SUSTAINABLE DEVELOPMENT

GOAL 2

ZERO HUNGER

Teacher's Manual

Teacher's Manual on SDG 2 by R. Pretorius, M. Nicolau, L. Brandli. A. Salvia,
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1 Introduction to the SDGs

Teachers will be empowered to

- provide the link between the SDGs and the MDGs
- explain the origin and overall aim of the SDGs
- name and briefly discuss the five priority areas of the SDGs
- position SDG 2 within the framework of Agenda 2030

The Sustainable Development Goals (SDGs) are the central component of the 2030 Agenda for Sustainable Development, as agreed on by the United Nations (UN) in September 2015. The 2030 Agenda consists of a set of 17 interlinked goals (United Nations, 2015), with associated targets and indicators, which are to be achieved by 2030.

The 2030 Agenda was developed as an action plan with the purpose of boosting the development of humanity in five priority areas: People, Planet, Prosperity, Peace and Partnerships, as well as continuing the progress made with the Millennium Development Goals (MDGs), which were in force during the years 2000 to 2015. The MDGs consisted of eight international development goals and were supported with 21 individual targets. Compared to the MDGs, the SDGs have a more comprehensive scope, rely more on collective action and are more detailed, with the message very clear that success will depend on the active support and participation of every nation (Feeny, 2020).

The SDGs provide a framework within which global approaches can be planned and implemented to secure a fair, healthy and prosperous future for the current and future generations (Morton et al., 2017). A key element is that all the SDGs are closely interconnected, and that failure to take this into account will lead to a highly ineffective way to address the sustainability dilemma the world is facing (Van Soest et al., 2019). According to Van Soest et al. (2019), key interactions exist across all areas of critical importance for the SDGs but lie especially within the area of “people”, as well as between the areas of “people” and “prosperity”, and between the areas of “people” and “planet”. Figure 1 presents the set of 17 Sustainable Development Goals of the 2030 Agenda.

Figure 1 – The 17 Sustainable Development Goals
Source: United Nations (n.d.)

In a certain way, the SDGs emerged from the MDGs and with the intention of going beyond them. For instance, while the MDGs had one goal for both poverty and hunger (MDG 1), the 2030 Agenda has one goal dedicated to eradicate poverty (SDG 1) and a goal dedicated to end hunger (SDG 2).

This manual specifically deals with SDG 2 – zero hunger, which is one of the SDGs within the area of "people". Officially SDG 2 is formulated as "End hunger, achieve food security and improve nutrition, and promote sustainable agriculture" (United Nations, 2022a).

SDG 2 is included in the "people" dimension of the 2030 Agenda and concerns the creation of a world free of hunger by 2030. With almost 690 million people worldwide suffering from undernourishment in 2019 (approximately 9% of the total population at that stage), 60 million higher than five years earlier (Gertz et al., 2020), there is general agreement that it will not be easy to achieve the aim of zero hunger by 2030, as expressed by SDG 2.

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- Díaz-López, C., Martín-Blanco, C., De la Torre Bayo, J.J., Rubio-Rivera, B. and Zamorano, M., 2021. Analyzing the Scientific Evolution of the Sustainable Development Goals. Applied Sciences, 11(18), 8286.

Examples of questions for assessment

1. Introduction to the SDGs

- Name the five areas of critical importance to which the 17 SDGs are linked and explain why this is referred to as the five Ps.
- Explain the link between the MDGs and the SDGs.
- Explain how the SDGs differ from the MDGs.

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2. Defining SDG 2

Teachers will be empowered to

- define SDG 2 and list its targets and indicators
- explain the significance of SDG 2 with reference to its three main thematic areas
- list and explain five advantages of SDG 2
- reflect on the interdependencies between SDG 2 and the other SDGs
- comprehend the implications of the interdependencies between SDG 2 and the other SDGs
- understand the challenges involved to achieve SDG 2 and discuss examples of actions to address these challenges

While the specific focus of SDG 2 is to end hunger, it integrates and links the dimensions of food security, nutrition and sustainable, resilient agriculture. In addition, SDG 2 emphasises the importance of the role of small producers in the various agricultural sectors and can be regarded as a key for safeguarding agro-ecosystems. This SDG comprises eight specific targets (refer to Table 1), with the first five directly linked to food security and sustainable agriculture, whereas the last three focus on market-related measures to increase agricultural investments and to lower disruptions to the market (Arora and Mishra, 2022). The eight targets can also be arranged according to the following three inter-related groups (Mollier et al., 2017):

- Group 1 (Targets 2.1 and 2.2 – social dimension): Ending hunger and improving nutrition
- Group 2 (Targets 2.3, 2.A and to a certain extent 2.B and 2.C – economic dimension): Achieving food security through productivity improvement and income increase
- Group 3 (Targets 2.4 and 2.5 – environmental dimension): Promoting sustainable agriculture

Table 1 – Targets and indicators for SDG 2

	Targets	Indicators
2.1	By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round	2.1.1: Prevalence of undernourishment 2.1.2: Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES)
2.2	By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons	2.2.1: Prevalence of stunting (height for age <-2 standard deviation from the median of the World Health Organization (WHO) Child Growth Standards) among children under 5 years of age 2.2.2: Prevalence of malnutrition (weight for height >+2 or <-2 standard deviation from the median of the WHO Child Growth Standards) among children under 5 years of age, by type (wasting and overweight)
2.3	By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment	2.3.1: Volume of production per labour unit by classes of farming/pastoral/forestry enterprise size 2.3.2: Average income of small-scale food producers, by sex and indigenous status
2.4	By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality	2.4.1: Proportion of agricultural area under productive and sustainable agriculture
2.5	By 2030, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed	2.5.1: Number of plant and animal genetic resources for food and agriculture secured in either medium or long-term conservation facilities 2.5.2: Proportion of local breeds classified as being at risk, not-at-risk or at unknown level of risk of extinction
2a	Increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development and plant and livestock gene banks in order to enhance agricultural productive capacity in developing countries, in particular least developed countries	2.a.1: The agriculture orientation index for government expenditures 2.a.2: Total official flows (official development assistance plus other official flows) to the agriculture sector
2b	Correct and prevent trade restrictions and distortions in world agricultural markets, including through the parallel elimination of all forms of agricultural export subsidies and all export measures with equivalent effect, in accordance with the mandate of the Doha Development Round	2.b.1: Agricultural export subsidies
2c	Adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility	2.c.1: Indicator of food price anomalies

Source: United Nations (2022a)

The DAAD-funded project "The Digital Introduction to the SDGs into Higher Education Teaching – regional aspects from South Africa and Brazil – supports the implementation of the SDGs

Supplementary readings

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2.1 Significance of SDG 2

The significance of SDG 2 stems from the fact that while food is at the heart of civilisation and prosperity (SDGCompass, 2022), the world had 828 million hungry people in 2021. This is 150 million more than in 2019 (United Nations, 2022b, 28). The underlying cause of this escalation of the problem of hunger is complex and includes multiple factors, including not only the growth in the world population, but also issues as the decline in the rural labour force, soil degradation, climate change, food waste, water scarcity, increased urbanisation and increases in protein-intensive diets (SDGCompass, 2022). Further complications are added by the growing number of conflicts (e.g., Kemmerling et al., 2022), the phenomenon of climate-related shocks (e.g., Hansen et al., 2022), and the occurrence of widening inequality (e.g., Spring et al., 2022). These global threats and their potential impacts constitute a serious challenge to the attainment of SDG 2 and therefore forms the topic of section 3 of this manual.

Although there is international consensus on the unacceptability of hunger, global policy incoherence appears to undermine the political will to end hunger (Cohen, 2019). Despite the nice-sounding promises by global policy makers, the world's food insecure population therefore continues to grow (FAO, 2019). These pressures on the global food system present a development challenge with increased risks for businesses, governments, communities and the environment. The significance of SDG 2 is further underlined by the fact that people around the world perceive ending hunger, achieving food security and promoting sustainable agriculture as the most important SDG (IPSOS, 2019).

It is convenient to conceptualise SDG 2 in terms of three thematic areas (Mollier et al., 2017): i) hunger and malnutrition, ii) food security, and iii) sustainable agriculture. These thematic areas serve as illustration of the wide-reaching scope, comprehensiveness and associated significance of SDG 2. Figure 2 provides a diagrammatic representation and overview of some important aspects associated with each of the three thematic areas of SDG 2.

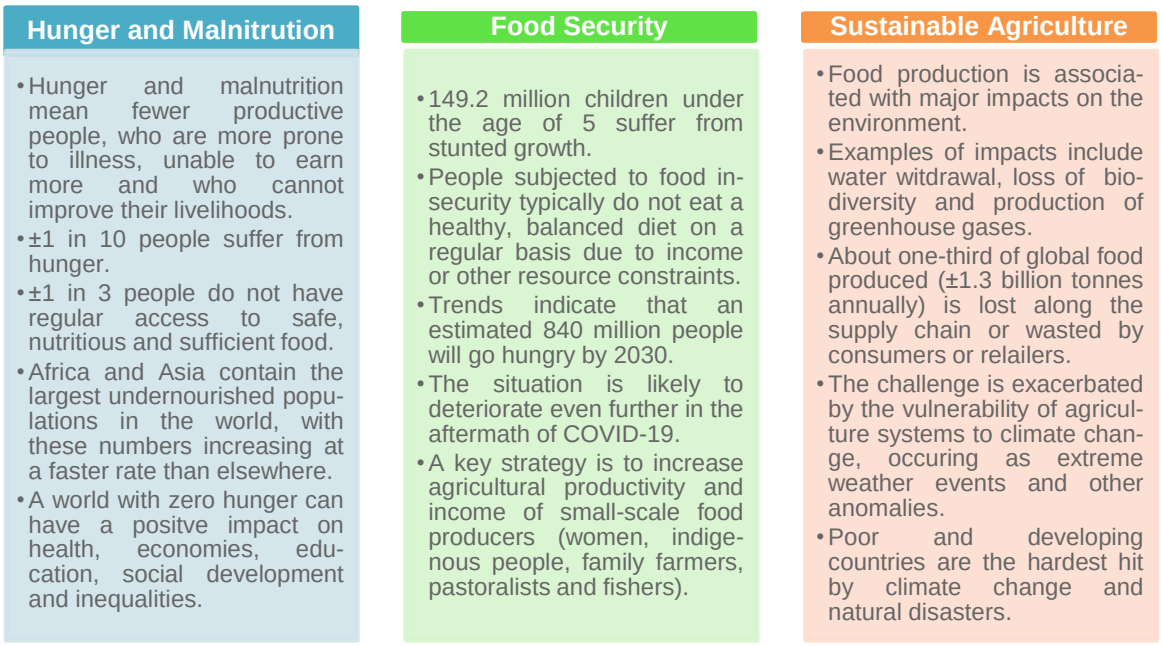

Figure 2 – The three main thematic areas of SDG 2

Source: Authors' compilation, United Nations (2020, 2022b), Mollier et al. (2017)

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2.2 Interdependencies of SDG 2

Arora and Mishra (2022) highlight the fact that SDG 2 has numerous complex interdependencies with other SDGs. In fact, compared to the other SDGs, SDG 2 features as one of the SDGs with the largest number of such interdependencies. These interdependencies also affect the achievement of the various targets of the SDGs. For example, consider the fact that although there is presently enough food available to feed the world population, hunger continues to persist, and the number of food insecure people continues to increase. This reflects the impact of, for example, the ongoing COVID-19 pandemic (SDG 3), the occurrence of climate

change (SDG 13), conflicts that affect the sustenance of supply chains and trade (SDG 12), future energy demands (SDG 7) and a looming economic crisis (SDG 8). These issues must be addressed in unison – the only chance of lifting millions of people out of hunger is to act together.

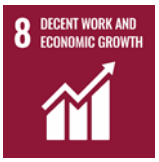
A pertinent current example of such interdependency is the effect of climate change (SDG 13) on food security (SDG 2). Climate change mitigation and adaptation measures are therefore essential to not only protect, but also to safeguard the quality and quantity of harvests. Working towards the achievement of SDG 2 can furthermore directly and indirectly advance SDGs 1, 3 and 8 through increasing incomes in rural areas as well as in developing countries, and thereby increasing access to nutrition. Advancing SDG 2 also has an impact on SDG 5 (gender equality) since a significant number of farmers, especially in Africa and Asia, are women. A summary of the major relations between SDG 2 and the other SDGs at goal level is supplied in Table 2. More potential relations exist between SDG 2 and these goals, especially at target level and depending on different contexts, priorities and point of views (Mollier et al., 2017).

Table 2 – Interdependencies between SDG 2 and the other SDGs at goal level

	The goal that all people always have access to safe, sufficient and nutritious food is directly linked to the eradication of poverty.
	Malnutrition contributes greatly to the global occurrence of disease. Malnourishment holds definite risks to health and well-being.
	Under-nutrition jeopardises education and complicates and expands the negative impacts of many aspects of poverty.
	For women hunger needs to be ended, and nutrition to be improved due to their role in food production and preparation, and their vulnerabilities regarding reproductive health.

Since agriculture is a major water user, SDG 2 depends on the availability of and sustainable management of water and sanitation.

Sustainable agriculture, food security and nutrition depend on energy security and reliable energy.



Many poor and vulnerable people find a livelihood through agriculture, which supports pro-poor economic development.

Due to changes in demographics, and patterns of food demand and consumption, more efficient food production systems are required to achieve SDG 2.

If inequality can be reduced and/or removed, sustainable agriculture and food and nutrition security will be enhanced.

Since cities may use land which could have been used for agriculture, this is a constraint in the attainment of SDG 2.

Many aspects of SDG 2 support progress in SDG 12, thus supporting the food system perspective.

	Various events associated with climate change have a negative impact on agricultural production, specifically affecting the developing world.
	In the long term food security and nutrition will be supported by more sustainable ocean fisheries and improved access for communities to these resources.
	Since agriculture is regarded as an important cause of land degradation and desertification, SDG 15 could constrain the achievement of SDG 2.
	The achievement of SDG 2 is related to peace, political stability, just and inclusive societies and strong institutions (effective accountable and inclusive).
	SDG 17 comprises the main elements required for successful implementation of all the SDGs: technology, finance, capacity-building, trade and systemic issues, and includes SDG 2.

Source: Extracted and adapted from Mollier et al. (2017)

Supplementary readings

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2.3 Advantages of SDG 2

Attainment of SDG 2 is generally viewed as crucial to ensure a better future for all (Hussein, 2020). This automatically implies achievement of many of the targets of the SDGs, since there is some of SDG 2 in each of the SDGs (da Silva, 2016). The targets forming part of this goal involve aspects of hunger related to health, social justice, food production, environment, productivity and economics. Generally, well-nourished people live more productive and longer lives, during which they are in the position to contribute to the achievement of aspirations concerning economic growth, human development, environmental health and innovation (ibid.). On the contrary, if the situation prevails in which hunger continues to limit human development in large parts of the world, the achievement of the other SDGs seems unlikely.

Following Hussein (2020) and other scholars (e.g., da Silva, 2016; Nejadrezaei and Ben-Othmen, 2020; Wieben, 2016) the overall advantages which can potentially be achieved with the attainment of SDG 2, supplemented with some important considerations, can be mapped as follows:

- The food and agriculture sector offers important solutions for development in general and specifically for hunger and poverty alleviation (Viana et al., 2022). Changes in the agriculture sector can potentially provide nutritious food for all while generating acceptable incomes, supporting rural development and protecting the environment.
- The development of inclusive and just policies regarding food and nutrition together with government initiatives aimed at the improvement of public health and nutrition form part of the SDG 2 targets (Breitmeier et al., 2021). This also implies a better and quicker response to emergencies and to put measures in place in support of victims.
- SDG 2 addresses the issue that there is not a lack of food, but shortcomings in making food available due to, for example, disruptions to food supply chains (Clapp and Moseley, 2020). This can be addressed through development of sustainable markets and improvement of infrastructure for rural farmers.
- Achievement of a more food secure future is particularly advantageous and implies direct connection of farmers to the required resources and investment in small-scale food production (Hussein, 2020). Anticipated outcomes include increased resilience to natural disasters and acquisition of skills to improve food security and nutrition.
- A direct spinoff of SDG 2 lies in the reduction/elimination of waste/loss of food (Hussein, 2020; Wieben, 2016). In developed countries, food waste results primarily from consumption, while in developing countries the main culprit is production – associated with inadequacies during storage or getting produce to markets.
- Educational initiatives and the establishment of social programmes on nutrition and hygiene aimed at children, mothers and elderly people through SDG 2 provide the

impetus to reduce malnutrition in all its forms (Mohajan, 2022), although the availability of a variety of crops and enough livestock remains an important part of the picture.

- Fostering sustainability is the ultimate advantage of SDG 2 (da Silva 2016). To improve agricultural production, communities must take care of and manage their own resources. This will support initiatives to make food systems sustainable. The goal is for impoverished areas to be able to create their own, consistent supply of food.

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2.4 Challenges with the implementation of SDG 2

Since SDG 2 consists of vastly differing objectives, but which also closely interact, achievement of this goal is regarded as challenging (Lipper et al., 2020). SDG 2 requires radical reconfiguration of food systems, together with allocation of a major role to small-scale farmers. However, achieving these changes is easier said than done, as implementation thereof in one component of the system has a direct/indirect impact on other components (HLPE, 2017). To achieve the SDG 2 targets, positive and negative interactions between food system components have to be considered (Lipper et al. 2020). However, evidence to support interventions in the food system is scarce and mostly based on analyses of only one or two components of the system.

