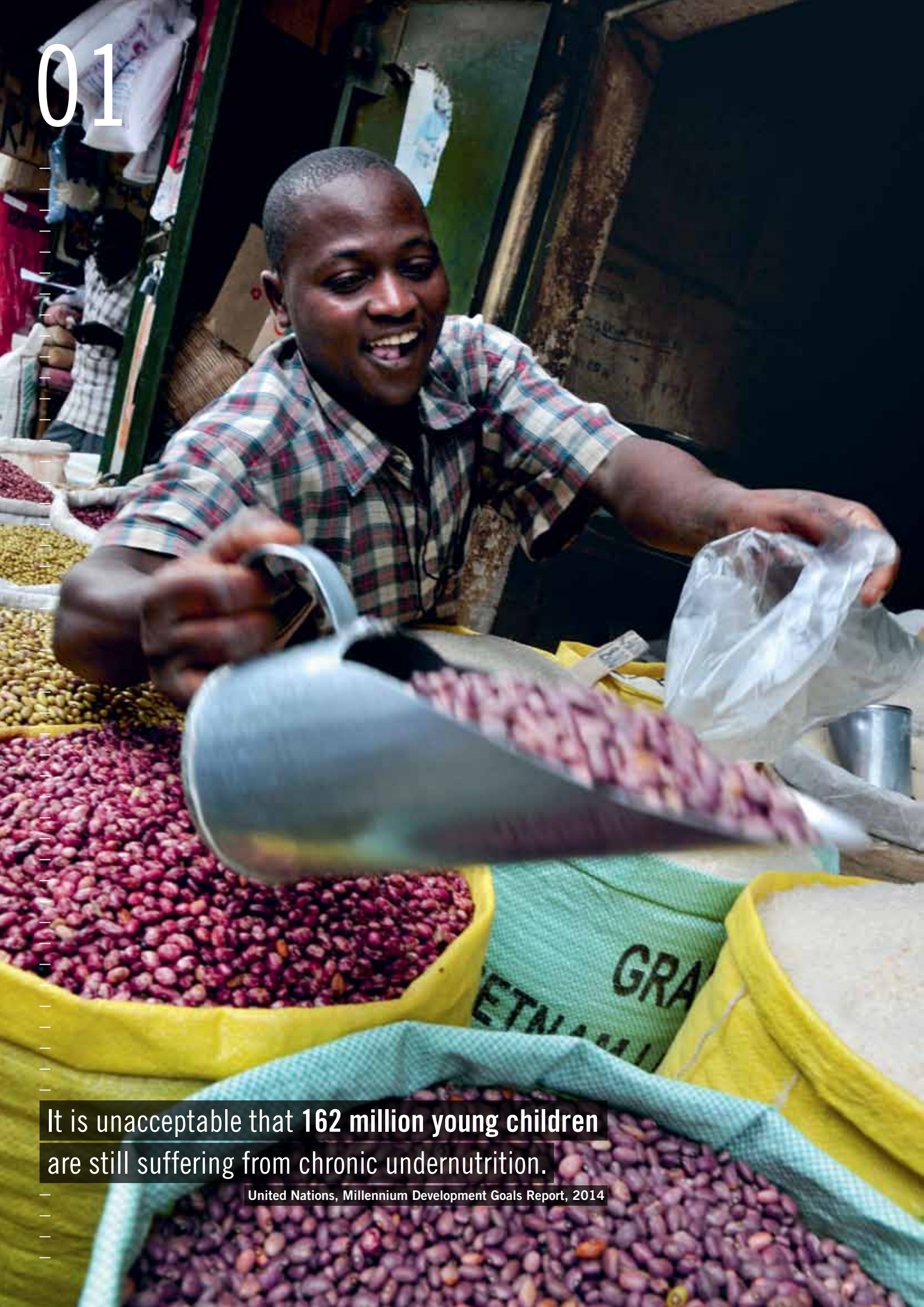
To eliminate hidden hunger, governments must demonstrate political commitment by making fighting it a priority. Governments and multilateral institutions need to invest in and develop human and financial resources, increase coordination, and ensure transparent monitoring and evaluation to build capacity on nutrition.

Governments must also create a regulatory environment that values good nutrition. This could involve creating incentives for private sector companies to develop more nutritious seeds or foods.

Transparent accountability systems are needed in order to ensure that investments contribute to public health, while standardized data collection on micronutrient deficiencies can build the evidence base on the efficacy and cost effectiveness of food-based solutions.

These and other recommendations set out in this report are some of the steps needed to eliminate hidden hunger. Ending hunger in all its forms is possible. It must now become a reality.

01



It is unacceptable that **162 million young children** are still suffering from chronic undernutrition.

United Nations, Millennium Development Goals Report, 2014

THE CONCEPT OF THE GLOBAL HUNGER INDEX

The Global Hunger Index (GHI) is a tool designed to comprehensively measure and track hunger globally and by region and country.¹ It highlights successes and failures in hunger reduction and provides insights into the drivers of hunger and nutrition insecurity. Calculated each year by the International Food Policy Research Institute (IFPRI), the GHI is designed to raise awareness and understanding of regional and country differences. It is hoped that the report will trigger action to reduce hunger around the world.

A number of different indicators can be used to measure hunger (Box 1.1). To reflect the multidimensional nature of hunger, the

BOX 1.1 CONCEPTS OF HUNGER

The words that refer to different concepts of hunger can be confusing. **Hunger** is usually understood to refer to the distress associated with lack of food. The Food and Agriculture Organization of the United Nations (FAO) defines food deprivation, or undernourishment, as the consumption of fewer than about 1,800 kilocalories a day—the minimum that most people require to live a healthy and productive life.*

Undernutrition goes beyond calories and signifies deficiencies in any or all of the following: energy, protein, or essential vitamins and minerals. Undernutrition is the result of inadequate intake of food—in terms of either quantity or quality—poor utilization of nutrients due to infections or other illnesses, or a combination of these factors. These in turn are caused by a range of factors including household food insecurity; inadequate maternal health or childcare practices; or inadequate access to health services, safe water, and sanitation.

Malnutrition refers more broadly to both undernutrition (problems of deficiencies) and overnutrition (problems of unbalanced diets, such as consuming too many calories in relation to requirements with or without low intake of micronutrient-rich foods). In this report, “hunger” refers to the index based on the three component indicators described on this page.

* FAO considers the composition of a population by age and sex to calculate its average minimum energy requirement for an individual engaged in low physical activity, which varies by country (from about 1,650 to more than 2,000 kilocalories per person per day for developing countries in 2011–2013 according to FAO 2014). The country's average minimum energy requirement for low physical activity is used to estimate undernourishment (FAO, IFAD, and WFP 2014). In 2012, FAO started computing the average minimum energy requirement for an individual engaged in normal physical activity and using this higher threshold to estimate the prevalence of food inadequacy for each country. This indicator is a less conservative measure of food deficiency in the population than the undernourishment indicator (FAO 2014).

GHI combines three equally weighted indicators into one index:

- 1. Undernourishment:** the proportion of undernourished people as a percentage of the population (reflecting the share of the population with insufficient caloric intake);
- 2. Child underweight:** the proportion of children under the age of five who are underweight (that is, have low weight for their age, reflecting wasting, stunted growth, or both), which is one indicator of child undernutrition; and
- 3. Child mortality:** the mortality rate of children under the age of five (partially reflecting the fatal synergy of inadequate food intake and unhealthy environments).²

This multidimensional approach to measuring hunger offers several advantages. It reflects the nutrition situation not only of the population as a whole, but also of children—for whom a lack of dietary energy, protein, or micronutrients (that is, essential vitamins and minerals) leads to a high risk of illness, poor physical and cognitive development, or death. It also combines independently measured indicators to reduce the effects of random measurement errors.³

The 2014 GHI has been calculated for 120 countries for which data on the three component indicators are available and where measuring hunger is considered most relevant (Box 1.2). The index excludes some higher-income countries because the prevalence of hunger there is very low.

The GHI is only as current as the data for its three component indicators. This year's GHI reflects the most recent country-level data available for the three component indicators spanning the period of 2009 to 2013. It is thus a snapshot not of the present, but of the recent past. For some countries, such as Afghanistan, the Democratic Republic of Congo, Georgia, Myanmar, Papua New Guinea, and Somalia, lack of data on undernourishment prevents the calculation of GHI scores.⁴

The scores are based on source data that are continually revised by the United Nations (UN) agencies that compile them, and

¹ For background information on the concept, see Wiesmann (2004) and Wiesmann, von Braun, and Feldbrügge (2000).

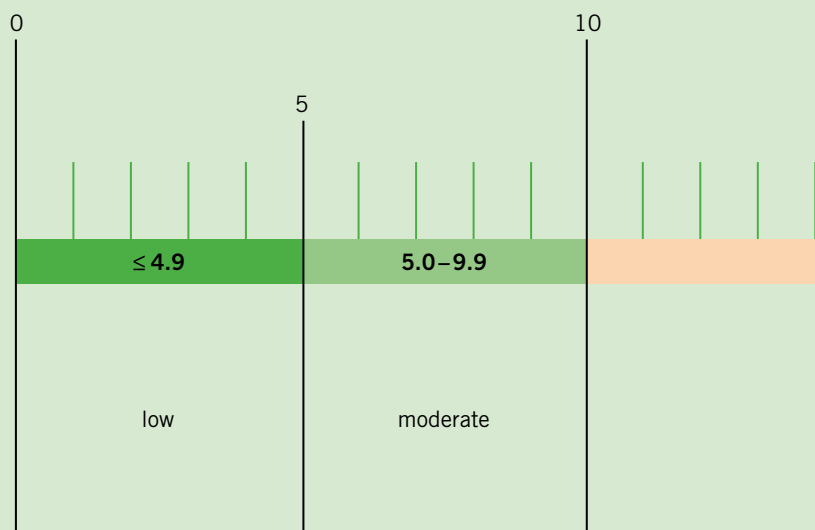
² According to recent estimates, undernutrition is responsible for 45 percent of deaths of children younger than five years old (Black et al. 2013).

³ For a multidimensional measure of poverty, see the index developed by the Oxford Poverty and Human Development Initiative for the United Nations Development Programme (Alkire and Santos 2010).

⁴ FAO stopped publishing country-level estimates of undernourishment for the Democratic Republic of the Congo and Myanmar in 2011 (FAO, IFAD, and WFP 2011). According to past GHI reports, the GHI score of the Democratic Republic of the Congo was in the “extremely alarming” category with the highest levels of hunger. For South Sudan, which became independent in 2011, and present-day Sudan, separate undernourishment estimates are not yet available from FAO (FAO 2014). Therefore GHI scores calculated for former Sudan refer to the population of both countries.

BOX 1.2 HOW GHI SCORES ARE CALCULATED

A country's GHI score is calculated by averaging the percentage of the population that is undernourished, the percentage of children younger than five years of age who are underweight, and the percentage of children who die before the age of five. This calculation results in a 100-point scale on which zero is the best score (no hunger) and 100 the worst, although neither of these extremes is reached in practice. A value of 100 would be reached only if the whole population was undernourished, all children younger than five were underweight, and all children died before their fifth birthday. A value of zero would mean that a country had no undernourished people in the population, no children younger than five who were underweight, and no children who died before their fifth birthday. The scale at the right shows the severity of hunger—from “low” to “extremely alarming”—associated with the range of possible GHI scores.



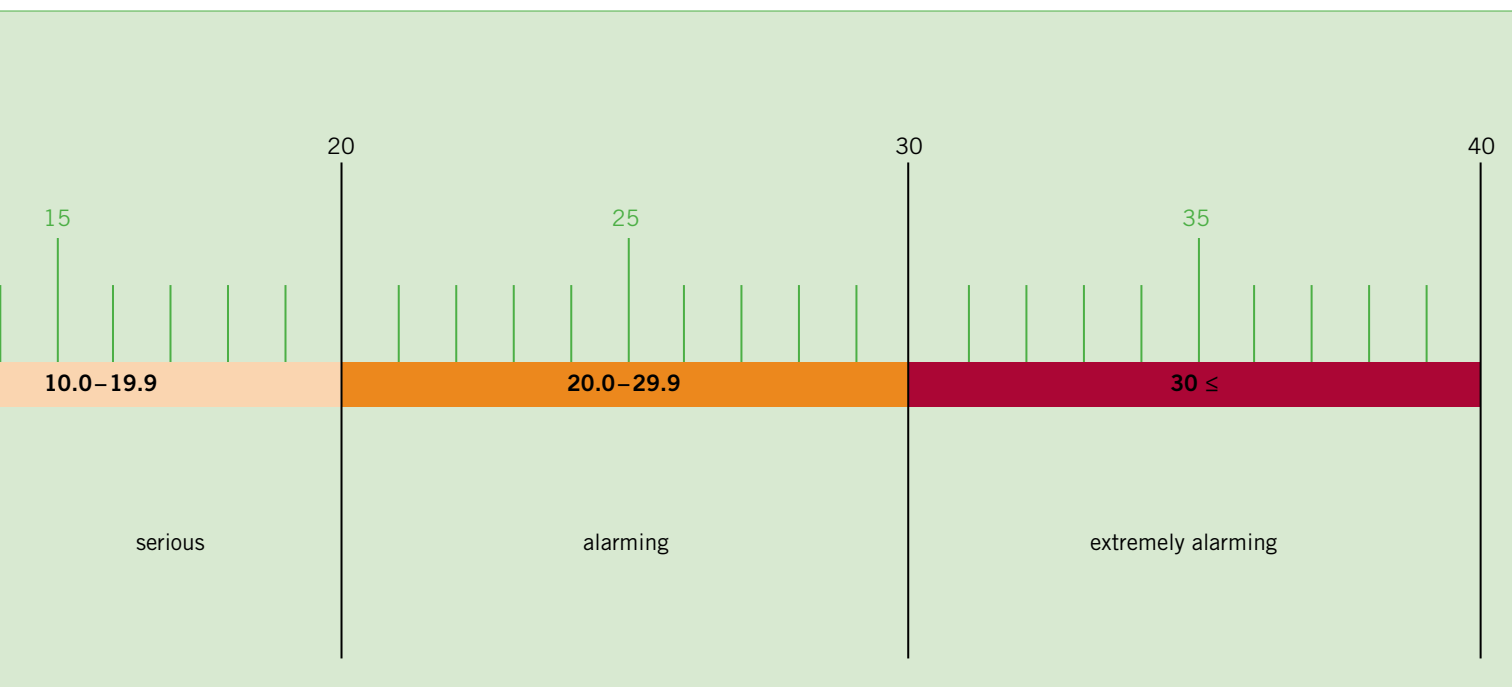
each year's GHI report reflects these revisions. While these revisions result in improvements in the data, they also mean that the GHI scores from different years' reports are not comparable with one another. This year's report contains GHI scores for four other reference periods—1990, 1995, 2000, and 2005—besides the most recent GHI.

The 1990, 1995, 2000, 2005, and 2014 GHI scores presented in this report reflect the latest revised data for the three component indicators of the GHI.⁵ Where original source data were not available, the authors' estimates for the GHI component indicators were used, based on the most recent data available. (See Appendix A for more detailed background information on the data sources for and calculations of the 1990, 1995, 2000, 2005, and 2014 GHI scores.)

The three component indicators used to calculate the GHI scores in this report draw upon data from the following sources:

- 1. Undernourishment:** Updated data from the Food and Agriculture Organization of the United Nations (FAO) were used for the 1990, 1995, 2000, and 2005, and 2014 GHI scores. Undernourishment data for the 2014 GHI are for 2011–2013 (FAO 2014; authors' estimates).
- 2. Child underweight:** The “child underweight” component indicator of the GHI scores includes data from the joint database of the United

⁵ For previous GHI calculations, see von Grebmer et al. (2013, 2012, 2011, 2010, 2009, 2008); IFPRI/Welthungerhilfe/Concern (2007); Wiesmann (2006a, b); and Wiesmann, Weingärtner, and Schöninger (2006).



Nations Children’s Fund (UNICEF), the World Health Organization (WHO), and the World Bank, and additional data from WHO’s continuously updated Global Database on Child Growth and Malnutrition; the most recent Demographic and Health Survey (DHS) and Multiple Indicator Cluster Survey reports; statistical tables from UNICEF; and the latest national survey data for India from UNICEF India.⁶ For the 2014 GHI, data on child underweight are for the latest year for which data are available in the period 2009–2013 (UNICEF/WHO/World Bank 2013; WHO 2014b; UNICEF 2014a; MEASURE DHS 2014; India, Ministry of Women and Child Development, and UNICEF 2014; authors’ estimates).

3. Child mortality: Updated data from the UN Inter-agency Group for Child Mortality Estimation were used for the 1990, 1995, 2000,

2005, and 2014 GHI scores. For the 2014 GHI, data on child mortality are for 2012 (IGME 2013). Despite the existence of many technological tools to collect and assess data almost instantaneously, time lags and data gaps persist in reporting vital statistics on hunger and undernutrition, particularly on micronutrient deficiencies. While some recent improvements have been made, more up-to-date, reliable, and extensive country data continue to be urgently needed. Further improvements in collecting high-quality data on hunger will allow for a more complete and current assessment of the state of global hunger and, in turn, more effective steps to reduce hunger.

⁶ Data on India’s latest child underweight rate are provisional.

02



Like undernutrition, micronutrient deficiency or **hidden hunger** is a violation of a child's right to a standard of living adequate for the child's physical and mental development.

Olivier De Schutter, former United Nations special rapporteur on the right to food, 2013

GLOBAL, REGIONAL, AND NATIONAL TRENDS

Since 1990, significant progress has been made in the fight against hunger. The Global Hunger Index (GHI) score in 1990 was 20.6 for the developing world.¹ The 2014 GHI stands at 12.5, representing a reduction of 39 percent (Figure 2.1). Despite this progress, the number of hungry people in the world remains unacceptably high. In 2012–2014, about 805 million people were chronically undernourished (FAO, IFAD, and WFP 2014).

The three GHI components (undernourishment, child underweight, and child mortality) each contributed differently to the overall drop in hunger as measured by the GHI since 1990. A decline in child underweight lowered the aggregate GHI score for the developing world by 3.5 points, whereas changes in the share of undernourished people in the population and the child mortality rate contributed reductions of 3.1 and 1.5 points, respectively.

Large Regional and National Differences

The period since 2005 has seen the greatest progress, with the GHI falling by 3.4 points in the developing world. In the three five-year periods between 1990 and 2005, the reductions varied from 1.4 to 1.7 points. Undernourishment fell most rapidly between 1990 and 1995, underweight after 2005, and progress in reducing child mortality has gained momentum since 2000. Even with these improvements, the 2014 aggregate GHI remains “serious” and warrants continued concern.

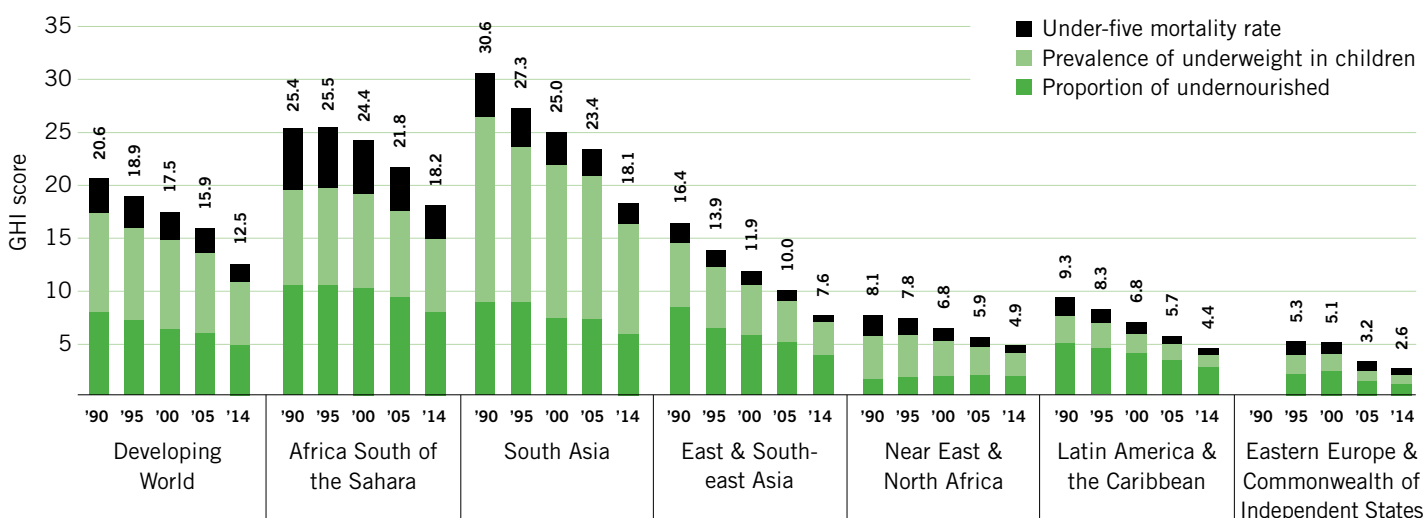
These global averages mask dramatic differences among regions and countries. Compared with the 1990 score, the 2014 GHI score is 28 percent lower in Africa south of the Sahara, 41 percent lower in South Asia, and 40 percent lower in the Near East and North Africa (Figure 2.1). Progress in East and Southeast Asia and Latin America and the Caribbean was even more remarkable, with the GHI scores falling by 54 percent and 53 percent respectively (although the 1990 score was already relatively low in the latter region). In Eastern Europe and the Commonwealth of Independent States, the 2014 GHI score is 51 percent lower than the 1995 score.²

South Asia and Africa south of the Sahara have the highest 2014 GHI scores, at 18.1 and 18.2 respectively. In absolute terms,

¹ The GHI for the developing world, also referred to as the “aggregate GHI,” includes all developing countries for which the GHI has been calculated. It also includes Afghanistan, the Democratic Republic of the Congo, Myanmar, Papua New Guinea, and Somalia. Country GHI scores were not calculated for these countries because much of the data for them is estimated or provisional. They were incorporated into the 2014 developing world GHI and regional GHI scores because data on child underweight and child mortality are available or could be estimated and because provisional estimates of undernourishment were provided by FAO only for regional and global aggregation (including provisional estimates for Georgia, which were considered in the regional GHI scores for Eastern Europe and the Commonwealth of Independent States). The unpublished undernourishment estimate for Ethiopia for 1990–1992 was also obtained from FAO and incorporated in the 1990 aggregate GHI and 1990 regional GHI for Africa south of the Sahara. As noted earlier, data for some other countries are not available, and most high-income countries are excluded from the GHI calculation.

² For Eastern Europe and the Commonwealth of Independent States, the 1995 GHI score was used for comparison because most countries in this region became independent after 1990 and no 1990 GHI scores were calculated.

FIGURE 2.1 CONTRIBUTION OF COMPONENTS TO 1990, 1995, 2000, 2005, AND 2014 GLOBAL HUNGER INDEX SCORES, BY REGION



Note: For the 1990 GHI, data on the proportion of undernourished are for 1990–1992; data on child underweight are for the year closest to 1990 in the period 1988–1992 for which data are available; and data on child mortality are for 1990. For the 1995 GHI, data on the proportion of undernourished are for 1994–1996; data on child underweight are for the year closest to 1995 in the period 1993–1997 for which data are available; and data on child mortality are for 1995. For the 2000 GHI, data on the proportion of undernourished are for 1999–2001; data on child underweight are for the year closest to 2000 in the period 1998–2002 for which data are available; and data on child mortality are for 2000. For the 2005 GHI, data on the proportion of undernourished are for 2004–2006; data on child underweight are for the year closest to 2005 in the period 2003–2007 for which data are available; and data on child mortality are for 2005. For the 2014 GHI, data on the proportion of undernourished are for 2011–2013, data on child underweight are for the latest year in the period 2009–2013 for which data are available, and data on child mortality are for 2012.

South Asia and East and Southeast Asia experienced the greatest improvements. South Asia saw the steepest absolute decline in GHI scores since 1990, amounting to more than 12 points. The region reduced its GHI score by 3 points between 1990 and 1995—mainly through a decline of almost 9 percentage points in underweight in children—and, following a ten-year slowdown, made considerable progress again since 2005. The decrease of more than 5 points in South Asia’s GHI score since 2005 can be largely attributed to recent successes in the fight against child undernutrition.

According to the most recent survey data from India, where the vast majority of South Asia’s population lives, underweight in children fell by almost 13 percentage points between 2005–2006 and

2013–2014 (India, Ministry of Women and Child Development, and UNICEF 2014).³ A range of programs and initiatives launched by India’s central and state governments in the past decade seem to finally have made a difference for child nutrition (Box 2.1).

Africa south of the Sahara has the highest regional GHI score, closely followed by South Asia. The region began with a lower GHI score than South Asia in 1990 and has since experienced less improvement overall. Between 1990 and 1995, the GHI score for Africa south of the Sahara increased minimally, then fell slightly until 2000, and declined more rapidly thereafter, by more than 6 points overall. As large-scale civil wars of the 1990s and 2000s ended, countries earlier gripped by conflict became more politically stable. Economic growth resumed on

BOX 2.1 EXPLAINING INDIA’S IMPROVED GHI SCORE

This year marks the end of a “data drought.” India determined its first new provisional national underweight estimate in eight years. At 30.7 percent, it points to real progress compared with the last estimate of 43.5 percent in 2005–2006 (IIPS and Macro International 2007; India, Ministry of Women and Child Development, and UNICEF, India, 2014).¹

As a consequence, India no longer ranks second to last on underweight in children, but 120th among 128 countries with data on child undernutrition from 2009–2013. Progress in dealing with underweight helped India’s 2014 GHI score fall to 17.8. Its GHI score declined by 26 percent, or 6.4 points, between the 2005 GHI and the 2014 GHI, outpacing the drop seen in other countries in South Asia in the same time period. India now ranks 55th out of 76 countries, before Bangladesh and Pakistan, but still trails behind neighboring Nepal (rank 44) and Sri Lanka (rank 39), see Table 2.1, p. 16. While no longer in the “alarming” category, India’s hunger status is still classified as “serious,” according to the GHI.

