



Ending hunger – How UNIDO can contribute?



Introduction

Two goals are of paramount importance of the Sustainable Development Goals (SDGs) of the United Nations, namely no poverty (SDG 1) and zero hunger (SDG 2). In response, at the G7 Summit in Elmau in 2015, world leaders committed to lifting 500 million people out of hunger and malnutrition by 2030. This is part of a broader effort, together with partner countries, to support the 2030 Agenda for Sustainable Development.

However, according to the Food and Agriculture Organization (FAO), the number of undernourished people in the world has continued to rise since then, from 589 million people in 2015 to 735 million last year, underscoring the scale of the challenge. And while the number of people facing hunger in 2022 fell slightly by around four million compared to 2021, the figure is still 12 per cent higher than in 2015, as the world's population grows to more than eight billion people. The majority of undernourished people, 401 million, live in Asia, which corresponds to about 8.5 per cent of the total population on the continent. The number of undernourished people has fallen slightly since last year. At the same time, it is growing rapidly in Africa, which is home to nearly 282 million of the world's undernourished – four per cent more than in 2021. This represents almost 20 per cent of the continent's total population, and more than 22 per cent of the population of sub-Saharan Africa.

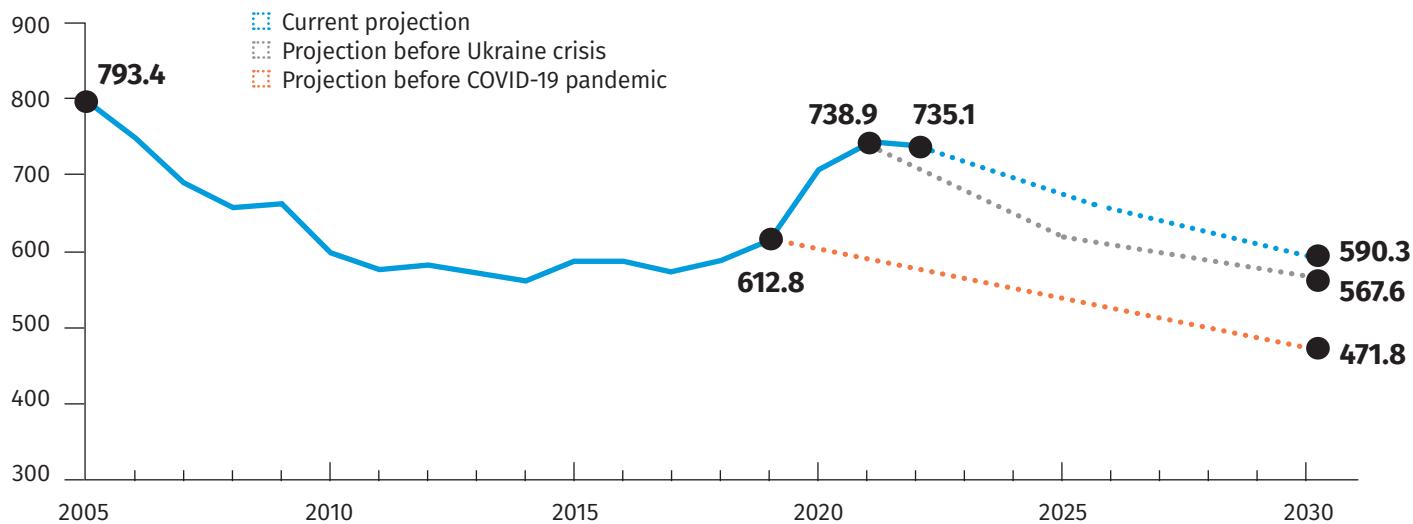
According to the latest FAO projections, 590 million people will still be undernourished in 2030. Current overarching geopolitical and economic trends play an important role: Without the war in Ukraine, figure is estimated to be just under 568 million. Before the COVID-19 pandemic, projections put the number of undernourished people at 472 million in 2030. Today's continued high prices could further exacerbate the problem. This means that the global community will be very slow to achieve its goal of ending hunger by 2030.

While the number of hungry people in Asia is projected to decrease to 242 million by 2030, the number of hungry people in Africa is projected to increase to 298 million by 2030. The countries of Africa therefore deserve special attention, especially the situation in sub-Saharan Africa.

All scientific scenarios also show that the goal of eradicating hunger and malnutrition by 2030 will be very difficult to achieve without determined efforts to combat climate change and to mitigate the negative effects of climate change and economic inequality.