Interdependencies between SDG 2 and the other SDGs (Mollier et al., 2017) provide major challenges during implementation. Variations across spatial and temporal scales, together with limitations in SDG 2 targets and indicators, complicate matters (Gil et al., 2019). These authors indicate that SDG 2 targets and indicators lack focus on the same groups of people, that quantification of SDG 2 indicators is hindered by unclear concepts and that some SDG 2 targets are not clearly defined. These weak points could lead to misunderstanding due to vagueness of terms and by not defining scale of monitoring and demarcation of food systems. The challenge with Targets 2.1 and 2.2 is how to achieve them efficiently, while Targets 2.3, 2.4 and 2.5 require more specific definitions before operationalisation (ibid.).

A further challenge with the implementation of SDG 2 is that it is riddled with uncertainty, related to the way in which food is produced and consumed (Fanzo, 2019). This includes uncertainty on matters such as climate change, biodiversity loss, pollution, the economy, urbanisation and population growth, which present challenges for attainment of SDG 2. Lipper et al. (2020) highlight the possibility of either negative or positive interactions between plans to achieve SDG 2, adding further uncertainty. They also identify "blind spots" in efforts to achieve SDG 2; for example, productivity–income interactions for small-scale farmers, which do not necessarily correlate with eradication of hunger/malnutrition. Challenges are also presented by non-implementation of pledges concerning agriculture and food security because of other priorities, lack of coherence in policies and ineffective fulfilment of pledges (Cohen, 2019).

While the reconfiguration of the food system, the multiple interdependencies between SDG 2 and all the other SDGs, the uncertainties at stake and the "blind spots" involved constitute some of the overall challenges involved in achieving the targets of SDG 2, it is also possible to highlight some specific challenges and the actions required to address them, of which a few examples are supplied in Table 3.

Table 3 – Examples of specific challenges to achieve SDG 2, and actions required to address them

Specific challenge	Required actions
Increasing numbers of food in-secure people worldwide	Increase multilateral and bilateral investments to countries with highest levels of food insecurity and highest concentrations of small-scale farmers.
Adverse impacts of climate risk on food security	Improve adaptive capacity to the impacts of climate risk by closing yield gaps, increasing production limits and reducing food waste.
Lacking resilience across food systems	Diversify the range of crops and move from long, centralised to shorter, multifaceted supply chains with increased ability to adapt to shocks.
Vulnerability and marginalisation of small-scale farmers	Implement agroecological approaches and structural reforms to ensure that resource-poor farmers have land to live sustainably.
High food prices	Food prices will remain high while the demand for food rises faster than yield growth. In the long run the only solution is to invest more in agriculture.

Supplementary readings

- Cohen, M.J., 2019. Let them eat promises: global policy incoherence, unmet pledges, and misplaced priorities undercut progress on SDG 2. Food Ethics, 4(2), 175–187.

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Examples of questions for assessment

2. Defining SDG 2 – Introduction

- What are the three main dimensions of SDG 2?
- What is the focus of the first five targets of SDG 2?
- What is the focus of the last three targets of SDG 2?

2.1 Significance of SDG 2

- What is your explanation of the current large number of hungry people in the world and why is this number increasing?
- What is the status of the progress to achieve SDG 2 by 2030?
- Briefly explain the comprehensive scope and importance of SDG 2 with reference to three main thematic areas covered by this SDG.

2.2 Interdependencies of SDG 2

- Select any three SDGs and briefly explain how they interact with SDG 2. Use examples from your region to illustrate your explanation.
- How is SDG 2 interconnected with the other SDGs? What other SDGs do you think will be most directly affected if SDG 2 is not achieved?

2.3 Advantages of SDG 2

- What will the main advantages be for the world if the goal of zero hunger can be achieved?
- Select any two of the targets of SDG 2 and explain the specific advantages which will manifest with the attainment of these targets. Link it to advantages for your specific region.

2.4 Challenges in the implementation of SDG 2

- What challenges can be anticipated to occur in the reconfiguration of food systems which will be required to achieve SDG 2?
- Explain how the interdependencies of SDG 2 with all the other SDGs provide challenges for the achievement of SDG 2. Select two SDGs to use as examples to illustrate your answer.

- What are the difficulties in implementing SDG 2 in your country? Which are the main barriers? And how can they be overcome?

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3. Overview of various crises that have a negative impact on the achievement of Zero Hunger

Teachers will be empowered to

- identify the major crises that have a negative impact on the achievement of SDG 2
- explain how the major crises prevent the achievement of SDG 2

- describe how the impact of current crises on the achievement of SDG 2 differs regionally

Historically, crises have formed the basis of the catalyst that initiates significant social, political and economic change in society (United Nations, 2021). A global or regional crisis also demonstrates exactly how interdependent and interlinked all the components of sustainable development are and this extends to the achievement of the SDGs by 2030. Further, as the impact of most global and regional crises transcends national and international borders, it is important that the international community in collaboration with governments work together to develop common solutions to mitigate the impact of the crisis by facilitating structural transformation that will enable and encourage success in the pursuit of achieving the SDGs targets by 2030 (United Nations, 2022b).

Presently, the most dominant global crises that have a negative impact on the achievement of zero hunger (SDG 2) by the year 2030, include climate change, the COVID-19 pandemic and conflict.

3.1 Climate change

One of the leading causes of hunger and food shortages in the world over the last decade has been the impact of climate change. The present global population growth and land use changes coupled with climate change will have a negative impact on achieving the targets of SDG 2 aimed at zero hunger by 2030.

Human actions since the post-industrial period have led to a rise of 1 °C in the average global temperature (Mukerji, 2019). Climate modelling predicts that over the next decade extreme hot weather accompanied by heavy precipitation in some areas and drought in other areas will become the norm (von Grebmer et al., 2019). FAO et al. (2018) indicate that since the 1990s, extreme weather conditions such as storms, fires, floods and drought have doubled in frequency and intensity.

These changes will have a negative impact on most human systems and particularly on global food systems. Agriculture will be particularly affected by changes in rainfall and temperature patterns and, given that an estimated 80% of the rural population across the globe have households that depend solely on agriculture for their livelihoods (Mukerjii, 2019), it is likely that as time goes by food insecurity in the rural parts of the world will increase exponentially.

The manifestation of extreme weather events will have a direct and indirect impact on increasing food insecurity and hunger; will result in changes in the production of food; the availability, access and quality of the food; and the utilisation and food value chain stability. Urgent mitigating strategies need to be implemented as a matter of urgency to turn the tide of food security and hunger, as it appears that it is unlikely that the world will reach the goal of zero hunger by 2030.

Supplementary readings

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3.1.1 Impact of climate change in Africa

Average temperature increases on the African continent are expected to rise by 3 to 6 °C , which is higher than the global increase in average temperatures. The sub-Saharan region is probably one of the most vulnerable regions in the world when it comes to climate change, and this is largely due to the limited capacity of the continent to adapt to or mitigate climate change (Ofori et al., 2021). The continent relies heavily on rainfall to provide its population with basic needs such as water, food and energy. In most countries in Africa dependency on reliable precipitation forms the basis of its rain-fed agricultural systems, placing its food systems at risk due to the present and future changing patterns of precipitation (Ofori et al., 2021; Pickson and Boateng, 2022). In Africa, climate change will not only have a negative impact on crop production but also on livestock rearing, with the cumulative impact of the continent falling short of achieving zero hunger and any of the related targets by 2030.

Supplementary readings

- Ofori, S.A, Cobbina, S.J. and Obiri, S. 2021. Climate Change, Land, Water, and Food Security: Perspectives from Sub-Saharan Africa. Frontiers in Sustainable Food Systems, 5, 680921. Available at: https://doi:10.3389/fsufs.2021.680924
- Pickson, R.B. and Boateng, E. 2022. Climate Change: a friend or foe to food security in Africa? Environment, Development and Sustainability 24, 4387–4412.

3.1.2 Impact of climate change in Latin America

The World Meteorological Organization (WMO) recently published the report “State of the Climate in Latin America and the Caribbean 2021”, which explores the climate change impacts in the region for ecosystems, food and water security, human health and poverty. Extreme weather events and hydrometeorological hazards are reported to have slowed progress towards achieving the SDGs, particularly SDG 1 and SDG 2. Significant and more frequent impacts are expected in terms of social and economic prospects, with agriculture and food production suffering from changing weather patterns.

Examples of negative impacts include changes in harvests or the planting season. Irregular rainfall distribution is affecting crop growing conditions, leading to reduced agricultural production and therefore increasing the levels of food insecurity. The cereal harvest in South America in 2021 declined by 2.6% compared to 2020, associated with reduced rainfall in the

region. In Haiti, the population living in acute food insecurity has almost doubled from 2018 to 2022. In Paraguay, the production of soybeans – a key export product – was predicted to be reduced by around 20% in 2020/2021, having an impact on the country's economy. In addition to issues associated with rainfall, higher temperatures are also affecting production and crop quality.

Supplementary readings

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3.1.3 Impact of climate change in Europe

According to rising evidence, climate change will have a negative impact on the European Union's food and nutrition security. Changes in temperature, precipitation, weather extremes, and fluctuation in pest and disease patterns have impacts on agriculture. Some effects are decreased cereal yields in southern Europe, decreased fruit and vegetable yields and nutrient content, altered fisheries and increased dispersion of livestock illnesses. (Fears, 2020)

According to future impact modelling, there could be significant yield decreases in central and southern Europe depending on how severe climate change is. A higher amount of CO_2 in the atmosphere could have further effects on crop quality and quantity. (ibid.)

Southeast Europe is expected to experience an increase in temperature of 4°C by the end of the century, along with a 20 to 50% decrease in precipitation and a 20% increase in drought, which will cause reduction in agricultural yields. For instance, a 30% decrease in agricultural productivity in Moldova is causing serious food security risks. (United Nations Development Programme, 2022)

Dairy cows in the hotter southern European nations spend more than half the day under heat stress, which is thought to have caused a loss of up to 5.5 kg of milk per cow per day. According

to a study conducted in Italy, high air humidity and temperatures may cause a 60% increase in cattle mortality. (FAO, 2015)

Furthermore, climate change in the EU has a severe impact on vegetable and fruit harvests, which have additional dietary and health ramifications. Even though the negative effects on fisheries in the European region may be less than in other regions, there will be uncertainty and local variation as a result of fish stocks traveling from tropical to temperate latitudes, and ocean acidification will lower shellfish productivity. (Fears, 2020)

Due to water shortages during the growing season and increasingly frequent and intense heat events which are most detrimental during blooming, the EU, the world's largest producer of wheat, may be particularly vulnerable to the negative effects of climate change. (FAO, 2015)

Supplementary readings

- FAO, 2015. Climate change and food security: Risks and responses. FAO, Rome.
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3.2 COVID-19 pandemic

Unfortunately, prior to the COVID-19 pandemic, the world was not on track to achieve the global targets set for SDG 2, and during the pandemic the situation worsened. Data indicate that, since the beginning of the pandemic, there has been an increase of 350 million people suffering from food insecurity around the world. The direct and indirect impacts of the pandemic on the achievement of zero hunger by 2030 vary across the globe, with the situation at its most critical in sub-Saharan Africa, Central and Southern Asia, and Latin America and the Caribbean. The COVID-19 pandemic has exposed just how deeply rooted the many problems are in our society, including the extent of insufficient social protection; weak public health systems; inadequate health coverage; and overall but inherent structural inequalities within our society (United Nations, 2021). Pandemic-related economic shocks have had a negative impact on livelihoods and the availability of food globally (Priyadarshini, 2022). Further lockdowns and/or slowdowns have resulted in significant reduction in both formal and informal agricultural production, and this in turn has had a negative impact on the availability and distribution of food in regions that were already food insecure.

Prior to the pandemic in 2019, approximately 8.4% of the world population were undernourished. At the peak (2020/1) of the pandemic, it was estimated that about 811 million people (9.9%) in the world were undernourished. In comparative terms this means that during the pandemic, the increase in world hunger outpaced the global population growth (FAO et al.,

2021), and in this way the global efforts since 2015 to reverse the then already increasing trend of hunger in the world ended abruptly.

While the world is still recovering from the pandemic, it has had a calamitous effect on people's lives and livelihoods. Globally recessions were triggered by the pandemic, and this has hampered access to regular food sources for many across the globe. The FAO et al. (2021) estimate that the lasting effect of the pandemic will mean that the goal of achieving zero hunger by 2030 will be missed by a margin of over 660 million people.

Supplementary readings

- Priyadarshini, P., 2022. The COVID-19 pandemic has derailed the progress of the Sustainable Development Goals. Anthropocene Science. Available at: https://doi.org/10.1007/s44177-022-00032-2

3.2.1 Impact of COVID-19 in Africa

Disease in Africa is endemic in many parts and has had indirect and direct impacts on food security over many decades, therefore the impact of the recent COVID-19 pandemic on Africa is significant. Prior to the COVID-19 pandemic, Africa was already battling with food security and meeting the SDG 2 targets. The pandemic thus exacerbated the already fragile state of food security on the continent (Ali Mohamed et al., 2021). During the pandemic, many African countries enforced directives to contain the spread of the virus, with very little regard for the livelihoods of their populations and their ability to feed themselves (Otekunrin, 2020b). The hardest hit segment of the African population was the urban poor, triggering the implementation of emergency relief in the form of food parcels. Unfortunately, this measure resulted in major corruption scandals and the distribution of poor quality of food (Mukiibi, 2020). While the pandemic resulted in an increase in food aid on the continent, it also resulted in a drop in the production and importation of food. This led to speculation that by the end of 2021 more than 73 million people in Africa will be food insecure (Ali Mohamed et al., 2021). The lasting impact of COVID-19 (and other crises) in Africa will mean that zero hunger will not be achieved by 2030.

Supplementary readings

- Ali Mohamed, E.M., Alhaj Abdallah, S.M., Ahmadi. A. and Lucero-Prisno, D.E., 2021. Food Security and COVID-19 in Africa: Implications and Recommendations. American Journal Tropical Medicine and Hygiene, 104(5), 1613.
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3.2.2 Impact of COVID-19 in Latin America

Combined with climate change and social problems in the region, the pandemic seriously worsened the situation related to SDG 2 in Latin America. The consequences of the pandemic involved reduced incomes and disruptions in food supply chains. On the one hand, the impacts on primary production and on the work in the food supply chain were not critical (FAO and ECLAC, 2020); on the other, hunger and food insecurity took a major hit.

According to the Regional Overview on Food Security and Nutrition (FAO et al., 2021), Latin America and the Caribbean saw an increase of 30% in the number of people suffering from hunger, between 2019 and 2020, reaching the highest value since 2000. Between these years, the number of undernourished people also increased almost 14 million, reaching 59.7 million people. Around 40% of the population is also experiencing moderate or severe food insecurity, an increase of 9% in comparison to pre-pandemic levels, and the highest increase in relation to other world regions – probably due to the high number of cases in the region, the share of the population working on the informal sector and the countries' inequalities (Ortiz, 2021). COVID-19 has also aggravated the malnutrition crisis in Latin America and the Caribbean.

In their study, Benites-Zapata et al. (2021) confirmed the prevalence of food insecurity in Latin America and the Caribbean to be high during the initial stage of the pandemic. Among the factors analysed, gender (females) and area of residence (rural areas) are associated with a higher probability of food insecurity – aligned with known increased socio-economic vulnerabilities.

Supplementary readings

- Cuenca, M.H., 2021. Food security and COVID-19 in Latin America: A challenge to overcome. Gaceta Medica de Caracas, S188–S195.
- Crush, J. and Si, Z., 2020. COVID-19 containment and food security in the Global South. Journal of Agriculture, Food Systems, and Community Development, 9(4), 149–151.
- Saccone, D., 2021. Can the Covid19 pandemic affect the achievement of the 'Zero Hunger' goal? Some preliminary reflections. The European Journal of Health Economics, 22(7), 1025–1038.

3.2.3 Impact of COVID-19 in Europe

The achievements toward the SDGs in the EU were unequal before the COVID pandemic; according to Eurostat (2022), it is still too soon for the effects of the pandemic to be reflected in their data. The pandemic has made the 2030 Agenda and SDGs even more challenging for the EU and globally. While the annual data used in the EU SDG monitoring report so far only partly reflect the impacts of the pandemic, short-term data published in the European Statistical Recovery Dashboard provide a more detailed picture of how COVID-19 and the related contingency measures are affecting the EU in its attempts to achieve the SDGs. Increased

mortality and the health implications of COVID-19 are the most obvious negative consequences of the pandemic, while the degree of social scarring is yet uncertain.

According to Fetting (2020), the European response to the COVID pandemic can be seen through five points under the logic of green recovery. Firstly, the EU countries seem to organise their response in line with the SDGs. Secondly, Covid responses included a higher degree of policy coherence reflected in increased inter-ministerial interaction and coordination at the national level and a stronger interaction at the EU Commission. Thirdly, a green recovery was envisioned, including the preoccupations with biodiversity loss and climate change, in line with the Green Deal. Fourthly, COVID-19 offers a window of opportunity to learn and design new governance systems and structures grounded in scientific advice aimed at evidence-based policy. Finally, it is advisable to strengthen the multilateral agenda to cope with global crises if COVID revealed that the type of national-based response lacked the strength to cope with the evolution of the pandemic, and more global coordination was needed to tackle the issue.

Lockdown measures put additional pressure on vulnerable populations by affecting the labour market. The economic effects had a negative influence, yet they returned to a stable moment just before the Russian invasion of Ukraine. In contrast, economic activity in the EU appeared to have stabilised after the disruption caused by the COVID-19 pandemic. Moreover, some of the long-term effects of the COVID-19 pandemic on the EU economy, labour market, education and poverty, as well as on environmental issues, remain to be seen.

