

# Food SECURITY



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## Policy Briefs on Food Security Issues in the Arab Region

**Economic and Social Commission for Western Asia**

# **Policy Briefs on Food Security Issues in the Arab Region**



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# Table of Contents

## **P. 4 Increasing Agricultural Production in the Arab Region**

- P. 4 Summary
- P. 4 Introduction
- P. 5 Policy recommendations

## **P. 12 Arab Food Security: Making the most out of Markets**

- P. 12 Summary
- P. 13 Introduction
- P. 14 Policy recommendations

## **P. 21 Options to Reduce Food Loss and Waste in the Arab Region**

- P. 21 Summary
- P. 22 Introduction
- P. 23 Policy recommendations

### **List of Figures**

- P. 16 **Figure 1.** Logistics Performance Index, 2016 (ranking out of a total of 160 countries)
- P. 22 **Figure 2.** Food loss and waste by commodity (Kcal/Cap/Day)

### **List of Boxes**

- P. 6 **Box 1.** Conservation agriculture
- P. 7 **Box 2.** Rainwater infiltration and harvesting
- P. 9 **Box 3.** Drip irrigation
- P. 11 **Box 4.** Payment for Ecosystem Services (PES) in Jordan
- P. 13 **Box 5.** Trade imbalances
- P. 14 **Box 6.** High-value crops
- P. 24 **Box 7.** Egypt's experience with post-harvest storage
- P. 25 **Box 8.** The Tunisian cold chain
- P. 27 **Box 9.** A Babel of Labels?
- P. 28 **Box 10.** Training of trainers in post-harvest handling of perishables

### **List of Tables**

- P. 8 **Table.** Agricultural water management (AWM) strategies and techniques for improving rain-fed productivity

# Increasing Agricultural Production in the Arab Region

## Summary

Food security is a major challenge in the Arab region. Agricultural production in Arab countries, which continues to be an important livelihood for many of the poorest, is failing to keep up with the demands for accessible and stable food supplies for the region's burgeoning population. Supporting producers to increase production and productivity needs to be done in a manner that improves the efficiency and resilience of farming systems while concurrently improving the livelihoods of the region's vulnerable communities that rely heavily upon agriculture for their food and income. This brief highlights key approaches to sustainable, context-based and climate-smart agricultural production interventions best suited to the unique environment of Arab States, building on the Arab Horizon 2030: Prospects for Enhancing Food Security in the Arab Region report, which reviews the major trends, scenarios and policy interventions for responding to the region's food security challenges.

## Introduction

The Arab region is experiencing unparalleled challenges in terms of population growth, forced displacement, increased water scarcity and soil degradation – all of which have impacted the region's food security. Responding to food insecurity is becoming increasingly urgent. There are several reasons why the situation in the Arab region is particularly problematic. While agricultural production has actually increased across the region, this has been done through the expansion of the amount of land under cultivation rather than increasing crop yields.

### Key policy recommendations

1. Adopt integrated soil, crop and water management techniques.
2. Maximize the potential of rain-fed agriculture.
3. Invest in climate-smart agricultural practices and technologies.
4. Increase the efficiency and resilience of agriculture systems to support rural livelihoods.
5. Invest in research and development to increase the learning and knowledge of value chain actors.

Gaps in supplies of main food staple crops remain high. Over the last two decades, the role of agriculture, both in national economies in the region as well as in the livelihoods of Arab households, has shrunk dramatically, leading to higher vulnerability to food price fluctuations and shocks in the global food market supply. Erratic weather patterns resulting from climate change are likely to further threaten regional production. Simultaneously, increased food demand in other regions, particularly the economic centres in East Asia, is also expected to increase future global food prices. Moreover, conflicts in the Arab region have also significantly decreased both domestic and foreign investments in the agricultural sector.

These social, economic, environmental and geo-political challenges require a redoubling of efforts to sustainably improve yields while, at the same time, increase the efficiency of agriculture systems and their resilience to shocks. This policy brief highlights key recommendations for addressing agriculture productivity issues in the Arab region, as mostly outlined in the report Arab Horizon 2030: Prospects for Enhancing Food Security in the Arab Region.