Figure 1: World hunger

Number of undernourished people in the world



Source: UN/FAO

The paper is based on the main findings of a study conducted by the Center for Development Research (ZEF) of the University of Bonn in cooperation with the Food and Agriculture Organization of the United Nations (FAO) in 2020: 'Investment Costs and Policy Action Opportunities for Reaching a World without Hunger (SDG 2). So far, this study has not received sufficient attention from policymakers and the media, partially because the COVID-19 pandemic has overshadowed everything else. This is all the more regrettable as the findings – developed on an empirical and model-theoretical basis – are ideally suited to revive the debate on the financial resources needed to fight global hunger. This paper reviews the findings of the ZEF/FAO study and examines their feasibility on the basis of the new projections.

In particular, it will show that the financial resources needed could be less than those assumed in the ZEF/FAO report. In 2020 the pessimistic projections – against the background of the COVID-19 pandemic and its as yet unforeseeable consequences – assumed that the number of people affected by hunger could rise to 909 million by the year 2030.

The study is therefore be structured as follows: It begins with a brief review of the achievements of the G7 countries in implementing the Elmau Commitment, which was reaffirmed at the recent G7 Summit in Hiroshima. This is followed by a discussion of the experiences of 19 countries with large numbers of undernourished people that have managed to significantly reduce the prevalence of undernourishment (PoU) between 2001 and 2018. This is followed by a discussion of the most effective policy and economic interventions to reduce hunger, using the marginal cost curve (MaCC) developed in the ZEF/FAO study. The results are compared with the Official Development Assistance (ODA) provided by the G7 countries to illustrate the increases needed to meet the Elmau and Hiroshima commitments. Finally, as a complement to the ZEF/FAO study, this paper presents the ways in which UN agencies (FAO, WFP, IFAD, UNIDO) interact to support the fight against hunger. The focus here is on the United Nations Industrial Development Organization (UNIDO), which has made the fight against hunger one of its strategic objectives.



G7 countries and Official Development Assistance (ODA)

Spending on food and investments in agriculture have increased significantly in order to meet the targets of SDG 2 by 2030. In 2018, G7 countries spent a total of US\$17 billion in ODA on food security and rural development. This is 109 per cent more than in 2000. Most of the ODA allocations are concentrated in countries with a high PoU, particularly in sub-Saharan Africa. A further breakdown of these ODA flows shows that, in addition to allocations for water and sanitation, food aid and environmental protection, a significant share of G7 ODA in target countries in 2018 went to agricultural development.

The study data shows that Germany was the country with the largest increase in contributions over this period, with Japan and France also significantly increasing their ODA allocations.

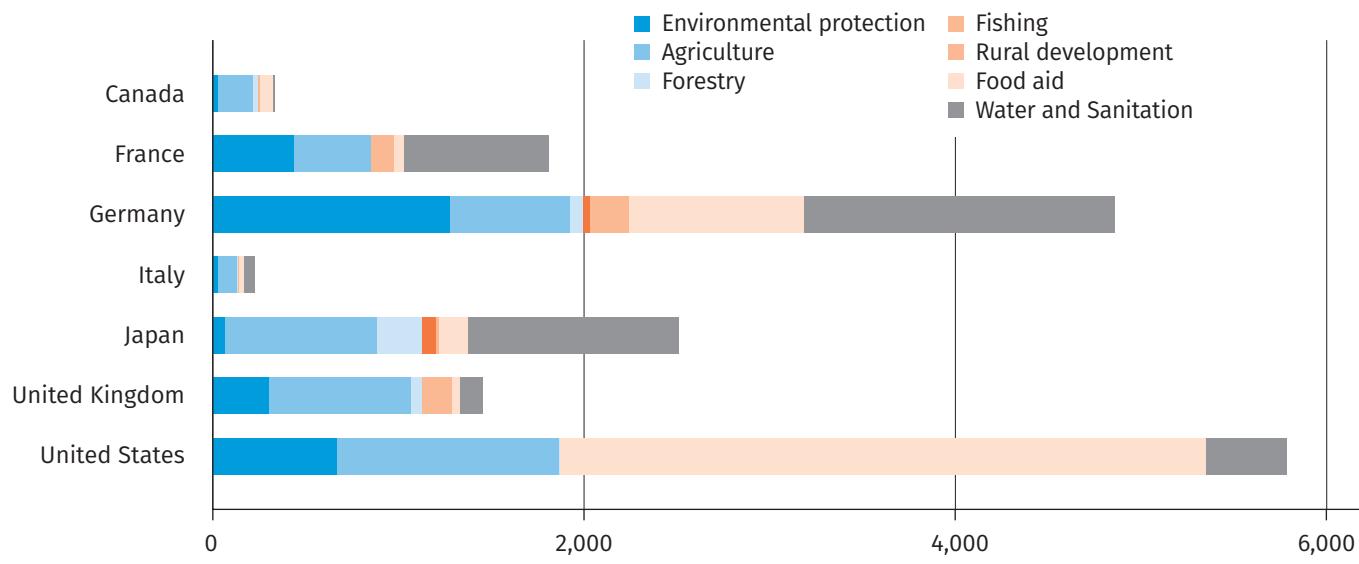
The latest financial report of the G7 Food Security Working Group for 2022 shows that G7 spending on food security has remained consistently high since the Elmau Summit in 2015. Figures for 2020, which include direct G7 contributions to agriculture, fisheries and food security, are given in the report at US\$14 billion. These figures represent only a part of the ODA described in the ZEF/FAO study. In Germany, the