Supplementary readings

- Behnassi, M. and El Haiba, M., 2022. Implications of the Russian-Ukraine war for global food security. Nature Human Behaviour, 6, 754–755.
- Ben Hassen, T. and El Bilali, H., 2022. Impacts of the Russian-Ukraine war on global food security: towards more sustainable and resilient food systems. Foods, 11, 2301. Available at: https://doi.org/10.3390/foods11152301
- Kemmerling, B., Schetter, C. and Wirkus, L., 2022. The logics of war and food (in) security. Global Food Security, 33, 100634. Available at: https://doi.org/10.1016/j.gfs.2022.100634

3.3 Conflict

Conflict reduces the ability of a nation, household and individual to secure food, by having a negative impact on the growing, harvesting, processing and transportation of food, and thus preventing sufficient food to enter the food supply chain and markets (Loewenberg, 2015). The more perceptible impact of armed conflict on food security is the indiscriminate *destruction* of infrastructure, agricultural land and irrigation schemes. This destruction mostly leads to long-term mass starvation and the *displacement* of people in the affected areas and thus the disruption of food production. Food supply during conflict is of a strategic importance to any armed group; *food control* is often a strategy of warring factions and this can lead to the looting

of food supplies. On the contrary, food control can have a positive impact on food supply when non-state armies take control and invest in agricultural activities and in so doing ensure a supply of food for their own soldiers and at the same time allow local inhabitants to protect their livelihoods and food security (Martin-Shields and Stojetz, 2019). Hunger can also be used a "*weapon of war*", this can be an intentional strategy of depriving populations of food that will inevitability lead to starvation. This practice has been used historically to perpetrate ethnic cleansing or genocide but has also been used to force hostile armed factions into submission (Kemmerling et al., 2022).

The Russian-Ukraine war started on the cusp of the COVID-19 pandemic when there was already huge pressure on global food prices and supply chains; a pending energy crisis; and climate-induced extreme events. The war has to date disrupted the export of wheat, corn and barley from Russia and Ukraine to various regions in the world. This disruption is significant as the two countries supply 30% of the world wheat supplies (Behnassi and El Haiba, 2022). In addition, to the dominance of the two countries in terms of food supply, they also produce a substantial proportion of the global fertiliser supplies. The combined result of this dominance is that globally the prices of food and fertiliser have escalated dramatically, and this has and will continue to have an impact on the production and availability of food worldwide (Ben Hassen and El Bilali, 2022). The rising cost and availability of grain has had a negative impact on the ability of organisations providing humanitarian aid to the Global South that are food insecure due to famine and their own armed conflicts, and this has now resulted in the exclusion of millions of people who currently receive food from a food aid programme (Kohnert, 2022). The war will reduce the chances of meeting the targets set for SDG 2, as the expectation is that the war will push a further 7.6 to 13.1 million people into a food insecure situation (Behnassi and El Haiba, 2022).

While the war in the Ukraine is expected to have a lasting impact on the global achievement of SDG 2, there are many regional conflicts that can significantly influence a region or a country's ability to progress towards achieving zero hunger by 2030. For this reason, it is important to consider regional conflicts in various regions as a challenge for achieving SDG 2.

Supplementary readings

- Behnassi, M. and El Haiba, M., 2022. Implications of the Russian-Ukraine war for global food security. Nature Human Behaviour, 6, 754–755.
- Ben Hassen, T. and El Bilali, H., 2022. Impacts of the Russian-Ukraine war on global food security: towards more sustainable and resilient food systems. Foods, 11, 2301. Available at: https://doi.org/10.3390/foods11152301
- Kemmerling, B., Schetter, C. and Wirkus, L., 2022. The logics of war and food (in) security. Global Food Security, 33, 100634. Available at: https://doi.org/10.1016/j.gfs.2022.100634

3.3.1 Impact of conflict in Africa

While the current Russian-Ukraine war will have a negative impact on Africa within the context that many countries import a large amount of wheat and grain (Kohnert, 2022) to supplement their food reserves, armed conflict on the continent is inherent and ongoing (Kemmerling et al., 2022). Since 2015, the progress towards achieving several targets and related indicators for SDG 2 has come to an end and has regressed in many areas in Africa, more especially in East and West Africa (Figure 3).

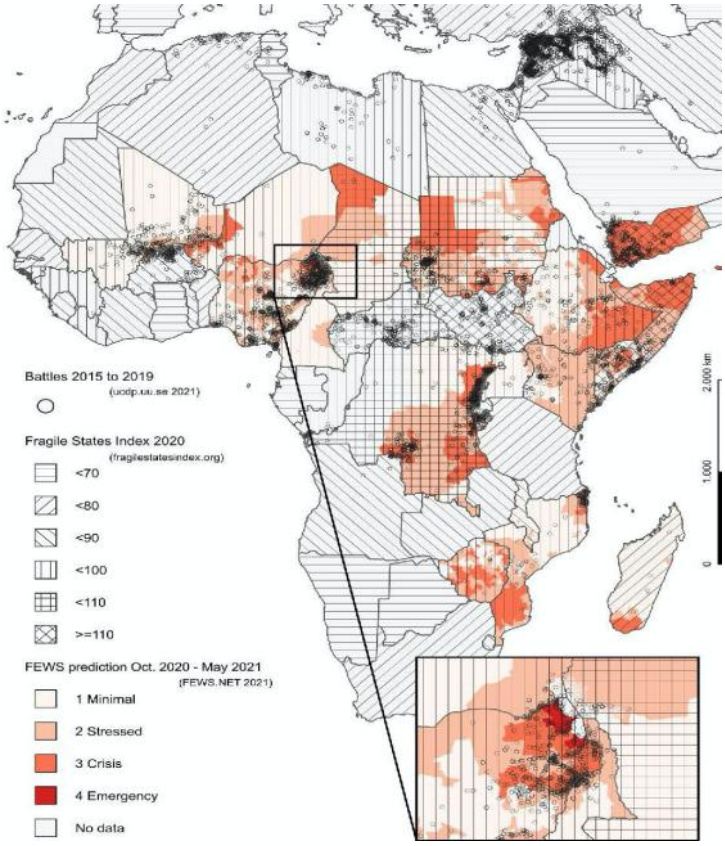

Figure 3: Food insecurity, violent conflicts and fragility in Africa 2015–2021
Source: Kemmerling et al. (2022, p. 2)

Armed conflict is the major driving force of the acute food insecurity that Africa is currently experiencing. Currently the countries in the eastern region of Africa experience the highest levels of food insecurity in terms of total population affected. Countries such as Ethiopia, South Sudan, Sudan and Kenya each have more than one million people facing acute food insecurity.

Figure 4 depicts the 15 countries in Africa that face the highest acute food insecurity in the region, and 12 of these countries face ongoing conflict (Africa Center for Strategic Studies, 2021) that has resulted in the mass displacement of people, a reduced ability to produce food and a negative impact on the transportation networks within the affected country. In addition, the

majority of the people in these countries are now dependent on high levels of humanitarian aid to feed their population.

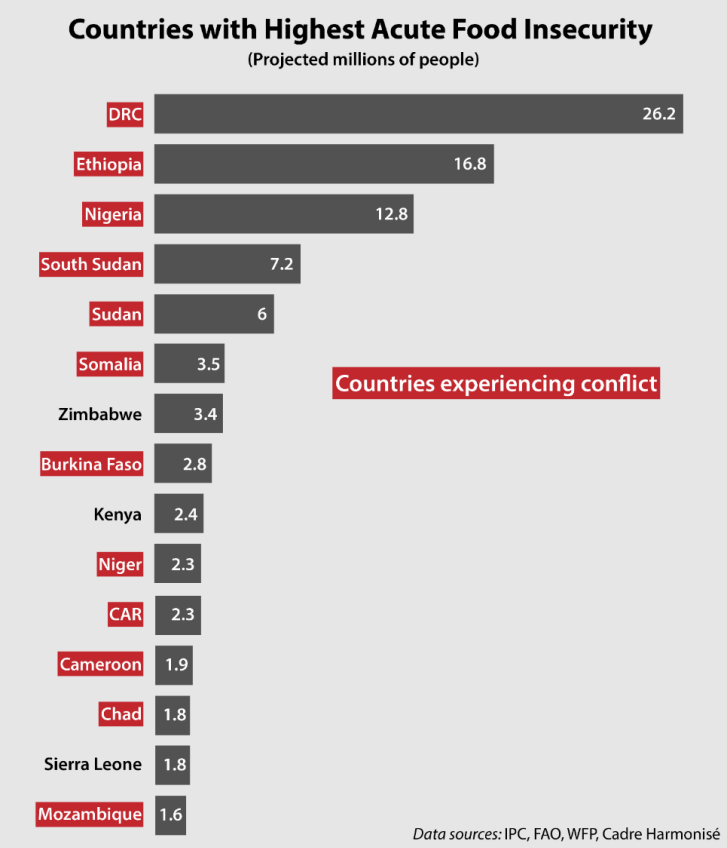

Figure 4: Countries with the highest acute food insecurity and conflict

Source: Africa Center for Strategic Studies (2021)

Supplementary readings

- Kemmerling, B., Schetter, C. and Wirkus, L., 2022. The logics of war and food (in) security. Global Food Security, 33, p.100634. Available at: https://doi.org/10.1016/j.gfs.2022.100634
- Kohnert, D, 2022 (April 14). Will Putin's Ukraine War Provoke Famine and Upheaval in Africa? Available at: http://dx.doi.org/10.2139/ssrn.4083725

3.3.2 Impact of conflict in Latin America

Given its primary export character, Latin America's economy is extremely dependent on international prices and the region quickly feels the impact of international crises. Combined

The DAAD-funded project "The Digital Introduction to the SDGs into Higher Education Teaching – regional aspects from South Africa and Brazil – supports the implementation of the SDGs

with other crises and the international scenario of uncertainty, the war in Ukraine has contributed to Latin American countries facing economic and trade slowdown, inflation and a slow and incomplete recovery in the labour market.

The report “Repercussions in Latin America and the Caribbean of the war in Ukraine: how should the region face this new crisis?” published by ECLAC (2022a) analyses the economic and social impacts of the Ukraine war on the region and offers recommendations for countries on how to address them. The impact of the war affects the region unevenly – depending on the importer/exporter context of each country. Some shared impacts, though, include the low levels of economic growth, the fall in the per capita GDP and the increase of inflation, besides the worsening levels of food insecurity in the region.

Russia and Ukraine play a key role in the supply chains of commodity markets – particularly food, energy and fertilisers – and the conflict affects volumes and prices of products and has an impact on international trade and Latin America. Countries that rely on imported commodities are affected by access and higher prices (especially the Caribbean, which imports most of their food); and countries that export products are also affected by the economic situation of the international market. This impact can be seen in the following respects (Bárcena, 2022; Vorwerk et al., 2022; ECLAC, 2022a):

- Although the region has a trade surplus in food, Latin America has the second-lowest self-sufficiency rate for fertiliser in the world, with this product representing a large deficit (almost 80% of the fertilisers used in agriculture are imported).
- The higher energy prices have led to an increase in the price of fertilisers, raising the cost of production and affecting the agricultural sector, especially small farmers.
- The low availability of fertilisers affects production, and estimates indicate reduced crop production in Latin American countries.
- When production is affected, the food price increases quickly, affecting the whole population but primarily the most vulnerable groups.
- Europe is an important export market for goods and services from Latin America, and the conflict has an impact on the economy in the region unbalancing the international trade.

Preliminary estimates point to poverty levels in Latin America to continue being high in 2022, led by inflation and food prices. This trend worsens social problems and increases the percentage of the population living with hunger and food insecurity (Cárdenas and Hernández, 2022).

Supplementary readings

- Ben Hassen, T. and El Bilali, H., 2022. Impacts of the Russia-Ukraine war on global food security: towards more sustainable and resilient food systems? Foods, 11(15), 2301.
- Kramer, D.J., Rouvinski, V. and Serbin Pont, A., 2022. The Impact of War in Ukraine on Latin America and the Caribbean. Research Publications, 51. Available at:

https://digitalcommons.fiu.edu/jgi_research/51
- Pereira, P., Zhao, W., Symochko, L., Inacio, M., Bogunovic, I. and Barcelo, D., 2022. The Russian-Ukrainian armed conflict impact will push back the sustainable development goals. Geography and Sustainability, 3(3), 277–287.

3.3.3 Impact of conflict in Europe

Osendarp et al. (2022) call attention to the alarming numbers posed by FAO: globally, between 8 and 13 million people could become undernourished between 2022–23, adding to the current 800 million. The effects of the Russia-Ukraine war, disrupting the global food, fertiliser and fuel systems, would be felt strongly by women and children, especially in low- and middle-income countries.

When the Russia-Ukraine war started in early 2022, global food markets were already seriously affected, and food prices were high due to the COVID pandemic. According to Ben Hassen and El Bilali (2022), the war has a dramatic impact on global food security apart from the humanitarian crisis, given that both countries are major agricultural powers. Middle Eastern and North African (MENA region) countries rely heavily on food imports.

Understanding how conflict-related disruptions in global food and fertiliser markets may affect price and availability is critical for understanding the overall impact on global food security. The war has resulted in immediate and far-reaching cascading consequences on global food security: Ukrainian exports have stopped, population displacement causes labour shortages, access to fertilisers is restricted and future harvests are uncertain. The war has crippled the agrarian sector of Ukraine, hampering its exports while labour has grown short due to conscription and displacement. Besides, the war can delay planting and harvesting, and the increase in fertiliser prices due to limited access can reduce yields. Panic buying (also experienced during COVID) can lead to negative situations. According to Ben Hassen and El Bilali (2022) war may particularly affect SDGs 1, 2 and 12.

Based on the FAO, Pereira et al. (2022) show that food prices increased 33.6% between March 2021 and 2022. The war has triggered famine and worsened nutrition in Ukraine, Russia and other places. The situation is dramatic in Ukraine, where food shortages could affect 45% of the population. A decrease in agricultural production and commercialisation, rising prices of agricultural commodities, and decreasing purchasing power will severely affect malnutrition and food insecurity, which is difficult to estimate. Commodity price increases have affected mainly sunflower products, fertilisers and wheat. While the COVID pandemic implied an increase in the number of people affected by food insecurity (from 135 million to 276 million), the war could result in 323 million by the end of 2022. Moreover, the war is affecting agriculture infrastructure and machinery and is preventing farmers from harvesting.

Supplementary readings

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Examples of questions for assessment

3. Overview of various crises that have a negative impact on the achievement of Zero Hunger

- Name at least three global crises that affect the achievement of the targets for SDG 2 in your region.
- What are the main factors behind the recent global increase in food prices?
- How is climate change having a negative impact on food security in your region?
- Did the COVID-19 pandemic have an impact on the progress of achieving the various targets of the SDG 2 in your region? Explain whether this impact was positive or negative.
- How is the COVID-19 pandemic affecting SDG 2 targets? Are these impacts positive or negative?
- Explain how conflict has a negative impact on food security in your region.
- Which is the relationship between war conflicts and food security worldwide?

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4. Progress towards the achievement of Zero Hunger by 2030

Teachers will be empowered to

- develop an understanding of regional differences in achieving SDG 2
- understand the various factors that have a negative impact on the achievement of the various targets for SDG 2

In 2020, it was estimated that the global population tally was around 7 billion. By all accounts, the provision of sufficient and good-quality food to this population is a challenge for all governments and stakeholders. A decade before SDG 2 must be achieved hunger still has an impact on an estimated 8.9% of the world population. FAO et al. (2021) estimate that around 2 billion people do not have regular access to sufficient food that is both safe and nutritious. A

further breakdown of these figures suggests that there are spatial differences in terms of where the people that are affected by hunger live, and broadly it is estimated that 1 billion of these people live in Asia, while approximately 205 million live in Latin America, and 675 million live in Africa. In Table 1, the explanation and breakdown of the principal targets (with related indicators) are supplied. As already suggested, there are regional differences in the prevalence of hunger across the globe and it is important to analyse the success or failures within various regions to establish the progress in achieving the set targets.

Supplementary readings

- FAO, IFAD, UNICEF, WFP and WHO, 2021. The State of Food Security and Nutrition in the World 2021. Transforming Food Systems for Food Security, Improved Nutrition and Affordable Healthy Diets for All. FAO, Rome. Available at: https://www.fao.org/3/cb4474en/cb4474en.pdf

4.1 Regional progress in Africa

Otekunrin (2021) indicates that Africa is not yet ready to achieve the targets for SDG 2 and substantiates this by indicating that no country in Africa achieved a green rating for achieving any of indicators of SDG 2. Atukunda et al. (2021) are of the opinion that if Africa is to progress towards ending hunger by 2030, the SDG agenda must be prioritised on all levels on the continent. Figure 5 depicts three categories of progress towards the achievement of SDG 2 by 2030.