## Policy Recommendations

### Integrated soil, crop and water management

Adding to the limitations of reduced water availability and efficiency, declining soil fertility and land degradation, due to erosion in rain-fed systems and unsustainable farming practices, are causing salinity and sodicity (high levels

of salt in the water and soil respectively) in irrigated farmlands. This trend has had an estimated economic cost of \$9 billion a year, with salinity alone estimated to have caused some \$1 billion in lost crop yields across the region. In some Arab countries the reduction in soil productivity has been estimated in the range of 30-35 per cent of potential productivity.

*Salinity alone is estimated to have caused \$1 billion in lost crop yields across the region*

Integrated approaches to soil, crop and water management in agriculture allow farmers to optimise productivity and increase resource efficiency while ensuring stable and decent harvests. For the most part, this requires promoting sustainable and climate-smart farming techniques, selecting crop varieties that are less vulnerable to salinity, drought and heat shocks and improving the management of agricultural water use and water-use efficiency.

Smallholder farmers are more productive when integrated approaches to soil and water management are combined with the cultivation of crop varieties with high adaptability to various agricultural conditions. Research has identified water-efficient and drought-tolerant crop varieties.

Faced with increasingly unpredictable rainfall and low organic matter in the soil, smallholder farmers in rain-fed farming systems can offset the impact of delayed rains by growing shorter cycle crops or more drought-tolerant varieties and changing planting dates. Focus should also be put on investment and incentives that promote market-oriented agriculture and maximize income per unit of resources used (land, water, energy and nutrients), by targeting crops that have the highest value added per unit of natural resources and on production patterns that return the highest incomes to farmers.

Efficient and economic water use can be enhanced through soil moisture retention, the efficient timing of irrigation, water saving technologies and controlled cropping environments such as greenhouses and low-cost hydroponic systems. Water management programmes for reuse of treated wastewater or use of marginal water, such as brackish water or drainage water, in dry areas can be further extended across the region, but need to be tailored to specific crop, soil and farm-size contexts. Good practices and conservation agriculture (box 1) can help overcome many of the soil-related factors that reduce crop yield. For example, the low water-holding capacity of sandy soils can be improved through the addition of organic matter, compost or polymer and localised irrigation. Salinity and sodicity problems can be overcome by improving drainage to leach surface salts or through chemical treatment. Growing legumes in crop rotations and using combined fertiliser with supplemental irrigation and other targeted interventions into “technology packages” can also improve soil fertility. In fact, experiments in nitrogen-deficient Mediterranean soils showed substantial increases in wheat yields and water productivity with a combination of supplemental irrigation and the addition of nitrogen.

### **Box 1. Conservation agriculture**

Conservation agriculture offers multiple benefits for farmers in the Arab region, by combining reduced or zero tillage (soil preparation), mulch retention, crop rotation and cover crops. These soil conservation practices control soil erosion and improve soil fertility. Results from research stations as well as farmers’ fields have shown increases in crop water availability, productivity, organic matter in the soil, nutrient availability and pest control, together with savings in labour and fuel costs. There is growing interest in testing and promoting these conservation agriculture methods in the region (Molden, 2007).

## Maximise the potential of rain-fed agriculture

Although there are many pockets of high-value agriculture in the Arab region, especially in irrigated areas, two thirds of farmers practice relatively low-yield, rain-fed and pastoral agriculture dependent on a frail natural resource base. Rain-fed farmers face the challenge of unpredictable rainfall and consequent stress on plants due to inadequate soil moisture. Rising variability and aridity due to climate change is amplifying these challenges. Different approaches are needed for rain-fed farming systems to address the region's low and variable water availability, on the one hand, and low soil fertility on the other hand (box 2).<sup>2</sup>

More attention must be paid by Governments and institutions to rain-fed systems through further research and development and supporting the adoption and adaptation of appropriate technology and innovative solutions to increase yields.