budget of the Federal Ministry for Economic Cooperation and Development falls from €13.82 billion in 2022 to an expected €12.16 billion in the 2023 budget.

These sums are small compared to the government subsidies for domestic agriculture in industrialised countries, which in turn distort prices in agricultural markets in emerging and developing countries. According to a 2021 study by the FAO, global agricultural subsidies amount to almost US\$540 billion per year, or 15 per cent of the total value of agricultural production. In the European Union, subsidies account for almost 25 per cent, in Japan even more than 75 per cent and in the US just under 10 per cent.

Against the backdrop of the Ukraine crisis, the G7 pledged an additional US\$4.5 billion to fight global hunger at last year's Elmau Summit, while this year's G7 Summit in Hiroshima reaffirmed the Elmau targets from 2015. One focus is on increased investment in improving the food supply – firstly by investing more in developing agricultural infrastructure, i.e. storage, irrigation, transport and communication infrastructure, especially in the least developed countries, and secondly by expanding processing facilities, distribution networks and cold chains.

Figure 2: Sub-sectoral allocation of G7 ODA for food security and rural development
2018, US\$ million



Source: ZEF/FAO

Lessons from successful countries

There is no denying that some countries have been more successful than others in the recent past in the fight against hunger. In order to suggest strategies and measures that hunger-affected low- and middle-income countries should prioritise in their economic, social and agricultural policies, the ZEF/FAO study compared 19 countries that were able to reduce their PoU by more than 50 per cent on average between 2001 and 2018 with 19 countries that where hunger increased by an average of 10 per cent over the same period. The comparison is based on seven indicators:

- Economic structure and performance
- Agricultural production (including agricultural value added)
- Demographic structure
- Human development
- Public interventions
- Institutional capacity
- Capital investment

There are two limitations to the interpretation of these lessons from successful countries. First, the descriptive analysis does not allow conclusions to be drawn about a causal relationship between policies and hunger reduction. Second, the high degree of heterogeneity across countries suggests that there is no one-size-fits-all solution to hunger. Despite these limitations, the analysis has revealed clear patterns.

The best results are found in larger political economies with large populations. This finding underlines the importance of the size of the (domestic) market for the development of the agricultural sector. It is also important to note that the successful countries experienced high economic growth during the period under review. It can be assumed that their growth was at least partly pro-poor and inclusive, i.e. it reached as many social groups and strata as possible. After all, the share

of manufacturing in total economic value added is four times higher there than in the unsuccessful countries. This illustrates the importance of the interplay between different macroeconomic and policy areas in sustainably reducing hunger, here in particular the close link between SDG 1 (ending poverty) and SDG 2 (ending hunger and malnutrition in all their forms).

The best performing countries in hunger reduction have some characteristics in common with countries in the early stages of the transition from an agricultural to an industrial society. While agriculture still plays an important role in their value added and employment, the share of manufacturing in total economic output is already growing rapidly. Crucially, these processes are accompanied by relatively high growth in agricultural value added and productivity. This pattern is particularly evident in the case of the top performers in the sample, as these countries started from a low base but quickly caught up with the economically more advanced countries. Labour that is no longer needed in agriculture migrates from rural areas to cities. This dynamic reinforces the trend towards urbanisation and its economic and social consequences. The importance of economic structural transformation based on the expanding agricultural value chain underscores the role of UNIDO, which is discussed in more detail in chapter five.