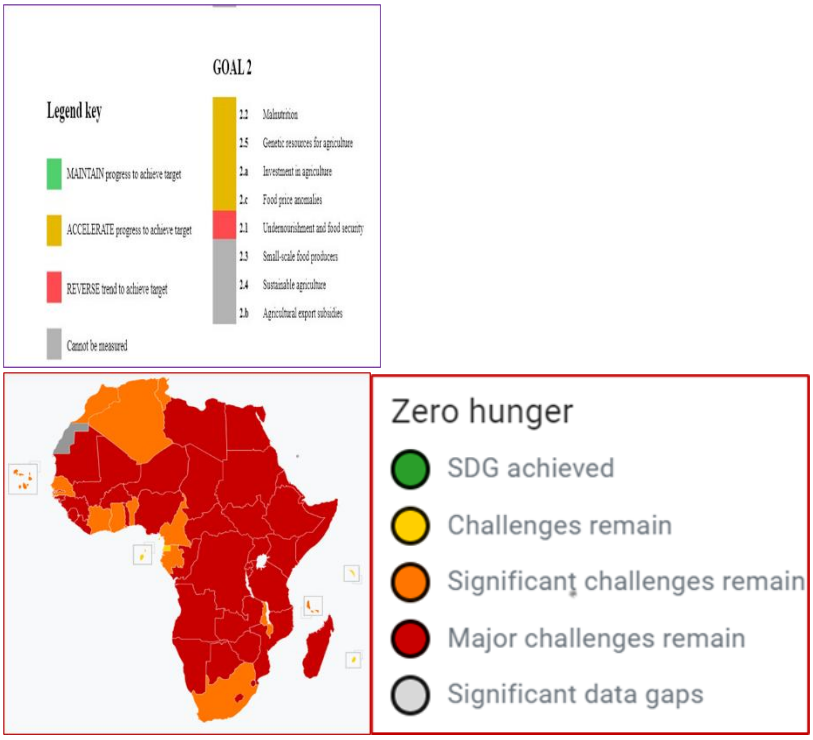

Figure 5: Progress in Africa towards achieving the SDG 2 targets by 2030
Source: https://ecastats.uneca.org/unsdgsafrica/sdgs Last accessed 19 August 2022

Targets that can only be achieved if the present trends are urgently reversed

SDG 2 has as its main target to end hunger by 2030 (Target 2.1) with the main indicators for monitoring progress of this SDG being the prevalence of undernourishment (POU) and food insecurity. An analysis of the various indicators of this target indicates that unless the challenges that have an impact on the target are not urgently addressed and the current increasing trend in terms of POU and food insecurity is not reversed, it is unlikely that Africa will be able to end hunger by 2030.

The prevalence of *undernourishment* (Indicator 2.1.1) is endemic in most of the regions in Africa. While some progress was made prior to 2005 to reduce POU in Africa, unfortunately the successes to reduce POU between 2005 and 2015 regressed (Table 3), with predictions of a worsening of the situation since the pandemic. While there are regional differences in terms of the rate of increase in POU on the continent, an overall upward trend for Africa is clearly reflected by an increase from 192.6 million (in 2015) to 433.2 million (in 2030), with East and West Africa reflecting the highest increases (probably due to the heightened conflict in the region – see Figure 3 in section 3.3.1).

Due to the decades-long armed conflict in Africa, climate change and pandemics such as COVID-19, *food security* (Indicator 2.1.2) on the continent is at severe risk of increasing exponentially. By 2021 it was estimated that more than 100 million people in Africa faced catastrophic levels of food insecurity. FAO et al. (2021) estimated that between 2020 and 2021,

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there was a 60% increase in people facing food security. A regional analysis shows that approximately a quarter of the food insecure people in Africa in 2021 live in West Africa (Kemmerling et al., 2022), with very little prospect of any improvement due to conflict and climate change.

Table 3: Total number of undernourished people in Africa (2005–2015)

Number of undernourished (Millions)				
	2005	**2010**	**2015**	**Projected values 2030**
Africa	192.6	196.2	216.9	433.2
Northern Africa	18.3	17.8	13.8	21.4
Sub-Saharan Africa	174.3	178.3	203.0	411.8
Eastern Africa	95.0	98.1	104.0	191.6
Middle Africa	39.7	40.0	43.5	90.5
Southern Africa	2.9	3.2	4.4	11.0
Western Africa	36.9	37.0	50.3	118.8

Source: Adapted from FAO et al. (2021) and Otekunrin et al. (2020)

Targets that can be achieved if progress is accelerated

Ending all forms of *malnutrition* forms the focus of Target 2.2 (Indicators 2.2.1 and 2.2.2). Although much progress has been made to achieve Target 2.2.1, it is unlikely that Africa will achieve the 2030 target. Although there are regional differences, an overall and gradual decline of stunting children under the age of 5 years in Africa occurred from 38% (2000) to 29% in 2020 (Atukunda et al., 2021). Another indicator (2.2.2) of malnutrition is *wasting* in children under the age of 5 years. While the global target for 2030 is to reduce the global prevalence of wasting to below 3%, Africa recorded 6.4% in 2021 (Atukunda et al., 2021). Only the region of Southern Africa recorded a prevalence of below 5% in 2021 (FAO et al., 2021). Despite significant progress in Targets 2.2.1 and 2.2.2 the performance falls short of the SDG 2 targets as set for 2030 and efforts to reduce malnutrition need to increase over the next decade.

While statistics for Targets 2.3, 2.4 and 2c for Africa are vague, FAO et al. (2021) report that the potential for agricultural productivity in Africa has been increased through the expansion of diverse and locally produced food through the expansion of small-holder farming (Atukunda et al., 2021). The latter has been achieved by securing more land ownership (Giller, 2020) and a more equitable distribution of resources for women, sustainable farmers and rural households (Otekunrin et al., 2020). The impact of climate change, conflict and pandemics have had a

negative impact on progress to achieve Targets 2.3, 2.4 and 2c and efforts contributing to their achievement need to be improved significantly to achieve the 2030 targets.

Targets that cannot be measured

The remaining three targets: agricultural productivity (Target 2.3); increased sustainable food production (Target 2.4) and the correction of trade restrictions in world agricultural markets (Target 2b) cannot be effectively measured due to challenges related to reporting. Sustainable agriculture remains an important factor in achieving SDG 2 and in Africa over 70% of the households rely on the agricultural economy as a major component of their livelihoods (Otekunrin et al., 2020). Of concern in Africa is that while more land has been made available for cultivation, this has not led to increases in the productivity of the land (Giller, 2020), as rural households lack the funding and incentives to invest in agriculture.

Supplementary readings

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4.2 Regional progress in Latin America

Since 2015, countries, organisations and citizens have become more aware of the 2030 Agenda and recognise the importance of reporting the progress of the SDGs. Therefore, although some targets and indicators still do not present complete information, there is an increase in the availability of data. Thus, the first progress is registered with increased commitment to the 2030 Agenda, which leads to increased measurement and availability of data on the status of the SDGs.

When it comes to the progress on SDG 2 targets, according to the Report "Projecting progress: the SDGs in Latin America and the Caribbean" (Nicolai et al., 2016) the progress of SDG 2 in Latin America and Central America can be classified as "little to no progress", while for the Caribbean and South America, as "more than a quarter of the way to target". Both cases are not favourable and do not reflect the progress that was expected for this SDG.

In addition, Latin America and the Caribbean experience contrasting situations. Considering the data from 2020, while some countries are still facing undernourishment among the entire population: Haiti (46.4%), Venezuela (24.9%) and Nicaragua (17.5%), other countries are facing overweight and obesity among the population of children under 5 years old: Argentina (13.6%), Ecuador (11.7%), Cuba (10.3%) (ECLAC, 2022b). This difference also reflects the well-known inequalities of this context since it is known that food production is sufficient to feed the demands of the populations of Latin and Caribbean countries, however, its uneven distribution does not serve all people in the same way (ECLAC, 2022b).

In this context, some factors arise as contributors to further increase inequalities and stagnate or even reduce the progress of SDG 2 such as the increase in food prices due to economic recession in some countries and as a consequence of the loss of agricultural productivity due to climate change (ECLAC, 2022b).

For Target 2.1, although it was on a downward trend, until 2014, the percentage of the population in undernourishment increased especially in the year 2020 and currently reaches 56.5 million people, representing 8.6% of the population (Figure 6). These values are reflected in the increase in severe food insecurity in the adult population, which for Latin America and the Caribbean in 2021, registered 12.3% among males and 16.5% among females (Figure 6). Thus, according to ELAC (2022b) progress is not being made in Target 2.1, however, “target likely to be reached with public policy intervention”.

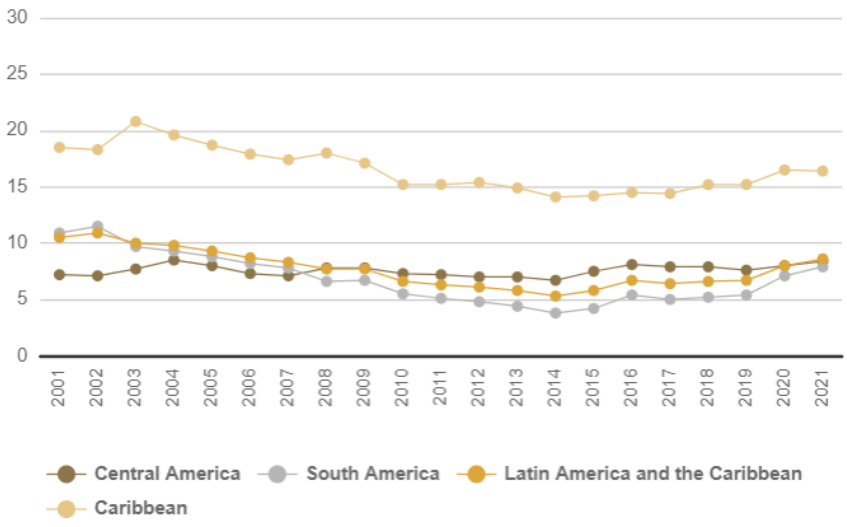

Figure 6: Prevalence of undernourishment in Latin America and the Caribbean (2001–2021)

Source: ECLAC (2022b) based on UN Global SDG Database

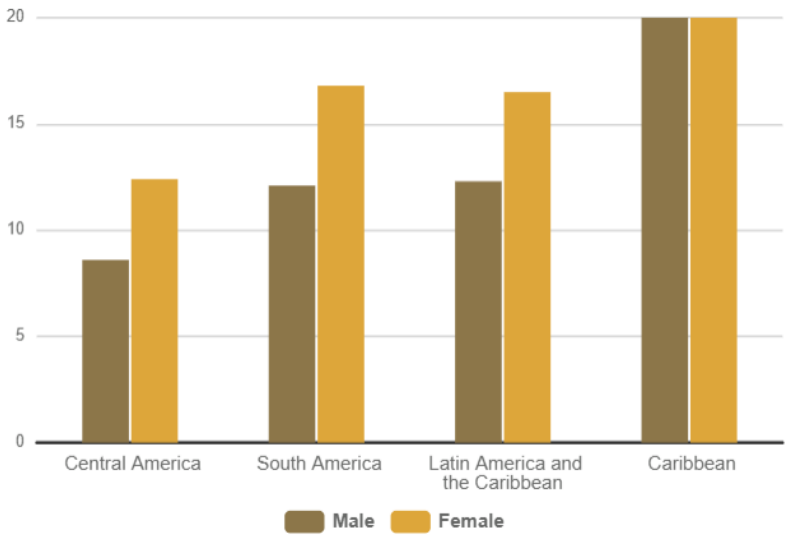

Figure 7: Prevalence of severe food insecurity in the adult population 2021
Source: ECLAC (2022b) based on UN Global SDG Database

For Target 2.2, although the indicators are improving, the progress registered is very slow. The proportion of moderately or severely stunted children reduced to 11.3%, compared to 12% in 2015 and thus, according to ECLAC (2020), Target 2.2 is defined as a "target likely to be reached only with significant public policy intervention".

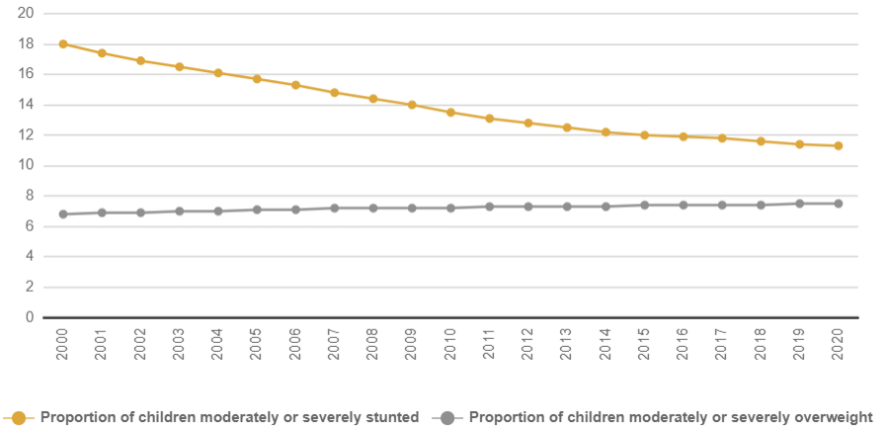

Figure 8: Proportion of children moderately or severely overweight and proportion of children moderately or severely stunted
Source: ECLAC (2022b) based on UN Global SDG Database

For Target 2.3, on agricultural productivity and incomes of small-scale food producers, there is no data available.

For Target 2.4, regarding sustainable food production systems, the intensity of fertiliser use has increased and from 2020 data, it reached the use of 45.98 kilograms per hectare of agricultural area. From the Latin America and Caribbean countries, the highest contribution to these values comes from Brazil, especially due to the increase in grain production in the country. Between 1975 and 2017 the production has grown more than six times and the planted area has doubled (Embrapa, 2022). Therefore, progress towards the target is stalled according to ECLAC (2020).

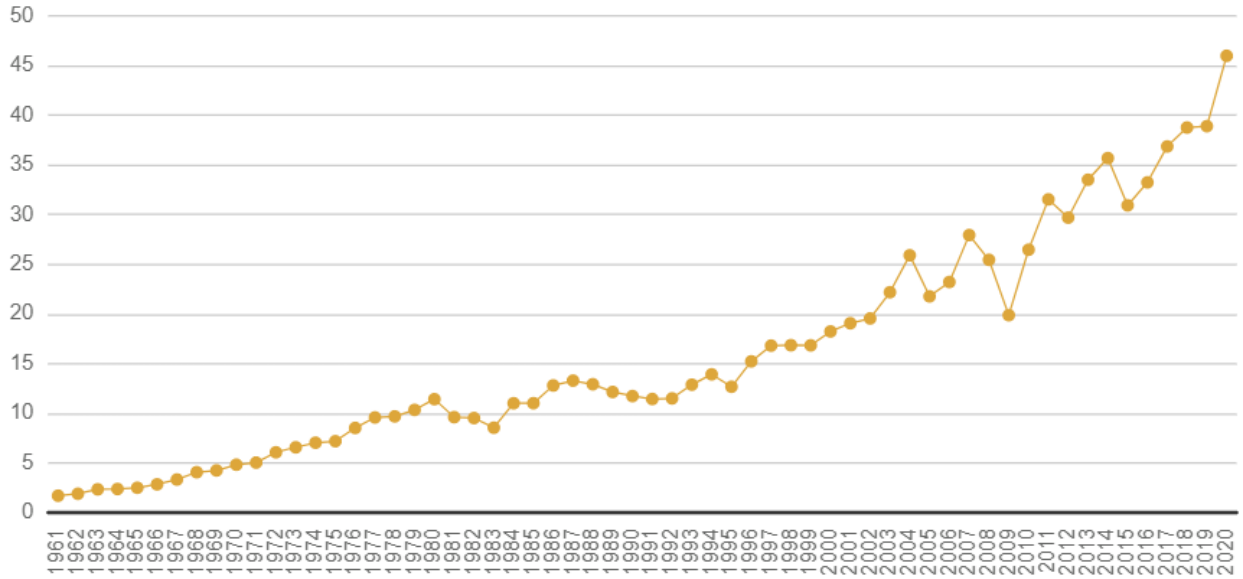

Figure 9: Fertiliser use intensity

Source: ECLAC (2020) based on FAO Online Statistical Database (FAOSTAT)

In summary, significant and major challenges remain in terms of the achievement of SDG 2 in Latin America (Figure 10).

Figure 10: Regional achievement of SDG 2 in Latin America (adapted from Sachs et al., 2022)

Supplementary readings

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4.3 Regional progress in Europe

The regional progress to achieve the various indicators for SDG 2 in Europe is varied (Figure 11). Of biggest concern is the malnutrition indicator that is moving away from the EU target. The indicators that are making insufficient progress in terms of the set targets include the use of

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hazardous pesticides, which has a negative impact on the drive towards more sustainable agricultural production. The culminative impact of nitrates on the groundwater shows a moderate move away from the objectives for SDG 2, while the common farmland bird index as proposed by the EU as a target to lessen the agricultural production impact on the environment also presents a negative trend to the proposed EU targets.

Figure 11: European Union progress to achieve SDG 2
Source: Eurostat, 2022 https://ec.europa.eu/eurostat/web/sdi

SDG 2 in Europe focuses on combating malnutrition and enhancing sustainable food production. According to Eurostat (2022), the central problem for the EU is overweight, which affects more than half of the population; every sixth person is obese, that is, almost 17% of the adult population in 2019. Pre-obesity affected 36.2% of the adult population in that year. The share of overweight (obese and pre-obese) people has risen slightly from 51.1% to 52.7%. Being overweight contributes to diseases such as cancer, cardiovascular disease and diabetes.

For example, Graça et al. (2020) discuss a decade of food and nutrition in Portugal, a period in which the country's first strategy for improving diets appeared. Portugal faces a major problem regarding overweight: more than 50% of the population is affected by it (26.9% in children), and more than 20% is affected by obesity. The cases of Helsinki (Finland), Basque Country (Spain), and Latvia show similar trends, dealing with overweight as a major issue and focusing on lifestyle changes.

The EU shows progress in making agricultural production more sustainable. Labour productivity and future farming investment have increased in EU agriculture. Between 2010 and 2021, the

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EU agricultural factor income per annual work unit grew 36.7% due, to a good extent, to the increase in government support spent on agricultural research and development (R&D) (in 2020 it amounted to 3.2 billion EUR). Besides, organic farming is growing across the EU, reaching 9.1% of the utilised agricultural area in 2020. However, it is unlikely that the 2030 goal will be reached. Fewer hazardous pesticides are used, amounting to a reduction of 9.0% between 2014 and 2019. Nevertheless, meeting the 2030 target seems improbable.

Finally, the environmental impacts of agricultural production are still challenging in Europe. In 2019, 3.2 million tonnes of ammonia were emitted while excessive nutrient inputs threaten water quality. On average, in 2019, groundwater had 21.2 milligrams of nitrates per litre. Likewise, soil erosion and its effects on biodiversity are other European agriculture challenges.