### Box 2. Rainwater infiltration and harvesting

Rainwater harvesting can boost yields by two to three times over conventional rain-fed agriculture, especially when combined with improved crop varieties and minimum tillage methods. The Arab region is home to some of the world's oldest and best practices of in situ water harvesting. Some terrace systems of the Yemeni and Omani highlands date back at least 3,000 years. Technologies range from simple in-field structures diverting water to a planting pit, to structures in the area which divert run-off to storage or run-on to fields, to permanent terraces or dams (Ward and Rucksthuhl, 2017).



Table 1 identifies agricultural water management strategies and techniques that could usefully be developed for improving rain-fed productivity in the Arab region.

Institutional approaches should design integrated development programmes which support:

- Including both cropping and livestock, in research, development and technology adoption;
- Providing farming services such as extension services and strengthening input supply and product marketing along the agricultural value chain;
- Supporting rural finance and rural infrastructure development, particularly farm-to-market roads and water infrastructure;
- Strengthening land tenure jointly with local people (land consolidation, land tenure confirmation and co-management of common or state land, such as forests or rangeland).

### Agricultural water management strategies and techniques for improving rain-fed productivity

Aim	AWM strategy	Purpose	Techniques
Improve water use efficiency by increasing water available to the plant roots	Soil and water conservation	Concentrate rainfall around crop roots	Planting pits
		Maximize rainwater infiltration (box 2)	Terracing, contour cultivation, conservation agriculture, dead furrows, staggered trenches
	Water harvesting (box 2)	Mitigate dry spells, protect springs, extend growing season, enable off-season irrigation	Surface dams, subsurface tanks, farm ponds, diversion and recharging structures
	Evaporation management	Reduce non-productive evaporation	Dry planting, mulching, conservation agriculture, intercropping, windbreaks, agroforestry, early plant vigour, vegetative bunds
Improve water productivity by increasing productivity per unit of water consumed	Integrated soil, crop and water management	Increase proportion of evapotranspiration (ET) flowing as productive transpiration and so obtain 'more crop per drop'	Increase plant water uptake capacity through conservation agriculture, dry planting (early), improved crop varieties, optimum crop spacing, soil fertility management, optimum crop rotation, intercropping, pest control, organic matter management

## Practices and technologies for climate-smart agriculture

Promoting climate-smart agricultural practices and technologies is likely to increase productivity, reduce yield gaps and enhance adaptation and mitigation to climate change effects. Technologies promoting water-use efficiency, such as drip irrigation (box 3), are important but must be tailored to local hydrological and institutional contexts and nurtured in an enabling environment.

There are many appropriate and well-known climate-smart practices and technologies such as use of improved crop varieties, improved livestock breeds, crop rotation, adapted agricultural machineries or innovative agricultural techniques such as zero-tillage. Agricultural yields can also be increased sustainably through the use of precision agriculture, an approach to farming that mobilizes real-time local data to support field-level management. For example, by increasing water- and nutrient-use efficiency through timely interventions during cultivation, farmers can optimise inputs and returns while minimising negative environmental impacts.

### Box 3. Drip irrigation

Drip irrigation can greatly reduce water losses. However, in supporting the uptake of drip irrigation, potential negative impacts (such as loss of groundwater recharge, loss of soil moisture, or increased upstream water use) and challenges (such as affordability) need to be evaluated based on local context when under consideration.

Hyperspectral imaging, which collects and processes information from across the electromagnetic spectrum, enables remote measurement of field data on the health of crops and soils. When combined with specific crop variety data and yield traits, historical weather and climatic records, such data offers targeted, crop-specific guidance for optimal management of pesticide and fertiliser use and can even lead to developing sources of supplemental irrigation. Mapping this data together allows farmers to detect nitrogen, potassium and phosphorus levels, identify weed infestations, crop diseases and crop health, and determine maturity and predict yield. At the national level, regularly developing soil capability maps helps in assessing crop suitability and updating current land-use and master plans.

Geospatial data systems also allow for the mapping and analysis of the effect of climate change on agricultural productivity and production. Simulation results show that changes in precipitation vary considerably across the Arab region. Projections see a trend towards drier conditions, with an increase in the number of consecutive dry days. Hotspot maps show the potential impacts which are primarily associated with declining water due to recurrent drought, degradation of rangelands and desertification.