The fight to eradicate hunger requires substantial financial resources – from domestic and foreign as well as private and public sources. This analysis underlines the importance that the private sector and market processes play in reducing poverty. In this sense, the share of public expenditure as a percentage of GDP is slightly lower in the successful countries than in the less successful ones. The results thus show that it is not only important how much money is spent that matters, but also what it is spent on. There are three key findings in this respect:

- First, agriculture in the best performing countries receives four times more public funding than in the less successful countries, which has a direct positive impact on food security.
- Second, capital investment should be prioritised over consumption spending.
- Finally, it is important that public investment does not, on average, crowd out private investment. On the contrary, it makes the country more attractive to foreign private investors.

Table 1: Country classification by gross national income (GNI) per capita

→ **Low-income countries:**

GNI per capita of \$1,085 or less

→ **Lower-middle income countries:**

GNI per capita between \$1,086 and \$4,255

→ **Upper-middle-income countries:**

GNI per capita between \$4,256 and \$13,205

→ **High-income countries:**

GNI per Capita of more than \$13,205

Source: UN

What do the numbers tell us on how to end hunger?

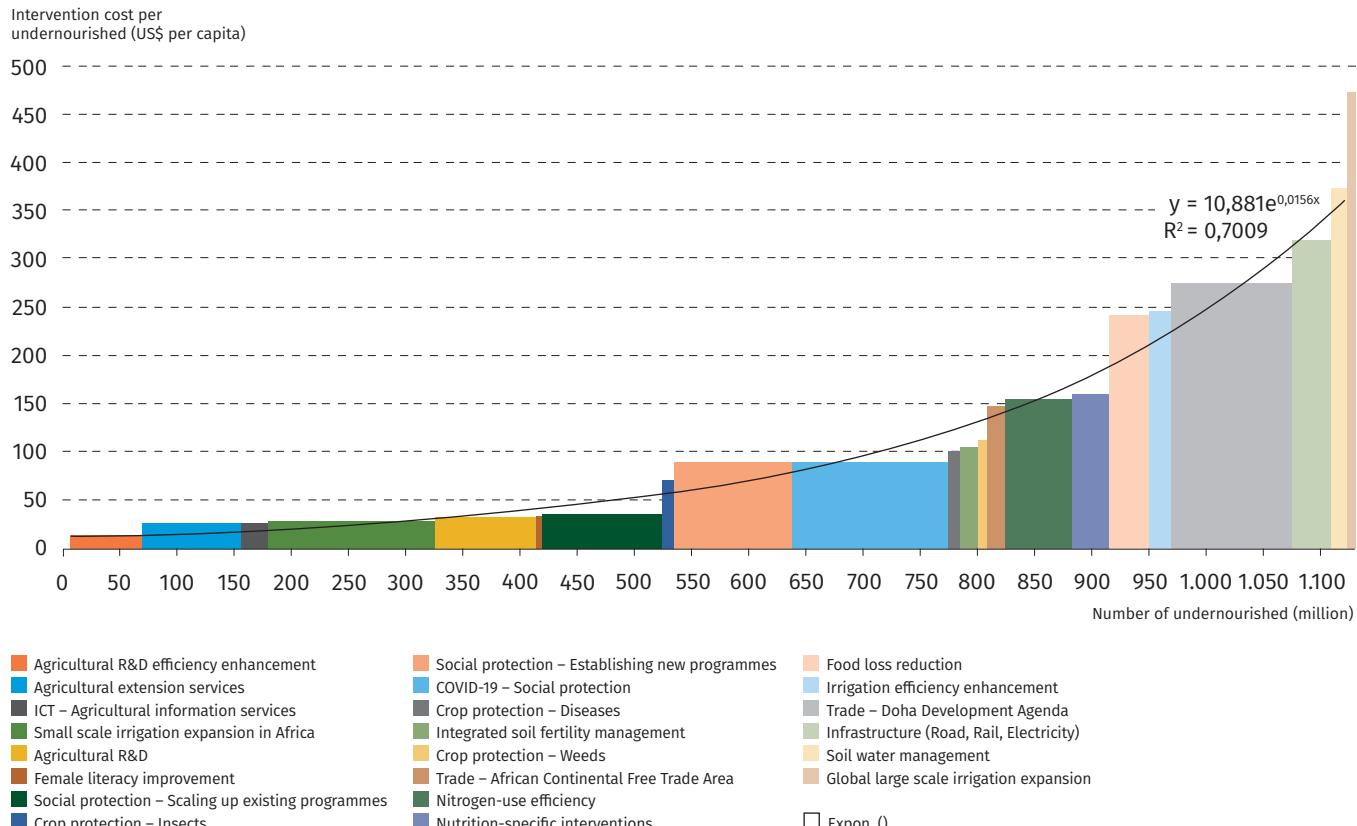
Given the limited financial resources available to reduce hunger, policymakers in hunger-affected countries and their development partners face the challenge of identifying cost-effective investment options that have the greatest potential to reduce PoU and malnutrition.