Scown and Nicholas (2020) evaluate the European agricultural policy in light of the SDGs. They stress that cutting-edge information suggests that agricultural policies should pursue integral results across multiple SDGs; however, in its current formulation, the indicators of the monitoring system of the European agricultural policy are biased towards SDGs 2, 8 and 15, while others are misrepresented, including SDGs 3, 5, 14 and 16. According to Scown et al. (2020), the subsidy composition of the European agricultural policy (59.4 billion Euro in 2015) found that most are allocated to above-average income, exacerbating inequality, and the subsidies targeting climate-friendly and biodiversity in farming are scarce.

In countries like North Macedonia, studies reveal that food waste is less than 2% of the purchased food for most of the population, although more research is needed (Bogevska et al., 2020). Vasko et al. (2022) in analysing the situation for Montenegro, also found that consumers throw away a small part, both in quantity and value. They attribute the behaviour to a traditional way of life based on frequent food preparation, consumption and use of leftovers at home; consumers have confusing perceptions regarding date labels of industrially processed foods. The pandemic has affected food consumption habits and increased food waste.

Supplementary readings

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Examples of questions for assessment

4. Progress towards the achievement of Zero Hunger by 2030

- How does your current life pattern affect the achievement of the SDG 2 targets?
- In your opinion, will the countries in Africa be able to achieve the SDG 2 targets by 2030?
- Which SDG 2 targets have been reversed since 2015? Briefly explain the reasons why the achievement of these targets have regressed since 2015.
- Explain the trend of undernourished people in the African region since 2005.
- Why can some SDG targets not be measured in Africa?
- Explain the factors that would prevent Latin America from achieving Target 2.4
- Discuss the trend in achieving Target 2.2 in Latin America.
- What needs to be done in Latin America to achieve Target 2.1?
- Why can some SDG targets not be measured in Latin America?
- Explain the focus of achieving SDG 2 in Europe.
- Describe the role that more sustainable agricultural production can play in Europe in the drive to achieve SDG 2.
- What impact does food waste have on Europe’s ability to achieve SDG 2?
- Discuss the various environmental challenges that have an impact on Europe's ability to achieve SDG 2.
- What are the main obstacles in achieving SDG 2 in your region/country?

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5. Case studies

Teachers will be empowered to

- identify good practices in various regional case studies in achieving SDG 2
- develop and apply a local project aimed at achieving SDG 2
- use the knowledge presented in regional case studies to adapt to a more sustainable way of living

This section presents examples of best practices applied in different countries around the world to support the implementation of SDG 2. These practices take different approaches: from educational measures to social policies, and from agriculture management to nutrient deficiencies, as shown in Table 4. Additional examples can be found in the United Nations Sustainable Development Goals Knowledge Platform. Following the table, this section is dedicated to presenting a selection of case studies in Africa, Latin America and Europe.

Table 4: Best practices as reflected in case studies on the achievement of SDG 2

Name and geographical coverage	Objective	Summary	Related SDGs	Source
Sprouting Entrepreneurs – South Africa	Addressing challenges related to education, youth unemployment and food insecurity.	The garden-based entrepreneurship education programme for public schools trains teachers and students on community-based projects related to growing organic vegetables, mapping and clearing invasive plants, the process of composting, and support to food insecure communities.	1, 2, 4, 17	http://sdgs.un.org/partnerships/sprouting-entrepreneurs-growing-change-sustainable-development-school-garde
Tarjeta Alimentar – Argentina	Reducing food insecurity and promoting access to healthy food.	To face the national social crisis and poverty-related challenges, the government implemented this initiative to guarantee food	1, 2, 10	http://sdgs.un.org/partnerships/tarjeta-alimentar

Name and geographical coverage	Objective	Summary	Related SDGs	Source
		access. The process of delivering the card – which contains financial resources for a basic food basket – to beneficiaries includes events with training sessions on healthy nutrition practices.		
Agribusiness potential – Rwanda	Boosting skills for the next generation of agricultural entrepreneurs.	The project involves a technical partnership to change young people's mindsets about agriculture, teaching about technological advances and business opportunities. The award-winning initiative can be replicated in other contexts by means of similar government-led integrated networks.	2, 8	https://www.fao.org/news/countries-good-practices/article/en/c/1430180/
Balde Cheio programme – Brazil	Developing and adapting production processes and administrative tools for small dairy farmers.	The programme consists of a technology transfer methodology that contributes to the development of dairy farming in family farms. Real-life scenarios are used for training technicians using small family-owned dairy farms and assessing environmental, economic and social impacts of the production systems.	1, 2, 8	https://sdgs.un.org/partnerships/balde-cheio-programme-full-bucket-farmer-oriented-programme-intensifying-dairy-farming

Name and geographical coverage	Objective	Summary	Related SDGs	Source
Hidden hunger – Zimbabwe	Responding to the micronutrient deficiency caused by unbalanced diet in rural areas.	The connection with SDG 2 is observed through increased land productivity and recovery of fertility by applying context-preferential models. The initiative consists of the production of biofortified vitamin A orange maize, involving community partnerships with the government, seen companies, and public and private institutions. The production also involves training and awareness-raising opportunities.	2, 3	https://www.fao.org/news/countries-good-practices/article/en/c/1400740/

Over the years examples of good practices have been applied in different countries around the world that support the achievement of the various indicators as set by SDG 2. These practices take different approaches and are reflected in the selection of case studies from the three regions.

5.1 Africa

5.1.1 Case study of Guinea-Bissau – Programme for the promotion of a multi-level approach to child malnutrition

Food insecurity in Guinea-Bissau as contextual setting

Guinea-Bissau is a low-income country with socio-economic and human development deeply constrained by entrenched political instability since independence (WFP, 2022a). Poverty affects women more than men, malnutrition is widespread and the recent COVID-19 pandemic exacerbated institutional weaknesses and exposed inadequate public services, lack of safety nets and overreliance on certain crop exports. According to the research by the World Food Programme “Fill the Nutrient Gap”, more than two-thirds of the population cannot afford a nutritious and healthy diet. On average, 28% of children aged 6 to 59 months are stunted (WFP, 2020).

Although relative political stability was experienced during 2021, an attempted coup d'état during February 2022 re-kindled political crisis and instability. In May 2022 the president dissolved parliament and scheduled new parliamentary elections for December 2022. Since February 2022, the impacts of the conflict in Ukraine has further aggravated the food security and nutrition situation in Guinea-Bissau and, since the country is a net food importer, rising food and fuel prices have become obstacles for vulnerable households to access food.

The World Food Programme (WFP), present in Guinea-Bissau since 1974, supports government policies and interventions in the areas of emergency preparedness and response, prevention of stunting and moderate-acute malnutrition treatment, education through home-grown school feeding, building of resilience and social protection.

The strategy of the programme

At the beginning of the programme on child malnutrition in 2008, Guinea-Bissau's child nutrition indicators were worrisome and included the following indicators (SDGFa, n.d.):

- a rate of exclusive breastfeeding up to six months of only 28%
- stunting affecting 28% of children
- prevalence of stunting higher in the poorest regions such as the east at 32.3%
- severe form of stunting affecting 9.2% of children
- severe acute malnutrition affecting 1.2% of children under 5 years
- 17% of children under 5 years underweight

In this context, the prevention of malnutrition was crucial, and the programme supported strengthening of the national capacity to reduce child malnutrition and mortality, particularly in the most vulnerable areas, by introducing a multilevel approach that involved major stakeholders as well as communities.

The programme intervention consisted of four approaches (SDGFa, n.d.):

1. Reinforcing the capacities of existing health and nutrition rehabilitation centres to treat malnourished children.
2. Building the capacity of 150 communities in the most vulnerable areas to promote basic nutrition counselling and surveillance.
3. Developing nutrition activities at 150 community schools to teach children good nutrition practices and ensure that they eat vegetables at least once a day.
4. Building the capacity of the Ministry of Health for the effective monitoring of nutritional activities at local level.

Results and impact of the programme

The following are key results from this programme (SDGFa, n.d.):

- Management of acute malnutrition was implemented in 24 nutrition rehabilitation and 94 health centres. All the beneficiary communities in all three the beneficiary regions trained health workers in the early detection and prevention of stunting and other forms of malnutrition.

- 167 school gardens were established in the beneficiary communities and 90% of school children were consuming vegetables produced in school gardens once a day.
- The Ministry of Health improved its capacity to monitor nutritional activities at the local level and to provide updated data on nutritional status in the programme areas.
- The direct involvement of children and their parents in the cultivation of school gardens resulted in an increase in awareness of horticulture among beneficiaries.
- Nutrition training yielded behavioural changes.
- Rates of exclusive breastfeeding significantly increased.

Challenges experienced

Initially, the programme faced challenges to coordinate activities between different UN agencies involved which were not used to working together. Additional challenges related to national counterparts, with inadequate involvement of the Ministry of Education at the central level, and insufficient involvement of regional authorities in monitoring activities related to nutrition and food security. Despite advocacy initiatives, nutrition-related indicators were also not included in the national health information system, which prevented the country from having nutrition-related data processed in an institutionalised and sustainable manner (SDGFa, n.d.).

Lessons learnt in terms of the achievement of SDG 2

Some of the most important lessons learnt with this programme include the following (SDGFa, n.d.):

- The support of volunteer groups that promoted exclusive breastfeeding and good child feeding practices at the community level proved very effective.
- The participation of community leaders, influential people and religious leaders also effectively opposed food taboos and other practices undermining breastfeeding and correct child feeding.
- School gardens were very successful in promoting nutrition.
- Besides the efforts of the participating agencies and the national partners, the successful establishment of school gardens was highly dependent on the active involvement of local school teachers and school children as well as women's associations at the community level.
- The Ministry of Health's designation of nutrition focal points at the regional level was crucial in achieving improved performance in terms of numbers of children screened, treated and reported for malnutrition and under-nutrition.

Sustainability and possibility for replication

Funds were mobilised to ensure that nutrition-related activities continued to be implemented after the programme ended. Involvement of central level authorities, technical level staff (at both the central and regional levels) and local communities contributed to stronger national and local ownership and proved a good base for future interventions to build on. Alignment and integration of community-based nutrition interventions using community health workers trained

for high impact interventions designed to reduce morbidity and mortality could also feed into subsequent nutrition efforts (SDGFa, n.d.).

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5.1.2 Case study of Mozambique – Programme on irrigated and integrated agro-production systems to help Mozambique adapt to climate change

Rural agricultural livelihoods and environmental crisis in Mozambique as contextual setting

The unpredictable climate of Mozambique is associated with frequent occurrences of extreme weather events. For example, from 2000 to 2009 the country experienced six droughts and 15 floods. These droughts affected over 3.2 million people, while the floods affected over six million people (SDGFb, n.d.). In 2010 both droughts and floods had an impact on the country. This left Mozambique with 465 000 people who required food assistance and destroyed 30% of the cultivated land. Food insecurity became common in a country that already experienced undernourishment. The World Food Programme (WFP) reported in September 2022 that 80% of Mozambique's population of 28 million people cannot afford an adequate diet and that 42.3% of all children under five are stunted (WFP, 2022b).

Although Mozambique has ample water resources such as the Limpopo River, during these crisis periods, irrigation was applied in a very limited way. Agricultural land around the Limpopo River was largely rain-fed and therefore subjected to unpredictable precipitation rates. In addition, only a small number of individuals owned water pumps to irrigate their crops. There was a high degree of food insecurity in the area and farmers turned to the natural vegetation for food and income. Consequently, the natural vegetation was over-exploited.

The strategy of the programme

As set out in SDGFb (n.d.), the focus of the programme was to address the issue of unpredictable irrigation in the Chicualacuala District on the banks of the Limpopo River. To assist the farmers in this semi-arid region to cope with climate change, the UN established a joint programme to leverage the use of existing water resources. The programme operated in close cooperation with the agriculture department of the Chicualacuala District government to promote expansion of irrigated production in areas close to the Limpopo River (ibid.). Although work was initiated in one community, it gradually progressed to others. At each site staff from the programme, government officials and community members engaged with each other to improve food security and climate change adaptation. Given the proximity of the river, irrigation was identified as top priority. The communities also identified other priorities, such as fish farming, crop irrigation systems, livestock production and forestry management to improve food security and to promote the implementation of climate change adaptation measures.

At the community level, the beneficiaries planned and executed activities such as water harvesting, livestock production, integrated fish farming, pig-keeping and forestry (SDGFb, n.d.). Women were fully involved in all activities, and in some cases, they even constituted most of the workforce, while interested families in the communities signed up to join farmer associations (ibid.). Barbed wire was provided by the programme to protect cultivated land from intrusion by farm animals. Each farmers' association created a fenced, communal field within which members had their individual plots. The programme provided the initial supply of seeds and agricultural chemicals, while irrigation equipment was supplied free of charge.

Results and impact of the programme

The main impact of the programme was that the agricultural production delivered by about 200 families was not only maintained but increased (SDGFb, n.d.). The result was an increase in income, an improvement in diet and reduced pressure on vegetation resources (ibid). While the main source of income of the farmers was previously derived from cutting trees and selling charcoal, they were now able to produce food right through the year. The use of manure, mulching and small-scale irrigation became commonplace for many farmers. Increased adherence to production practices was observed, which coincided with increased membership of farmers' associations. Members of the three farmers' associations increased their incomes significantly with the support of the programme. Diversification of livelihoods using irrigated systems that combined crops, livestock, and forest resources, assisted the Chicualacuala District to adapt to climate change. The systems which were created can be replicated in other regions (SDGFb, n.d.).

Challenges experienced

Some of the most important challenges experienced with this programme include the following (SDGFb, n.d.):

- The programme had to deal with disputes between certain influential members of some of the farmers' associations, which had a negative impact on production activities and management.
- The programme encountered challenges with the marketing of the crops – overproduction in 2009, associated with poor market access, resulted in spoilage of tons of produce.
- The introduction of integrated fish farming within the fenced crop growing areas led to challenges since market access was not considered. This resulted in some communities eliminating fish production while concentrating on agro-forestry and other livestock activities.
- Due to evapotranspiration and seepage, irrigation tanks needed restocking every other week. Given that the use of these tanks was a new practice, it was crucial to communicate their use in a proper way to ensure their continued use, especially for the use of pumping systems instead of gravitational systems to stock the ponds.

Lessons learnt in terms of the achievement of SDG 2

Some of the most important lessons learnt with this programme include the following (SDGFb, n.d.):

- Programme design should be carefully considered for undeveloped remote areas, requiring reconnaissance visits to the project, active engagement with local stakeholders, assessment of baseline data and sufficient time for the design phase.
- In arid and semi-arid regions and remote areas, available data and understanding of what works and what does not work in the local context are very limited. Sufficient time should be allocated to project design and formulation for these contexts to prevent costly inefficiencies during implementation.
- It is crucial to have a programme coordinator for the whole programme with a separate budget for coordination activities among the various agencies involved.
- Harmonisation between all agencies is required with a single procurement process which would greatly reduce inefficiencies brought about by each agency conducting its own procurement.
- It is critical that there is full involvement and buy-in of all the intended beneficiaries, as well as local government leadership from inception. Project design should allow sufficient time to engage with local communities and stakeholders.
- Flexibility is important to build resilience in climate change adaptation programmes, with the development of value chains based on the resource endowment of the district.
- The use of renewable energy from the sun and organic waste should always be supported as a climate change adaptation measure.
- The programme showed that where adequate water, such as a perennial river, is available in arid or semi-arid areas, the potential for producing food through the careful use of this water is high.

Sustainability and possibility for replication

The programme is replicable in areas where water is available for agricultural production. There is tremendous potential to increase food production and productivity, improve food security and household nutrition, and increase adaptive ability to climate change through the development of irrigated, integrated production systems close to rivers at relatively little cost. To build on the work of the programme and to ensure that progress continues, the following measures are vital (SDGFb, n.d.):

- Water is central and critical to climate change adaptation in Chicualacuala and similar areas.
- The current and future water resources must be scientifically assessed and used in a sustainable way to be able to adapt to climate change and to support long-term development.
- Future project formulation and site selection should assess water availability potential as this will significantly influence adaptive capacity to climate change.
- Flexibility in climate change adaptation programmes is crucial in order to be able to incorporate changing conditions and to help build resilience.
- Crop–livestock integration was not envisaged as an intervention by the project but will remain an important area for future expansion.
- The development of animal traction rather than conventional mechanised ploughing could serve as a more affordable and environmentally sustainable solution to the problem of climate change.
- Agro-fish farming is an important area for further research. It offers substantial prospects for building resilience and developing synergies between crops and livestock in smallholder systems which depend on gravitational water systems from perennial water bodies and where livestock are crucial resources involved in adaptation.
- Urgent attention to managing and regulating the harvesting of vegetation resources, combined with the strengthening of alternative income generation from sources other than charcoal, is crucial to climate change adaptation.
- The development of value chains, particularly small enterprises, based on the resource endowments of the district, will be an important mechanism for adaptation to climate change.

Supplementary readings

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5.1.3 Case study of Nigeria – Joint programme to empower youth and promote innovative public-private partnerships through more efficient agro-food value chains

The context and nature of the food security challenge in Nigeria

Nigeria is the country with the largest number of people in Africa, and even though it showed high economic growth in the past, approximately 61% of its people live in absolute poverty (SDGFc, n.d.). As for many countries across sub-Saharan Africa, food security has also become a challenge for Nigeria. The World Food Programme (WFP) reports that it provided unconditional assistance to 1 511 008 people in August 2022, which is 34% more than in July (WFP, 2022c). During September 2022, the WFP expected to reach over 1.7 million people in need in Nigeria (ibid.). In response to reports received in August 2022 of increased malnutrition in northeast Nigeria, the WFP distributed emergency nutrition assistance to 104 835 crisis-affected children aged 6 to 59 months and to 82 202 pregnant and lactating women and girls.