More targeted use of inputs (water, fertilizers, pesticides, energy, labour) can improve yields, reduce production costs and reduce agricultural run-off and the associated health risks. Another means of support for farmers is through targeted extension services which provide detailed information about crop needs and health, soil properties and weather patterns.

## Supporting rural livelihoods

The majority of households in rural areas of the Arab region rely on agriculture and related activities for their livelihoods, and more than half of the income of small-scale farmers is derived from farming and livestock rearing activities.<sup>3</sup> Climate change will expose them to increased aridity, greater risk of drought and reduced water availability and other climate-induced negative impacts affecting yields, cropping intensity, pasture availability and water demand for irrigation purposes. The combined hazards of climate change will reduce the resilience of agriculture livelihoods and deplete small producers' assets, both natural and financial.

Innovative sources of financing need to be adopted. Payment for Ecosystem Services (PES) provides one such mechanism, in which incentives are offered to farmers to manage their land in ways that support key environmental services. PES can support climate change mitigation, biodiversity preservation and sustainable watershed management. Other services could incentivise food production, erosion management, rainwater harvesting and soil fertility management (box 4).

Smallholder farmers in rain-fed farming systems – which accounts for two thirds of the region's farmers – will be particularly vulnerable to climate change. Policies and programmes need to be developed to protect poor and marginal producers and production systems. Pastoralism should remain an important source of animal products but needs to increasingly rely on purchased animal feed and benefit from proactive drought management to mitigate climate risks. Furthermore, supporting the development of modern rangeland management systems and investment in infrastructure is needed to increase productivity and sustainability.

### Box 4. Payment for Ecosystem Services (PES) in Jordan

In Jordan, arable land is limited. In addition, overgrazing and other unsustainable agricultural and water management practices have significantly contributed to soil degradation caused to wind and water erosion. In response to these challenges, local pastoralist farmers in the Ma'an governorate were trained and paid to conserve local biodiversity, protect soil fertility and conserve water resources by practicing more sustainable grazing practices and rangeland management.

## Research, development and training

Investing in adaptive research, innovation and strategies for risk reduction and mitigation must be promoted if countries in the region are to sustainably boost agricultural production. This can be done through knowledge development and sharing as an interactive process between farmers, technical staff and researchers. Research must focus on building more effective farming systems that not only produce more nutritious food, but also foster market access and improve economic opportunities for smallholder farmers, especially for women working in the agricultural sector.

Now more than ever, in light of the social and environmental challenges to regional food security, the region must begin to adequately fund research and pilot demonstration projects into crops, techniques, technology and strategies to improve agricultural efficiency and resilience. Even in the face of climate change, yields, including cereals yields, can grow significantly through appropriate technological adaptation. Applying improved technologies, practices and strategies to increase water-use efficiency and agricultural productivity can offset the negative impacts of climate change.

### Arab Horizon 2030: Prospects for Enhancing Food Security in the Arab Region

The Arab Horizon 2030: Prospects for Enhancing Food Security in the Arab Region report provides insights and perspectives on the central food security issues affecting the region presently. The report - a collaboration between ESCWA, the FAO Regional Office for Near East and Northern Africa and experts working on the region - also evaluates the potential implications of differing scenarios up to 2030. The core discussions include:

- Expanding populations are increasingly reliant on food imports;
- Access to food is primarily an economic challenge;
- Undernutrition and micronutrient deficiencies exist side by side with obesity;
- Continued important role of domestic agriculture;
- Reliable trade is critical to the region's food security;
- Food loss and waste is an additional concern for the region;
- Simulating future prospects of food security in the region.

The full text of the report can be found at <https://www.unescwa.org/publications/arab-horizon-2030-prospects-enhancing-food-security-arab-region>.

(Full citation: E/ESCWA/SDPD/2017/1).

# Arab Food Security: Making the most out of Markets

## Summary

This policy brief outlines key options for optimising engagement with world food markets that could be adapted to the unique environment of Arab countries, as discussed in the Arab Horizon 2030: Prospects for Enhancing Food Security report<sup>4</sup> which reviews the major trends, scenarios and policy interventions for sustainably responding to the Arab region's food security challenges.