Many factors may have contributed to the improvement. Since the last undernutrition data became available, the Indian government rolled out and expanded several programs that targeted a mix of direct and indirect causes of undernutrition. Nutrition-specific interventions that were scaled up after 2006 include (1) a final push to expand the Integrated Child Development Services program that aims to improve the health, nutrition, and development of children in India and establish 1.4 million centers; and (2) the launch of the National Rural Health Mission, a community-based outreach and facility-based health initiative to deliver essential health services to rural India (Avula et al. 2013).

Indirect factors may have included the National Rural Employment Guarantee Scheme, a rural jobs program, and reforms in several states to the Public Distribution System, which distributes food to the poor. Although implementation of these social sector programs has been fairly uneven across India’s diverse states, given the scale and budget of these programs in India, it is likely that changes have helped improve underlying conditions for child growth in parts of India.

Efforts have also been made to create an enabling environment for nutrition. Within the context of India’s decentralized governance system, state governments have taken ownership of nutrition and tried to strengthen delivery of targeted nutrition efforts. The state of Maharashtra was the first of several to bring high-level political and bureaucratic leadership to nutrition through a Nutrition Mission, a program with greater flexibility and freedom than usual (Gillespie et al. 2013). Another key element in the enabling environment for food security and nutrition was the creation of a body called the Commissioners to the Supreme Court on the Right to Food Act, a group that supports independent monitoring of the delivery of food-based programs like the Integrated Child Development Services program and the Public Distribution System.

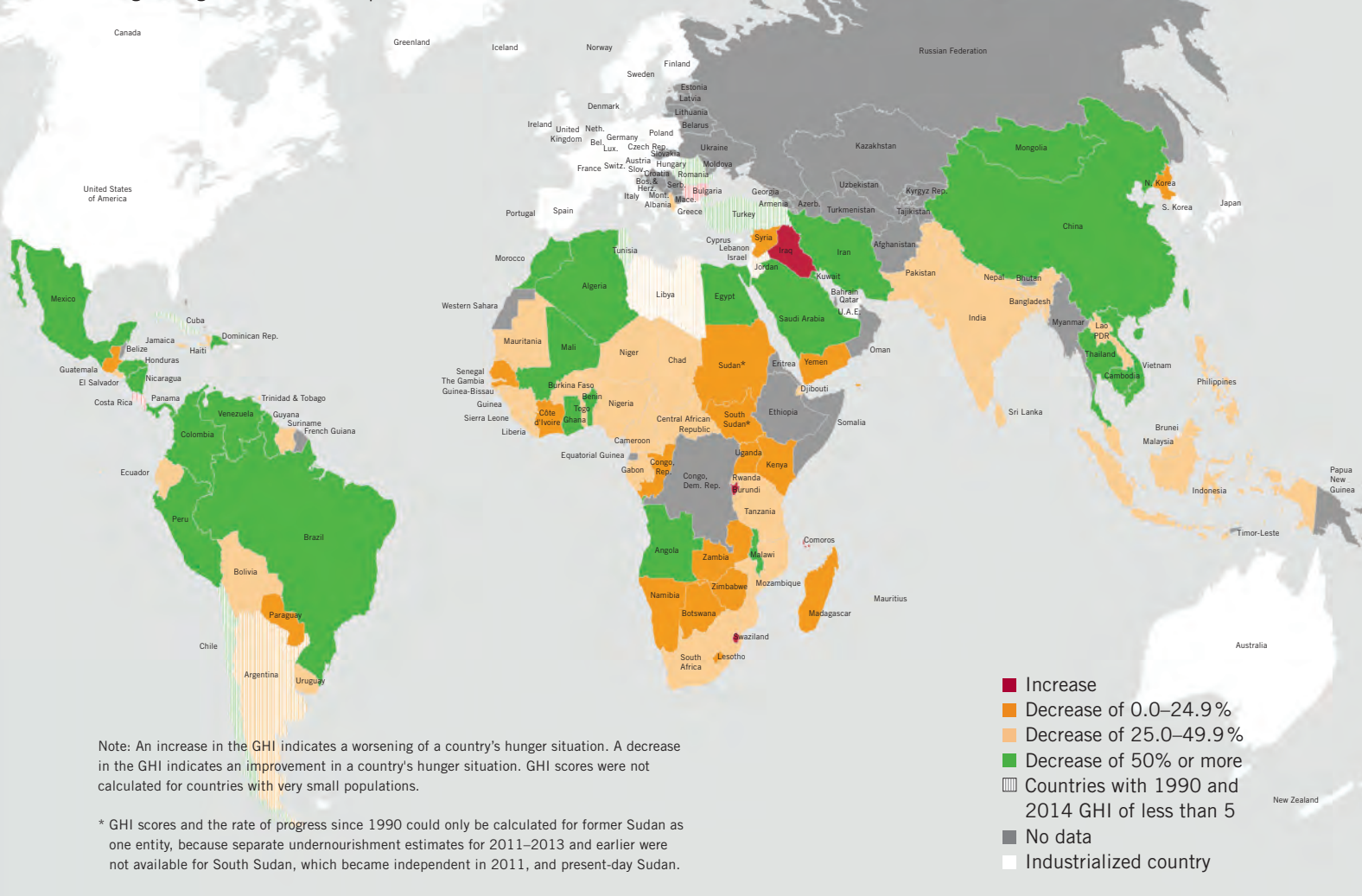
While India has made significant progress in reducing underweight among children under five in the past few years, much work still needs to be done at the national and state levels so that a greater share of the population will enjoy nutrition security.

¹ India’s provisional underweight estimate was based on a survey conducted by India’s Ministry of Women and Child Development with support from UNICEF in 2013–2014.

³ Data on India’s child underweight rate in 2013–2014 are provisional.

FIGURE 2.2 COUNTRY PROGRESS IN REDUCING GHI SCORES

Percentage change in 2014 GHI compared with 1990 GHI



the continent, and advances in the fight against HIV and AIDS helped reduce child mortality in the countries most affected by the epidemic. Since 2000, mortality rates for children under the age of five have declined in Africa south of the Sahara. A key factor behind the improved rates seems to be the decrease in the prevalence of malaria, which coincided with the increased use of insecticide-treated bed nets and other antimalarial interventions (Demombynes and Trommlerová 2012). Other factors that may have helped reduce mortality rates include higher immunization rates; a greater share of births in medical centers; improved antenatal care; better access to clean water and sanitation facilities; and increasing levels of income leading to better nutrition and access to medical care.

The situation in the Sahel, however, remains precarious. The rising frequency and intensity of climate shocks has continued to erode the coping capacity of vulnerable households. The trend toward increased demand for humanitarian assistance illustrates this deterioration of resilience in the region and underlines the need to rebuild resilience through long-term efforts (UN OCHA 2014; von Grebmer et al. 2013). The security situation in northern Mali improved due to international efforts, but violence has increased in northern Nigeria. An exodus of people from this region, the Central African Republic, and Darfur put more pressure on Chad, Cameroon, and Mali to absorb refugees. Displaced populations and their host communities face a high risk of food insecurity, malnutri-

tion, and epidemics. Substantial humanitarian assistance for the Sahel region—including food and nutrition security interventions, protection from violence, measures to boost households' and communities' coping capacity, and support for internally displaced people and refugees—will continue to be necessary (UN OCHA 2014).

Best and Worst Country-Level Results

From the 1990 GHI to the 2014 GHI, 26 countries reduced their scores by 50 percent or more (Figure 2.2). Thirty-nine countries made modest progress with scores that dropped by between 25.0 and 49.9 percent, and 17 countries decreased their GHI scores by less than 25 percent.⁴ In Africa south of the Sahara, only one country—Ghana—is among the 10 best performers in terms of improving its GHI score since 1990 (Figure 2.3). Kuwait's progress in reducing hunger is due mainly to its unusually high score in 1990, when Iraq invaded the country: Its GHI score fell by more than 10 points (or two-thirds) by 1995, by 3.6 points between 1995 and 2000, and by only 0.1 point after 2000 (see country trends in Appendix C).

Thailand has achieved impressive progress in reducing hunger since 1990 (see Appendix C). In the past two decades, Thailand

⁴ The numbers in these first two sentences refer to the 86 countries for which (1) data for the 1990 and 2014 GHI scores are available and (2) either or both of those scores is greater than 5.

experienced robust economic growth and reduced poverty (World Bank 2014) despite brief setbacks related to the Asian financial crisis. As early as the 1980s, the government showed a strong commitment to fighting child undernutrition by integrating nutrition into its National Economic and Social Development Plan and implementing successful community-driven nutrition programs (Tontisirin and Winichagoon 1999).

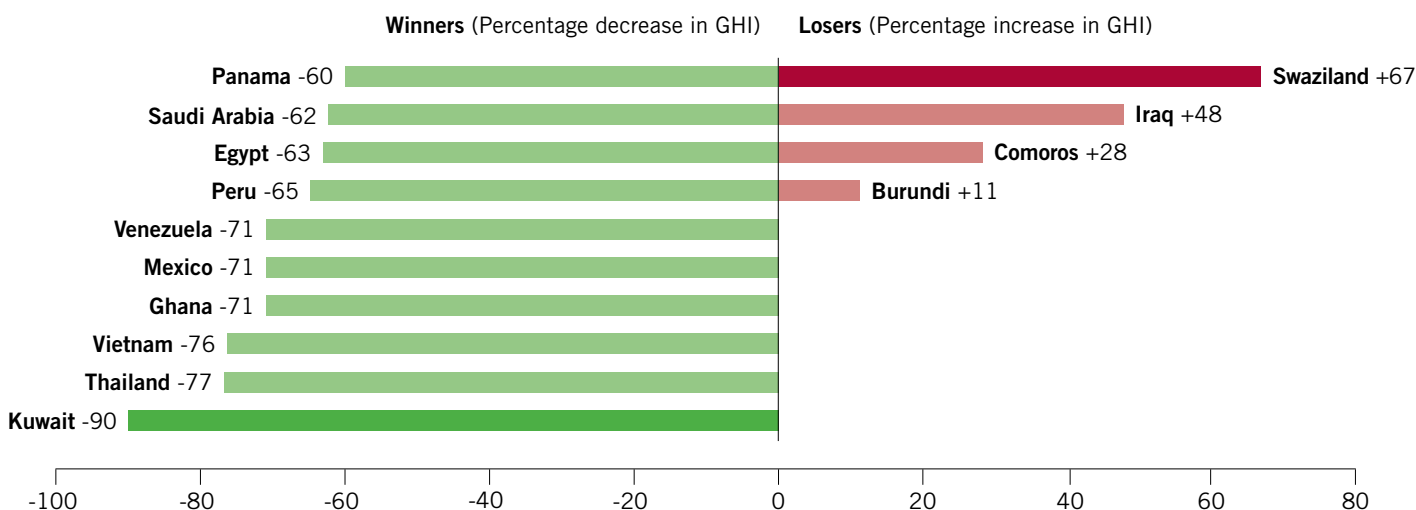
Another Southeast Asian country—Vietnam—also cut back its 1990 GHI by more than three-quarters. It reduced the proportion of undernourished from 48 percent to only 8 percent, lowered underweight in children from 41 percent to 12 percent between 1990 and 2011, and more than halved the under-five mortality rate. While every second pregnant woman in Vietnam was anemic in 1995, only one in three pregnant women still suffered from anemia six years later (World Bank 2014). GDP per capita has more than tripled in Vietnam since 1990, and strong, broad-based economic growth translated into a decline in the proportion of people living on less than US\$1.25 per day, from 64 percent to 17 percent between 1993 and 2008 (World Bank 2014). The country put nutrition high on its agenda, effectively developed and carried out a plan to prevent protein-energy malnutrition among children, achieved high coverage of immunization and other primary healthcare services, granted targeted health subsidies to the poor, and ran successful social security programs (von Braun, Ruel, and Gulati 2008; Huong and Nga 2013).

Ghana has substantially decreased its GHI scores since 1990. The country reduced child underweight and child mortality by more

than 40 percent and slashed the proportion of undernourished from 44 percent in 1990–1992 to less than 5 percent in 2011–2013. Ghana is considered one of the most politically stable countries in Africa south of the Sahara and has invested heavily in agriculture, rural development, education, and health. The country boosted its vaccination rates for common childhood diseases in the past 30 years (World Bank 2014), and the government provided farmers with information, agricultural inputs, and infrastructure such as roads and storage facilities. Because agriculture employs half the workforce in Ghana, investments in agriculture helped to transform other sectors. The government also launched an ambitious program to give all kindergarten and primary school pupils a daily hot, nutritious meal made from locally produced foods (von Grebmer et al. 2011). However, little progress has been made in eradicating anemia among pregnant women and preschool children (World Bank 2014).

In four countries, GHI scores have risen since 1990. Iraq is the second-worst performer. The other three countries with negative developments—Comoros, Burundi, and Swaziland—are located in Africa south of the Sahara (Figure 2.3). Increased hunger since 1990 in Comoros can be attributed to prolonged conflict and political instability. In Comoros, the GHI peaked in 2000, then declined by four points in the following five years, but fell only slightly after 2005. Between 1990 and 2005, Burundi’s GHI score rose steadily, by almost 7 points altogether, approaching a score of 40. Since then, hunger has fallen in Burundi and the trend seems to have reversed (see Appendix C). With

FIGURE 2.3 GHI WINNERS AND LOSERS FROM 1990 GHI TO 2014 GHI



Note: Countries with both 1990 and 2014 GHI scores of less than 5 are excluded.

BOX 2.2 THE GLOBAL HUNGER INDEX'S RELATIONSHIP WITH HIDDEN HUNGER

The Global Hunger Index (GHI) shows statistically significant correlations with measures of hidden hunger, namely indicators of vitamin A deficiency and anemia, and with a proxy indicator of diet quality for children (see figure and notes).¹ The strength of this correlation varies from moderate to strong. It is moderate in the case of night blindness in preschool children and pregnant women, low levels of serum retinol in preschool children, and anemia in preschool children and pregnant women (with correlation coefficients of 0.40–0.60).^{2,3} The correlation is strong for poor diet quality of complementary foods for infants and young children (correlation coefficient >0.70).⁴ The GHI and its components' lack of association with low serum retinol levels in pregnant women may be attributed to a dearth of data: Survey data from the World Health Organization (2009) were available for only 17 countries with GHI scores (not shown).

The figure below shows that the GHI is more closely associated with hidden hunger than FAO's undernourishment indicator. The proportion of undernourished seeks to capture caloric consumption in the population, but not the micronutrient adequacy of vulnerable groups such as children and women. Child mortality and child underweight are the two components of the GHI that make the index sensitive to variations in micronutrient deficiencies and children's dietary diversity. Child mortality correlates more highly than child underweight with anemia in preschool children and pregnant women, night blindness, and low serum retinol in preschool children.

Child underweight is more strongly associated than child mortality with low dietary diversity in infants and young children and night blindness in pregnant women.

The correlation between the GHI, its components, and urinary iodine concentration in preschool children—the most common indicator of iodine deficiency—is weak and insignificant (correlation coefficients <0.20, using nationally representative data on iodine deficiency for 61 countries from Andersson, Karumbunathan, and Zimmermann 2012; not shown). This is not surprising because neither the main causes of iodine deficiency (low iodine content of soils and consequently the crops grown in these soils, and lack or insufficient coverage of salt iodization), nor its most serious consequences—which include pregnancy loss, goiter, and mental retardation—are likely to be reflected in the three indicators included in the GHI (de Benoist et al. 2004; Andersson, Karumbunathan, and Zimmermann 2012).

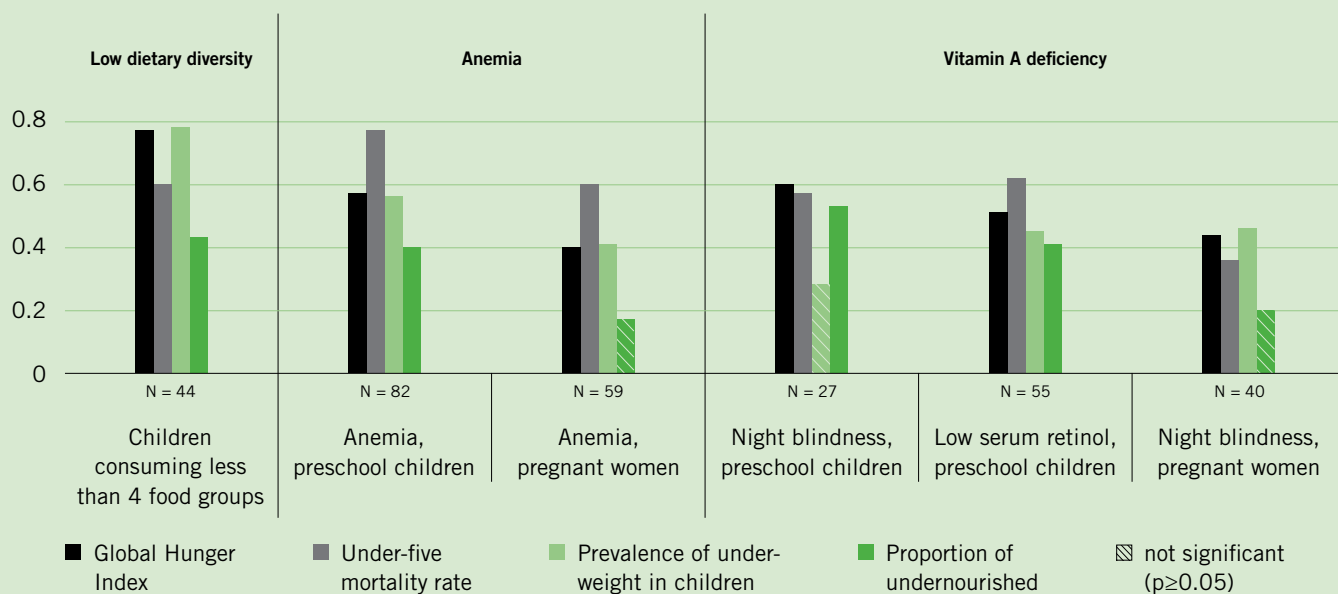
¹ For a definition of micronutrient deficiencies and information on the most common ones, see Chapter 3.

² Correlation coefficients measure the association between two variables. A value of 0 indicates no association, a value of 1 perfect positive association.

³ Low serum retinol levels are one indicator of vitamin A deficiency.

⁴ The consumption of at least four of seven food groups is defined as the minimum dietary diversity for infants and young children and is a proxy indicator for the micronutrient density of complementary foods (Working Group on Infant and Young Child Feeding Indicators 2006, 2007). Comparable nationally representative data for adult diet quality in developing countries are not yet available, but an indicator of minimum dietary diversity for women of reproductive age was recently developed as a proxy for micronutrient adequacy (FAO and IRD 2014).

HOW THE GLOBAL HUNGER INDEX CORRELATES WITH MEASURES OF HIDDEN HUNGER



Notes: Spearman rank correlation coefficients can range from 0 (no association) to 1 (perfect association). All correlations with the GHI are statistically significant at $p < 0.01$. For the GHI components, solid color indicates significance at $p < 0.05$. Nationally representative survey data were used for indicators of micronutrient deficiencies and diet diversity. The latest available data were matched with the GHI and its components using the year of the survey and the GHI reference periods. N indicates the number of countries for which the correlation coefficients could be computed.

Definitions and data sources: Low dietary diversity: Proportion of children 6–23 months who consume fewer than four out of seven food groups (grains, roots and tubers; legumes and nuts; dairy products; flesh foods; eggs; vitamin-A rich fruits and vegetables; other fruits and vegetables) (WHO 2010; Kothari and Abderrahim 2010). Anemia: Proportion of preschool-age children whose hemoglobin level is less than 110 grams per liter, and proportion of pregnant women whose hemoglobin level is less than 110 grams per liter (World Bank 2014; MEASURE DHS 2014; de Benoist et al. 2008). Vitamin A deficiency: Proportion of preschool-age children with night blindness, proportion of pregnant women with night blindness, and proportion of preschool-age children whose serum retinol level is less than 0.70 micromole per liter (WHO 2009).

TABLE 2.1 COUNTRY GLOBAL HUNGER INDEX SCORES BY RANK, 1990 GHI, 1995 GHI, 2000 GHI, 2005 GHI, AND 2014 GHI

| Rank | Country | 1990 | 1995 | 2000 | 2005 | 2014 | Rank | Country | 1990 | 1995 | 2000 | 2005 | 2014 | | | | | |
|------|----------------------|------|------|------|------|------|---|--------------------------|------------|------------|------------|------------|-------------------|------------|------------|------------|------------|------------|
| 1 | Mauritius | 8.3 | 7.6 | 6.7 | 6.0 | 5.0 | 56 | Congo, Republic | 22.6 | 22.7 | 18.3 | 18.3 | 18.1 | | | | | |
| 1 | Thailand | 21.3 | 17.3 | 10.2 | 6.7 | 5.0 | 57 | Bangladesh | 36.6 | 34.4 | 24.0 | 19.8 | 19.1 | | | | | |
| 3 | Albania | 9.1 | 6.3 | 7.9 | 6.2 | 5.3 | 57 | Pakistan | 26.7 | 23.3 | 22.1 | 21.0 | 19.1 | | | | | |
| 3 | Colombia | 10.9 | 8.2 | 6.8 | 7.0 | 5.3 | 59 | Djibouti | 34.1 | 29.4 | 28.5 | 25.6 | 19.5 | | | | | |
| 5 | China | 13.6 | 10.7 | 8.5 | 6.8 | 5.4 | 60 | Burkina Faso | 27.0 | 22.6 | 26.3 | 26.5 | 19.9 | | | | | |
| 5 | Malaysia | 9.4 | 7.0 | 6.9 | 5.7 | 5.4 | 61 | Lao PDR | 34.5 | 31.4 | 29.4 | 25.0 | 20.1 | | | | | |
| 7 | Peru | 16.1 | 12.4 | 10.6 | 10.0 | 5.7 | 62 | Mozambique | 35.2 | 32.3 | 28.2 | 24.8 | 20.5 | | | | | |
| 8 | Syrian Arab Republic | 7.8 | 6.1 | <5 | 5.1 | 5.9 | 63 | Niger | 36.4 | 36.1 | 31.2 | 26.4 | 21.1 | | | | | |
| 9 | Honduras | 14.6 | 13.9 | 11.2 | 9.0 | 6.0 | 64 | Central African Republic | 30.3 | 30.3 | 28.1 | 28.9 | 21.5 | | | | | |
| 9 | Suriname | 11.3 | 10.1 | 10.9 | 9.0 | 6.0 | 65 | Madagascar | 25.3 | 24.9 | 27.4 | 25.2 | 21.9 | | | | | |
| 11 | Gabon | 10.0 | 8.6 | 7.8 | 7.4 | 6.1 | 66 | Sierra Leone | 31.2 | 29.0 | 29.8 | 29.1 | 22.5 | | | | | |
| 12 | El Salvador | 10.8 | 8.8 | 7.9 | 6.4 | 6.2 | 67 | Haiti | 33.6 | 32.9 | 25.3 | 27.9 | 23.0 | | | | | |
| 13 | Guyana | 14.5 | 10.9 | 8.1 | 7.9 | 6.5 | 68 | Zambia | 24.7 | 24.0 | 26.5 | 24.7 | 23.2 | | | | | |
| 14 | Dominican Republic | 15.6 | 11.5 | 9.9 | 9.6 | 7.0 | 69 | Yemen, Republic | 30.1 | 27.8 | 27.8 | 28.0 | 23.4 | | | | | |
| 15 | Vietnam | 31.4 | 25.4 | 17.3 | 13.1 | 7.5 | 70 | Ethiopia | – | 42.6 | 37.4 | 30.8 | 24.4 | | | | | |
| 16 | Ghana | 27.2 | 20.2 | 16.1 | 11.3 | 7.8 | 71 | Chad | 39.7 | 35.4 | 30.0 | 29.8 | 24.9 | | | | | |
| 17 | Ecuador | 14.9 | 11.9 | 12.0 | 10.3 | 7.9 | 72 | Sudan/South Sudan* | 30.7 | 25.9 | 26.7 | 24.1 | 26.0 | | | | | |
| 18 | Paraguay | 9.2 | 7.4 | 6.8 | 6.3 | 8.8 | 73 | Comoros | 23.0 | 26.7 | 34.0 | 30.0 | 29.5 | | | | | |
| 19 | Mongolia | 20.3 | 23.1 | 18.5 | 14.1 | 9.6 | 74 | Timor-Leste | – | – | – | 25.7 | 29.8 | | | | | |
| 19 | Nicaragua | 24.0 | 19.7 | 15.4 | 11.4 | 9.6 | 75 | Eritrea | – | 41.2 | 40.0 | 38.8 | 33.8 | | | | | |
| 21 | Bolivia | 18.6 | 16.8 | 14.5 | 13.9 | 9.9 | 76 | Burundi | 32.0 | 36.9 | 38.7 | 39.0 | 35.6 | | | | | |
| 22 | Indonesia | 20.5 | 17.8 | 16.1 | 15.2 | 10.3 | COUNTRIES WITH 2014 GHI SCORES LESS THAN 5 | | | | | | | | | | | |
| 23 | Moldova | – | 7.9 | 9.0 | 7.4 | 10.8 | Country | '90 | '95 | '00 | '05 | '14 | Country | '90 | '95 | '00 | '05 | '14 |
| 24 | Benin | 22.5 | 20.5 | 18.0 | 15.3 | 11.2 | Algeria | 6.6 | 7.3 | 5.1 | <5 | <5 | Lebanon | <5 | <5 | <5 | <5 | <5 |
| 25 | Mauritania | 23.0 | 18.7 | 17.1 | 14.4 | 11.9 | Argentina | <5 | <5 | <5 | <5 | <5 | Libya | <5 | <5 | <5 | <5 | <5 |
| 26 | Cameroon | 23.3 | 24.6 | 21.3 | 16.6 | 12.6 | Armenia | – | 10.5 | 9.0 | <5 | <5 | Lithuania | – | <5 | <5 | <5 | <5 |
| 27 | Iraq | 8.6 | 11.9 | 12.8 | 11.6 | 12.7 | Azerbaijan | – | 14.8 | 12.0 | 5.2 | <5 | Macedonia, FYR | – | 5.6 | <5 | <5 | <5 |
| 28 | Mali | 27.2 | 27.2 | 24.8 | 20.7 | 13.0 | Belarus | – | <5 | <5 | <5 | <5 | Mexico | 5.8 | 5.6 | <5 | <5 | <5 |
| 29 | Lesotho | 13.1 | 15.4 | 14.6 | 15.0 | 13.1 | Bosnia&Herzegovina | – | <5 | <5 | <5 | <5 | Montenegro | – | – | – | – | <5 |
| 29 | Philippines | 20.1 | 17.5 | 17.9 | 14.7 | 13.1 | Brazil | 8.8 | 7.7 | 6.5 | <5 | <5 | Morocco | 7.6 | 7.1 | 6.1 | 6.4 | <5 |
| 31 | Botswana | 15.6 | 16.5 | 18.1 | 16.8 | 13.4 | Bulgaria | <5 | <5 | <5 | <5 | <5 | Panama | 11.6 | 10.7 | 11.8 | 9.5 | <5 |
| 32 | Gambia, The | 18.7 | 20.4 | 15.5 | 15.1 | 13.6 | Chile | <5 | <5 | <5 | <5 | <5 | Romania | <5 | <5 | <5 | <5 | <5 |
| 32 | Malawi | 31.3 | 28.8 | 21.9 | 18.9 | 13.6 | Costa Rica | <5 | <5 | <5 | <5 | <5 | Russian Fed. | – | <5 | <5 | <5 | <5 |
| 34 | Guinea-Bissau | 22.6 | 20.4 | 20.5 | 17.3 | 13.7 | Croatia | – | 5.4 | <5 | <5 | <5 | Saudi Arabia | 6.6 | 6.5 | <5 | <5 | <5 |
| 35 | Togo | 23.6 | 19.4 | 20.8 | 18.0 | 13.9 | Cuba | <5 | 8.4 | <5 | <5 | <5 | Serbia | – | – | – | – | <5 |
| 36 | Guinea | 22.0 | 20.9 | 22.4 | 18.0 | 14.3 | Egypt, Arab Rep. | 7.0 | 6.3 | 5.3 | <5 | <5 | Slovak Republic | – | <5 | <5 | <5 | <5 |
| 37 | Senegal | 18.9 | 19.6 | 19.5 | 14.3 | 14.4 | Estonia | – | <5 | <5 | <5 | <5 | South Africa | 7.5 | 6.4 | 7.4 | 7.8 | <5 |
| 38 | Nigeria | 25.9 | 23.0 | 17.9 | 16.7 | 14.7 | Fiji | 6.2 | 5.3 | <5 | <5 | <5 | Trinidad & Tobago | 6.7 | 7.6 | 6.8 | 6.7 | <5 |
| 39 | Sri Lanka | 22.2 | 20.2 | 17.6 | 16.8 | 15.1 | Iran, Islamic Rep. | 8.5 | 7.3 | 5.8 | <5 | <5 | Tunisia | <5 | <5 | <5 | <5 | <5 |
| 40 | Guatemala | 15.6 | 16.0 | 17.3 | 17.0 | 15.6 | Jamaica | 6.1 | <5 | <5 | <5 | <5 | Turkey | <5 | 5.0 | <5 | <5 | <5 |
| 40 | Rwanda | 30.6 | 35.1 | 30.6 | 24.1 | 15.6 | Jordan | <5 | 5.5 | <5 | <5 | <5 | Turkmenistan | – | 10.5 | 9.1 | 6.9 | <5 |
| 42 | Côte d'Ivoire | 16.4 | 16.6 | 17.6 | 16.5 | 15.7 | Kazakhstan | – | <5 | 7.8 | <5 | <5 | Ukraine | – | <5 | <5 | <5 | <5 |
| 43 | Cambodia | 32.9 | 30.8 | 28.1 | 20.8 | 16.1 | Kuwait | 15.6 | 5.3 | <5 | <5 | <5 | Uruguay | 5.0 | <5 | <5 | <5 | <5 |
| 44 | Nepal | 28.4 | 26.8 | 25.2 | 22.2 | 16.4 | Kyrgyz Republic | – | 11.2 | 9.0 | 5.4 | <5 | Uzbekistan | – | 7.7 | 8.9 | 6.9 | <5 |
| 44 | North Korea | 17.9 | 22.4 | 22.8 | 19.3 | 16.4 | Latvia | – | <5 | <5 | <5 | <5 | Venezuela, RB | 7.5 | 7.3 | 6.8 | 5.8 | <5 |
| 44 | Tajikistan | – | 21.5 | 22.3 | 18.8 | 16.4 | *GHI scores could only be calculated for former Sudan as one entity, because separate undernourishment estimates for 2011–2013 and earlier were not available for South Sudan, which became independent in 2011, and present-day Sudan. | | | | | | | | | | | |
| 47 | Kenya | 21.5 | 21.0 | 20.2 | 19.5 | 16.5 | – = Data not available or not presented. Some countries, such as the post-Soviet states prior to 1991, did not exist in their present borders in the given year or reference period. | | | | | | | | | | | |
| 47 | Swaziland | 9.9 | 12.3 | 13.5 | 11.8 | 16.5 | Note: Ranked according to 2014 GHI scores. Countries with a 2014 GHI score of less than 5 are not included in the ranking, and differences between their scores are minimal. Countries that have identical 2014 scores are given the same ranking (for example, Mauritius and Thailand both rank first). The following countries could not be included because of lack of data: Afghanistan, Bahrain, Bhutan, the Democratic Republic of the Congo, Georgia, Myanmar, Oman, Papua New Guinea, Qatar, and Somalia. | | | | | | | | | | | |
| 47 | Zimbabwe | 19.7 | 22.5 | 22.0 | 21.3 | 16.5 | | | | | | | | | | | | |
| 50 | Liberia | 24.5 | 28.9 | 25.1 | 20.7 | 16.8 | | | | | | | | | | | | |
| 51 | Namibia | 21.7 | 22.0 | 18.4 | 16.5 | 16.9 | | | | | | | | | | | | |
| 52 | Uganda | 21.5 | 22.7 | 20.2 | 18.4 | 17.0 | | | | | | | | | | | | |
| 53 | Tanzania | 23.5 | 26.8 | 26.3 | 20.8 | 17.3 | | | | | | | | | | | | |
| 54 | Angola | 40.8 | 38.9 | 32.3 | 24.1 | 17.4 | | | | | | | | | | | | |
| 55 | India | 31.2 | 26.9 | 25.5 | 24.2 | 17.8 | | | | | | | | | | | | |