This country has 84 million hectares of arable land, but only 40% of it is cultivated. While agriculture accounts for approximately 70% of national employment in Nigeria, it accounts for only 22 % of the GDP (SDGFc, n.d.). Obstacles to agricultural development include land ownership fragmentation, rain-fed irrigation and climate change. Additionally, several challenges are posed by the inadequate infrastructure, the low quality of agricultural inputs for small-scale farmers, insufficient access to agricultural extension services for education of farmers and lack of local agro-processing facilities.

Concerning employment, an estimated 50 million young people in Nigeria are jobless, with youth unemployment higher in rural areas and among women (SDGFc, n.d.). Rural women face more disadvantages in this regard and have limited access to land and agricultural inputs, with inherited land in practice normally going to men. The knowledge gap is also at stake here, as 15% of households led by men have access to extension services, compared to 8% for women. Women also have less access to human capital and have less time available because they do most of the housework and childrearing.

Kaduna State in Northwest Nigeria was the focus of this programme. It has a population of 6 million and its capital city serves as a trade centre and transportation hub for the surrounding areas. Kaduna State has the second-highest poverty rate in Nigeria. It has the highest rate of vulnerability and food insecurity and is most vulnerable to droughts. Although the government has provided infrastructure to support agricultural development, farmers still face challenges regarding matters such as poor-quality agricultural inputs, basic infrastructure, and lack of irrigation and credit facilities.

The strategy of the programme

As set out in SDGFc (n.d.), this joint programme's strategy was based on a partnership between the Sahara Group (private sector), three UN agencies, SDG Fund Ambassadors (the Roca Brothers – internationally acclaimed chefs) and the Kaduna State Government. The partners worked together to promote replicable and integrated solutions for agro-food value chain development, food security and nutrition, youth employment and poverty alleviation. This strategy allowed each partner to contribute with its expertise to help to achieve the objectives of the joint programme.

Linked to this programme, activities were launched in Kaduna State in support of public-private partnerships to create a business model to boost local agriculture and establish a local food processing facility (ibid.). The programme also aimed to improve the livelihoods of farmers by expanding their market access. Expected outcomes included opportunities for decent jobs that could in turn address hunger and nutrition problems while promoting sustainable economic growth. The programme also addressed the empowerment of the local youth through improvement of their technical and business management skills.

Results and impact of the programme

The joint programme ran from August 2018 to April 2019, during which it supported reduction of post-harvest losses and establishment of a processing facility for agribusiness development. The Food Africa joint programme reached 246 farmers and 15 cooperatives and farmers' groups over six months. They benefited from skills training and access to agricultural inputs and equipment, which led to improvements in their productivity and the minimisation of post-harvest losses (SDGFc, n.d.).

Due to the short period over which the programme was active, the construction of the agro-processing facility by the private sector partner (Sahara Foundation) was not completed yet at the time that the evaluation of the programme took place. However, the Sahara Foundation is committed to operating the facility beyond the programme period. When the facility becomes operational, contracts with local farmers will be established (ibid.).

The programme addressed the skills gaps that were prevalent in agricultural techniques and agro-processing. Based on the needs assessment, training was organised by UN agencies for selected farmers, farmers' groups and cooperatives. This included training sessions on farming practices, business development and management, and occupational health and safety (ibid.).

Beneficiaries in the Jere farming area were assisted by Food Africa to strengthen agro-food value chains and to improve access to markets. Farmers were connected with micro-, small and medium enterprises (MSMEs), which strengthened local business development and supported value chain development. Business management training was provided for 62 young people and women in the Jere farming area and the surrounding communities. This resulted in the development of 62 profitable business plans to help participants turn their small-scale farming practices into large-scale agri-businesses (ibid.).

Challenges experienced

Some of the most important challenges experienced with this programme include the following (SDGFc, n.d.)

- Significant implementation delays were experienced, especially in terms of the release of and access to funding. As a result, the timeline of the programme had to be reduced from the initially planned two years to only six months. Not all planned activities were therefore implemented.
- Delays occurred in the construction of the processing facility that was expected to serve as the training centre and lack of other venues for this purpose affected implementation of training activities.
- Construction was postponed due to delays in land approvals by the Federal Ministry of Water Resources. As a result, training had to take place outside of the Jere community, leading to higher costs and a lower number of beneficiaries.
- Some training had to be rescheduled or cancelled due to security concerns in Kaduna State. Training activities therefore had to be moved from the field to the cities of Abuja and Kaduna. While this helped with implementation, it led to higher costs and reduced the number of beneficiaries.

Lessons learnt in terms of the achievement of SDG 2

Some of the most important lessons learnt with this programme include the following (SDGFc, n.d.):

- The joint programme was supposed to run over two years, but eventually only six months materialised. The lesson learnt is that programmes of such magnitude and complexity require more time, particularly in terms of getting started. Follow-up programmes would also be necessary to realise the full potential of this type of partnership project.
- Despite the short period over which the programme ran, the joint implementation experience – including scoping and profiling of beneficiaries, joint missions, partner meetings, and coordinated training and field work – clearly indicates that “delivering as one” is possible when partnering with the private sector.

Sustainability and possibility for replication

Despite the short period over which the programme ran, substantive results were achieved by the Food Africa programme (SDGFc, n.d.). It was the first of its kind to be implemented in Kaduna State and the first to focus on horticulture value chains and the development of cooperatives in Nigeria. During the January 2019 monitoring mission, stakeholders noted the relevance of the Food Africa programme to government policy, development challenges, the needs of targeted groups and market-orientation/value chains. There were strong financial commitments and positive feedback from all programme partners and participants.

The results that were achieved over only six months demonstrate the importance of national ownership together with engagement by the private sector during implementation. The synergy between the expanded ownership through public and private sector engagement, and the increased capacity of local beneficiaries in agro-production, processing and financial and business management, support the sustainability of results. Moreover, this programme, designed as a public-private partnership, shows that these types of integrated solutions can be replicated in other regions (Africa and elsewhere) that face similar problems.

Supplementary readings

- SDGFc (Sustainable Development Goals Fund) n.d. Food Africa: Empowering youth and promoting innovative public-private partnerships through more efficient agro-food value chains. Available at: https://www.sdgfund.org/case-study/nigeria-food-africa-%E2%80%93-empowering-youth-and-promoting-innovative-public-private
- WFP (World Food Programme), 2022c. Nigeria Country Brief August and September 2022. Available at: https://docs.wfp.org/api/documents/WFP-0000143024/download/?_ga=2.72925722.888202114.1668327820-2077246752.1660090450

5.2 Latin America

5.2.1 Case study of Brazil

In Brazil, 13% of the population lives in rural areas, a trend that is followed in the Latin American and Caribbean context, with 19% (World Bank, 2018). Despite the relatively low percentage when compared to the global context (43%), the Brazilian territory is very diverse and presents different realities in its five geographic regions. In this context, the regions with the highest percentages of rural and most vulnerable populations are the populations in the north and northeast of the country. The population facing some aspect of food insecurity in Brazil is 58% and the prevalence of moderate or severe food insecurity is 40% among the rural population against 23% among the urban population.

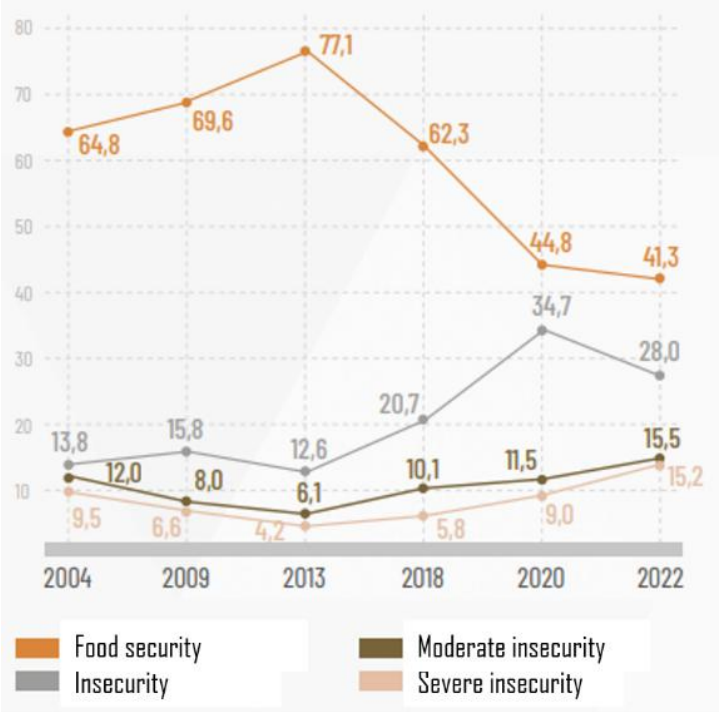

Figure 12 – Food insecurity in Brazil (2004–2022)
Source: ECLAC (2020) based on FAO Online Statistical Database (FAOSTAT)

Although Brazil has an agricultural productivity that stands out as one of the most important worldwide, it is focused on the production of commodities such as soybeans and corn, and, in this way, agricultural food production is not a priority. In many cases, this business model benefits mainly the large and wealthy farmers rather than the small rural producers.

To overcome this challenge and ensure the achievement of "Zero hunger and sustainable agriculture" the alternative is to support small producers once equal distribution of food can be achieved by encouraging more family farming and small-scale food production. The Fome Zero Program (Zero Hunger) is a project that has as main objective to combat hunger and ensure food security for the Brazilian population. To achieve this purpose the programme combines a National Food and Nutrition Security Policy and a task force against hunger, involving the national government, states and municipalities. Among the programme's initiatives are:

- Financial aid to the poorest families: Families receive financial assistance to buy food and to receive this benefit, all children of school age in the family have to be enrolled and attending school.
- Construction of popular restaurants: Available in municipalities with more than 100 000 inhabitants and with a considerable population in a situation of misery or poverty. Food prices are more affordable than at conventional restaurants, in addition to being concerned about the nutritional quality of meals. These spaces aim primarily to serve the population in a situation of food insecurity or social vulnerability but are also available to the entire population.

- Some other examples: Population awareness focusing on instruction on eating habits, the distribution of vitamins and food supplements, among others; Family Farming Food Acquisition Program (PAA) for small family farmers and National Program for Strengthening Family Agriculture (Pronaf), focusing on financing investment in agroecological or organic production systems.

Supplementary readings

- Economic Commission for Latin America and the Caribbean (ECLAC), 2020. The 2030 Agenda for Sustainable Development in the new global and regional context: scenarios and projections in the current crisis. (LC/PUB.2020/5), Santiago. Available at: https://repositorio.cepal.org/bitstream/handle/11362/45338/S2000207_en.pdf?sequence=4&isAllowed=y.
- Economic Commission for Latin America and the Caribbean (ECLAC), 2021. Building forward better: action to strengthen the 2030 Agenda for Sustainable Development. (LC/FDS.4/3/Rev.1), Santiago. Available at: https://www.cepal.org/en/publications/46696-building-forward-better-action-strengthen-2030-agenda-sustainable-development.
- Economic Commission for Latin America and the Caribbean (ECLAC), 2022b. A decade of action for a change of era. (LC/FDS.5/3), Santiago. Available at: https://www.cepal.org/en/publications/47746-decade-action-change-era-fifth-report-regional-progress-and-challenges-relation

5.2.2 Case study of Colombia

In the Colombian context, 29% of the population is facing some level of food insecurity. Food security in Colombia is even more threatened by the current context in the country. In addition to the impacts of climate change, aggravating living conditions in cities and agricultural productivity in the countryside, the country receives many Venezuelan immigrants, who are migrating to Colombia in search of better life opportunities. The undernourishment situation in Colombia follows the pattern registered for Latin America, showing a significant drop from 2011. With a setback in 2018, currently 8.2% of its population is undernourished which in absolute terms represents 4.1 million people (ECLAC, 2022b). In the context of Colombia, an initiative that stands out for its contribution to achieving SDG 2 is the national food and nutrition plan, as follows.

The national food and nutrition plan in Colombia (Plan Nacional de Seguridad Alimentaria y Nutricional – PNSAN)

The plan was established in 2007 with the aim to improve the food and nutritional condition of the most vulnerable people in the country. It was focused on action among the aspects of food, agriculture, education, environment and health. Especially regarding the food dimensions, the

actions had an impact on food security, food quality and breastfeeding support. To continue the advances that have been achieved, the plan was revised and adopted for the period from 2012 to 2019. Table 5 shows the specific aims of PNSAN.

Table 5 – Specific aims of PNSAN

Dimension of economic means	Dimension of quality of life and welfare
• Adequate supply of the priority food group • Guaranteed access to the priority food group	• Ensure that the Colombian population consumes a complete, balanced, sufficient and adequate diet • Improve the level of utilisation and biological use of food

Source: Government of Colombia (2013)

Supplementary readings

- Economic Commission for Latin America and the Caribbean (ECLAC), 2020. The 2030 Agenda for Sustainable Development in the new global and regional context: scenarios and projections in the current crisis. (LC/PUB.2020/5), Santiago. Available at: https://repositorio.cepal.org/bitstream/handle/11362/45338/S2000207_en.pdf?sequence=4&isAllowed=y.
- Economic Commission for Latin America and the Caribbean (ECLAC), 2021. Building forward better: action to strengthen the 2030 Agenda for Sustainable Development. (LC/FDS.4/3/Rev.1), Santiago. Available at: https://www.cepal.org/en/publications/46696-building-forward-better-action-strengthen-2030-agenda-sustainable-development.
- Economic Commission for Latin America and the Caribbean (ECLAC), 2022b. A decade of action for a change of era. (LC/FDS.5/3), Santiago. Available at: https://www.cepal.org/en/publications/47746-decade-action-change-era-fifth-report-regional-progress-and-challenges-relation

5.2.3 Case study of Mexico

Undernourishment conditions in the population of Mexico remain stable compared to 2017 values, reaching 6% of the population in the year 2020 (the same value as for 2017). Moderate or severe food insecurity conditions in the adult population also show high values and since 2015 (beginning of records), no significant progress has been made in this regard. In 2020, 26% of the population had their food security threatened in some way.

Mexico's national conditional cash transfer programme PROGRESA (Programa de Educacion, Salud y Alimentacion) was created in 1997. It is funded by the Mexican government and the

World Bank with a focus on providing education, health and food in rural areas of the country. In 2001 it started including semi-urban and urban areas as well. The target population of the project are families in food insecurity conditions. To be eligible to receive the financial benefit of the programme, the children in the families should attend school and their family should visit local health centres regularly. The programme covers 40% of all rural families and could promote long-term behavioural change by incentivising children to attend school and the families to frequently attend to medical appointments. Over the years the programme has also included new monetary funding for energy support, support for the elderly and food support to alleviate the crisis caused by the rise in international food prices.

Supplementary readings

- Economic Commission for Latin America and the Caribbean (ECLAC), 2020. The 2030 Agenda for Sustainable Development in the new global and regional context: scenarios and projections in the current crisis. (LC/PUB.2020/5), Santiago. Available at: https://repositorio.cepal.org/bitstream/handle/11362/45338/S2000207_en.pdf?sequence=4&isAllowed=y.
- Economic Commission for Latin America and the Caribbean (ECLAC), 2021. Building forward better: action to strengthen the 2030 Agenda for Sustainable Development. (LC/FDS.4/3/Rev.1), Santiago. Available at: https://www.cepal.org/en/publications/46696-building-forward-better-action-strengthen-2030-agenda-sustainable-development.
- Economic Commission for Latin America and the Caribbean (ECLAC), 2022b. A decade of action for a change of era. (LC/FDS.5/3), Santiago. Available at: https://www.cepal.org/en/publications/47746-decade-action-change-era-fifth-report-regional-progress-and-challenges-relation

5.3 Europe

Ricciolini et al. (2022) performed a multicriteria assessment of the progress of the European countries regarding the SDGs. Their study shows that Nordic countries show the best sustainability outcomes while Eastern European states rank much lower, particularly Romania, Bulgaria and Greece. Most difficulties are related to economic and social dimensions. In contrast, some countries that rank higher in those dimensions display worse improvements in the environmental dimension, for example, the Netherlands or Germany. Resce and Schiltz (2021) reach a similar conclusion. Using an econometric approach, Costa et al. (2021) found (in)compatibilities among some of the SDGs in Europe, showing negative effects on environmental sustainability. They show that the SDG pillars have heterogeneous determinants and suggest reinforcing multi-country compensations.

Measuring progress towards the SDGs over time with a measure based on the Eurostat method, Hametner and Kostetckaia (2020) assessed the EU countries. They show that southern

and eastern European countries that score lower in existing indices display stronger progress towards the SDGs, while sustainability leader countries (e.g., the Nordic) show little further progress. Moczek et al. (2021) evaluate the contribution of citizen science to the SDGs in Europe, given that the Agenda 2030 claims to be participatory. While the surveyed self-assessment of the projects shows a focus on and a potential in SDGs 3, 4, 3, 13 and 15, SDGs 1, 2, 7 and 8 are less important.

SDG designs

Breuer et al. (2019) assess national governments' proposals for institutional designs for SDG implementation in reports from 2016 and 2017. They also explain which political and socioeconomic factors shape these institutional designs. They analyse institutional designs through the interplay between individual dimensions, political regimes, systems of government and forms of state organisation. Interestingly, Breuer et al. (2019) suggest that the grounding of the SDGs locally requires a careful selection of leading ministries and stress that the ministries involved should go beyond the usual. Besides, they suggest a horizontal integration where relevant non-state and local stakeholders are involved. Finally, they stress the relevance of monitoring the establishment of institutional designs.