The marginal cost curve (MaCC) developed in the ZEF/FAO study, which considers 24 individual interventions that have different costs and benefits in terms of ending hunger, can help in the decision-making process. Some are more short-term interventions, such as social protection, while others are more long-term, such as agricultural research and development (R&D) or soil fertility management.

The MaCC can be used to answer the question of what it will cost to end hunger, depending on the number of people who need to be lifted out of hunger by 2030. These results can guide global and national efforts to achieve targets of SDG 2. The MaCC analysis shows:

A number of promising investments would be sufficient to meet the G7 commitment to lift 500 million people out of hunger by 2030. These include the first seven MaCC interventions, as shown in Table 2.

Figure 3: Marginal cost curve of the suggested interventions to eradicate hunger and malnutrition



Note: The MaCC for hunger shows the cost of each hunger reduction measure such that each bar represents a single intervention where the width shows the number of individuals lifted out of hunger, the height its associated per-capita cost, and the area its associated total cost. The total width of the MaCC reflects the total hunger reduction possible from all interventions, while the sum of the areas of all of the bars represents the total cost of reducing hunger and stunting through the implementation of all interventions considered. The positions of the bars along the MaCC reflect the order of each intervention by their cost-effectiveness. When moving along the MaCC from left to right, the cost-effectiveness of the interventions worsens as each next intervention becomes more expensive than the preceding.

Source: ZEF/FAO

Table 2: Hunger reduction potential of planned interventions between 2020 and 2030

Interventions	Reduction in number of people at risk of hunger	Average annual incremental investment cost (US\$ million)	Average annual incremental investment cost per person saved from hunger
Agricultural R&D efficiency enhancement	69.9	888	12.7
Agricultural extension services	81.5	2096	25.7
ICT/agricultural information services	26.6	698	26.2
Small-scale irrigation expansion in Africa	142.3	3790	26.6
Agricultural R&D	92	2960	32.2
Improving female literacy	2.6	87	33.1
Social protection – scaling up existing programmes	103.1	3676.8	35.7

Source: ZEF/FAO

Implementing these programmes would require an additional US\$11–14 billion per year. This would be roughly equivalent to doubling G7 ODA for agriculture, food and rural development (from US\$17 billion in 2018).

However, achieving SDG 2 is not unaffordable if a mix of low-cost interventions with the greatest potential to reduce hunger are prioritised and investments are optimally coordinated. Investments that have a longer-term impact should be prioritised to ensure that their positive effects are felt by 2030. Social and nutrition programmes are needed to provide rapid assistance to the hungry poor.

In 2020, FAO projections indicate that the number of undernourished people could rise to 909 million by 2030 in a worst-case scenario, including those suffering from hunger as a result of the COVID-19 pandemic. Lifting 900 million people out of hunger by 2030 would require about US\$39–50 billion per year (including the US\$11–14 billion investment mentioned above).

Not surprisingly, the investment required to lift the first 500 million people out of hunger is less than that required for the remaining 400 million people, who live in even more difficult conditions. Marginal costs are as so the compound impact of these investments.

As mentioned above, the latest projections from July 2023 indicate that the number of people facing hunger can be reduced to 590 million by 2030. This significantly reduces the annual investment required, from US\$39–50 billion to less than US\$24 billion per year, according to the MaCC. Additional measures needed to lift an additional 100 million people out of hunger include social protection, scaling up existing programmes and protecting crops from insects.

It should be noted that because the MaCC considers each investment in isolation, the model does not capture potential synergies. This means that the costs are likely to be overestimated or the positive impact on hunger reduction underestimated. It is also crucial that many of the investments contribute to long-term, sustainable economic development beyond 2030 and are not limited hunger reduction. In this way, they will build lasting resilience to hunger crises among the population.