the transition to peace and political stability that started in 2003, Burundi began a slow recovery from decades of economic decline. Persistent food insecurity, a very high poverty rate, high inflation, and poor education are among factors that pose challenges for the country's future development (FAO 2014; World Bank 2014).

In Iraq, GHI scores have increased considerably since 1990. The country has suffered from deteriorating accessibility and quality of basic services for decades and years of instability, ongoing violence, large numbers of internally displaced people, and the influx of refugees from Syria have added to the burden (WFP 2014a; UCDP 2013). Hunger worsened until 2000, followed by a slight decline in GHI scores up to 2005, and then another increase (see Appendix C). Under-five mortality declined since 1990, but less than in most other countries in the Near East and North Africa region. Progress in reducing child undernutrition was also slow, although the prevalence of underweight in children fell slightly after peaking in 2000, whereas the proportion of undernourished in the population more than doubled since 1990 (see data table in Appendix B).⁵

In Swaziland, the HIV/AIDS epidemic has severely undermined food security along with high income inequality, high unemployment, and consecutive droughts (World Bank 2014; WFP 2014b). Swaziland's adult HIV prevalence in 2012 was estimated at 26.5 percent—the highest in the world (UNAIDS 2013). The country's GHI score worsened until 2000, then declined slightly until 2005, but has increased again since then (see Appendix C). Swaziland and several other African countries have made great strides in preventing mother-to-child transmission of HIV, and child mortality rates have dropped after peaking around 2003–2004 (UNAIDS 2013; IGME 2013). However, the proportion of people who are undernourished more than doubled in Swaziland since 2004–2006 (see data table in Appendix B). Since 1990, life expectancy fell by ten years, amounting to only 49 years in 2012, despite a slight recovery in recent years (World Bank 2014).

Some countries achieved noteworthy absolute progress in improving their GHI scores. Comparing the 1990 GHI and the 2014 GHI, Angola, Bangladesh, Cambodia, Chad, Ghana, Malawi, Niger, Rwanda, Thailand, and Vietnam saw the largest improvements—with decreases in their scores ranging between 14 and 24 points (Table 2.1). Angola and Cambodia have been recovering from devastating conflicts: In Angola, 2002 marked the end of a 27-year civil war, and in Cambodia, 13 years of fighting ended in 1991. Bangladesh has experienced broad-based progress in social indicators, and its very active nongovernmental (NGO) sector and public transfer programs helped reduce child undernutrition among the poorest (World Bank 2014, 2005). The country is committed to regular monitoring of children's nutritional status and has cut back underweight in children from a staggering 62 percent in 1990 to only 37 percent in 2011 (WHO 2014b).

Sixteen countries still have levels of hunger that are “extremely alarming” or “alarming” in the severity map (Figure 2.4). Most of the countries with alarming GHI scores are in Africa south of the Sahara. The only exceptions are Haiti, Laos, Timor-Leste, and Yemen. The two countries with “extremely alarming” 2014 GHI scores—Burundi and Eritrea—are in Africa south of the Sahara.

The Democratic Republic of the Congo, with an estimated population of close to 70 million in 2014 (UN 2013), still appears as a gray area on the map (Figure 2.4) because reliable data on undernourishment are lacking and the level of hunger cannot be assessed. It remains unclear if the GHI score in this country would be classified as “extremely alarming,” as in previous editions of this report, up to 2011, because data are not available. High-quality data for the Democratic Republic of the Congo and other likely hunger hotspots, such as Afghanistan and Somalia, are badly needed.

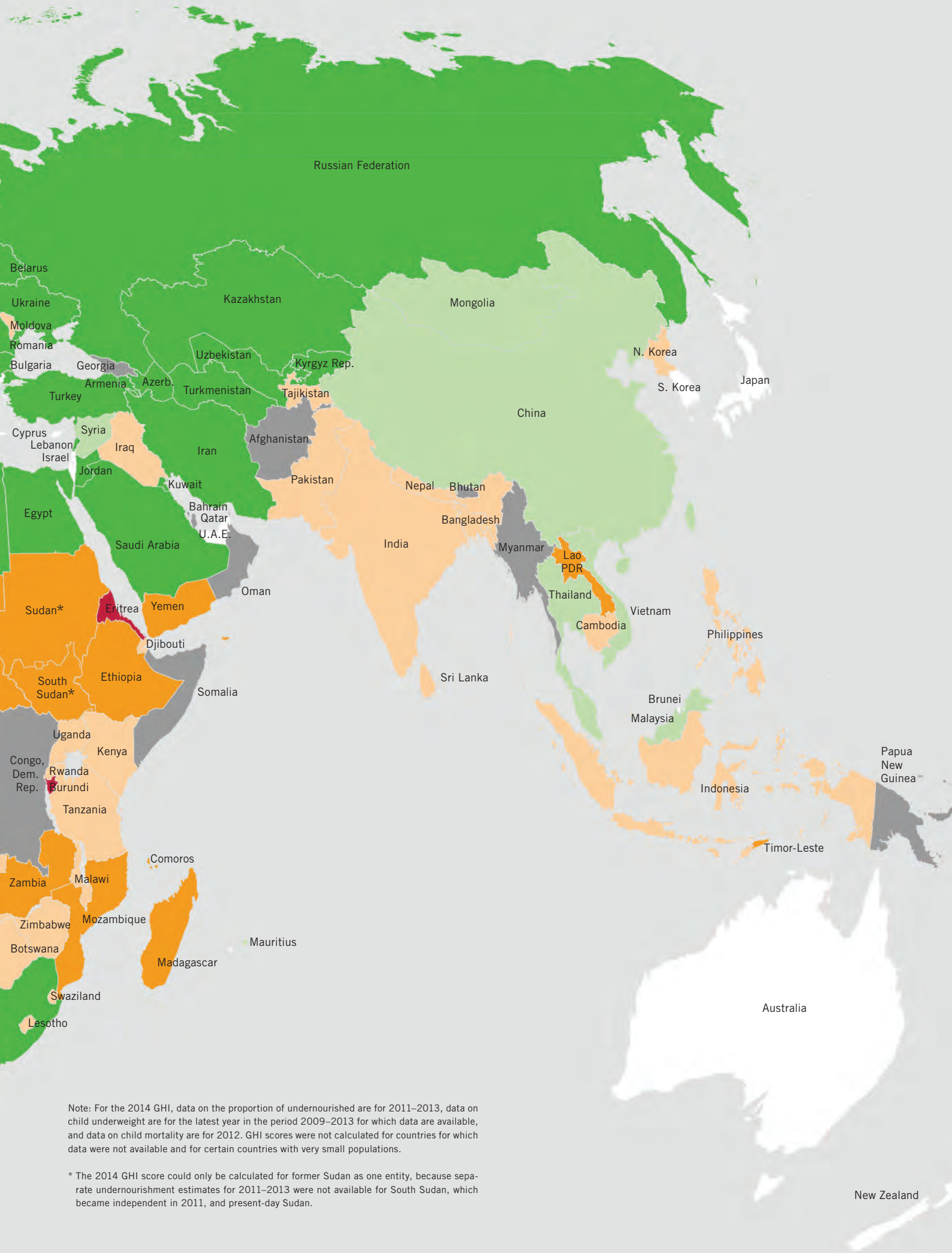
In terms of the GHI components, Burundi, Comoros, and Eritrea currently have the highest proportion of undernourished people—more than 60 percent of the population.⁶ Bangladesh, Niger, Timor-Leste, and Yemen have the highest prevalence of underweight in children under five, amounting to more than 35 percent in each country. Angola, Chad, and Sierra Leone have the highest under-five mortality rate, ranging from 15 percent to more than 18 percent.

⁵ The escalation of violence in large parts of Iraq in 2014 is not yet considered in the latest GHI, which includes data from the period 2009–2013.

⁶ Although the Democratic Republic of the Congo and Somalia are likely to have high proportions of undernourished as well, they could not be included in this comparison because of a lack of reliable data.

FIGURE 2.4 2014 GLOBAL HUNGER INDEX BY SEVERITY





Note: For the 2014 GHI, data on the proportion of undernourished are for 2011–2013, data on child underweight are for the latest year in the period 2009–2013 for which data are available, and data on child mortality are for 2012. GHI scores were not calculated for countries for which data were not available and for certain countries with very small populations.

* The 2014 GHI score could only be calculated for former Sudan as one entity, because separate undernourishment estimates for 2011–2013 were not available for South Sudan, which became independent in 2011, and present-day Sudan.



The 'hidden hunger' due to **micronutrient deficiency** does not produce hunger as we know it. You might not feel it in the belly, but it strikes at the core of your health and vitality.

Kul C. Gautam, former deputy executive director of UNICEF

ADDRESSING THE CHALLENGE OF HIDDEN HUNGER

Hidden hunger, also known as micronutrient deficiencies, afflicts more than 2 billion individuals, or one in three people, globally (FAO 2013). Its effects can be devastating, leading to mental impairment, poor health, low productivity, and even death. Its adverse effects on child health and survival are particularly acute, especially within the first 1,000 days of a child's life, from conception to the age of two, resulting in serious physical and cognitive consequences. Even mild to moderate deficiencies can affect a person's well-being and development. In addition to affecting human health, hidden hunger can curtail socioeconomic development, particularly in low- and middle-income countries.

A Different Kind of Hunger

Hidden hunger is a form of undernutrition that occurs when intake and absorption of vitamins and minerals (such as zinc, iodine, and iron) are too low to sustain good health and development (Box 3.1). Factors that contribute to micronutrient deficiencies include poor diet, increased micronutrient needs during certain life stages, such as pregnancy and lactation, and health problems such as diseases, infections, or parasites.

While clinical signs of hidden hunger, such as night blindness due to vitamin A deficiency and goiter from inadequate iodine intake, become visible once deficiencies become severe, the health and devel-

opment of a much larger share of the population is affected by less obvious “invisible” effects. That is why micronutrient deficiencies are often referred to as hidden hunger.

The Global Hidden Hunger Crisis

More than 2 billion people worldwide suffer from hidden hunger, more than double the 805 million people who do not have enough calories to eat (FAO, IFAD, and WFP 2014). Much of Africa south of the Sahara and the South Asian subcontinent are hotspots where the prevalence of hidden hunger is high (Figure 3.1). The rates are relatively low in Latin America and the Caribbean where diets rely less on single staples and are more affected by widespread deployment of micronutrient interventions, nutrition education, and basic health services (Weisstaub and Araya 2008). Although a larger proportion of the burden of hidden hunger is found in the developing world, micronutrient deficiency, particularly iron and iodine deficiency, is also widespread in the developed world (Figures 3.1 and 3.2).

The nature of the malnutrition burden facing the world is increasingly complex. Developing countries are moving from traditional diets based on minimally processed foods to highly processed, energy-dense, micronutrient-poor foods and drinks, which lead to obesity and diet-related chronic diseases. With this nutrition transition, many developing countries face a phenomenon known as the “triple burden” of malnutrition—undernourishment, micronutrient deficiencies, and obesity (Pinstrup-Andersen 2007). In higher income, more urbanized countries, hidden hunger can coexist with overweight/obesity when a person consumes too much dietary energy from macronutrients such as fats and carbohydrates (Guralnik et al. 2004). While it may seem paradoxical, an obese child can suffer from hidden hunger.

Micronutrient deficiencies cause an estimated 1.1 million of the 3.1 million child deaths that occur each year as a result of undernutrition (Black et al. 2013; Black et al. 2008). Vitamin A and zinc deficiencies adversely affect child health and survival by weakening the immune system. Lack of zinc impairs growth and can lead to stunting in children. Iodine and iron deficits prevent children from reaching their physical and intellectual potential (Allen 2001).

Women and children have greater needs for micronutrients (Darnton-Hill et al. 2005). The nutritional status of women around the time of conception and during pregnancy has long-term effects for fetal growth and development. Nearly 18 million babies are born with brain damage due to iodine deficiency each year. Severe anemia contributes to the death of 50,000 women in childbirth each year. In addition, iron deficiency saps the energy of 40 percent of women in the developing world (UNSCN 2005; Micronutrient Initiative 2014). Interventions to fight hidden hunger and improve nutrition outcomes generally focus on women, infants, and young children. By targeting

BOX 3.1 DEFINITIONS

- **Hunger:** distress related to lack of food
- **Malnutrition:** an abnormal physiological condition, typically due to eating the wrong amount and/or kinds of foods; encompasses undernutrition and overnutrition
- **Undernutrition:** deficiencies in energy, protein, and/or micronutrients
- **Micronutrient deficiency** (also known as **hidden hunger**): a form of undernutrition that occurs when intake or absorption of vitamins and minerals is too low to sustain good health and development in children and normal physical and mental function in adults. Causes include poor diet, disease, or increased micronutrient needs not met during pregnancy and lactation
- **Undernourishment:** chronic calorie deficiency, with consumption of less than 1,800 kilocalories a day, the minimum most people need to live a healthy, productive life
- **Overnutrition:** excess intake of energy or micronutrients

Sources: FAO (2013); and von Grebmer et al. (2013).

these populations, interventions achieve high rates of return by improving health, nutritional status, and cognition later in life (Hod-dinott et al. 2013).

The most commonly recognized micronutrient deficiencies across all ages, in order of prevalence, are caused by a lack of iodine, iron, and zinc (Table 3.1, p. 24). Less common, but significant from a public health standpoint, is vitamin A deficiency, with an estimated 190 million preschool children and 19 million pregnant women affected (WHO 2009). Low intakes of other essential micronutrients, such as calcium, vitamin D, and B vitamins, such as folate are also common (Allen et al. 2006). Although pregnant women, children, and adolescents are often cited as populations affected the most by hidden hunger, it impairs the health of people throughout the life cycle (Figure 3.3, p. 24).

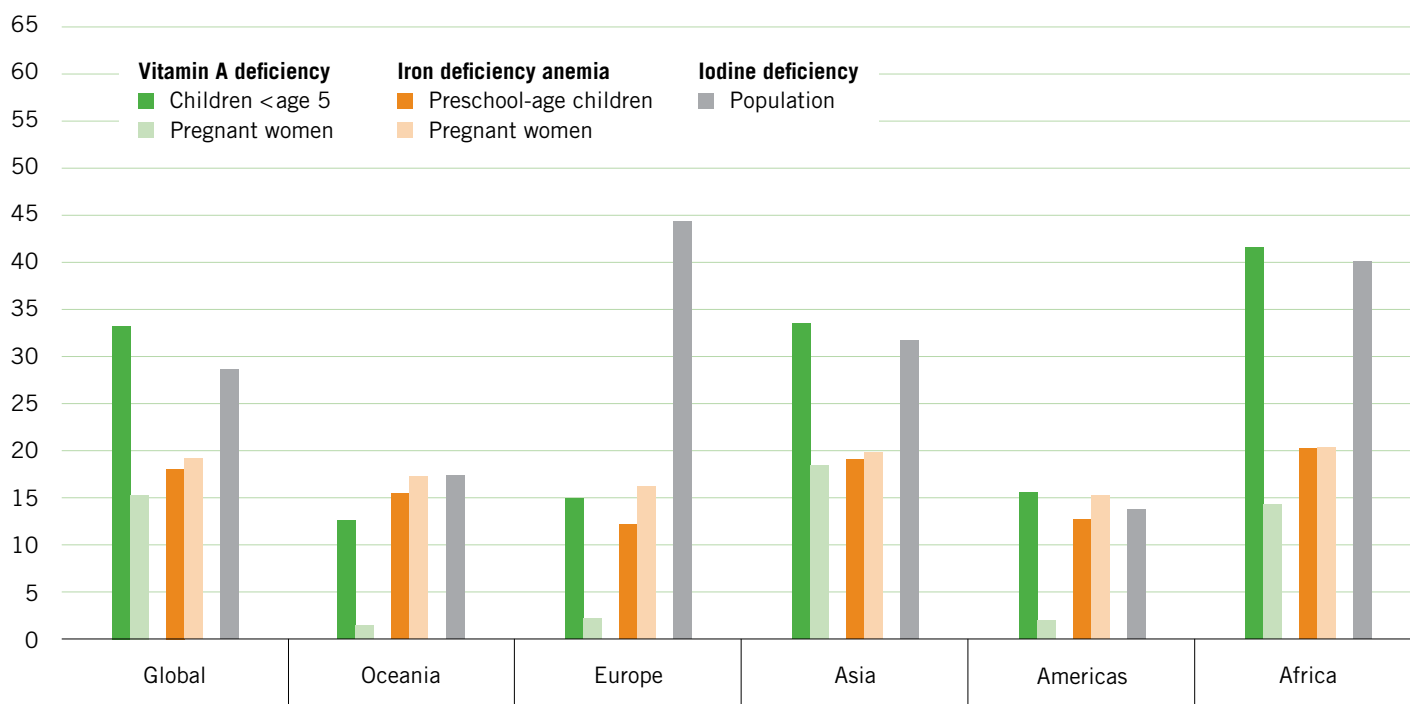
It is difficult to describe the magnitude of deficits for most micronutrients. For many micronutrient deficits, prevalence data are scarce. Scientists have not reached a consensus on standard recommended intakes for many of the 19 micronutrients that directly influence physical and mental development and the immune system (Biesalski 2013). Furthermore, for many micronutrients, the relationship between intake and utilization is not well understood.

Obtaining accurate data is a challenge. Time lags, data gaps, and lack of disaggregation are common problems. Often proxies for common examples of hidden hunger are imperfect. For example, anemia is used as a proxy for iron deficiency, although only half of all anemia is caused by iron deficiency (de Benoist et al. 2008). Typical physical measurements of hunger, such as stunting (low height for one's age), wasting (low weight for one's height), and underweight, may capture micronutrient deficiencies in affected populations, but are inadequate proxies, because the deficiencies are seldom the only factors involved. Exact measurements via blood samples, and also by specific diagnoses, such as night blindness, beriberi, and scurvy, are more reliable ways to determine micronutrient deficiencies. Many important micronutrients lack prevalence data, because related biomarkers have not yet been identified for a nutrient deficit. As long as these gaps in data persist, it will be difficult to describe the full contours of hidden hunger.

Causes of Vitamin and Mineral Deficiencies

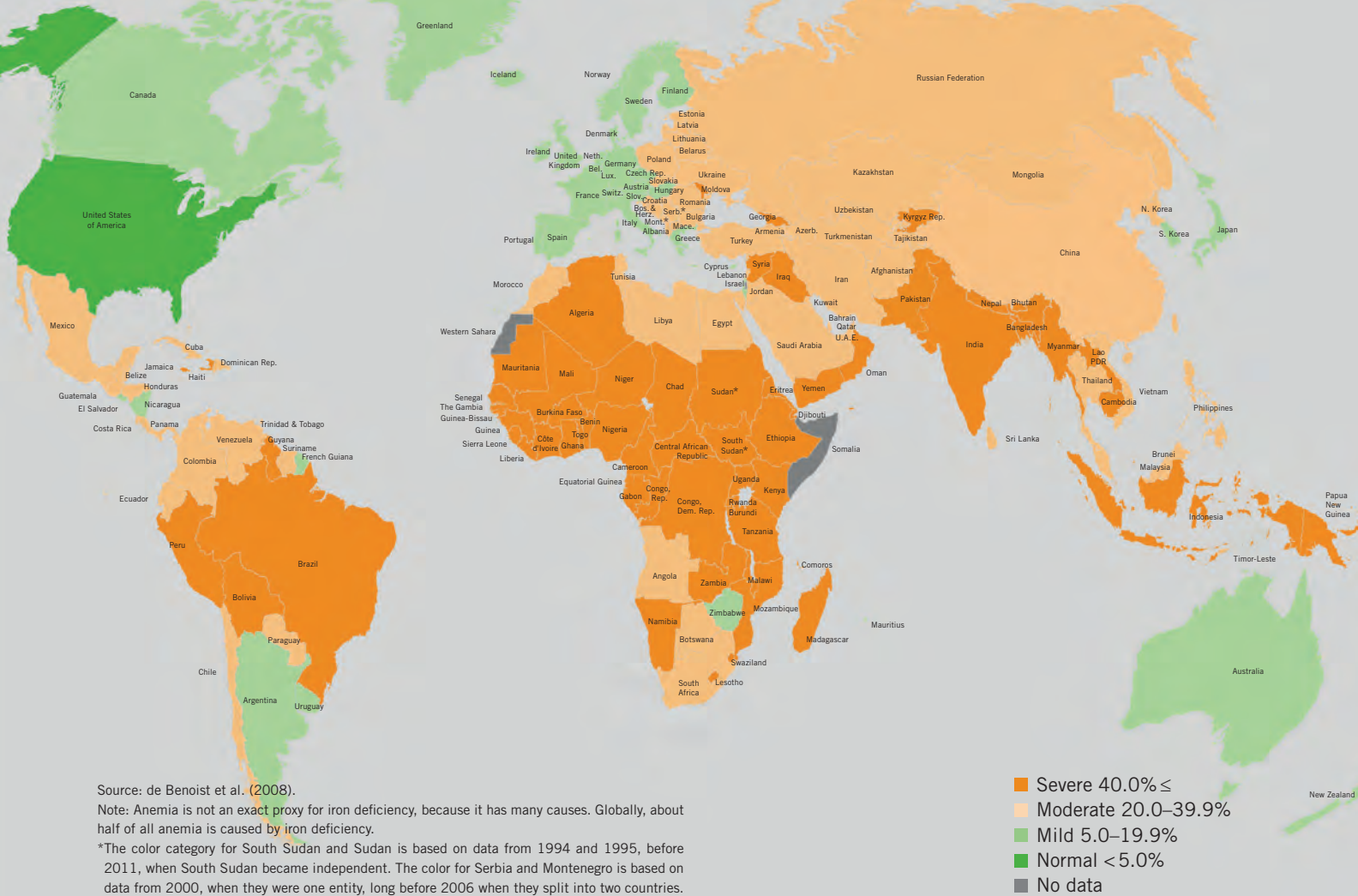
Poor diet is a common source of hidden hunger. Diets based mostly on staple crops, such as maize, wheat, rice, and cassava, which provide a large share of energy but relatively low amounts of essential vitamins and minerals, frequently result in hidden hunger. What people eat

FIGURE 3.1 **PERCENTAGE OF POPULATION WITH SELECTED MICRONUTRIENT DEFICIENCIES**



Source: Black et al. (2013).