Mulholland (2018) analyses the national reviews while using other supporting information from surveys. He discusses basic information on the national implementation of the 2030 Agenda and the SDGs, developing and monitoring SDG indicators, mechanisms for vertical integration, evaluating and reporting progress, and stakeholders' engagement in the implementation of the SDGs. Mulholland (2019) focuses on finding good practices of sustainability communication, especially in Finland, France, Germany and Iceland. The author also takes into account stakeholder SDG communication good practices.

A more recent initiative is that of Voluntary Local Reviews. Siragusa et al. (2020) and Siragusa et al. (2022) organised two editions of the European Handbook of Voluntary Local Reviews (VLRs). Ciambra (2021) assesses the VLRs and identifies three pioneering clusters: the Spanish, the Finnish and the German. While the study documents good practices in reporting, including data availability and visualisation, it shows that the comparability of the indicators used in the VLRs with those of the European Handbook (Siragusa et al., 2020) ranges between 5 and 35%.

The UN launched a compilation of SDG implementation success stories in two editions (2020 and 2022), each with a chapter on Europe. In the chapter of 2020, three cases are highlighted as success stories. Firstly, the Modular Applied GeNeral Equilibrium Tool (MAGNET) is a global economic simulation model to assess the impact of global change on food and nutrition security, a more bio-based economy, and environmental, trade and agricultural policy reform scenarios. Secondly, EKOenergy is an ecolabel for energy launched by Finnish non-profit organisations. Thirdly, the electronic Personal Health Record (e-PHR) looks to foster access to health and integration of migrants. Of the three, only the first has a direct impact on SDGs 1 and 2, as part of a general equilibrium model that includes impacts in all SDGs (United Nations Department of Economic and Social Affairs, 2020). In the 2022 version, four initiatives are included, none with

a direct impact on SDGs 1 and 2. Firstly, the Russian International Center for Statistical Expertise (Centrostat) aims to develop statistics. Secondly, the Turkish BOOST Civil Society Technology Challenge aims to accelerate digital transformation among civil society organisations. Thirdly, the British Game Changer Innovation Programme is an extra-curricular innovation programme using design thinking to find solutions to SDGs and foster ingenuity, creativity and innovative design to deliver sustainable solutions. Finally, the Mediterranean Cleanup, led by an NGO in Italy and Greece, is a professional fishing school that teaches fishermen how to fish more sustainably while withdrawing plastic from the sea (United Nations Department of Economic and Social Affairs, 2022).

5.3.1 The successful multi-level implementation of the SDGs in the Basque Country, Spain

The Basque Country shows an interesting case regarding the innovative integratory approach to localise the SDGs under a complex multi-level "SDG Ecosystem" framework. In this Spanish region, SDG 2 is addressed through a renewed rural development plan and an independent association concerned with reducing food waste. The SDGs have become a fundamental decision-making and policy action element for the Government of Spain. A programmatic action plan was designed to implement the SDGs in the short run and to develop a sustainable development strategy until 2030 (partially launched so far). Besides, Spain supports the bottom-up initiatives of its 17 regional administrations, and the Basque Country is one of them. The Basque Country, also called the Basque Autonomous Community (although the historical Basque Country also includes the Spanish region of Navarra and the French provinces of Labourd, Lower Navarre and Soule), is an area of 7 234 km on the northern coast of Spain, close to the French border. It is divided into three provinces, Álava, Biscay and Gipuzkoa, which have a population of 2.2 million. It is a densely populated area, eminently urban. This industrial area has a regional GDP over the national average and is among the better off regarding poverty. The case provides insights into the successful implementation of the SDGs at the local level, focusing on the local food waste network.

SDGs in Spain

Spain has released two National Voluntary Reviews (NVRs) (2018 and 2021, the last only in Spanish). According to the first, which is the richest in figures, the proportion of the population experiencing significant food deficiency was 3.7% in 2017 in Spain. The fundamental causes of hunger could be attributed to social vulnerability and marginalisation. Besides, hunger could be associated with inequality, including social exclusion that affects nutrition, unsustainable consumption patterns and unhealthy lifestyles. Spain has taken actions, for example, the campaign "Know what you eat", among other programmes, which promotes fruit, vegetable and milk consumption in schools aiming to tackle childhood obesity while promoting healthy living habits.

In 2014, 16.9% of the population were obese, 35.7% overweight, and 2.2% had insufficient weight in Spain. In this regard, healthy diets, fresh products (without additives), local products and agroecology are being promoted while bad eating habits are combatted, especially in childhood. Besides, 2 018 802 hectares were dedicated to ecological farming, the largest such area in any EU country, equivalent to 8.24% of all agricultural land in 2015 (this figure increased

to 9.66% in 2019). Of all EU ecological land use, 16.9% is in Spain. Furthermore, this type of farming has increased significantly, from 5.3% in 2008 to 7.5% in 2011 and 8.2% in 2015. However, most of this production is exported.

The National Voluntary Review 2021 contains a brief progress assessment and the Spanish Sustainable Development Strategy 2030. The strategy contains eight country challenges, which include a diagnostic and an associated accelerating policy. Each accelerating policy touches on various SDGs simultaneously, and together these accelerating policies are the pragmatic road to meet the 2030 objectives.

SDG 2 is tackled by the strategic policy lines Accelerating Policies IV, VII and VIII. Accelerating Policy IV “A new economic and economic and productive model green, digital and fair” tackles SDGs 2, 5, 6, 7, 8, 10, 12, 13, 14, 15 and 17. It contains strategies, actions and policies to specifically address SDG 2.

(a) Strategic Plan for the Common Agricultural Policy Post-2020 (PESPAC). Containing instruments to promote an economic, social, and environmentally sustainable agricultural sector.

(b) Digitalisation Strategy for the Agrifood, Forestry and Rural Sector. To reduce the digital divide, foster data use and boost business development and new business models. Complemented with the II Action Plan of the Rural Digitalisation Strategy 2021–2022, the Connectivity Plan 2025, and the European Innovation Partnership EIP-Agri.

(c) Sustainable irrigation policy through its modernisation. A plan to improve the efficiency and sustainability of irrigation systems to enable the more efficient management of water resources and energy consumption, and the protection of traditional livelihoods.

(d) Aid programme for the implementation of energy efficiency actions in agricultural holdings through the autonomous communities. To promote energy savings, improve the competitiveness of the sector and contribute to the global objectives of reducing emissions.

(e) Advertising campaigns to promote the eco-label and water footprint to publicise organic production.

(f) Food chain law. To promote price formation transparency, protect the weakest links in the chain and stimulate trade relations by improving the efficiency of transactions.

(g) Fishing Law on Marine Reserves of Fishing Interest. To protect fishing resources and professional artisanal fisheries locally, under an adaptive management and updated scientific knowledge.

(h) Actions in support of fisheries and aquaculture research. Including training, ecosystemic-based scientific advice for sustainable fisheries management, species not directly targeted by fisheries, and climate change effects assessment.

(i) A state strategy for organic farming. Promoting organic manure and the substitution of synthetic fertilisers to reach 25% of the utilised agricultural area (UAA) in organic farming. Also, to develop and implement fertiliser regulations considering the nutrient cycle and soil improvement. Based on agroecological principles and technological innovations, it focuses on crop requirements to maintain yields and the minimisation of environmental impact. It should consider the generalised use of the Integrated Pest Management strategy.

(j) State Strategy for the Management and Promotion of Extensive Livestock Farming. It establishes the conditions for use in the territory's pasture resources to contribute to the mitigation of emissions, prevent forest fires and conserve certain semi-natural habitats of high ecological value.

(k) Development and updating the spatial ordering regulations of livestock farms.

Accelerating Policy VI "Strengthened public services strengthened for a welfare state democratic and resilient welfare state" tackles SDGs 1, 2, 3, 5, 10, 16 and 17. It contains the following strategies, actions and policies to address SDG 2 specifically:

(a) Nutrition Observatory to promote healthy eating and a non-obesogenic environment. To reduce excess weight prevalence (overweight and obesity), specifically focusing on children and disadvantaged people.

(b) Naos Strategy (Nutrition, Physical Activity and Obesity Prevention). To regulate food advertising aimed initially at children under 12 years of age in order to promote healthy nutrition and eating and to promote physical activity.

(c) A Frontal Nutrition Labelling System. To guide consumers towards healthier food choices and encourage the food industry to improve the nutritional quality of the food supply.

(d) The Spanish Strategy to implement the School Fruit, Vegetables and Milk Programme (from 2017/2018 until 2022/2023). To halt the reduction in consumption, particularly pronounced among children, and to contribute to the strategy to combat obesity and associated diseases.

Accelerating Policy VII "International leadership for a fair, sustainable fair, sustainable, egalitarian, democratic and human rights-based globalisation" tackles every SDG. However, it does not have a direct action to address SDG 2. Accelerating Policy VIII "Social and territorial cohesion. A rural environment with equal rights and opportunities" tackles SDGs 1, 2, 3, 4, 8, 9, 10, 11, 12, 13, 14, 15, 16 and 17. It contains strategies, actions and policies to address SDG 2 specifically a digitisation strategy for the agrifood, forestry and rural environment, with the aim of reducing existing technical, legislative, economic and training barriers.

SDG 2 in the Basque Country

The Basque Country is a leading region implementing a territorial approach to SDGs. Their key concept is the "SDG Ecosystem", a multi-level institutional network that operationalises the

SDGs (Gea Aranoa, 2021; Hidalgo Simón, 2021). The Basque Country has operationalised the implementation of this objective in three aspects:

- Five Government Programme Goals: (a) Improving the competitiveness and sustainability of the agricultural sector, (b) Providing rural and coastal areas with adequate infrastructure and services to ensure living conditions comparable to those in urban areas and living conditions comparable to the urban environment and the maintenance of the population, (c) Revitalising the primary sector as a guarantee for the future, (d) Promoting innovation and research to improve the competitiveness of the agricultural sector, (e) Promoting organic farming and its processing industry.
- Five planning instruments: (a) Osoa Rural Development Programme 2015–2020, (b) Gaztenek 2020 Plan for Young Farmers, (c) Integral Care Plan for Seasonal Work, (d) Food Safety Research Coordination Plan, (e) Organic Farming Plan, and (f) Gastronomy and Food Strategic Plan 2020.
- One legislative initiative: Draft Law to amend Law 10/1998, of 8 April 1998, on Rural Development.

It also includes a dashboard of indicators that recognises the following:

- Three UN indicators: Prevalence of under-nutrition, prevalence of malnutrition among children under five years of age, by type of malnutrition, number of plant and animal genetic resources for food and agriculture, prevalence of malnutrition among children under five by type of malnutrition, per capita growth rates of expenditure or income of households in the poorest 40% of the population
- Two EU indicators: Obesity Index and Gross nutrient balance in the field
- Three governmental indicators: Healthy life years at birth, Obesity rate, Organic farming areas

SDG 2 is approached mainly by the Basque Foundation for Food Safety, which tackles SDGs 2, 3, 12 and 14 together. This foundation has coordinated the Food Waste Alliance since 2018 and involves the governmental departments of Agriculture, Health, Finance and Environment. The alliance participants include the Basque Government, municipalities, retail companies, universities and research centres. Its detailed action plan includes the creation of various working groups that meet at least twice a year and have an operational structure (six to eight people). The groups are dedicated to: (i) Information and data sources, acknowledging the waste hotspots agrifood chain; (i) awareness, outreach and training, focused on enhancing adherence to the manifesto against food waste; (iii) development of guidelines and good practices, (iv) support and promotion of research, prioritising joint actions between food chain operators and research centres. Diverse public and private stakeholders pursue a very specific objective: to halve food waste by 2030.

Multi-level integration

Hidalgo Simón (2021) synthesises the integratory multi-level SDG approach of the Basque Country under the “SDG Ecosystem” for the localisation of the SDGs. The SDG Ecosystem “is

the coordinated design, implementation and monitoring of multi-level, multi-stakeholder strategies, initiatives and actions for the achievement of the Sustainable Development Goals on the ground" (p. 13). The approach is built on three integratory axis:

A. Vertical development: Where the regional, provincial and municipal levels are coordinated.

Firstly, the coordinating strategy is the Euskadi Basque Country 2030 Agenda, structured at the highest administrative level (regional). The accountability of the strategy is ensured by several initiatives at the political and operational levels.

Secondly, specific regional initiatives: (i) Sustainable Bonds financing programmes helping to materialise the SDGs in the territory. In total 2,200 M€ (in four years), 83% were allocated to social and 17% to environmental investments; (ii) Ingurugela network or School Agenda 21, a non-university educational system public network that supports teachers and schools elaborating environmental education plans and programmes; (iii) The Food Waste Alliance (explained above).

Thirdly, the Multi-level Agenda consisted of a two-year co-creation exercise in which representatives from the three administrative levels (regions, provinces and capital cities) met periodically in a two-stage process (40 plus 6 meetings) and produced the document synthesising a "common vision" about common action. It established 50 goals, 204 reference documents and 258 relevant actions.

Fourthly, at the provincial level, various actions took place: (i) The province of Gipuzkoa articulated SDG-oriented budgeting; the aim was to allocate a specific budget for the concrete actions with equally specific SDG targets; (ii) In Araba, a multi-stakeholder alliance for SDGs was built from a previously existing alliance of more than 300 stakeholders gathering academia, industry and civil society. The interesting challenge was to build trust and involve the existing initiatives with specific SDGs; (iii) Bizkaia is adapting its tax collection system to SDGs, taking advantage of the fact that the Basque Country has its own autonomous tax system. The objective is to determine the conditions under which SDG-compliant companies, projects and investments could access a differentiated tax treatment and to implement the regulation in that direction.

Fifthly, at the municipal level, various initiatives were developed. Finally, the Basque Urban Agenda and the neighbourhood regeneration initiatives aim at "bridging" the levels.

B. Implementation activities:

Firstly, training activities for politicians and technicians involving the private sector. Secondly, data measurement (statistics and indicators): the work being done by the Basque Statistical Office on SDG targets concerns both the measurement and the development of indicators.

C. Horizontal development:

It is mainly coordinated under the “Euskadi 2030 Gunea” Guide, which resulted from a pilot project developed by 17 stakeholders (industry, civil society, institutions and others), and consists of an instrument for multi-stakeholder engagement. Besides, the University of the Basque Country and its Agenda 2030 play an important role in this integration.

Lessons learned and takeaway messages

The case of the Basque Country shows how important multi-level integration is in achieving successful implementations of the SDGs. Its “SDG Ecosystem” reveals its complex and interlinked character. How they dealt with SDG 2 is an example of such complex planning. The Basque Alliance for Food Safety, aimed at reducing food waste and increasing food quality, shows how a bottom-up strategy was supported by and articulation of multiple state agencies to tackle the remaining issues related to SDG 2.

Several takeaway messages can be drawn from this case study. Firstly, the SDGs can be more successful when the actions consider initiatives that already have experience and networks. Secondly, matching bottom-up and top-down initiatives requires a great deal of institutional engineering and innovation; therefore, it is crucial to dedicate efforts to building a complex planning system to deal with complex issues. Thirdly, such complex planning must innovate to the broader spectrum of civil society organisations, particularly in “horizontal” integration, between state agencies and beyond.

Supplementary readings

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5.3.2 Improving nutrition with a physical exercise policy? An innovative SDG 2 policy in Helsinki, Finland

Finland is considered one of the most developed countries nowadays. Finland's capital, Helsinki, a city with 656 920 inhabitants within a region of 1 524 489 people, is one of the leading places implementing a multi-level SDG approach. Helsinki has already submitted two Voluntary Local Reviews, one in 2019 and the second in 2021. The city included an action plan for sustainable development as early as 2002, and currently tackles SDG 2 through an innovative programme based on physical exercise, aiming at changing unhealthy lifestyles and tackling the main nutritional problem: overweight.

The SDGs in Finland

The Voluntary National Review (VNR) of Finland builds on existing institutional, follow-up and monitoring mechanisms and relies on data, evaluations, research and reports. The VNR includes chapters written by stakeholders and institutions. The assessment of the progress in each SDG consists of two independent assessments: one by government officials and one by civil society actors. The governments of Mozambique and Switzerland supported Finland in preparing the VNR by reviewing the draft report and sharing their views.

While Finland is at the forefront of SDG progress worldwide and is reaching many social and economic sustainability goals, its main challenges relate to consumption and production patterns, climate action and biodiversity. Besides, obesity is an increasing problem, and gender equality challenges remain.

Finland has enhanced policy coherence by including all ministries in the Sustainable Development Coordination Network. The ministries report information each year, allowing them to include sustainability in the annual policy planning, budgeting and reporting cycle. While the environmental dimension has been successfully integrated into policy, the social one shows more difficulty.

Finland has successfully prevented exclusion by implementing universal social security and service systems and good educational opportunities for the entire population. However, people from minority groups and people with disabilities still suffer discrimination. Under the National Commission on Sustainable Development, Finland's main good practice is its multi-stakeholder approach, which is vital for engaging the whole of society: the public sector, businesses, civil society and private individuals. It stands on the country's long tradition of participatory mechanisms. The engagement of youth, the private sector and cities in implementing the 2030 Agenda has further increased. The other key element is grounding the SDGs through the Voluntary Local Reviews of various Finnish cities and municipalities. Finally, the independent assessment of sustainable development policies and reports is essential, for example, by the Expert Panel for Sustainable Development or the Citizen Panel. The main challenges in the SDG implementation relate to consumption and production patterns, climate action and biodiversity conservation. Other challenges include systematic interconnection of the policy cycle phases, dealing with irreconcilable trade-offs and properly accounting for spillovers.