Fighting global hunger. How can UNIDO help?

The UN family of organisations are an important pillar of international development policy. In the field of agriculture and nutrition, these include the Food and Agriculture Organization (FAO), which focuses on increasing smallholder food production. The World Food Programme (WFP) focuses on food distribution and food security, particularly in crisis situations. The International Fund for Agricultural Development (IFAD) is an international financial institution that finances investments in rural development. Its focus primarily on promoting smallholder agriculture, rural development, food security and rural poverty alleviation.

While the role of the FAO, WFP or IFAD is always mentioned when it comes to hunger alleviation, the role of UNIDO – which focuses on sustainable industrialization through structural transformation in the least developed countries – off-farm job creation, rural infrastructure development, food-related SME development, improvement of post-harvest processes, agricultural value addition, food safety and food preservation – has not yet received sufficient attention. UNIDO's vision is a world free of poverty and hunger, where industry drives a sustainable, low-emission economy, improves living standards, preserves a livable environment for present and future generations and leaves no one behind.

Even in the above-mentioned declaration of the G7 countries at this year's Hiroshima Summit, the focus remains on agricultural production and short-term food aid. Medium- and long-term optimisation of the entire agricultural value chain is only slowly gaining in importance. It is therefore necessary to re-emphasise the importance of agricultural resources and industrial technologies in the sustainable fight against hunger.

Given its range of mandates, UNIDO can play an important role not only in the fight against hunger and malnutrition, but also through its work on economic transformation and rural development. In many developing countries, agrifood remains most crucial economic and employment sector in many developing countries. UNIDO plays a particularly important role in improving the harvesting, storage, transport, processing, safety, quality and trade of agricultural products. In doing so, UNIDO covers essential processes in the agricultural value chain that are necessary for a successful agrifood industry in developing and emerging countries.

Reducing post-harvest losses and waste (PHLW)

It's hard to imagine that a third of all food produced for human consumption worldwide is either lost or wasted. The numbers are staggering – 13 per cent of food is lost and 17 per cent is wasted, amounting to about 1.3 billion tonnes per year, with a value of approximately US\$1 trillion (approximately US\$680 billion in industrialised countries and US\$320 billion in developing countries). All the food that goes uneaten (lost and wasted) could feed two billion people. That's more than twice the number of undernourished people in the world. It's important that we take action to reduce food waste and ensure that everyone has access to enough food. In addition, this loss is responsible for eight to 10 per cent of annual greenhouse gas emissions, which contribute to extreme weather events such as droughts and floods. This in turn negatively impacts crop yields, reduces the nutritional quality of crops and causes supply chain disruptions. Reducing post-harvest losses (PHL) contributes significantly to food and nutrition security through the four dimensions of food security: availability, access, utilisation and stability. Reducing losses and waste improves access and availability.

PHL reduction is a critical factor in improving food security. UNIDO assists developing countries in identifying and deploying a range of proven technologies for mechanisation, harvesting, cold and dry storage, processing, packaging materials and improved logistics. UNIDO works to establish and upgrade micro, small, and medium-sized enterprises in post-harvest handling of the products. Currently, less than two per cent of the valuable nutrients in food byproducts and waste are recycled, and most of it ends up in landfills, producing greenhouse gases. UNIDO is working to turn this waste into useful products, such as organic fertiliser and energy, promoting circular economic loops that generate positive impacts on food security and the environment.

Structural transformation and food security

Many of the world's agricultural workers live in poverty. The main way out of poverty for all societies has been structural transformation, which involves moving surplus agricultural labour off the farm and into higher-productivity sectors.

UNIDO develops programmes for rural industrialisation and non-farm economic activities to reduce redundant farm labour by supporting the creation and upgrading of small and medium-sized enterprises along the agrifood value chain, from inputs, supply, mechanisation, agrologistics, marketing and various forms of digitalisation services. This increases per capita income in rural areas, contributing to food security and community resilience.

Nutrition

To combat malnutrition in African countries, UNIDO is partnering with WFP to produce fortified cereals and special nutritious foods (SNFs) adapted to local contexts and needs to address micronutrient deficiencies. This initiative aims not only to improve nutrition security, but also to stimulate local production of cereals by creating market outlets, promoting local value addition and food safety and making nutritious food more affordable and available.