FIGURE 3.2 PREVALENCE OF ANEMIA AMONG PRESCHOOL-AGE CHILDREN, 1993–2005



depends on many factors, including relative prices (Box 3.2, p. 25) and preferences shaped by culture; peer pressure; and geographical, environmental, and seasonal factors. Victims of hidden hunger may not understand the importance of a balanced, nutritious diet. Nor may they be able to afford or access a wide range of nutritious foods such as animal-source foods (meat, eggs, fish, and dairy), fruits, or vegetables, especially in developing countries. In nonemergency situations, poverty is a major factor that limits access to adequate nutritious foods. When food prices rise, consumers tend to continue to eat staple foods while cutting their intake of nonstaple foods that tend to be richer in micronutrients (Bouis, Eozenou, and Rahman 2011).

Another source of micronutrient deficiencies is impaired absorption or use of nutrients. Absorption may be impaired by infection or a parasite that can also lead to the loss of or increased need for many micronutrients. Infections and parasites can spread easily in unhealthy environments with poor water, sanitation, and hygiene conditions. Unsafe food handling and feeding practices can further exacerbate nutrient losses.

Diet also affects absorption. Fat-soluble vitamins such as vitamin A are best absorbed when consumed with dietary fat, while consumption of some compounds such as tannins or phytates can inhibit iron absorption. Alcohol consumption can interfere with the absorption of micronutrients.

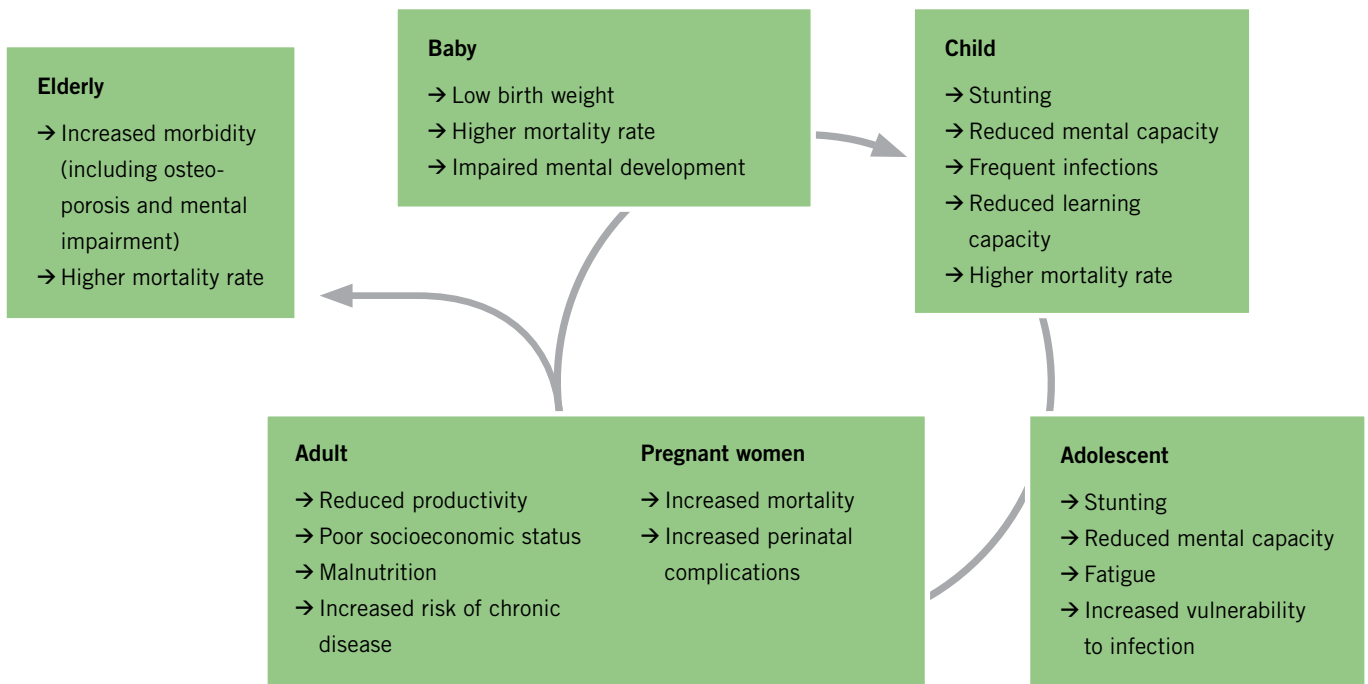
The Economic Toll

Vitamin and mineral deficiencies impose a significant burden on the affected persons and societies, both in terms of health costs and negative impacts in lost human capital and reduced economic productivity. Hidden hunger impairs physical growth and learning, limits productivity, and ultimately perpetuates poverty (Figure 3.4, p. 26) in a continuous cycle. Countries where a large share of the population is affected by vitamin and mineral deficiencies cannot realize their economic potential (Stein 2013; Stein and Qaim 2007). Poor people disproportionately suffer from micronutrient deficiencies, and bear the long-term negative effects that constrain socioeconomic development (Darnton-Hill et al. 2005).

The economic costs of all forms of micronutrient deficiency can be considerable, cutting gross domestic product by 0.7–2 percent in most developing countries (Micronutrient Initiative and UNICEF 2004). For example, it is estimated that India sustains a 1 percent loss in GDP and Afghanistan a 2.3 percent loss. Global losses in economic productivity due to macronutrient and micronutrient deficiencies reach more than 2 to 3 percent of GDP (World Bank 2006) at a global cost of US\$1.4 to 2.1 trillion per year (FAO 2013).

On the other hand, the return on investment in nutrition can be high. Copenhagen Consensus Expert Panels consistently find nutrition interventions cost-effective (Copenhagen Consensus 2004,

FIGURE 3.3 CONSEQUENCES OF MICRONUTRIENT DEFICIENCIES THROUGHOUT THE LIFE CYCLE



Source: Adapted from ACC/SCN (2000).

TABLE 3.1 SELECTED MICRONUTRIENT DEFICIENCIES AND THEIR EFFECTS

| Micronutrient deficiency | Effects include | Number of people affected |
|--------------------------|---|---|
| Iodine | Brain damage in newborns, reduced mental capacity, goiter | ~1.8 billion |
| Iron | Anemia, impaired motor and cognitive development, increased risk of maternal mortality, premature births, low birthweight, low energy | ~1.6 billion |
| Vitamin A | Severe visual impairment, blindness, increased risk of severe illness and death from common infections such as diarrhea and measles in preschool age children; (in pregnant women) night blindness, increased risk of death | 190 million preschool age children; 19 million pregnant women |
| Zinc | Weakened immune system, more frequent infections, stunting | 1.2 billion |

Sources: Allen (2001); Andersson, Karumbunathan, and Zimmermann (2012); de Benoist et al. (2008); Micronutrient Initiative (2009); Wessels and Brown (2012); and WHO (2009; 2014a).

2008, 2012). In 2008, the panel ranked supplements for children (vitamin A and zinc), fortification (iron and iodine), and biofortification among the top five best investments for economic development. For example, estimates for salt iodization suggest that every dollar invested generates up to US\$81 in benefits (Hoddinott, Rosegrant, and Torero 2012).

Solutions to Hidden Hunger

Diversifying Diets

Increasing dietary diversity is one of the most effective ways to sustainably prevent hidden hunger (Thompson and Amoroso 2010). Dietary diversity is associated with better child nutritional outcomes, even when controlling for socioeconomic factors (Arimond and Ruel 2004). In the long term, dietary diversification ensures a healthy diet that contains a balanced and adequate combination of macronutrients (carbohydrates, fats, and protein); essential micronutrients; and other food-based substances such as dietary fiber. A variety of cereals, legumes, fruits, vegetables, and animal-source foods provides adequate nutrition for most people, although certain populations, such as pregnant women, may need supplements (FAO 2013). Effective ways to promote dietary diversity involve food-based strategies, such as home gardening and educating people on better infant and young child feeding practices, food preparation, and storage/preservation methods to prevent nutrient loss.

Fortifying Commercial Foods

Commercial food fortification, which adds trace amounts of micronutrients to staple foods or condiments during processing, helps consumers get the recommended levels of micronutrients. A scalable, sustainable, and cost-effective public health strategy, fortification has been particularly successful for iodized salt: 71 percent of the world's population has access to iodized salt and the number of iodine-deficient countries has decreased from 54 to 32 since 2003 (Andersson, Karumbunathan, and Zimmermann 2012).

Other common examples of fortification include adding B vitamins, iron, and/or zinc to wheat flour and adding vitamin A to cooking oil and sugar. Fortification may be particularly effective for urban consumers, who buy commercially processed and fortified foods. It is less likely to reach rural consumers who often have no access to commercially produced foods. To reach those most in need, fortification must be subsidized or mandatory; otherwise people may buy cheaper nonfortified alternatives.

Fortification, however, has a number of shortcomings. People may resist fortified foods. For example, up to 30 percent of Pakistanis

avoid iodized salt, according to the Micronutrient Initiative, due to a mistaken belief that iodine causes infertility and rumors of a plot to limit population growth (Leiby 2012). Consumers may also resist using fortified foods due to cooking properties or flavor. From another perspective, it can be difficult to determine the appropriate level of nutrients. Fortificants, the compounds used to fortify foods, may not be stable and may be lost during processing or storage. In addition, bioavailability, the degree or rate at which a substance can be absorbed, may be limited. That said, evidence of the acceptability and efficacy of home fortification continues to grow (Adu-Afarwuah et al. 2008; Dewey, Yang, and Boy 2009; De-Regil et al. 2013).

Biofortification

Biofortification is a relatively new intervention that involves breeding food crops, using conventional or transgenic methods, to increase their micronutrient content.¹ Plant breeders also improve yield and pest resistance, as well as consumption traits, like taste and cooking time—to match or outperform conventional varieties. To date, only conventionally bred biofortified crops have been released and delivered to farmers. Biofortified crops that have been released so far include vitamin A orange sweet potato, vitamin A maize, vitamin A cassava, iron beans, iron pearl millet, zinc rice, and zinc wheat. While biofortified crops are not available in all developing countries, biofortification is expected to grow significantly in the next five years (Saltzman et al. 2013).

¹ Conventional plant breeding involves parent lines with high vitamin or mineral levels that are crossed over several generations to produce plants with the desired nutrient and agronomic traits. Transgenic approaches, in which genes are manipulated or new genes inserted, are advantageous when the nutrient is not naturally found in a crop (for example, provitamin A in rice).

BOX 3.2 EFFECTS OF THE GREEN REVOLUTION

Public research and development practice have over many years focused on increasing productivity of staple crops in order to reduce malnutrition. However, the intensified production of high-yielding cereal varieties during the Green Revolution from the 1970s to mid-1990s may have both improved and worsened nutrition. The increase in total output of food staples translated into a drop in the prices of starchy staples relative to the prices of more micronutrient-rich nonstaple foods, such as vegetables and pulses. While staple cereals became more affordable, the prices of nonstaple foods in some countries rose, making micronutrient-rich foods less attractive to poor people (Bouis 2000; Kennedy and Bouis 1993).

Biofortified foods could provide a steady and safe source of certain micronutrients for people not reached by other interventions. In contrast to large-scale fortification, which usually reaches a greater share of urban than rural residents, biofortification first targets rural areas where crops are produced. Marketed surpluses of biofortified crops may make their way into retail outlets, reaching consumers first in rural areas, then in urban ones.

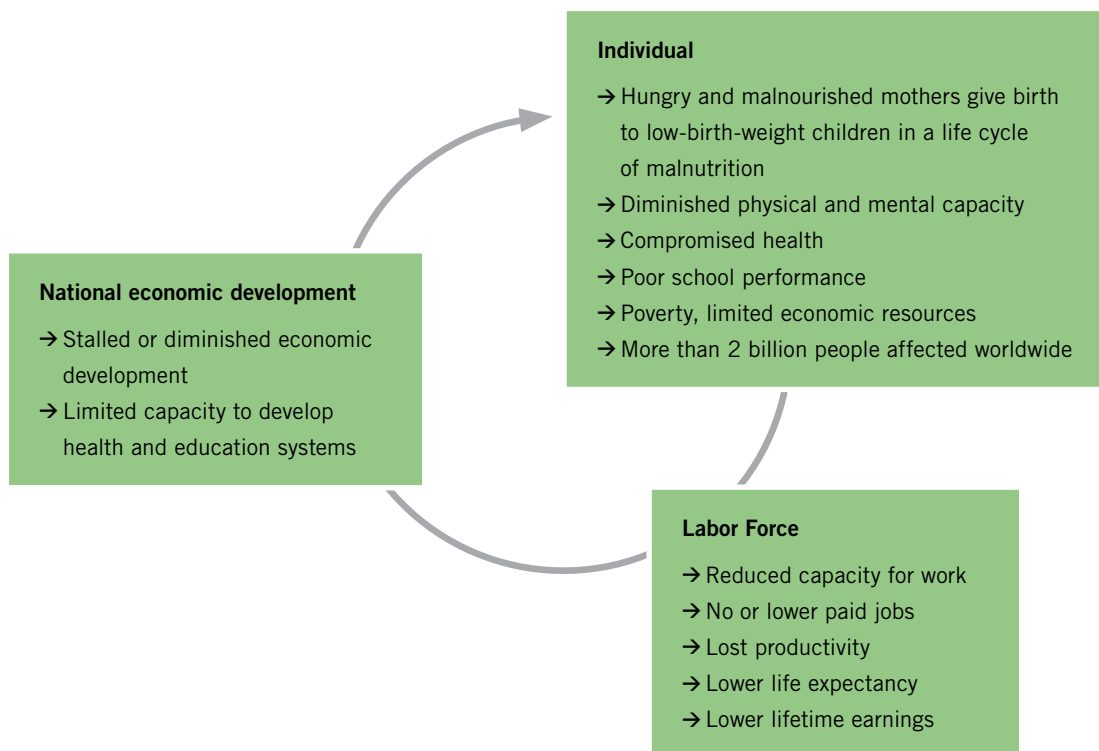
Given that biofortified staple foods cannot deliver as high a level nor as wide a range of minerals and vitamins as supplements or industrially fortified foods can, they are not the best response to clinical deficiencies. However, they can help close the micronutrient intake gap and increase the daily intake of vitamins and minerals throughout a person's life (Bouis et al. 2011). While the evidence on biofortification is not yet complete, several crops (iron beans, maize, pearl millet, rice, sweet potato, and vitamin A cassava) show evidence of improved micronutrient levels (Haas et al. 2005; 2011; 2013; 2014; Luna et al. 2012; Scott et al. 2012; Pompano et al. 2013; De Moura et al. 2014;

Tanumihardjo 2013; Talsma 2014; van Jaarsveld et al. 2005). Interventions delivering biofortified orange sweet potato significantly improved vitamin A intake of mothers and young children (Hotz et al. 2012a; Hotz et al. 2012b).

Supplementation

Vitamin A supplementation is one of the most cost-effective interventions for improving child survival (Tan-Torres Edejer et al. 2005). Between 1999 and 2005, coverage increased more than fourfold, and in 2012, estimated coverage rates were near 70 percent globally (UNICEF 2014b). Programs to supplement vitamin A are often integrated into national health policies because they are associated with a reduced risk of all-cause mortality and a reduced incidence of diarrhea (Imdad et al. 2010). According to UNICEF, at least 70 percent of young children ages 6 to 59 months need to receive vitamin A supplements every six months in order to achieve the desired reductions in child mortality. However, because of fluctuations in funding,

FIGURE 3.4 **CYCLE OF HIDDEN HUNGER, POVERTY, AND STALLED DEVELOPMENT**



Sources: Black et al. (2013); IFPRI (2014); FAO (2013); von Grebmer et al. (2010).
Note: The life cycle of malnutrition refers to how women who were poorly nourished as girls tend to give birth to underweight babies, perpetuating the cycle of undernutrition.

coverage varies widely from year to year in many priority countries. It should also be noted that vitamin A supplements typically target only vulnerable populations between six months and five years old.

Supplementation for other micronutrient deficiencies is less common. In some countries, iron-folate supplements are prescribed to pregnant women though coverage rates are often low and compliance rates even lower. For children, home fortification with micronutrient powders and lipid-based nutrient supplements can include multiple micronutrients, like iron and zinc, but they are harder to get into homes on a large scale than vitamin A supplements. The learning curve can be steep. In a trial in rural China, about half of parents or grandparents stopped giving children nutritional supplements containing soybeans, iron, zinc, calcium, and vitamins because they suspected the free supplements were unsafe or fake. They also feared they would be charged later (Economist 2014).

Looking Ahead

A range of interventions are needed to solve the complex problem of hidden hunger. To sustainably tackle the underlying causes will require a multisectoral approach at the national and international levels. National governments must take a cohesive approach to confronting hidden hunger, otherwise it will not get the attention it deserves. Only when all ministries, including agriculture, health, child development, and education, and those handling regulatory affairs, form a united front to improve food and nutrition security will governments truly have a chance of succeeding. The Scaling Up Nutrition (SUN) Movement offers a model for cross-sectoral collaboration, bringing people and resources together at the national level to improve nutrition (SUN 2014). Essential components to fight hidden hunger must include:

- Behavior-change communication that aims to improve women's, infants', and young children's utilization of health services, clean water, good sanitation, and hygiene to protect them from diseases that interfere with nutrient absorption;
- Messaging that promotes best practices, such as early initiation of exclusive breastfeeding up to 6 months followed by breastfeeding up to 24 months with adequate and sufficient complementary food as an economic and sustainable way to prevent hidden hunger in children;
- Social protection that gives poor people access to nutritious food and shields them from price spikes; and
- A focus on empowering women by increasing access to education.

Eliminating hidden hunger will not be easy. Challenges lie ahead. But if enough resources are allocated, the right policies developed, and the right investments made, these challenges can be overcome (Fan and Polman 2014). Much still needs to be done to ensure that people around the world gain access to the nutrient-rich foods they and their communities need to combat poor health and reach their development potential.



Increasing dietary diversity is one of the most effective ways to sustainably prevent hidden hunger.

Thompson and Amoroso, 2010

INTEGRATED APPROACHES TOWARD IMPROVED NUTRITION OUTCOMES

Concern Worldwide and Welthungerhilfe share a strong commitment to eliminating global food and nutrition insecurity. Both organizations draw on experience and evidence from their programs in order to develop models which can address hunger in different countries and contexts around the world. They are confronting the problem by tackling it on many fronts with interventions that support dietary diversity and strengthen local food systems. Empowering women, agricultural diversification, public health interventions, and household practices to maximize micronutrient intake are just some of the ways their programs are addressing undernutrition at the community level in developing countries.

This chapter offers insights from Concern and Welthungerhilfe's programs in rural Zambia, India, and Cambodia, recognizing the reality that hunger and malnutrition primarily affect the rural poor who depend on smallholder farming for a living (FAO 2013; Olinto et al. 2013). These insights and examples of how people are directly affected by this work convey not only the challenges of securing micronutrient-rich food, but also what can be done to enhance a household's food and nutrition security.

Realigning Agriculture to Improve Nutrition (RAIN) Project in Zambia

Concern's Realigning Agriculture to Improve Nutrition (RAIN) project in Zambia is designed to address the problem of chronic undernutrition by delivering sustainable and scalable cross-sectoral solutions to transform the lives of the poorest and most vulnerable in Zambia.

Of a population of 13 million, more than 60 percent of Zambian people live in rural areas and depend on agriculture for their livelihood (Zambia 2012). In 2014, Zambia ranked 68th in the Global Hunger Index (GHI), with a score indicating levels of hunger that are "alarming." An

estimated 45 percent of Zambian children under the age of five are stunted and suffer chronic malnutrition (UNICEF 2014b). Inadequate nutrient intake is reflected in low dietary diversity scores: Only one-quarter of the children surveyed met the minimum dietary diversity criterion of having eaten four or more food groups the day before, according to a baseline survey conducted in 2011 (Disha et al. 2012).

In 2010, Concern Worldwide Zambia and the International Food Policy Research Institute (IFPRI) began collaborating on the design of a five-year research project which aims to produce and share evidence on how to optimize agriculture for nutrition. The project, which began in mid-2011, has three objectives:

1. To reduce the prevalence of chronic malnutrition among young children and improve the nutritional status of pregnant and lactating women in Mumbwa District through targeted interventions during the critical period from conception through the child's second birthday (the first 1,000 days of life);
2. To realign and integrate activities and mechanisms within the Ministry of Agriculture and Livestock and the Ministry of Health, especially at the district level, to more effectively and efficiently achieve sustainable nutritional outcomes; and
3. To use and share evidence generated at the district level to influence the local, national, and international policy agenda to prevent child stunting.

One key aspect of the project involves exploring new ways to promote coordination between officials in the agriculture, health, and community development sectors. Malnutrition is a multidimensional problem with many direct and underlying causes. Efforts to address it must be multisectoral as increased coordination and alignment between sectors and ministries will be vital for sustained impact on nutrition outcomes. The changes begin at the district level in Mumbwa and cascade down to the community level. In Mumbwa, a District Nutrition Coordination Committee (DNCC) has been established to bring together representatives from the ministries of agriculture and livestock, health, community development, and maternal and child health as well as representatives from civil society.

This model of coordination is considered innovative and effective in supporting collaboration among ministries. It will be replicated across all 14 districts receiving support from the Scaling Up Nutrition (SUN) Fund to implement the First 1,000 Most Critical Days Project.

Note: This chapter was prepared by Welthungerhilfe and Concern Worldwide, and reflects these organizations' views and analyses, which have not been peer-reviewed by IFPRI's Publications Review Committee and cannot be attributed to IFPRI. Any citation of results or statements from this chapter should follow this format: Welthungerhilfe and Concern Worldwide. 2014. "Integrated Approaches toward Improved Nutrition Outcomes," Ch. 4 in von Grebmer et al. (eds.) 2014 Global Hunger Index: The Challenge of Hidden Hunger. Bonn, Washington, D.C., and Dublin: Welthungerhilfe, International Food Policy Research Institute, and Concern Worldwide.

BOX 4.1 SOME BASIC FACTS ABOUT REALIGNING AGRICULTURE TO IMPROVE NUTRITION

- Targets more than 4,490 households with pregnant women and/or children below two years of age.
- Has developed a system where community health workers and smallholder farmers teach women's groups.
- Implementing partners: the Ministry of Agriculture and Livestock, the Ministry of Health, the Mumbwa Child Development Agency, and IFPRI.

Note: For more information on this project, visit www.concern.net/rain

Approaches within the Realigning Agriculture to Improve Nutrition Project

Food Systems

HOMESTEAD GARDENS AND SMALL ANIMAL HUSBANDRY. As in much of Zambia, maize is the main crop grown and consumed in Mumbwa District. Because a key focus of the project is to increase household consumption of foods produced, agricultural activities focus mainly on homestead gardening and small-scale animal husbandry. The project promotes crops based on their nutritional value, including legumes (cowpeas, groundnuts, and iron-biofortified beans); vegetables (amaranth, carrots, green beans, paprika, pumpkins and their leaves, rapeseed, tomatoes); fruits (bananas, granadillas, passion fruit, watermelon); and orange-fleshed sweet potatoes. Because the iron-rich beans mature early, cook quickly, and taste good, they are popular with farmers. In addition, people eat the leaves.¹



CONCERN'S PROGRAM AREAS IN ZAMBIA

- Capital
- Concern's program areas
- Concern's RAIN project area

Source: Concern based on official maps.



A RAIN poster promotes gender equality and the importance of working together.

Community health volunteers and smallholder model farmers provide continuing agriculture and nutrition training to groups of 15–20 women, who are pregnant or have children under the age of two. Training covers agricultural practices that boost yields, including how to use organic manure, best practices for integrated pest management, and how to rear small livestock (Box 4.2).

A “pass-on” scheme facilitates livestock distribution. At the start of the project, all smallholder model farmers were given a male and a female goat. One-third of the group members received a female goat and are passing on the goat’s first female offspring to other women in their group. Each woman also received one chicken. The milk, eggs, and occasional meat from the animals are helping to increase families’ micronutrient and protein intake, while the manure the animals produce can be used to improve the fertility of their vegetable gardens’ soil. As access to water for irrigation during the dry season is a big challenge, the project has also rehabilitated boreholes.