SDG 2 in Finland

Surprisingly, the Voluntary National Review shows that SDG 2 still has significant challenges for Finland. The country ensures food security, and malnutrition is not an issue. Free school meals and other subsidies secure nutrition, while a preventive health system grants early-stage diagnosis. Besides, agricultural policy follows the EU policy lines. Nonetheless, specific challenges for Finland include obesity and dietary quality. Finland's main problem regarding SDG 2 is prevalent obesity. Poor dietary quality includes overconsumption of energy, salt and saturated fat and under-consumption of fruit, vegetables and wholegrain cereals. Besides, Berg et al. (2019) suggest that SDG 2 still has significant challenges, mainly because of the poor morbidity rate. In 2017, 26.1% of men and 27.5% of women over 30 were considered obese, and 46% of adults were abdominally obese. Besides, obesity affected 4% of girls and 8% of boys aged 2 to 16 in 2018. Regarding nutrition quality, 90% of the adults exceeded the recommended intake of salt and saturated fat in 2017, while only 14% of men and 22% of women consumed at least the recommended daily intake of fruit, berries and vegetables.

Concerning agriculture, the main issue is low profitability. Finland compromises with agricultural development policy, promoting food security, sustainable agricultural production and food value chains, land management and organisation of small-scale farmers.

Helsinki

Helsinki is a leading city in sustainable development in Europe. However, Helsinki's challenges are the same as Finland's: climate change, consumption and biodiversity. Besides, increased inequalities, health disparities, mental well-being, perceived income disparities, housing prices, the deteriorating employment situation and the transition from a linear economy to a circular economy are obstacles to further progress in the SDGs' implementation. The main obstacle is the fragmentation of measures and actions that the city's different organisations perform.

Given such a situation, Helsinki engages in coordination actions (e.g., cross-cutting well-being and health plan and the Carbon-neutral Helsinki Action Plan) and a series of programmes to tackle the SDGs transversally, tackling two and 16 SDGs at the time. Only three tackle SDG 2. These are: The City Strategy 2017–2021 (SDGs 1–16), The housing and land use programme (SDGs 1–4, 7–13, 16), and the COVID-19 recovery plan (SDGs 1–4, 8–13, 16). Besides those general programmes, Helsinki approaches SDG 2 through two strategies related to well-being, given that the main issue is obesity. One is related to improving food quality and the other is focused on increasing physical activity.

The Physical Activity Programme of the city is the central instrument focusing on health and well-being promotion. It aims to increase the daily physical activity of residents of different ages and city employees. The VNR shows some results by age group. Children in Helsinki have an early childhood education plan (*Liikkuva varhaiskasvatus*) in which physical activity plans are adapted to the playground units, supplying bicycles, and training early childhood education staff. Almost all early childhood education units have joined the programme. The city's day-care

centres have received donations of €50 000, and a large communication campaign promoting everyday physical activities for children (*Anna arjen liikuttaa lasta*) has been carried out.

Improved schoolyards for schoolchildren and students, extended counselling for secondary school students, active mobility to and from school are promoted, campaigns with parents are performed, and secondary school students receive digital passes to promote hobbies. In contrast, time for hobbies is allocated at schools in Helsinki. Finally, all upper secondary schools and vocational colleges include the operating model for physical activities at school (*Liikkuva opiskelu*). For the city staff, workstations are provided with workout settings, and city bikes have become part of their benefits. Expert sports coaching has been introduced, aiming to change lifestyles. The promotion has been through contests. For the elderly, more than 70% of home-care clients have a mobility agreement in place, and the agreements are expected to be extended, seeking universality.

Lessons learned and takeaway messages

Finland in general and Helsinki in particular are sustainable development showcases. The most interesting lesson from the case of the City of Helsinki is that they have tackled the main issue they identified regarding SDG 2, obesity and food quality, with an innovative policy based on lifestyle and habit change. The policy requires a multi-level integration framework, age-group targets and interventions in multiple realms of social life (schools, workplaces, free-time hobby places, households and elderly homes).

The main take-home message for replication is that progress can be made by proposing and implementing policies that are outside the box. Particularly, countries that address policies more classically may benefit from innovations such as the exercise policy of Helsinki.

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5.3.3 Promoting local producers' associations to achieve SDG 2 in Latvia, Baltic region

The Republic of Latvia is one of the three Baltic states (Estonia and Lithuania). It has a population of 1.9 million and an area of 64 589 km2. The country has assumed leadership in implementing the SDGs, having released two Voluntary National Reviews (2017, 2022). According to the 2022 review, the main progress on SDG 2 has been the increase in the proportion of the area dedicated to organic agriculture, which was 10,6% in 2010 and reached 14,8% in 2019. Besides, the country is now internally demanding more healthy food and local food production. The Latvian countryside is rich in its diversity regarding land use and production. This trend is linked to the dynamism of the rural sector, considered key in Latvia, and the promotion of rural tourism. However, obesity is a challenge due to limited income to access healthy food and a lack of awareness about healthy eating habits and lifestyles.

SDG 2 in Latvia

Latvia has issued new policies that serve to implement SDG 2. In particular, the Strategic Plan for the Common Agricultural Policy for 2023–2027 and the community-led local development strategies. While the country produces high-quality, healthy and environmentally friendly food, obesity or overweight affects 25% of women and 20% of men. Regarding sustainable agriculture, Latvia has a Land Fund which leases agricultural land to preserve its agricultural use. Besides, it has a low use of agrochemicals (0.84 kg/ha; EU average 2.05 kg/ha).

Latvia has set a series of actions to guarantee the implementation of SDG 2. Firstly, it has developed a dietary scheme for schools based on nutritional balance (fruit, vegetables and milk), helping schools to facilitate and encourage healthy eating habits. State and local governments grant free lunches to primary school pupils (Grades 1 to 4). Besides, regarding agricultural production, products certified under the national food quality scheme or the organic farming scheme are given preferential treatment. Moreover, the government has created a public poverty alleviation scheme in which individual food packs are delivered to disadvantaged households, and hot meals are offered at distribution points.

The Rural Development Programme targets small farmers granting economic and vocational assistance. Agrochemicals are controlled and monitored. Further productive support is granted through a national food quality scheme and through brand recognition.

Latvia has an international engagement promoting export capacities and competitiveness of small- and medium-sized farmers in partner countries. A highlight has been the assessment of Ukrainian small- and medium-sized companies preparing to export to the EU market. More

recently, the country organised a national dialogue called Resilience of the Latvian Countryside for Food and Future Generations.

The National Voluntary Review captures three good practices regarding SDG 2:

- Novada Garša ("Taste of the Region") is a system that traces local food products' origin and quality and has a catalogue of products, producers and processors. It also organises events to raise awareness regarding Latvian local food nationally and internationally. Particularly, the initiative has contributed to promoting over 6 280 local products under local quality labels (organic farming, integrated growing, Green Spoon and Global GAP).
- The School Fruit, Vegetables, and Milk Scheme: The school programme provides preschool and school-age children up to Grade 9 with free fruit, vegetables and milk. The scheme contributes to healthy eating habits through the consumption of fresh products. Children and their families not only learn about the importance of a healthy diet and lifestyle but also become more aware of agricultural production and related aspects of food and nutrition.
- The Latvian Rural Forum unites the Latvian Local Action Groups, which represent the rural population and promote sustainable development in rural areas. These local groups involve public and private organisation partnerships in community-led local development strategies, mainly seeking to develop the local economy by creating non-agricultural jobs. Their partnerships result in territorial cohesion, linking rural, suburban, urban and coastal areas. The Latvian Rural Forum and the EU grant a yearly Great Projects Award for successful rural projects.

One of the most important challenges in Latvia is that the bioeconomy policy ends up favouring larger farms, increasing their income, while the support to smaller farms is less prominent, leading to a progressive reduction in their number, displacing much of the rural population. Besides, agricultural policy has fostered the modernisation of production and processing, while promoting certain export products. However, small-farm productivity is specialising in goods for the local market. Better cooperation is required to strengthen small farms' visibility in international markets. Finally, regarding the promotion of organic food, the main challenge lies in that it is more expensive that conventional food, both being considered healthy. Hence, lifestyle change programmes aimed at promoting healthy nutrition often fail delivering habit reconfigurations.

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Examples of questions for assessment

5. Case studies

- Select a case study in your country that reflects a best practice in terms of achieving the SDG 2 targets in your region. Briefly explain this case study in relation to SDG 2 and explain the best practice that is reported in this case study that will contribute to the achievement of the SDG targets.
- List some good practices that target the implementation of SDG 2.
- What could be your own contribution to SDG 2?
- What impact does your own and everyone's eating habits have on the achievement of SDG 2?

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6. Examples of exercises and assessments

Teachers will be empowered to

- reflect on their understanding of the definition of SDG 2
- reflect on their understanding of the significance of SDG 2
- reflect on their understanding of the interdependencies of SDG 2
- reflect on their understanding of the challenges in implementing SDG 2
- provide an overview of the crises that have a negative impact on the achievement of SDG 2
- explain the regional differences of the impact of climate change, conflict and COVID-19 on the achievement of SDG 2
- give an introductory explanation of the regional progress in achieving of SDG 2
- reflect on their life-style choices and the impact these have on the achievement of SDG 2
- select a suitable case study that reflects good practices in achieving SDG 2 in their own region

Based on the SDG 2 targets and concepts, this section of the manual firstly provides a set of exercises that users (professors, lecturers and teachers) can use with their students to foster ideas, solutions and new initiatives for sustainable development. The level of detail and complexity of these exercises can be regulated according to the educational level of the students. Secondly, a set of shorter assessment questions is also included. These questions cover all the sections in this manual, and require shorter, more to the point answers. For both the exercises and the assessments, users can decide if they want to use them as provided,

adapt them according to their on local context and needs or use them as examples and rather develop their own exercises and assessments accordingly.

6.1 Exercises

- *Food Tales:* Students should research the typical journey of a piece of food from where it is grown to how it ends up on your plate. The exercise promotes an understanding of how daily personal choices have on impact on climate change and how everyday food choices can change our carbon footprint and affect the environment.
- *The fight against hunger:* Students should explore the goal and demonstrate empathy by designing a campaign for those affected by malnutrition. The exercise involves examining the work of the World Food Programme and how it works to eliminate world hunger.
- *Food innovations*: In this exercise, students should examine different ways communities grow food, think about different possibilities of innovation in food production, and make observations, raise questions and develop opinions about urban farming.
- *Food waste:* Students should act as investigators observing the amount of food wasted in the school lunchroom or at a university restaurant/coffee shop. The exercise involves calculating the percentage of food wasted, presenting the data graphically, having group discussions and reflecting on potential changes to eliminate food waste.
- *Mapping the university food system and practices: A*s a first sustainable food project, you may want to map out your university food system and practices. This can help you to understand how the system works, what is already going well and who makes decisions about food purchasing that you may want to influence.
- Check whether (parts of) the catering services at your university are run by the university itself or whether they have been outsourced. Figure out who the suppliers are and which criteria they may already follow.
- *Establishing a campus garden:* Like running a food cooperative, you could also directly grow sustainable food at your university. Green Offices Leuven and Greenwich have done this. By growing food in a campus garden, you can directly control the sustainability standards and can then offer it for free or sell it to your university community. It is also a great project to involve volunteers and get people excited about sustainable food!
- *Running events and campaigns:* If you decide to pick students and staff as the leverage point, a great practice is to run events and campaigns to encourage more sustainable food consumption at your university. A frequent practice is to start sustainable food campaigns at your university to encourage voluntary meatless Mondays, vegan weeks, or other sustainable habits. A splendid example is the SusTasty Food Festival by Green Office Utrecht. Another option is to screen a sustainability documentary related to food, and to then discuss this topic with participants. To get started, you can learn more about how to engage students on the Sustainable Development Goals.

6.2 Assessments

1. Introduction to the SDGs

- Name the five areas of critical importance to which the 17 SDGs are linked and explain why this is referred to as the five Ps.
- Explain the link between the MDGs and the SDGs.
- Explain how the SDGs differ from the MDGs.

2. Defining SDG 2

- What are the three main dimensions of SDG 2?
- What is the focus of the first five targets of SDG 2?
- What is the focus of the last three targets of SDG 2?

2.1 Significance of SDG 2

- What is your explanation of the current large number of hungry people in the world and why is this number increasing?
- What is the status of the progress to achieve SDG 2 by 2030?
- Briefly explain the comprehensive scope and importance of SDG 2 with reference to three main thematic areas covered by this SDG.

2.2 Interdependencies of SDG 2

- Select any three SDGs and briefly explain how they interact with SDG 2. Use examples from your region to illustrate your explanation.
- How is SDG 2 interconnected with the other SDGs? What other SDGs do you think will be most directly affected if SDG 2 is not achieved?

2.3 Advantages of SDG 2

- What would the main advantages be for the world if the goal of zero hunger can be achieved?
- Select any two of the targets of SDG 2 and explain the specific advantages which will manifest with the attainment of these targets. Link it to advantages for your specific region.

2.4 Challenges in the implementation of SDG 2

- What challenges can be anticipated to occur in the reconfiguration of food systems which will be required to achieve SDG 2?
- Explain how the interdependencies of SDG 2 with all the other SDGs provide challenges for the achievement of SDG 2. Select two SDGs to use as examples to illustrate your answer.
- What are the difficulties in implementing SDG 2 in your country? Which are the main barriers? And how can they be overcome?

3. Overview of global crises that have a negative impact on the achievement of Zero Hunger

- Name at least three global crises that affect the achievement of the targets for SDG 2 in your region.
- What are the main factors behind the recent global increase in food prices?

3.1 Climate change

- What negative impact does climate change have on food security in your region?

3.2 COVID-19

- Did the COVID-19 pandemic have an impact on the progress of achieving the various targets of the SDG 2 in your region? Explain whether this impact was positive or negative.
- How is the COVID-19 pandemic affecting SDG 2 targets? Are these impacts positive or negative?
- How can SDG 2 actions help on post-COVID-19 recovery?

3.3 Conflict

- Explain the negative impact of conflict on food security in your region.
- Which is the relation between war conflicts and food security worldwide?

4. Progress towards the achievement of Zero Hunger by 2030

- How does your current life pattern affect the achievement of the SDG 2 targets?
- In your opinion, will the countries in Africa be able to achieve the SDG 2 targets by 2030?
- Which SDG 2 targets have been reversed since 2015? Briefly explain the reasons why the achievement of these targets has regressed since 2015.
- Explain the trend of undernourished people in the African region since 2005.
- Why can some SDG targets not be measured in Africa?
- Explain the factors that would prevent Latin America from achieving Target 2.4.
- Discuss the trend in achieving Target 2.2 in Latin America.
- What needs to be done in Latin America to achieve Target 2.1?
- Why can some SDG targets not be measured in Latin America?
- Explain the focus of achieving SDG 2 in Europe.
- Describe the role that more sustainable agricultural production can play in Europe in the drive to achieve SDG 2.
- What impact does food waste have on Europe's ability to achieve SDG 2?
- Discuss the various environmental challenges that have an impact on Europe's ability to achieve SDG 2.
- What are the main obstacles to achieving SDG 2 in your region/country?

5. Case studies

- Select a case study in your country that reflects a best practice in terms of achieving the SDG 2 targets in your region. Briefly explain this case study in

relation to SDG 2 and explain the best practice that is reported in this case study that will contribute to the achievement of the SDG targets.

- List some good practices that target the implementation of SDG 2.
- What could be your own contribution to SDG 2?
- What impact does your own and everyone's eating habits have on the achievement of SDG 2?

7. Closing statement

This manual provided you with an introduction to some crucial aspects regarding SDG 2, while turning the focus to global crises that currently have a negative impact on its achievement as well as its progress in three regional contexts. Case studies highlighting best practices, examples of exercises and assessments, and supplementary readings formed part of this introduction to SDG 2. In this way you were exposed to a variety of information, resources and perspectives on this SDG and also obtained and developed your own insights. We trust that this has kindled your interest in SDG 2 and why it is so important. Similarly, we trust that this has empowered you to offer a class or a series of classes on SDG 2, and/or to be innovative and develop your own classes, while using some of the information and resources provided.

To be able teach SDG 2 successfully, a working knowledge of its architecture and internal interactions is essential. This boils down to the food security targets (2.1 and 2.2), which highlight the importance of food availability, access to and the utilisation of food. Targets 2.3, 2.4 and 2.5 extend the scope of SDG 2 to agricultural production. In addition, Target 2.3 emphasises income for small-scale farmers, which links with SDG 1 ("No poverty"). However, the latter target needs to be achieved without compromising Target 2.4 (sustainable production practices), and Target 2.5 (preserving genetic diversity). Each of the SDG 2 targets therefore has its own tensions, and the question is how more can be produced in a healthy, sustainable and equitable way, all at the same time.

An equally important take-home message relates to the interdependencies between SDG 2 and all the other SDGs, some with which it operates in full symbiosis. An example is poverty elimination (SDG 1), which is critical to ensure food access. Other examples are good health/well-being (SDG 3) and clean drinking water (SDG 6). Apart from these, a broader set of SDGs concerning the socioeconomic context affects the progress with SDG 2 in general and has been identified as key enablers for its attainment. Several trade-offs exist between SDG 2 and the SDGs related to the environmental context, which complicates matters further. You were also exposed to three regional contexts, which clearly showcase the importance of a localised approach for the implementation of SDG 2 and its associated challenges.

With all the impacts and challenges highlighted in this manual, it is clear that the global food system needs far-reaching changes to support achievement of Agenda 2030. Large-scale transformations will be required both on the supply and demand sides. These include but are not limited to the following:

- Increasing investment, research and innovation in support of sustainable agriculture

- Lowering of agricultural product prices and easier access to food by market and trade integration
- Shifting diets and changing consumption patterns due to its potential to leverage considerable benefits on SDG 2 outcomes
- Reducing food waste and losses and reducing inefficiencies along the food supply chain, in households and in restaurants is an additional lever for sustainable transformation of food systems.
- Implementing transformative pathways for the world's food systems is a win-win across all dimensions, such as reducing food losses.
- Supporting sustainable pathways in the food system through combination of a large number of options on the supply and the demand sides

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