Infrastructure

As the ZEF/FAO study shows, the size of the (domestic) market is an important factor in the fight against hunger, as it facilitates interregional trade and exchange. The size of a market is determined not only by a country's population and land area, but also by the quantity and quality of the infrastructure that opens up the market and makes production, trade and consumption possible.

Better roads reduce transport costs, as well as for fertiliser and seeds. Most importantly, an efficient road network helps to link local and regional markets. This not only allows farmers to benefit from price differences in different markets. Consumers are also better protected against harvest fluctuations or crop failures, as goods can be exchanged between areas surplus and shortage – and famines can be avoided. In contrast to Africa, intraregional trade between emerging economies in Asia is relatively high, according to OECD figures. While African intraregional trade accounts for only 18 percent of its total merchandise exports, the equivalent figure for Asia is 52 percent. This is partly due to better transport infrastructure.

If the many small farms had access to a better infrastructure and could market their products profitably, they would have a greater incentive to produce more for urban centres, i.e. to increase their market share. This is all the more important as the level of urbanisation in Africa, for example, continues to grow. More than 40 per cent of the population of sub-Saharan Africa already lives in cities. If the countries most affected by hunger, as well as development partners, paid more attention to developing infrastructure and extending the value chain – through increased public or privately funded or public-private partnerships – they could not only feed a growing population, but also modernise their economies.

Investing in agribusiness and food processing

As developing countries experience population growth and urbanisation (more than 40 per cent of the population in sub-Saharan Africa now lives in cities), the processed food industry is expected to grow, especially as a middle class with purchasing power emerges. However, the lack of infrastructure can hinder investment in this sector. It is crucial to address this infrastructure deficit in order to promote responsible investment and agro-industrialisation.

UNIDO is actively assisting its Member States to promote responsible investment in agriculture and agribusiness by both the public and private sectors. These infrastructure investments include integrated agrifood parks, where all the necessary utilities and common facilities are provided for the private sector to invest in different nodes of the value chain. The agrifood parks are also networked with rural transformation centres in the catchment area, where farmers are provided with market information, aggregation facilities and extension services.

To accelerate and scale development opportunities, UNIDO is working with international financial institutions, including the African Development Bank and the African Export-Import Bank, to finance these large-scale infrastructure projects in rural areas of Africa.

Expanding the food processing sector will support local value addition, rather than exporting raw materials and importing processed food. It would also create much-needed and well-paid new jobs would be created outside the traditional agricultural sector. This would not only alleviate the high unemployment in many countries, rising household incomes would also reduce the risk of malnutrition for a growing proportion of the population, even as prices rise.

Conclusion

Sustainable hunger reduction is at least a three-step process. The first step is to significantly increase agricultural production in fields and stables. Priority must be given to measures with the greatest marginal benefit. Equally important is the second step, which involves the transport and storage of crops, milk and meat. Finally, adding value to agricultural products, i.e. further processing and distribution to the end consumer at home or abroad, plays a key role. It is especially in this last step that UNIDO's programmes, with their focus on technology, infrastructure and industrial development, can provide valuable support.

The experiences of the best performing countries discussed above underscore the prospects for success of a UNIDO-led strategy and thus provide important pointers for a successful development policy. At the same time, individual countries must develop and implement strategies that take into account their specific circumstances.

At first glance, the investments needed to end hunger and all forms of malnutrition appear expensive. But the question must be asked: Expensive compared to alternative uses of these resources? Or expensive compared to the benefits of a world without hunger?



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UNIDO is a specialized agency of the United Nations with a unique mandate to promote, dynamize and accelerate industrial development. Our mandate is reflected in Sustainable Development Goal (SDG) 9: “Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation”, but UNIDO’s activities contribute to all the SDGs. UNIDO’s vision is a world without poverty and hunger, where industry drives low-emission economies, improves living standards, and preserves the livable environment for present and future generations, leaving no one behind.

UNIDO provides support to its 172 Member States through four mandated functions: technical cooperation; action-oriented research and policy-advisory services; normative standards-related activities; and fostering partnerships for knowledge and technology transfer.

Our work is concentrated on three focus areas: ending hunger by helping businesses from farm to fork; stopping climate breakdown by using renewable energy and energy efficiency to reduce industrial greenhouse gas emissions; and supporting sustainable supply chains so that developing country producers get a fair deal and scarce resources are preserved.

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