FOOD PROCESSING AND STORAGE. Household activities focus on improving food preparation and preservation and exploring appropriate time- and labor-saving technologies to maximize women’s time for childcare. In addition, each women’s group received a solar food dryer to preserve fruits and vegetables, increasing access to micronutrient-rich foods, such as cow pea leaves, pumpkin leaves, tomatoes, and okra, throughout the year. While sun drying vegetables is a traditional practice, solar dryers have improved the process by speeding it up, reducing contamination, and minimizing micronutrient loss.

¹ Mbereshi beans are rich in iron (102 ppm) and zinc (35 ppm).

Social and Behavior Change

The RAIN project seeks to optimize food utilization, commonly understood as the way the body makes the most of various nutrients in the food (FAO 2008). Key social and behavior change (SBC) messages aim to change both infant and young child feeding (IYCF) behaviors as well as gender-related behaviors. Messages cover the importance of diversifying diets, nutrition during pregnancy, early and exclusive breastfeeding, the appropriate quantity and quality of complementary foods, and preventive healthcare services, such as immunizations, and antenatal care. The government curriculum and counselling cards are used to educate women in infant and young child feeding practices, and inform the project's nutrition activities.

Gender issues are also part of the messaging related to agricultural diversification, nutrition, and health. Women comprise more than 40 percent of the agricultural workforce in the developing world, and more than 50 percent in Africa (FAO 2011). However, many interventions designed to help communities become more food- and nutrition-secure fail to take into account their many roles, demands on their time, and the specific constraints they face. This project seeks to address this failure, not least by securing husbands' support to work on improving agriculture and nutrition at the household level.

Specific gender-focused social and behavior change materials communicate messages aimed at changing the behavior of beneficiaries and the community at large by changing how they see certain traditions and beliefs about gender roles ascribed by society. These messages promote increased female decisionmaking and a more equitable division of farming and childcare duties. Recognizing the important role that men play, the program highlights the importance of engaging men and boys to support women in their productive and childcare duties. Key messages are conveyed in creative ways, such as plays and cooking demonstrations. Different change agents, including community health workers and agriculture extension agents, reinforce the messages.

Public Health Interventions

The project seeks to work through and build the capacity of existing structures, while increasing overall demand for health services. Government staff and partners train all community health volunteers in infant and young child feeding. In addition, health facility staff train the trainers, leading monthly nutrition refresher classes for volunteers on various topics including maternal health, how to conduct cooking demonstrations, and how to address micronutrient deficiencies. The community health volunteers also help mobilize the community for the twice-yearly Child Health Week and other national days that promote public health.

Supplementation

The project supports micronutrient supplementation by promoting iron/folic acid supplementation among pregnant women, deworming both children and pregnant women, and giving vitamin A supplements to children twice a year. These interventions are highlighted as part of the social and behavior change messaging. The project's vision is a long-term one, which entails working with people to ensure most of their nutritional needs can be sustainably met through a diverse food system.

BOX 4.2 SEEDS, LIVESTOCK, AND TRAINING LED TO A MORE VARIED AND NUTRITIOUS DIET

Esnart Shibeledi is a single mother of five. Before joining the Realigning Agriculture to Improve Nutrition project in 2011, she and her family ate two meals a day and they grew two crops: maize and cotton.

The project provided seeds for micronutrient-dense crops, such as amaranth, tomatoes, carrots, soybeans, cow peas, and groundnuts. Now Esnart grows 14 kinds of crops in her garden and also uses a solar dryer to dry her vegetables for consumption later.

"These new crops mean I can better feed my family," she said. "Now they can eat five times a day—three main meals and two snacks. They drink goat milk and enjoy a more varied and nutritious diet."

After receiving chickens and a goat, Esnart was also able to add some animal-source protein to her family's diet, while the manure from the animals improves the fertility of her garden's soil. In order to ensure decent crop yields, Esnart receives the support of Elly, a smallholder model farmer who monitors her work and checks that the crops are growing well.



Esnart Shibeledi now grows 14 kinds of crops in her garden.

Early Indications of Impact

Preliminary results are promising. In less than three years, the production of diverse micronutrient-rich food has increased significantly and child and maternal dietary diversity, a proxy indicator of diet quality, has improved, according to early progress reports. Furthermore, the percentage of women involved in joint decisionmaking with their husbands or as the sole decisionmaker on food production and spending has increased.

Evidence from the project's baseline survey analysis by IFPRI shows that women with high empowerment scores are more likely to have achieved minimum dietary diversity for their children ages 6–23 months and are more likely to have visited a health clinic in the last six months. The percentage of women participating in decisions on what to grow and spending money from the sale of field crops has almost doubled. That said, around half of the women are not participating in such decisions, so these efforts must be expanded.² These and other lessons continue to inform projects in Zambia as well as Concern's wider agriculture-nutrition programming across Mozambique, Rwanda, Sierra Leone, Tanzania, and Uganda.

Linking Agriculture, Natural Resource Management and Nutrition in Asia

India and Cambodia have shown promise over the past decade in reducing maternal and child mortality (UNICEF 2014b). In addition, India achieved a significant decrease in child underweight (India, Ministry of Women and Child Development, and UNICEF, India 2014). However, there is still much room for improvement. Despite an improved 2014 Global Hunger Index ranking (55th), and an upgrade from the “alarming” to the “serious” category, India continues as home to the highest number of chronically malnourished (stunted) children under five: Nearly every second child is stunted (UNICEF 2014b). In Cambodia, ranked 43rd in the GHI, stunting affects 40 percent of the children under five.

Both countries produce enough food to meet the average calorie requirements of their populations (FAO 2014). Despite this fact, access to food is unevenly distributed and public policies still focus on quantity (energy supply) while investments in improving nutrition security such as improving the quality of diets and access to sanitation are lagging behind (IDS 2014; Results 2014).

Anemia remains a critical public health problem affecting half of Cambodia's children under five and 70 percent of children under five in India (Cambodia 2013; IIPS and Macro International 2007). At the present rate of progress, both countries are unlikely to meet the Millen-

nium Development Goals related to eradicating hunger and malnutrition, and improving maternal and child health (Cambodia 2013; India 2014).

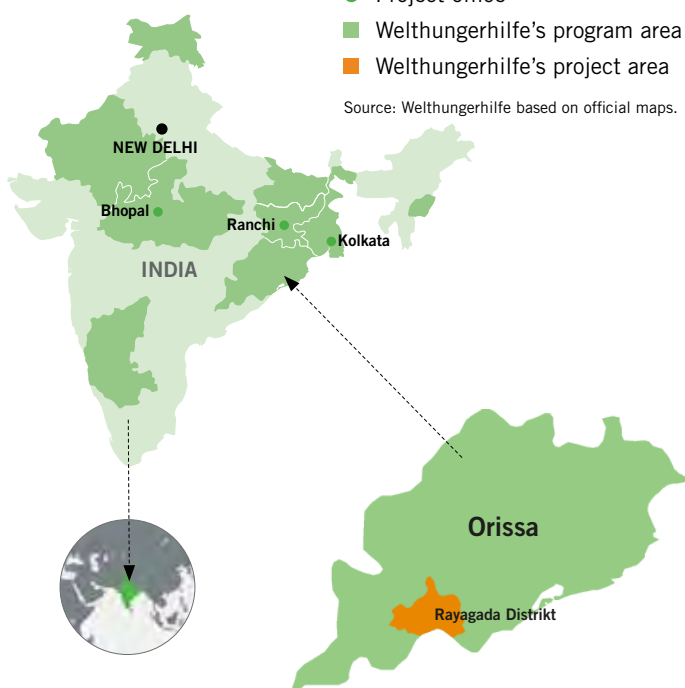
To address undernutrition, in terms of lack of protein and energy, and the micronutrient deficiencies that affect particularly the rural poor and marginalized people, Welthungerhilfe applies a community-based training approach known as Linking Agriculture, Natural Resource Management and Nutrition (LANN) in its programs.

Research literature notes that traditional agricultural and income generation programs are not enough to improve nutrition and that potential synergies between the sectors have been underused (Lancet 2008; 2013). In 2009, Welthungerhilfe worked with an NGO network in Laos and jointly developed an integrated food-based training approach to reduce high levels of undernutrition in tribal communities in remote areas with low access to public health services, high levels of illiteracy, and a high dependency on wild food. The approach promotes linkages between small-scale agriculture, income-generating activities, natural resource management, and nutrition. So far it has been applied to Welthungerhilfe programs throughout Southeast and South Asia benefitting 26,000 households, or almost 130,000 people.

WELTHUNGERHILFE'S PROGRAM AREAS IN INDIA

- Capital/regional/country office
- Project office
- Welthungerhilfe's program area
- Welthungerhilfe's project area

Source: Welthungerhilfe based on official maps.



² These preliminary findings came from Concern's annual survey of women's group participants in June 2013.

LANN's long-term objective is to change behaviors and foster better family nutrition. As a community-based training approach it can be integrated into livelihood and food security interventions which aim for greater alignment of sectors to maximize their nutritional impact.

Establishing Good Nutrition Practices

To improve knowledge and practices related to good nutrition, the approach uses participatory learning. Women's groups assess their family situations and learn about the vicious cycle of malnutrition where malnourished mothers give birth to underweight children who are likely to become stunted and face a greater risk of delivering low birth-weight babies themselves. Thus, malnutrition passes from one generation to the next if this cycle is not broken. The training further highlights the different elements of a healthy diet throughout the life cycle, personal and domestic hygiene, techniques to limit nutrient losses during food storage and preparation, and appropriate maternal and childcare practices to ensure proper child growth and maternal health. Furthermore, families learn to make informed spending decisions that give priority to nutrient-rich foods rather than sweets, sweetened beverages, snacks, and alcohol.

Theater, role playing, and cooking demonstrations help the villagers realize the importance of good nutrition for their wellbeing as well as validate and share traditional knowledge on how to prepare highly nutritious locally available food.

As women face multiple forms of discrimination and at the same time play a crucial role in safeguarding nutrition and caregiving, they are the main targets for awareness raising and empowerment. However, the participation and support of men are vital as well. In the Rayagada District of Orissa, the project area of Welthungerhilfe's Indian partner, Living Farms, for example, men have begun to play a critical role at the village level in opposing early marriage of girls, according to progress reports. In addition, together with their mothers, men do the work of their pregnant wives to allow them to rest.

Enhancing the Availability of and Access to Nutritious Food

Rice dominates the diets of people in Cambodia and most of India. As the next harvest draws near, household stocks become depleted and increasing demand pushes prices higher. As a result, poor families are the first to cut down on their food consumption—especially by reducing spending on micronutrient-rich foods which are more expensive than staples. Other factors such as reduced availability of traditional crop varieties and their low status when compared with “modern foods” also limit nutritious food options (Box 4.3).

Home and school gardens can increase the availability of vegetables and fruits rich in vitamins and minerals, such as green leafy vegetables, jackfruit, mangos, moringa, papaya, pumpkins, and sweet

BOX 4.3 EMERGING THREATS TO TRADITIONAL DIETS

“The traditional crops like different types of millets, pulses, and oilseeds, which were part of our regular diet and very nutritious, are now disappearing from the villages due to the government's introduction of rice and other hybrid crops. In addition, the younger generation nowadays feels collecting and consuming food from the forest is humiliating. So community members are being forced to eat only Public Distribution System rice, which does not contain enough vitamins and minerals. We used to be much healthier when we ate traditional diverse foods.”¹

– Minati Tuika

¹ Subsidized rice is provided by the Public Distribution System and makes up about 20 percent of the rice consumed by families.



Minati Tuika, a peasant farmer from the village of Katalipadar, Orissa, India.

potatoes. Uncultivated forest foods (for example, bamboo shoots, ferns, mushrooms, and fruit), make up to 40 percent of the local food basket of the indigenous target groups in Welthungerhilfe's project areas in India (Rayagada District of Orissa) and Cambodia (Ratanakiri province) (Box 4.4). These foods are highly nutritious, rich in beta-carotene, vitamins, calcium, iron, and protein. To raise awareness of the importance of protecting and conserving such foods, project staff help the village people document the varieties and encourage them to share their food preparation knowledge. Raising small livestock such as chicken and fish provides essential animal-source nutrients like vitamin B12 and iron, plus high quality proteins. In addition, the support for agroecological or integrated farming practices such as traditional millets-based mixed cropping (combining cereals, pulses, oilseeds, and vegetables)

is expected to reduce the dependence on single crops, shorten the lean periods, and increase household dietary diversity and family incomes through the sale of surpluses.

Creating an Enabling Environment for Nutrition

Combining food-based strategies with behavior change communication and support for a healthy environment addresses the underlying causes of malnutrition, including hidden hunger. But in the long term, people cannot break out of the vicious cycle of poverty and malnutrition unless basic rights, such as adequate access to productive resources, including land and income, as well as education and health services are met and related public services are put in place. At training and group meetings, community-based organizations are empowered to hold policymakers and local administration accountable and demand improvements in the reach and quality of services. The villagers of Rayagada district now use community score cards and social audits, introduced by Welthungerhilfe's Indian partner Living Farms, to monitor service delivery by local governments in the health and education sectors. In addition, the health staff are trained to improve the quality of their services providing counseling, check-ups, supplements, deworming, and immunization to pregnant women and their children. Women are encouraged to regularly use these services.

Effects on Nutrition

While it is too early to provide comprehensive evidence of the approach's impact on reducing malnutrition, availability of and access to different micronutrient-rich food items and household dietary diversity have

increased. Preliminary data suggest a significant decline in waterborne diseases since improved water sources and latrines became available in the targeted villages and people began using better hygiene practices. Exclusive breastfeeding during a child's first six months has increased and complementary feeding has improved in quality and frequency. More women receive regular check-ups, counseling, and iron and folic acid supplements. Women have a higher level of self-confidence and more actively participate in decisionmaking at the household and community level.

However, while enhanced nutrition knowledge is possible in the short and medium term, achieving behavioral change for better family nutrition is a long-term process. To improve nutritional outcomes, the Linking Agriculture, Natural Resource Management and Nutrition approach connects interventions from different sectors with better nutrition, thereby helping to reduce micronutrient deficiencies.

Conclusion

The challenge of micronutrient deficiency is complex. Particularly in countries facing a high burden of malnutrition, hidden hunger goes hand in hand with other forms of malnutrition and cannot be addressed in isolation. Experience shows that any sustainable solution to hidden hunger will require a comprehensive and integrated approach toward balanced diets and healthy environments, with multiple sectors joining efforts and planning in a more coordinated way.

The programs highlighted in this chapter outline the approaches that Concern and Welthungerhilfe are pursuing and show that the



Source: Welthungerhilfe based on official maps.

BOX 4.4 STRENGTHENING DIETARY DIVERSITY IN RURAL CAMBODIA



Romas Phas lives in northeastern Cambodia.

Romas Phas is a 30-year-old mother of four children. She lives with her husband and children, ages 4–15, in Dal Veal Leng village in Ratanakiri province in northeastern Cambodia. The area is inhabited mostly by indigenous groups. Rates of maternal and child malnutrition, including micronutrient deficiencies, are at or above Cambodia's national average. While the children in Dal Veal Leng village appear to be healthy, their parents, healthcare workers, and decisionmakers in the area often do not realize that the children are missing out on essential vitamins and minerals.

With support from one of Welthungerhilfe's local partners, Centre d'Etude et de Développement Agricole Cambodgien (CEDAC), Romas was among 20 women in her village who took part in nutrition training to learn how to take good care of her children and herself. When she had her first few children, she followed the traditional beliefs passed down through generations of mothers and daughters. "I was told to avoid eating bananas, jackfruit, mangoes, fish with red tails, generally all orange and red things," she recalled. "Now I know that these foods are particularly rich in

nutrients and would have been good for me and my children." Over the past few years, Romas started planting various fruit trees close to her house. She now grows different kinds of green leafy vegetables, tomatoes, papayas, and sweet potatoes. Raising chickens helps her add essential nutrients to her family's diet and earn more income from selling the surplus eggs or chickens.

The changes in the village are encouraging. Besides enjoying a more diverse diet, people in the village are benefiting from improved hygiene due to an improved well and latrines built by villagers with support from Welthungerhilfe and CEDAC. However, another issue troubles Romas: While land titling by the Cambodian government slowly proceeds, the government has awarded parts of the land she and her family have been tilling for years to a private investor who logged the forest and carved out another rubber plantation.

Romas' household is among half those in the village affected by illegal land acquisition practices, which have dramatically reduced the supply of wild meat and vegetables. Homegrown vegetables compensate a little. But to make up for the shortfall, Romas also needs to buy more food, especially meat. In addition, yields from Romas' rice paddies could decrease in the near future, because her remaining land will not allow her to maintain the traditional fallow periods. With a reduced family income, she would not be able to maintain the level of dietary diversity she has achieved over the past few years.

Romas' story is just one example of how progress in tackling the underlying causes of hidden hunger is at serious risk of being reversed when the main sources of peoples' livelihood—the land and forests—face threats.

response to the challenge of hidden hunger will require a sustained, long-term effort and the capacity and commitment to bring effective interventions to scale. Leveraging the complementary expertise of different ministries and sectors and offering the local community targeted training and support programs will help improve the nutritional status of individuals and communities. While further evidence is needed on how agriculture can improve and contribute to nutritional outcomes and which interventions or combinations will be the most effective, much can be done right now to alleviate hidden hunger.

Chapter 05 presents recommendations targeting specific areas and dimensions that need to be addressed. Recent years have seen tremendous political will and commitment in the area of undernutrition, but it is vital that governments, policymakers, and all stakeholders follow through to ensure these commitments deliver results.



The post-2015 sustainable development agenda must put addressing all forms of malnutrition at the top of its goals.

The Lancet Maternal and Child Nutrition Series, 2013

POLICY RECOMMENDATIONS

While the international community has long recognized the importance of food security, it has not always accorded nutrition security the attention it deserves. As a result, hidden hunger remains a significant challenge that continues to exact a devastating human, societal, and economic toll. Every man, woman, and child has the right to adequate food in a quantity and quality sufficient to satisfy their dietary needs. One of the key challenges going forward is to shine a light on food quality to address hidden hunger so that it is eliminated. To make this happen, a wide range of stakeholders at many levels must take action.

Make it a priority to eliminate hidden hunger

Political commitment and leadership on food and nutrition security must now address the enormous challenge of hidden hunger. The international community must ensure that the post-2015 framework includes a universal goal to end hunger and malnutrition in all its forms.

- Targets and indicators within and beyond this goal must build on existing national and international nutrition commitments, including the World Health Assembly targets for 2025.
- Regional, national, and community-based agendas and action plans must reflect these commitments. Policy analysis related to food and nutrition security should go beyond consideration of energy intake and also highlight the importance of dietary quality.
- Ensure hidden hunger is not overlooked. Micronutrient deficiencies cannot stay in the shadows when there are ways to eliminate this kind of hunger.

Policies must be appropriate, adequate, and connected to each other

- Integrate approaches across relevant ministries and stakeholders. National governments should engage health, agriculture, and education ministries, as well as ministries of planning, finance, and water and sanitation to reach a shared understanding of how national policies will work to reduce undernutrition, including micronutrient deficiencies.

- Enhance girls' access to education. Removing gender barriers to learning and literacy can help girls later become more empowered as women. While men control most household income and decision-making, women play a key role in ensuring household food security and fostering the health and nutrition of household members. There is a critical link between a woman's level of schooling and her family's nutritional status.
- Increase access to nutritious foods by endorsing targeted social safety nets and support for the poorest, particularly focusing on pregnant or lactating women, infants under two, and adolescents.
- Each country needs to define the best set of interventions necessary, considering options such as dietary diversification, fortification, supplementation, biofortification, nutrition education/behavior change, improving access to water and sanitation, and promoting good hygiene practices. International and national experts should collaborate with local experts to develop optimal country interventions that maximize coverage and impact, while minimizing costs. Interventions should support dietary diversity and strengthen local food systems by building capacity and giving priority to local and sustainable solutions to hidden hunger.
- Create an enabling environment to improve access to and local availability of micronutrient-rich foods. Develop long-term strategies that ensure nutritious foods are available locally. International organizations, the donor community, national and regional governments, as well as the international and national research and extension communities, should invest more in sustainable and diversified productivity increases for a range of foods, such as animal-source foods, fruits, and vegetables, as well as for biofortified staples.
- Increase support for improved access to local markets and the development of local food processing facilities.

Invest in human capacity building and allocate the necessary funds to build expertise and capacity in nutrition at all levels

→ Invest in increasing the number and building the capacity of nutrition and health experts at national and subnational levels, supporting greater coordination and joint interventions across the range of ministries and at lower levels, including between health workers and agriculture extension services.

→ Expand coordination within and across multilateral institutions, including CGIAR, FAO, WFP, WHO, UNICEF, and civil society organizations.

Enhance accountability: Governments and international institutions must create a regulatory environment that promotes adequate nutrition

→ National governments must translate voluntary codes of conduct—such as the International Code of Marketing of Breastmilk Substitutes and the WHO recommendations on the marketing of foods and nonalcoholic beverages high in fat, salt, or sugar to children—into national legislation to ensure that the marketing does not undermine efforts to promote healthy diets and recommended caring practices. Governments should enforce rules.

→ International organizations and national governments must educate consumers about the nutritional value of foods in order to stimulate demand. As consumer demand grows, private sector suppliers will respond.

→ Governments must incentivize private sector entities, such as seed and food companies, to develop more nutritious seeds and foods. Transparent accountability systems should be installed to control conflicts of interest more systematically and ensure that investments contribute to public health interests.

→ Governments must require companies to communicate nutrition-related information, practices, and performance in a transparent way.

Expand monitoring, research, and evidence base to increase accountability

→ Standardize and regularize data collection on micronutrient deficiencies. Good policies must be backed by reliable data: To quantify and track the prevalence of micronutrient deficiencies through time and space, the international nutrition community must develop and standardize cost-effective biomarkers and methods for measuring micronutrient deficiencies. International organizations, the international research community, and national and regional governments need to collaborate to gather and provide disaggregated data in a timely manner.

→ Build further evidence of efficacy, cost-effectiveness, and scalability of food-based solutions for fighting hidden hunger. Research must explore the impact of food-based interventions, such as homestead food production and biofortification, on target populations' micronutrient status, as well as the interventions' cost-effectiveness and sustainability. Scalability must be assessed. Evidence and best practices have to be continuously disseminated via researchers, international organizations, nongovernmental organizations, and the media.

“We need to look at the world through the eyes of a mother, the head of a poor household, a small-holder farmer, and a poor slum dweller to really understand the subtle and interlinked causes of hunger. In this way problems that seemed technical become people’s problems and as a result **our response becomes more social, more human.** I think this could be another mindset shift in our efforts to tackle hunger and undernutrition.”

Mary Robinson, former President of Ireland and
President of the Mary Robinson Foundation – Climate Justice

A APPENDIXES

Data Sources and Calculation of the 1990, 1995, 2000, 2005, and 2014 Global Hunger Index Scores

All three index components are expressed in percentages and weighted equally. Higher GHI scores indicate more hunger. The index varies between a minimum of 0 and a maximum of 100, but these extremes do not occur in practice. The maximum value of 100 would be reached only if all children died before their fifth birthday, the whole population was undernourished, and all children under five were underweight. The minimum value of zero would mean that a country had no undernourished people in the population, no children under five who were underweight, and no children who died before their fifth birthday. The table below provides an overview of the data sources for the Global Hunger Index.

THE GLOBAL HUNGER INDEX IS CALCULATED AS FOLLOWS:

$$\text{GHI} = (\text{PUN} + \text{CUW} + \text{CM})/3$$

with **GHI:** Global Hunger Index

PUN: proportion of the population that is undernourished (in %)

CUW: prevalence of underweight in children younger than five years (in %)

CM: proportion of children dying before the age of five years (in %)

GLOBAL HUNGER INDEX COMPONENTS, 1990, 1995, 2000, 2005, AND 2014 GHI SCORES

| GHI | Number of countries with GHI | Indicators | Reference years | Data sources |
|------|------------------------------|---|------------------------|--|
| 1990 | 97 | Percentage of undernourished in the population ^a | 1990–1992 ^b | FAO 2014 and authors' estimates |
| | | Percentage of underweight in children under five | 1988–1992 ^c | UNICEF/WHO/World Bank 2013; WHO 2014b; ^d and authors' estimates |
| | | Under-five mortality | 1990 | IGME 2013 |
| 1995 | 117 | Percentage of undernourished in the population ^a | 1994–1996 ^b | FAO 2014 and authors' estimates |
| | | Percentage of underweight in children under five | 1993–1997 ^e | UNICEF/WHO/World Bank 2013; WHO 2014b; ^d and authors' estimates |
| | | Under-five mortality | 1995 | IGME 2013 |
| 2000 | 117 | Percentage of undernourished in the population ^a | 1999–2001 ^b | FAO 2014 and authors' estimates |
| | | Percentage of underweight in children under five | 1998–2002 ^f | UNICEF/WHO/World Bank 2013; WHO 2014b; ^d and authors' estimates |
| | | Under-five mortality | 2000 | IGME 2013 |
| 2005 | 118 | Percentage of undernourished in the population ^a | 2004–2006 ^b | FAO 2014 and authors' estimates |
| | | Percentage of underweight in children under five | 2003–2007 ^g | UNICEF/WHO/World Bank 2013; WHO 2014b; UNICEF 2013; UNICEF 2009; ^d and authors' estimates |
| | | Under-five mortality | 2005 | IGME 2013 |
| 2014 | 120 | Percentage of undernourished in the population ^a | 2011–2013 ^b | FAO 2014 and authors' estimates |
| | | Percentage of underweight in children under five | 2009–2013 ^h | UNICEF/WHO/World Bank 2013; WHO 2014b; UNICEF 2014a; MEASURE DHS 2014; India, Ministry of Women and Child Development, and UNICEF, India 2014; ^d and authors' estimates |
| | | Under-five mortality | 2012 | IGME 2013 |

^a Proportion of the population with chronic calorie deficiency.

^b Average over a three-year period.

^c Data collected from the year closest to 1990; where data for 1988 and 1992, or 1989 and 1991, were available, an average was used. The authors' estimates are for 1990.

^d UNICEF/WHO/World Bank 2013 data are the primary data sources, and WHO 2014b; UNICEF 2014a, 2013, and 2009; and MEASURE DHS 2014 are complementary data sources. For India's 2014 GHI score, data on underweight in children were provided by India, Ministry of Women and Child Development, and UNICEF, India.

^e Data collected from the year closest to 1995; where data for 1993 and 1997, or 1994 and 1996, were available, an average was used. The authors' estimates are for 1995.

^f Data collected from the year closest to 2000; where data for 1998 and 2002, or 1999 and 2001, were available, an average was used. The authors' estimates are for 2000.

^g Data collected from the year closest to 2005; where data for 2003 and 2007, or 2004 and 2006, were available, an average was used. The authors' estimates are for 2005.

^h The latest data gathered in this period.

DATA UNDERLYING THE CALCULATION OF THE 1990, 1995, 2000, 2005, AND 2014 GLOBAL HUNGER INDEX SCORES

| Country | Proportion of undernourished in the population (%) | | | | | Prevalence of underweight in children under five years (%) | | | | | Under-five mortality rate (%) | | | | | GHI | | | | | | | | |
|--------------------------|--|---------|---------|---------|---------|--|---------|---------|---------|---------|-------------------------------|---------|---------|---------|------|------|------|------|------|------|--|--|--|--|
| | '90-'92 | '94-'96 | '99-'01 | '04-'06 | '11-'13 | '88-'92 | '93-'97 | '98-'02 | '03-'07 | '09-'13 | 1990 | 1995 | 2000 | 2005 | 2012 | 1990 | 1995 | 2000 | 2005 | 2014 | | | | |
| | | | | | | | | | | | with data from | | | | | | | | | | | | | |
| | | | | | | | | | | '88-'92 | '93-'97 | '98-'02 | '03-'07 | '09-'13 | | | | | | | | | | |
| Afghanistan | - | - | - | - | - | - | 44.9 | 36.5 * | 32.8 | 25.0 | 17.6 | 14.8 | 13.4 | 11.8 | 9.9 | - | - | - | - | - | | | | |
| Albania | 9.0 * | 2.4 * | 3.8 * | 9.7 * | 7.8 * | 14.1 * | 12.8 * | 17.0 | 6.6 | 6.3 | 4.3 | 3.6 | 2.9 | 2.2 | 1.7 | 9.1 | 6.3 | 7.9 | 6.2 | 5.3 | | | | |
| Algeria | 5.5 | 6.3 | 6.3 | 5.0 | 2.4 * | 9.2 | 11.3 | 5.4 | 3.7 | 3.6 * | 5.0 | 4.4 | 3.5 | 2.6 | 2.0 | 6.6 | 7.3 | 5.1 | <5 | <5 | | | | |
| Angola | 63.2 | 58.6 | 49.0 | 37.9 | 24.4 | 37.8 * | 37.0 | 27.5 | 15.1 | 11.3 * | 21.3 | 21.0 | 20.3 | 19.4 | 16.4 | 40.8 | 38.9 | 32.3 | 24.1 | 17.4 | | | | |
| Argentina | 2.1 * | 1.2 * | 1.0 * | 1.9 * | 3.4 * | 3.4 * | 3.2 | 2.4 * | 2.3 | 2.3 * | 2.8 | 2.3 | 2.0 | 1.7 | 1.4 | <5 | <5 | <5 | <5 | <5 | | | | |
| Armenia | - | 22.6 | 21.5 | 6.9 | 2.6 * | - | 5.1 * | 2.6 | 4.2 | 5.3 | - | 3.9 | 3.0 | 2.3 | 1.6 | - | 10.5 | 9.0 | <5 | <5 | | | | |
| Azerbaijan | - | 26.6 | 14.9 | 2.2 * | 1.1 * | - | 8.8 | 14.0 | 8.4 | 4.1 * | - | 9.0 | 7.2 | 5.1 | 3.5 | - | 14.8 | 12.0 | 5.2 | <5 | | | | |
| Bahrain | - | - | - | - | - | 6.3 | 7.6 | - | - | - | 2.3 | 1.8 | 1.3 | 1.1 | 1.0 | - | - | - | - | - | | | | |
| Bangladesh | 33.9 | 36.7 | 18.0 | 15.3 | 16.3 | 61.5 | 55.2 | 45.3 | 37.3 | 36.8 | 14.4 | 11.4 | 8.8 | 6.8 | 4.1 | 36.6 | 34.4 | 24.0 | 19.8 | 19.1 | | | | |
| Belarus | - | 1.1 * | 2.3 * | 2.8 * | 0.4 * | - | 2.4 * | 1.1 * | 1.3 | 0.8 * | - | 1.8 | 1.4 | 0.9 | 0.5 | - | <5 | <5 | <5 | <5 | | | | |
| Benin | 22.4 | 19.6 | 17.8 | 13.8 | 6.1 | 27.0 * | 26.2 | 21.5 | 20.2 | 18.4 * | 18.1 | 15.8 | 14.7 | 12.0 | 9.0 | 22.5 | 20.5 | 18.0 | 15.3 | 11.2 | | | | |
| Bhutan | - | - | - | - | - | 34.0 | 24.5 * | 14.1 | 14.3 * | 12.8 | 13.1 | 10.4 | 8.0 | 6.1 | 4.5 | - | - | - | - | - | | | | |
| Bolivia | 33.9 | 31.0 | 29.9 | 29.9 | 21.3 | 9.7 | 9.2 | 5.9 | 5.9 | 4.4 * | 12.3 | 10.1 | 7.8 | 5.8 | 4.1 | 18.6 | 16.8 | 14.5 | 13.9 | 9.9 | | | | |
| Bosnia & Herzegovina | - | 6.4 * | 6.3 * | 2.1 * | 2.2 * | - | 3.5 * | 4.2 | 1.6 | 1.5 | - | 1.4 | 1.0 | 0.9 | 0.7 | - | <5 | <5 | <5 | <5 | | | | |
| Botswana | 25.1 | 28.2 | 35.0 | 32.6 | 25.7 | 17.0 * | 15.1 | 10.7 | 11.2 * | 9.2 * | 4.8 | 6.3 | 8.5 | 6.7 | 5.3 | 15.6 | 16.5 | 18.1 | 16.8 | 13.4 | | | | |
| Brazil | 15.0 | 13.9 | 12.9 | 8.9 | 6.9 | 5.3 | 4.5 | 3.2 * | 3.0 | 2.1 * | 6.2 | 4.7 | 3.3 | 2.3 | 1.4 | 8.8 | 7.7 | 6.5 | <5 | <5 | | | | |
| Bulgaria | 3.5 * | 7.8 * | 7.0 * | 7.9 * | 7.2 * | 4.0 * | 3.1 * | 2.6 * | 2.2 | 1.8 * | 2.2 | 2.3 | 2.1 | 1.6 | 1.2 | <5 | <5 | <5 | <5 | <5 | | | | |
| Burkina Faso | 22.9 | 18.3 | 26.5 | 25.8 | 25.0 | 37.8 * | 29.6 | 33.7 | 37.6 | 24.4 | 20.2 | 19.9 | 18.6 | 16.0 | 10.2 | 27.0 | 22.6 | 26.3 | 26.5 | 19.9 | | | | |
| Burundi | 44.4 | 57.9 | 62.1 | 68.5 | 67.3 | 35.1 * | 37.1 * | 38.9 | 35.2 | 29.1 | 16.4 | 15.7 | 15.0 | 13.4 | 10.4 | 32.0 | 36.9 | 38.7 | 39.0 | 35.6 | | | | |
| Cambodia | 39.4 | 37.6 | 33.6 | 27.7 | 15.4 | 47.6 * | 42.6 | 39.5 | 28.4 | 29.0 | 11.6 | 12.1 | 11.1 | 6.3 | 4.0 | 32.9 | 30.8 | 28.1 | 20.8 | 16.1 | | | | |
| Cameroon | 38.3 | 39.4 | 31.7 | 21.4 | 13.3 | 18.0 | 19.3 * | 17.3 | 15.9 | 15.1 | 13.5 | 15.1 | 15.0 | 12.4 | 9.5 | 23.3 | 24.6 | 21.3 | 16.6 | 12.6 | | | | |
| Central African Republic | 48.5 | 51.8 | 46.0 | 43.1 | 28.2 | 25.4 * | 22.2 | 21.8 | 28.0 | 23.5 | 17.1 | 16.8 | 16.4 | 15.7 | 12.9 | 30.3 | 30.3 | 28.1 | 28.9 | 21.5 | | | | |
| Chad | 60.1 | 51.8 | 41.7 | 38.0 | 29.4 | 38.2 * | 34.3 | 29.4 | 33.9 | 30.3 | 20.9 | 20.0 | 18.9 | 17.6 | 15.0 | 39.7 | 35.4 | 30.0 | 29.8 | 24.9 | | | | |
| Chile | 9.0 | 5.8 | 4.5 * | 3.1 * | 3.0 * | 0.9 * | 0.8 | 0.7 | 0.6 | 0.5 * | 1.9 | 1.3 | 1.1 | 0.9 | 0.9 | <5 | <5 | <5 | <5 | <5 | | | | |
| China | 22.9 | 16.6 | 14.4 | 13.4 | 11.4 | 12.6 | 10.7 | 7.4 | 4.5 | 3.4 | 5.4 | 4.7 | 3.7 | 2.4 | 1.4 | 13.6 | 10.7 | 8.5 | 6.8 | 5.4 | | | | |
| Colombia | 20.3 | 15.2 | 13.1 | 13.8 | 10.6 | 8.8 | 6.3 | 4.9 | 5.1 | 3.4 | 3.5 | 3.0 | 2.5 | 2.2 | 1.8 | 10.9 | 8.2 | 6.8 | 7.0 | 5.3 | | | | |
| Comoros | 41.4 | 48.2 | 67.1 | 58.6 | 65.3 | 15.2 | 21.1 | 25.0 | 22.1 | 15.3 | 12.4 | 10.7 | 9.9 | 9.4 | 7.8 | 23.0 | 26.7 | 34.0 | 30.0 | 29.5 | | | | |
| Congo, Dem. Rep. | - | - | - | - | - | 21.5 * | 30.7 | 33.6 | 28.2 | 24.2 | 17.1 | 17.1 | 17.1 | 17.1 | 14.6 | - | - | - | - | - | | | | |
| Congo, Rep. | 42.4 | 45.4 | 32.6 | 31.9 | 33.0 | 15.3 * | 11.7 * | 10.4 * | 11.8 | 11.6 | 10.0 | 11.0 | 11.8 | 11.3 | 9.6 | 22.6 | 22.7 | 18.3 | 18.3 | 18.1 | | | | |
| Costa Rica | 4.0 * | 5.0 * | 4.3 * | 5.0 | 8.2 | 2.5 | 2.9 | 1.9 * | 1.5 * | 1.1 | 1.7 | 1.5 | 1.3 | 1.0 | 1.0 | <5 | <5 | <5 | <5 | <5 | | | | |
| Côte d'Ivoire | 13.3 | 14.2 | 20.0 | 19.6 | 20.5 | 20.6 * | 20.3 | 18.2 | 16.7 | 15.7 | 15.2 | 15.2 | 14.5 | 13.1 | 10.8 | 16.4 | 16.6 | 17.6 | 16.5 | 15.7 | | | | |
| Croatia | - | 14.6 * | 11.6 * | 2.1 * | 1.4 * | - | 0.5 | 0.5 * | 0.4 * | 0.3 * | - | 1.0 | 0.8 | 0.7 | 0.5 | - | 5.4 | <5 | <5 | <5 | | | | |
| Cuba | 7.8 | 20.0 | 2.9 * | 1.1 * | 0.6 * | 4.4 * | 4.2 * | 3.4 | 3.5 | 2.1 * | 1.3 | 1.1 | 0.8 | 0.7 | 0.6 | <5 | 8.4 | <5 | <5 | <5 | | | | |
| Djibouti | 70.2 | 60.8 | 49.4 | 37.2 | 20.5 | 20.2 | 16.0 | 25.4 | 29.6 | 29.8 | 11.9 | 11.3 | 10.8 | 9.9 | 8.1 | 34.1 | 29.4 | 28.5 | 25.6 | 19.5 | | | | |
| Dominican Republic | 32.5 | 24.9 | 22.3 | 20.9 | 15.6 | 8.4 | 4.7 | 3.5 | 4.6 | 2.8 * | 6.0 | 4.9 | 4.0 | 3.4 | 2.7 | 15.6 | 11.5 | 9.9 | 9.6 | 7.0 | | | | |
| Ecuador | 26.4 | 19.4 | 20.0 | 21.8 | 16.3 | 12.6 * | 12.0 * | 12.5 | 6.2 | 5.0 * | 5.6 | 4.3 | 3.4 | 2.9 | 2.3 | 14.9 | 11.9 | 12.0 | 10.3 | 7.9 | | | | |
| Egypt, Arab Rep. | 2.0 * | 1.6 * | 1.5 * | 2.2 * | 1.3 * | 10.5 | 10.8 | 9.8 | 5.4 | 4.5 * | 8.6 | 6.4 | 4.5 | 3.1 | 2.1 | 7.0 | 6.3 | 5.3 | <5 | <5 | | | | |
| El Salvador | 15.3 | 14.8 | 10.9 | 10.7 | 11.9 | 11.1 | 7.2 | 9.6 | 6.1 | 5.1 * | 5.9 | 4.4 | 3.2 | 2.3 | 1.6 | 10.8 | 8.8 | 7.9 | 6.4 | 6.2 | | | | |
| Eritrea | - | 72.4 | 76.5 | 75.6 | 61.3 | - | 39.6 | 34.5 | 33.9 * | 34.8 * | - | 11.7 | 8.9 | 7.0 | 5.2 | - | 41.2 | 40.0 | 38.8 | 33.8 | | | | |
| Estonia | - | 6.4 * | 4.3 * | 4.3 * | 3.3 * | - | 1.7 * | 0.9 * | 0.8 * | 0.7 * | - | 1.6 | 1.1 | 0.7 | 0.4 | - | <5 | <5 | <5 | <5 | | | | |
| Ethiopia | - | 67.5 | 55.7 | 46.8 | 37.1 | 41.9 | 42.7 * | 42.0 | 34.6 | 29.2 | 20.4 | 17.5 | 14.6 | 11.0 | 6.8 | - | 42.6 | 37.4 | 30.8 | 24.4 | | | | |
| Fiji | 6.6 | 6.4 | 4.8 * | 2.9 * | 2.7 * | 9.0 * | 6.9 | 6.2 * | 5.3 | 6.3 * | 3.1 | 2.7 | 2.4 | 2.2 | 2.2 | 6.2 | 5.3 | <5 | <5 | <5 | | | | |
| Gabon | 9.5 | 8.6 | 5.9 | 6.1 | 5.6 | 11.4 * | 8.4 * | 8.8 | 8.2 * | 6.5 | 9.2 | 8.9 | 8.6 | 7.9 | 6.2 | 10.0 | 8.6 | 7.8 | 7.4 | 6.1 | | | | |
| Gambia, The | 18.2 | 23.8 | 19.4 | 20.1 | 16.0 | 20.8 * | 23.2 | 15.4 | 15.8 | 17.4 | 17.0 | 14.1 | 11.6 | 9.5 | 7.3 | 18.7 | 20.4 | 15.5 | 15.1 | 13.6 | | | | |
| Georgia | - | - | - | - | - | - | 3.6 * | 2.7 | 2.3 | 1.1 | - | 4.5 | 3.4 | 2.6 | 2.0 | - | - | - | - | - | | | | |
| Ghana | 44.4 | 23.5 | 17.8 | 11.2 | 2.9 * | 24.4 | 25.8 | 20.3 | 13.9 | 13.4 | 12.8 | 11.3 | 10.3 | 8.8 | 7.2 | 27.2 | 20.2 | 16.1 | 11.3 | 7.8 | | | | |
| Guatemala | 16.9 | 19.9 | 27.2 | 29.8 | 30.5 | 22.0 * | 21.7 | 19.6 | 17.0 * | 13.0 | 8.0 | 6.3 | 5.1 | 4.1 | 3.2 | 15.6 | 16.0 | 17.3 | 17.0 | 15.6 | | | | |
| Guinea | 18.2 | 20.7 | 21.1 | 17.9 | 15.2 | 23.6 * | 21.2 | 29.1 | 22.5 | 17.5 | 24.1 | 20.9 | 17.1 | 13.5 | 10.1 | 22.0 | 20.9 | 22.4 | 18.0 | 14.3 | | | | |
| Guinea-Bissau | 21.8 | 20.7 | 22.3 | 19.0 | 10.1 | 25.3 * | 21.2 * | 21.9 | 17.4 | 18.1 | 20.6 | 19.2 | 17.4 | 15.6 | 12.9 | 22.6 | 20.4 | 20.5 | 17.3 | 13.7 | | | | |
| Guyana | 22.0 | 14.2 | 7.9 | 8.7 | 5.0 | 15.6 * | 13.2 | 11.9 | 10.8 | 11.1 | 6.0 | 5.3 | 4.6 | 4.2 | 3.5 | 14.5 | 10.9 | 8.1 | 7.9 | 6.5 | | | | |
| Haiti | 62.7 | 62.4 | 51.4 | 55.8 | 49.8 | 23.7 | 24.0 | 13.9 | 18.9 | 11.6 | 14.4 | 12.4 | 10.5 | 9.1 | 7.6 | 33.6 | 32.9 | 25.3 | 27.9 | 23.0 | | | | |
| Honduras | 22.0 | 19.2 | 17.2 | 15.2 | 8.7 | 15.8 | 17.7 | 12.5 | 8.6 | 7.1 | 5.9 | 4.7 | 3.8 | 3.1 | 2.3 | 14.6 | 13.9 | 11.2 | 9.0 | 6.0 | | | | |
| India | 25.5 | 24.9 | 21.1 | 21.5 | 17.0 | 55.5 | 44.8 | 46.3 | 43.5 | 30.7 | 12.6 | 10.9 | 9.2 | 7.5 | 5.6 | 31.2 | 26.9 | 25.5 | 24.2 | 17.8 | | | | |
| Indonesia | 22.2 | 16.4 | 19.9 | 17.1 | 9.1 | 31.0 | 30.3 | 23.3 | 24.4 | 18.6 | 8.4 | 6.7 | 5.2 | 4.2 | 3.1 | 20.5 | 17.8 | 16.1 | 15.2 | 10.3 | | | | |
| Iran, Islamic Rep. | 3.4 * | 3.5 * | 4.3 * | 5.7 | 4.5 * | 16.5 * | 13.8 | 9.5 | 4.6 | 4.1 | 5.6 | 4.5 | 3.5 | 2.6 | 1.8 | 8.5 | 7.3 | 5.8 | <5 | <5 | | | | |
| Iraq | 10.0 | 19.8 | 20.9 | 23.2 | 26.2 | 10.4 | 10.9 * | 12.9 | 7.6 | 8.5 | 5.3 | 4.9 | 4.5 | 4.1 | 3.4 | 8.6 | 11.9 | 12.8 | 11.6 | 12.7 | | | | |
| Jamaica | 10.1 | 8.1 | 7.4 | 7.0 | 8.6 | 5.2 | 4.0 | 3.8 | 3.4 | 3.2 | 3.0 | 2.6 | 2.3 | 2.1 | 1.7 | 6.1 | <5 | <5 | <5 | <5 | | | | |
| Jordan | 6.1 | 9.5 | 7.9 | 2.9 * | 3.1 * | 4.8 | 3.8 | 3.6 | 3.0 * | 3.0 | 3.7 | 3.2 | 2.8 | 2.4 | 1.9 | <5 | 5.5 | <5 | <5 | <5 | | | | |
| Kazakhstan | - | 0.8 * | 15.3 | 1.1 * | 0.4 * | - | 4.4 | 3.8 | 4.9 | 3.7 | - | 5.4 | 4.4 | 3.3 | 1.9 | - | <5 | 7.8 | <5 | <5 | | | | |
| Kenya | 34.8 | 32.1 | 32.2 | 30.5 | 25.8 | 19.9 * | 19.8 | 17.5 | 18.4 | 16.4 | 9.8 | 11.1 | 11.0 | 9.7 | 7.3 | 21.5 | 21.0 | 20.2 | 19.5 | 16.5 | | | | |
| Kuwait | 39.3 | 5.3 | 1.6 * | 0.9 * | 1.5 * | 5.9 * | 9.2 | 2.2 | 2.7 | 2.2 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 15.6 | 5.3 | <5 | <5 | <5 | | | | |
| Kyrgyz Republic | - | 16.6 | 16.8 | 9.6 | 5.9 | - | 10.4 | 5.2 * | 2.7 | 3.7 | - | 6.6 | 5.0 | 4.0 | 2.7 | - | 11.2 | 9.0 | 5.4 | <5 | | | | |
| Lao PDR | 44.7 | 44.0 | 39.8 | 33.5 | 26.7 | 42.4 * | 35.9 | 36.4 | 31.6 | 26.5 | 16.3 | 14.2 | 12.0 | 9.8 | 7.2 | 34.5 | 31.4 | 29.4 | 25.0 | 20.1 | | | | |
| Latvia | - | 2.0 * | 5.6 * | 3.3 * | 4.3 * | - | 0.9 * | 1.2 * | 0.9 * | 0.7 * | - | 2.3 | 1.7 | 1.3 | 0.9 | - | <5 | <5 | <5 | <5 | | | | |
| Lebanon | 3.4 * | 4.0 * | 3.5 * | 3.3 * | 2.9 * | 5.2 * | 3.5 | 3.6 * | 4.2 | 3.2 * | 3.3 | 2.6 | 2.0 | 1.4 | 0.9 | <5 | <5 | <5 | <5 | <5 | | | | |
| Lesotho | 17.0 | 18.1 | 17.5 | 16.2 | 15.7 | 13.8 | 18.9 | 15.0 | 16.6 | 13.5 | 8.5 | 9.2 | 11.4 | 12.3 | 10.0 | 13.1 | 15.4 | 14.6 | 15.0 | 13.1 | | | | |
| Liberia | 29.6 | 42.2 | 34.8 | 29.8 | 28.6 | 19.0 * | 21.6 * | 22.8 | 20.4 | 14.3 | 24.8 | 23.0 | 17. | | | | | | | | | | | |

DATA UNDERLYING THE CALCULATION OF THE 1990, 1995, 2000, 2005, AND 2014 GLOBAL HUNGER INDEX SCORES

| Country | Proportion of undernourished in the population (%) | | | | | Prevalence of underweight in children under five years (%) | | | | | Under-five mortality rate (%) | | | | | GHI | | | | | | | | |
|----------------------|--|---------|---------|---------|---------|--|---------|---------|---------|---------|-------------------------------|------|------|------|---------|----------------|---------|---------|---------|------|--|--|--|--|
| | '90-'92 | '94-'96 | '99-'01 | '04-'06 | '11-'13 | '88-'92 | '93-'97 | '98-'02 | '03-'07 | '09-'13 | 1990 | 1995 | 2000 | 2005 | 2012 | 1990 | 1995 | 2000 | 2005 | 2014 | | | | |
| | | | | | | | | | | | | | | | | with data from | | | | | | | | |
| | | | | | | | | | | | | | | | '88-'92 | '93-'97 | '98-'02 | '03-'07 | '09-'13 | | | | | |
| Libya | 1.0 * | 1.2 * | 1.6 * | 1.5 * | 1.4 * | 7.3 * | 4.3 | 4.7 * | 5.6 | 4.9 * | 4.3 | 3.4 | 2.8 | 2.3 | 1.5 | <5 | <5 | <5 | <5 | <5 | | | | |
| Lithuania | - | 4.0 * | 2.3 * | 1.5 * | 1.2 * | - | 1.4 * | 0.9 * | 0.7 * | 0.6 * | - | 1.7 | 1.2 | 1.0 | 0.5 | - | <5 | <5 | <5 | <5 | | | | |
| Macedonia, FYR | - | 12.3 * | 6.8 * | 4.5 * | 4.4 * | - | 2.1 * | 1.9 | 1.8 | 1.3 | - | 2.5 | 1.6 | 1.4 | 0.7 | - | 5.6 | <5 | <5 | <5 | | | | |
| Madagascar | 24.4 | 30.7 | 32.4 | 30.6 | 27.2 | 35.5 | 30.4 | 38.9 * | 36.8 | 32.8 * | 15.9 | 13.7 | 10.9 | 8.1 | 5.8 | 25.3 | 24.9 | 27.4 | 25.2 | 21.9 | | | | |
| Malawi | 45.2 | 38.7 | 26.7 | 26.4 | 20.0 | 24.4 | 26.5 | 21.5 | 18.4 | 13.8 | 24.4 | 21.3 | 17.4 | 12.0 | 7.1 | 31.3 | 28.8 | 21.9 | 18.9 | 13.6 | | | | |
| Malaysia | 4.5 * | 2.1 * | 2.9 * | 3.5 * | 3.6 * | 22.1 | 17.7 | 16.7 | 12.9 | 11.8 * | 1.7 | 1.3 | 1.0 | 0.8 | 0.9 | 9.4 | 7.0 | 6.9 | 5.7 | 5.4 | | | | |
| Mali | 24.9 | 26.7 | 22.3 | 16.8 | 7.3 | 31.3 * | 30.8 | 30.1 | 27.9 | 18.9 | 25.3 | 24.0 | 22.0 | 17.3 | 12.8 | 27.2 | 27.2 | 24.8 | 20.7 | 13.0 | | | | |
| Mauritania | 12.9 | 11.6 | 9.7 | 9.8 | 7.8 | 43.3 | 32.7 * | 30.4 | 23.2 | 19.5 | 12.8 | 11.9 | 11.1 | 10.2 | 8.4 | 23.0 | 18.7 | 17.1 | 14.4 | 11.9 | | | | |
| Mauritius | 8.6 | 7.5 | 6.7 | 5.9 | 5.4 | 13.9 * | 13.0 | 11.5 * | 10.4 * | 8.2 * | 2.3 | 2.2 | 1.9 | 1.6 | 1.5 | 8.3 | 7.6 | 6.7 | 6.0 | 5.0 | | | | |
| Mexico | 3.2 * | 3.1 * | 3.0 * | 0.1 * | 0.7 * | 9.6 | 10.3 | 6.0 | 3.4 | 2.8 | 4.6 | 3.5 | 2.5 | 2.0 | 1.6 | 5.8 | 5.6 | <5 | <5 | <5 | | | | |
| Moldova | - | 15.4 * | 19.8 * | 16.6 * | 28.2 * | - | 4.6 * | 4.1 * | 3.2 | 2.3 * | - | 3.6 | 3.0 | 2.3 | 1.8 | - | 7.9 | 9.0 | 7.4 | 10.8 | | | | |
| Mongolia | 38.4 | 48.5 | 37.5 | 32.6 | 21.2 | 11.8 | 12.3 * | 11.6 | 5.3 | 4.7 | 10.7 | 8.5 | 6.3 | 4.3 | 2.8 | 20.3 | 23.1 | 18.5 | 14.1 | 9.6 | | | | |
| Montenegro | - | - | - | - | 2.3 * | - | - | - | 2.2 | 0.7 * | - | - | - | - | 0.6 | - | - | - | - | <5 | | | | |
| Morocco | 6.7 | 7.2 | 6.6 | 5.3 | 5.0 | 8.1 | 7.7 | 6.8 * | 9.9 | 3.1 | 8.0 | 6.3 | 5.0 | 4.1 | 3.1 | 7.6 | 7.1 | 6.1 | 6.4 | <5 | | | | |
| Mozambique | 57.8 | 52.1 | 45.1 | 39.9 | 36.8 | 24.4 * | 23.9 | 23.0 | 21.2 | 15.6 | 23.3 | 20.8 | 16.6 | 13.2 | 9.0 | 35.2 | 32.3 | 28.2 | 24.8 | 20.5 | | | | |
| Myanmar | - | - | - | - | - | 32.5 | 38.7 | 30.1 | 29.6 | 22.6 | 10.6 | 9.2 | 7.9 | 6.7 | 5.2 | - | - | - | - | - | | | | |
| Namibia | 36.2 | 39.0 | 27.7 | 25.2 | 29.3 | 21.5 | 20.1 * | 20.3 | 17.5 | 17.5 * | 7.3 | 6.9 | 7.3 | 6.7 | 3.9 | 21.7 | 22.0 | 18.4 | 16.5 | 16.9 | | | | |
| Nepal | 25.4 | 26.8 | 24.3 | 21.8 | 16.0 | 45.6 * | 42.6 | 43.0 | 38.8 | 29.1 | 14.2 | 10.9 | 8.2 | 6.1 | 4.2 | 28.4 | 26.8 | 25.2 | 22.2 | 16.4 | | | | |
| Nicaragua | 55.1 | 44.2 | 34.3 | 26.8 | 21.7 | 10.4 * | 9.6 | 7.8 | 4.3 | 4.8 * | 6.6 | 5.2 | 4.0 | 3.2 | 2.4 | 24.0 | 19.7 | 15.4 | 11.4 | 9.6 | | | | |
| Niger | 35.5 | 40.5 | 27.4 | 22.0 | 13.9 | 41.0 | 40.0 * | 43.6 | 39.9 | 37.9 | 32.6 | 27.9 | 22.7 | 17.4 | 11.4 | 36.4 | 36.1 | 31.2 | 26.4 | 21.1 | | | | |
| Nigeria | 21.3 | 12.9 | 10.2 | 7.8 | 7.3 | 35.1 | 35.1 | 24.7 | 26.5 | 24.4 | 21.3 | 20.9 | 18.8 | 15.8 | 12.4 | 25.9 | 23.0 | 17.9 | 16.7 | 14.7 | | | | |
| North Korea | 23.7 | 34.1 | 37.8 | 34.0 | 31.0 | 25.5 * | 25.8 * | 24.7 | 20.6 | 15.2 | 4.4 | 7.3 | 6.0 | 3.3 | 2.9 | 17.9 | 22.4 | 22.8 | 19.3 | 16.4 | | | | |
| Oman | - | - | - | - | - | 18.6 | 10.4 | 11.3 | 10.4 * | 8.6 | 3.9 | 2.5 | 1.7 | 1.3 | 1.2 | - | - | - | - | - | | | | |
| Pakistan | 27.2 | 23.2 | 23.8 | 22.2 | 17.2 | 39.0 | 34.2 | 31.3 | 30.8 * | 31.6 | 13.8 | 12.6 | 11.2 | 10.1 | 8.6 | 26.7 | 23.3 | 22.1 | 21.0 | 19.1 | | | | |
| Panama | 23.3 | 22.8 | 27.5 | 21.0 | 8.7 | 8.2 * | 6.3 | 5.4 * | 5.1 | 3.3 * | 3.2 | 2.9 | 2.6 | 2.3 | 1.9 | 11.6 | 10.7 | 11.8 | 9.5 | <5 | | | | |
| Papua New Guinea | - | - | - | - | - | 24.2 * | 19.8 * | 17.8 * | 18.0 | 27.2 | 8.9 | 8.3 | 7.9 | 7.5 | 6.3 | - | - | - | - | - | | | | |
| Paraguay | 20.2 | 15.1 | 13.0 | 12.6 | 22.3 | 2.8 | 3.2 * | 4.0 * | 3.4 | 2.0 * | 4.6 | 3.8 | 3.3 | 2.8 | 2.2 | 9.2 | 7.4 | 6.8 | 6.3 | 8.8 | | | | |
| Peru | 31.6 | 25.8 | 22.5 | 21.9 | 11.8 | 8.8 | 5.7 | 5.2 | 5.4 | 3.4 | 7.9 | 5.8 | 4.0 | 2.8 | 1.8 | 16.1 | 12.4 | 10.6 | 10.0 | 5.7 | | | | |
| Philippines | 24.5 | 21.7 | 21.3 | 19.7 | 16.2 | 29.9 | 26.3 | 28.3 | 20.7 | 20.2 | 5.9 | 4.6 | 4.0 | 3.6 | 3.0 | 20.1 | 17.5 | 17.9 | 14.7 | 13.1 | | | | |
| Qatar | - | - | - | - | - | - | 4.8 | 0.8 * | 0.6 * | 0.3 * | 2.1 | 1.5 | 1.2 | 1.0 | 0.7 | - | - | - | - | - | | | | |
| Romania | 2.2 * | 2.1 * | 1.3 * | 0.4 * | 0.4 * | 5.0 | 3.8 * | 3.7 | 3.3 * | 2.6 * | 3.8 | 3.3 | 2.7 | 2.1 | 1.2 | <5 | <5 | <5 | <5 | <5 | | | | |
| Russian Federation | - | 5.0 * | 4.7 * | 2.0 * | 1.8 * | - | 2.6 | 2.2 * | 0.7 * | 0.6 * | - | 2.6 | 2.3 | 1.7 | 1.0 | - | <5 | <5 | <5 | <5 | | | | |
| Rwanda | 52.3 | 57.3 | 53.4 | 43.5 | 29.7 | 24.3 | 22.6 | 20.3 | 18.0 | 11.7 | 15.1 | 25.3 | 18.2 | 10.7 | 5.5 | 30.6 | 35.1 | 30.6 | 24.1 | 15.6 | | | | |
| Saudi Arabia | 2.9 * | 3.4 * | 1.3 * | 2.0 * | 1.6 * | 12.3 * | 12.9 | 7.6 * | 5.3 | 4.9 * | 4.7 | 3.1 | 2.2 | 1.5 | 0.9 | 6.6 | 6.5 | <5 | <5 | <5 | | | | |
| Senegal | 22.0 | 24.8 | 24.4 | 18.4 | 21.6 | 20.4 | 19.6 | 20.3 | 14.5 | 15.7 | 14.2 | 14.5 | 13.9 | 9.9 | 6.0 | 18.9 | 19.6 | 19.5 | 14.3 | 14.4 | | | | |
| Serbia | - | - | - | - | 4.1 * | - | - | - | 1.8 | 1.6 | - | - | - | - | 0.7 | - | - | - | - | <5 | | | | |
| Sierra Leone | 42.5 | 37.1 | 41.3 | 37.3 | 29.4 | 25.4 | 25.2 * | 24.7 | 28.3 | 19.9 | 25.7 | 24.8 | 23.4 | 21.6 | 18.2 | 31.2 | 29.0 | 29.8 | 29.1 | 22.5 | | | | |
| Slovak Republic | - | 3.5 * | 5.3 * | 5.4 * | 4.6 * | - | 4.3 * | 3.7 * | 3.3 * | 2.4 * | - | 1.4 | 1.2 | 1.0 | 0.8 | - | <5 | <5 | <5 | <5 | | | | |
| Somalia | - | - | - | - | - | - | - | 22.8 | 32.8 | - | 17.7 | 17.1 | 17.1 | 17.1 | 14.7 | - | - | - | - | - | | | | |
| South Africa | 5.3 * | 5.2 | 4.9 * | 3.9 * | 2.1 * | 11.0 * | 8.0 | 9.8 | 11.6 | 7.9 * | 6.1 | 6.0 | 7.4 | 7.9 | 4.5 | 7.5 | 6.4 | 7.4 | 7.8 | <5 | | | | |
| Sri Lanka | 33.4 | 30.2 | 28.3 | 28.0 | 22.8 | 31.0 * | 28.3 | 22.8 | 21.1 | 21.6 | 2.1 | 2.1 | 1.7 | 1.3 | 1.0 | 22.2 | 20.2 | 17.6 | 16.8 | 15.1 | | | | |
| Sudan/South Sudan** | 41.9 | 32.1 | 29.5 | 30.6 | 38.9 | 34.5 * | 31.8 | 38.4 | 31.7 | 31.2 | 15.7 | 13.8 | 12.1 | 10.1 | 8.0 | 30.7 | 25.9 | 26.7 | 24.1 | 26.0 | | | | |
| Suriname | 17.5 | 16.0 | 18.1 | 16.8 | 10.2 | 11.4 * | 10.1 * | 11.4 | 7.5 | 5.8 | 5.1 | 4.1 | 3.3 | 2.6 | 2.1 | 11.3 | 10.1 | 10.9 | 9.0 | 6.0 | | | | |
| Swaziland | 15.8 | 20.6 | 19.2 | 16.7 | 35.8 | 6.8 * | 7.5 * | 9.1 | 6.1 | 5.8 | 7.1 | 8.8 | 12.1 | 12.7 | 8.0 | 9.9 | 12.3 | 13.5 | 11.8 | 16.5 | | | | |
| Syrian Arab Republic | 4.8 * | 4.1 * | 3.6 * | 3.3 * | 6.0 | 14.7 * | 11.3 | 6.0 | 10.0 | 10.1 | 3.8 | 3.0 | 2.4 | 1.9 | 1.5 | 7.8 | 6.1 | <5 | 5.1 | 5.9 | | | | |
| Tajikistan | - | 36.0 | 40.9 | 34.0 | 30.2 | - | 17.1 * | 16.8 * | 14.9 | 13.3 | - | 11.5 | 9.1 | 7.4 | 5.8 | - | 21.5 | 22.3 | 18.8 | 16.4 | | | | |
| Tanzania | 28.8 | 37.4 | 40.5 | 36.7 | 33.0 | 25.1 | 26.9 | 25.3 | 16.7 | 13.6 | 16.6 | 16.0 | 13.2 | 9.0 | 5.4 | 23.5 | 26.8 | 26.3 | 20.8 | 17.3 | | | | |
| Thailand | 43.3 | 33.7 | 20.0 | 11.4 | 5.8 | 16.7 * | 15.4 | 8.4 * | 7.0 | 8.0 * | 3.8 | 2.9 | 2.3 | 1.8 | 1.3 | 21.3 | 17.3 | 10.2 | 6.7 | 5.0 | | | | |
| Timor-Leste | - | - | - | 27.6 | 38.3 | - | - | 40.6 | 41.5 | 45.3 | - | - | - | 8.0 | 5.7 | - | - | - | 25.7 | 29.8 | | | | |
| Togo | 34.8 | 28.1 | 26.4 | 20.5 | 15.5 | 21.7 | 16.7 | 23.8 | 22.3 | 16.5 | 14.3 | 13.3 | 12.2 | 11.2 | 9.6 | 23.6 | 19.4 | 20.8 | 18.0 | 13.9 | | | | |
| Trinidad & Tobago | 12.4 | 15.5 | 13.3 | 14.1 | 7.6 | 4.4 * | 4.4 * | 4.4 | 3.4 * | 2.4 * | 3.3 | 3.0 | 2.8 | 2.5 | 2.1 | 6.7 | 7.6 | 6.8 | 6.7 | <5 | | | | |
| Tunisia | 1.0 * | 1.0 * | 0.7 * | 0.9 * | 0.9 * | 7.9 | 8.1 | 3.5 | 3.3 | 2.0 | 5.1 | 3.9 | 3.0 | 2.3 | 1.6 | <5 | <5 | <5 | <5 | <5 | | | | |
| Turkey | 0.5 * | 0.6 * | 0.9 * | 1.0 * | 0.6 * | 6.7 * | 9.0 | 7.0 | 3.5 | 2.6 * | 7.4 | 5.4 | 3.7 | 2.4 | 1.4 | <5 | 5.0 | <5 | <5 | <5 | | | | |
| Turkmenistan | - | 10.4 | 9.0 | 5.9 | 2.5 * | - | 12.1 * | 10.5 | 8.0 | 5.8 * | - | 8.9 | 7.9 | 6.7 | 5.3 | - | 10.5 | 9.1 | 6.9 | <5 | | | | |
| Uganda | 27.1 | 30.9 | 26.9 | 27.8 | 30.1 | 19.7 | 20.8 | 19.0 | 16.4 | 14.1 | 17.8 | 16.5 | 14.7 | 10.9 | 6.9 | 21.5 | 22.7 | 20.2 | 18.4 | 17.0 | | | | |
| Ukraine | - | 3.9 * | 4.1 * | 1.3 * | 0.8 * | - | 2.2 * | 4.1 | 0.7 * | 1.1 * | - | 2.1 | 1.9 | 1.5 | 1.1 | - | <5 | <5 | <5 | <5 | | | | |
| Uruguay | 7.6 | 5.2 | 4.2 * | 4.6 * | 6.2 | 5.2 * | 3.9 | 4.7 | 6.0 | 4.0 | 2.3 | 2.1 | 1.6 | 1.6 | 0.7 | 5.0 | <5 | <5 | <5 | <5 | | | | |
| Uzbekistan | - | 2.8 * | 13.5 | 11.2 | 5.7 | - | 13.3 | 7.1 | 4.4 | 4.2 * | - | 6.9 | 6.1 | 5.1 | 4.0 | - | 7.7 | 8.9 | 6.9 | <5 | | | | |
| Venezuela, RB | 12.8 | 15.1 | 14.5 | 11.4 | 2.1 * | 6.7 | 4.1 | 3.9 | 4.1 | 2.9 | 3.0 | 2.6 | 2.1 | 1.8 | 1.5 | 7.5 | 7.3 | 6.8 | 5.8 | <5 | | | | |
| Vietnam | 48.3 | 31.5 | 19.9 | 14.1 | 8.3 | 40.7 | 40.6 | 28.9 | 22.7 | 12.0 | 5.1 | 4.0 | 3.2 | 2.6 | 2.3 | 31.4 | 25.4 | 17.3 | 13.1 | 7.5 | | | | |
| Yemen, Rep. | 29.2 | 31.3 | 31.2 | 33.2 | 28.8 | 48.5 * | 40.9 | 42.5 * | 43.1 | 35.5 | 12.5 | 11.2 | 9.7 | 7.8 | 6.0 | 30.1 | 27.8 | 27.8 | 28.0 | 23.4 | | | | |
| Zambia | 33.8 | 33.7 | 43.0 | 46.6 | 43.1 | 21.2 | 19.6 | 19.6 | 14.9 | 17.7 * | 19.2 | 18.8 | 16.9 | 12.7 | 8.9 | 24.7 | 24.0 | 26.5 | 24.7 | 23.2 | | | | |
| Zimbabwe | 43.6 | 46.4 | 44.4 | 40.2 | 30.5 | 8.0 | 11.8 | 11.5 | 14.0 | 10.1 | 7.4 | 9.4 | 10.2 | 9.7 | 9.0 | 19.7 | 22.5 | 22.0 | 21.3 | 16.5 | | | | |

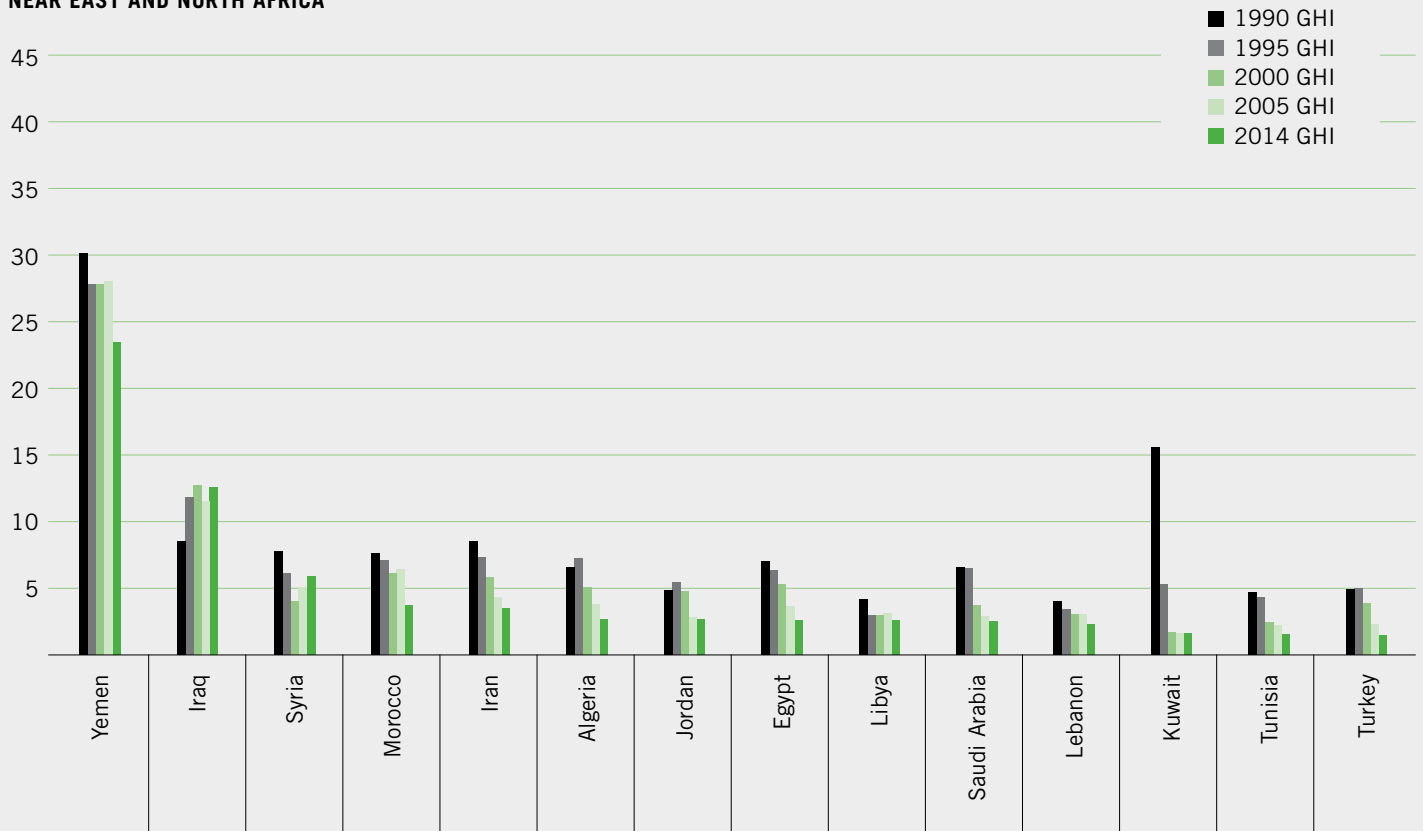
- = Data not available or not presented. Some countries, such as the post-Soviet states prior to 1991, did not exist in their present borders in the given year or reference period.

* IFPRI estimates

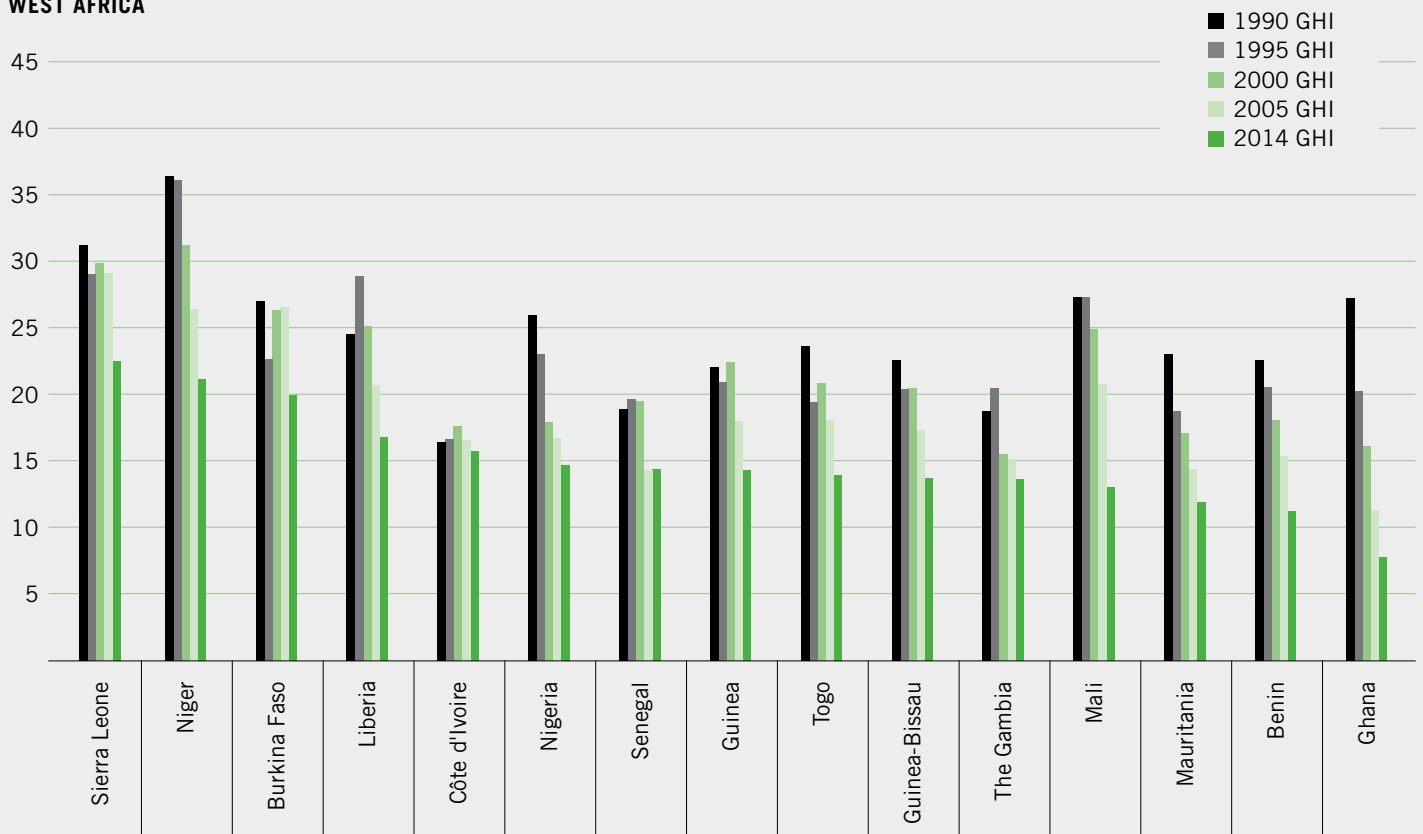
** GHI scores could only be calculated for former Sudan as one entity, because separate under-nourishment estimates for 2011–2013 and earlier were not available for South Sudan, which became independent in 2011, and present-day Sudan.

COUNTRY TRENDS FOR THE 1990, 1995, 2000, 2005, AND 2014 GLOBAL HUNGER INDEX SCORES

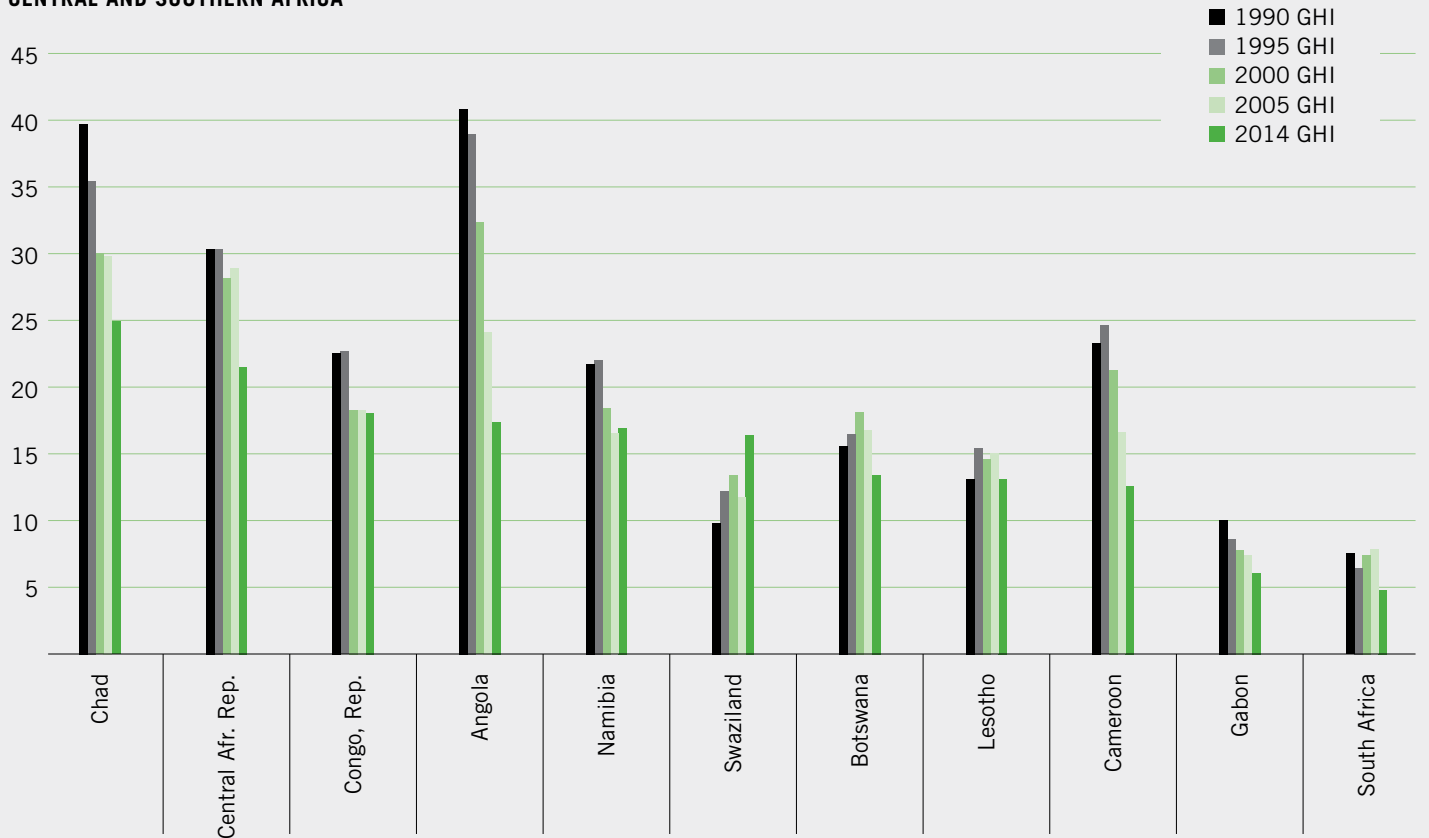
NEAR EAST AND NORTH AFRICA



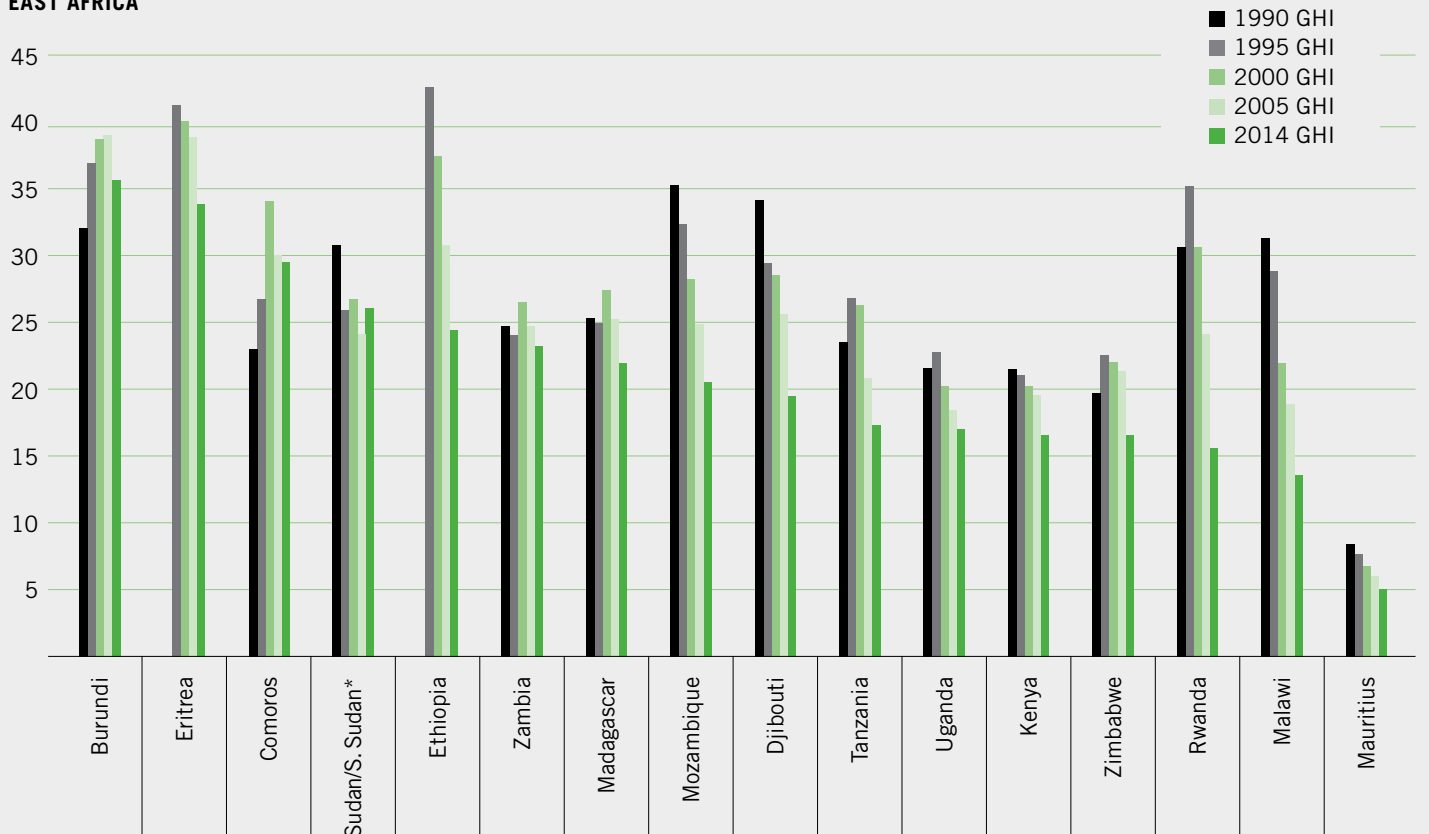
WEST AFRICA



CENTRAL AND SOUTHERN AFRICA

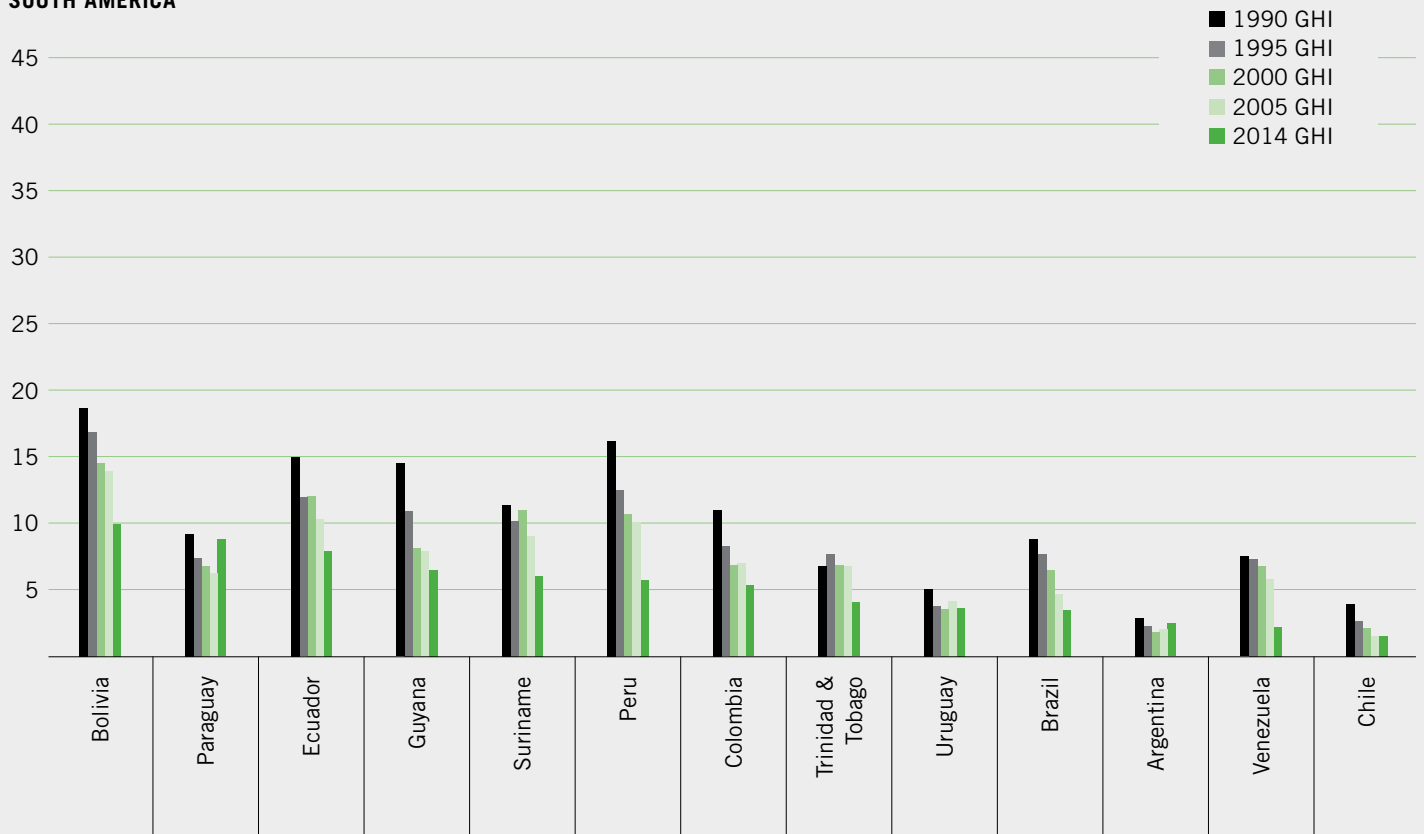


EAST AFRICA

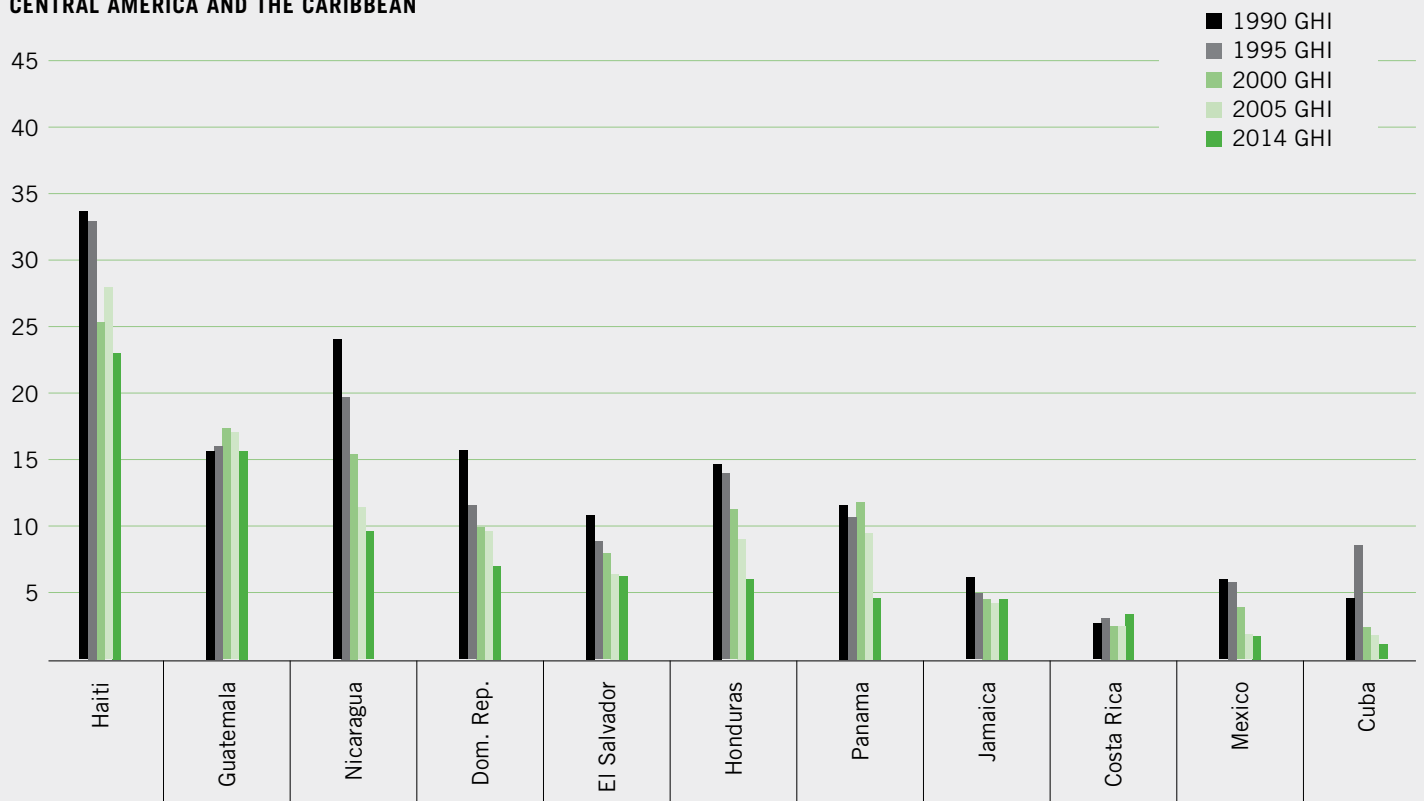


* GHI scores could only be calculated for former Sudan as one entity, because separate undernourishment estimates for 2011–2013 and earlier were not available for South Sudan, which became independent in 2011, and present-day Sudan.

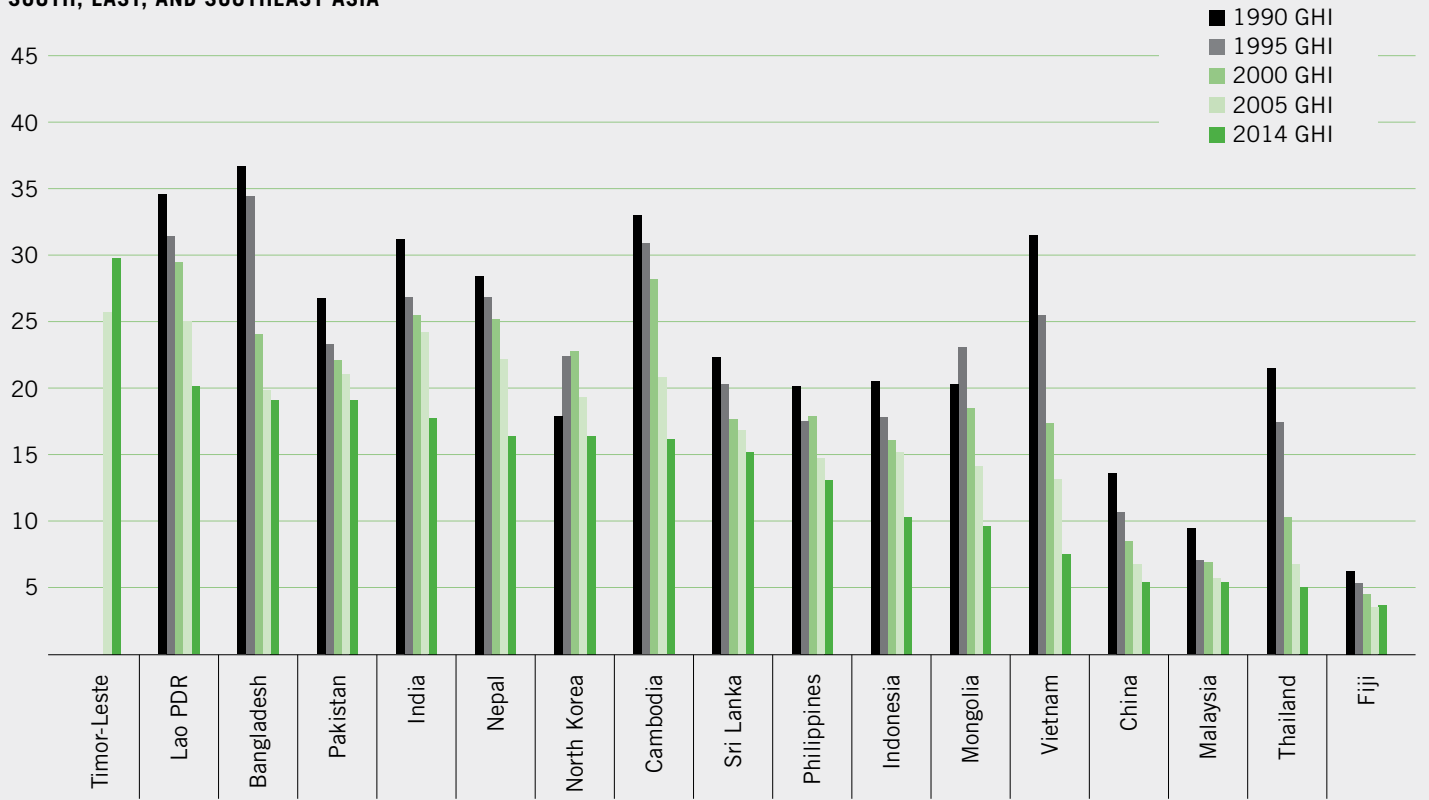
SOUTH AMERICA



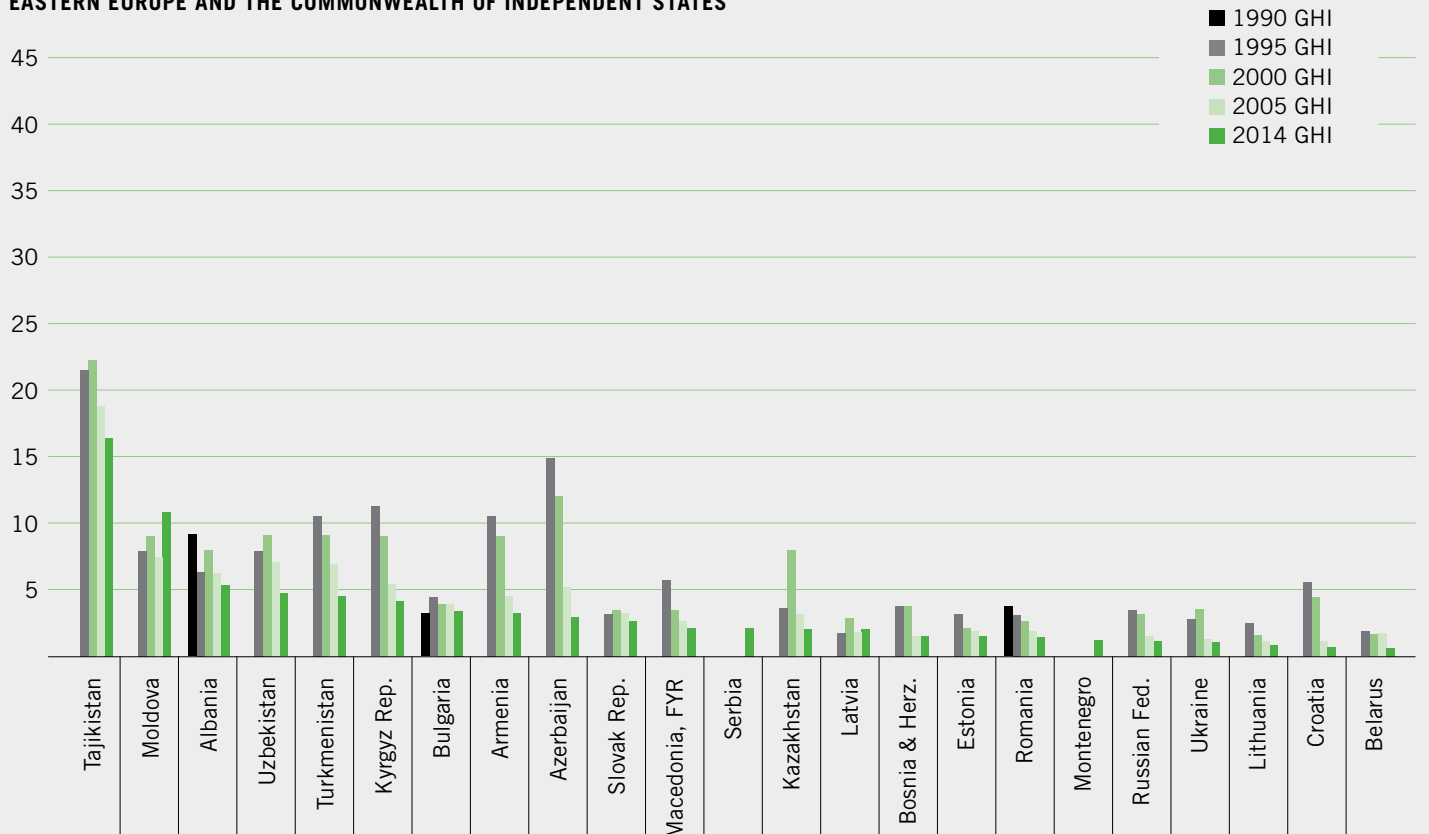
CENTRAL AMERICA AND THE CARIBBEAN



SOUTH, EAST, AND SOUTHEAST ASIA



EASTERN EUROPE AND THE COMMONWEALTH OF INDEPENDENT STATES



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PARTNERS



About IFPRI

The International Food Policy Research Institute (IFPRI), established in 1975, provides research-based policy solutions to sustainably reduce poverty and end hunger

and malnutrition. The Institute conducts research, communicates results, optimizes partnerships, and builds capacity to ensure sustainable food production, promote healthy food systems, improve markets and trade, transform agriculture, build resilience, and strengthen institutions and governance. Gender is considered in all of the Institute's work. IFPRI collaborates with partners around the world, including development implementers, public institutions, the private sector, and farmers' organizations.



Our identity – who we are

Founded in Ireland in 1968, Concern Worldwide is a non-governmental, international, humanitarian organization, dedicated to the reduction of suffering and working toward the ultimate

elimination of extreme poverty. We work in 27 of the world's poorest countries, with offices in London, New York, Belfast and Dublin and more than 2,900 committed and talented staff.

Our mission – what we do

Our mission is to help people living in extreme poverty achieve major improvements in their lives which last and spread without ongoing support from Concern Worldwide. To this end, Concern Worldwide will work with the poor themselves, and with local and international partners who share our vision, to create just and peaceful societies where the poor can exercise their fundamental rights. To achieve this mission we engage in long-term development work, respond to emergency situations, and seek to address the root causes of poverty through our development education and advocacy work.

Our vision – for change

A world where no one lives in poverty, fear or oppression; where all have access to a decent standard of living and the opportunities and choices essential to a long, healthy and creative life; a world where everyone is treated with dignity and respect.



Who we are

Welthungerhilfe is one of the largest nongovernmental aid agencies in Germany. It was founded in 1962 under the umbrella of the United Nations Food and Agricultural Organization (FAO). At that time, it was the German section of the "Freedom from Hunger Campaign," one of the first global initiatives for the fight against hunger.

What we do

We fight against hunger and poverty. Our goal is to make ourselves redundant. We provide integrated aid: from rapid disaster aid to long-term development cooperation projects. We supported people in 40 countries through 355 overseas projects in 2013.

How we work

Help to self-help is our basic principle; it allows us to strengthen structures from the bottom up together with local partner organizations, and ensures the long-term success of project work. In addition, we inform the public and take an advisory role with regard to national and international policy. This is how we fight to change the conditions that lead to hunger and poverty.

Our vision

A world in which all people can exercise their right to lead a self-determined life in dignity and justice, free from hunger and poverty.

9 YEARS OF TRACKING WORLD HUNGER

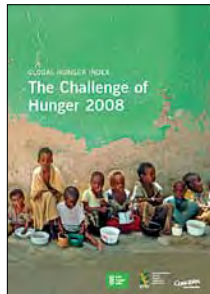
Since 2006, the Global Hunger Index has been reporting on the state of hunger globally, by region, and by country.



Case Studies in the Post-conflict Countries of Afghanistan and Sierra Leone



Measures Being Taken to Reduce Acute Undernourishment and Chronic Hunger



The Vicious Circle of Hunger and Poverty



Financial Crisis and Gender Inequality



The Crisis of Child Undernutrition



Taming Price Spikes and Excessive Food Price Volatility



Ensuring Sustainable Food Security Under Land, Water, and Energy Stresses



Building Resilience to Achieve Food and Nutrition Security



The Challenge of Hidden Hunger

For more information about the 2014 GHI, visit www.ifpri.org/ghi/2014

GHI resources for researchers and developers include:

- Interactive maps
- Dataverse data files
- Global Hunger Index Linked Open Data (LOD) available in both Resource Description Format (RDF) and Web Ontology Language (OWL) for reuse in new applications and analyses.
- Global Hunger Index SPARQL Endpoint

Global Hunger Index for Mobile Devices

You can download the report from Google Books, Google Play, Amazon, and iTunes.

IMPRINT

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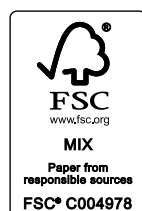
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Cover photography: Mikkel Ostergaard/Panos, Bharuamonda Village, Orissa, India, Sanamati Gauda, 28, is cooking at her home, 2006; page 2: Gareth Bentley/Concern, Zambia, Queen, 36, works in her vegetable garden. She has received tools, seeds, livestock and training from Concern's RAIN program, 2014; page 6: Neil Palmer/CIAT, Kampala, Uganda, iron-biofortified beans at a market, 2009; page 10: Tiago Miranda/laiif, Marandallah, Ivory Coast, Timite Nani grills river fish which she will later sell to working men for lunch, 2013; page 20: Florian Kopp/Welthungerhilfe, Cañadón Peñas, Bolivia, Epifania Ayala's family makes a living with homemade dairy products sold in the regional capital Oruro. Welthungerhilfe offers training and infrastructure for the commercial production of cheese and yogurt, 2010; page 28: Roland Brockmann/Welthungerhilfe, Adivasi indigenous people, Orissa, India, Living Farms organized a food fair to demonstrate the variety of wild forest foods available to enhance dietary diversity, 2014; page 31: Jennifer Nolan/Concern, Mumbwa District, Central Province, Zambia, Esnart Shibleleki, 45, single mother of five. She joined the RAIN project in 2011 after being selected by the community members. She had one malnourished child, 2014; page 33: Roland Brockmann/Welthungerhilfe, Katalipadar Village, Orissa, India, Minati Tuika, 25, Adivasi farmer collecting wild foods, 2014; page 35: Miriam Bingemann/Welthungerhilfe, Romas Phas, 30, Dal Veal Leng, Ratanakiri Village, Cambodia, a mother of four children, who learned more about diversifying diets in a nutrition training program; page 36: Andreas Herzau/Welthungerhilfe, Jacmel, Haiti, selling mangos at the market, 2010.

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To learn more, visit the
2014 GHI website at
www.ifpri.org/ghi/2014



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Civil Society
Participant



MILANO 2015
FEEDING THE PLANET
ENERGY FOR LIFE

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