International markets have become increasingly important for ensuring food security for the growing Arab population — a trend likely to continue over the coming decades. As consumption has been rising much faster than production for key agricultural commodities, global markets have helped Arab countries fill the widening production gap. The region, which accounts only for 5 per cent of the world population, imports more than one third of all sheep meat and more than one quarter of all wheat and milk on world markets. The overreliance upon global markets for food security carries inherent risks, most notably the prevailing unpredictability of global food supplies and price volatility, which was exemplified in the global food crisis of 2007–2008. Although food supplies are declining in terms of proportion of value added and exports in most national economies, agriculture continues to be a source of foreign currency for several Arab countries and a main livelihood for rural households, especially those trapped in poverty and most vulnerable to food insecurity.

Effective engagement in world food markets must be done in a manner that not only improves trade imbalances, but also protects vulnerable consumers and producers from food market volatility. Potential strategies need careful consideration if Arab countries are to make the most out of world food markets in ways that ensure protection, stability and food security for the citizens of the region.

### Key policy recommendations

1. Boost domestic production to offset trade dependencies and support rural livelihoods.
2. Improve import infrastructure.
3. Diversify suppliers.
4. Develop strategic stocks.
5. Expand intraregional trade.
6. Enhance regional cooperation and coordination.
7. Invest in other countries to gain direct access to supplies.

# Introduction

World food markets have helped countries in the Arab region fill the production gap created by modest yield improvements in comparison to the significant regional population growth, urbanisation and shifting dietary preferences. Food imports as a share of total earnings from exports are higher in Arab countries compared to world averages, indicating a growing trade imbalance and import dependency. While for some countries this difference is marginal, countries in conflict and the least developed countries (LDCs) experience much higher ratios (box 5).

In addition to import dependency, several Arab countries have high exposure to market shocks due to narrow concentration in the sourcing of commodities. Roughly four fifths of the region's imported calories originate from only five suppliers<sup>5</sup>.

Faced with increased water scarcity and low soil fertility, many countries are progressively cultivating more high-value and water-efficient crops, targeting export markets to generate essential foreign currency reserves and improve trade imbalances. But by relying on world markets for staple foods, such as and for the most part wheat, countries are increasingly exposed to global markets supply and price volatility.

This reliance on world markets creates two interrelated risks for Arab countries: (a) supply risk, in which supplies may not be available on the world market for import; and (b) price risk, in which world market prices increase above levels affordable to an importing country.

## Box 5. Trade imbalances

The ratio of food import to merchandise export is a good measure of food-related trade imbalance since a country is only considered able to afford food imports when food imports account for a small and stable share of export earnings. The ratio for most Gulf Cooperation Council (GCC) countries is usually around 5 per cent as their food import bill is footed by oil and gas resources. In the Maghreb region, the ratio ranges from about 10 per cent in Libya to around 20 per cent in Morocco. The ratio is even wider for the Mashreq region, ranging from about 10 per cent in Iraq to more than 100 per cent in the Syrian Arab Republic. Most Mashreq countries are well above the 50 per cent mark, highlighting the growing problem of food production levels too low to meet local demand. The starkest problem is in the Least Developed Countries (LDCs) where food imports are volatile and consistently above the total value of all merchandise exports. The share of food and animal imports in total merchandise exports reaches 400 per cent in Comoros and well over 500 per cent in Somalia and Djibouti.

With insufficient export revenue to sustain food imports, these countries are highly vulnerable to global food supply shortages and price shocks, and consequently, food insecurity.

In addition to increased regional demand, global supplies of food are likely to be tighter in the future, not least due to increased demand from South and East Asia. Dependence on world food markets is only likely to increase due to numerous factors including regional scarcity of land and water resources, climate change impacts on productivity, decreasing returns on investments in production, higher energy prices, urbanization, increases in population and protracted conflicts.

Several national, regional and global instruments need to be deployed to manage the vulnerabilities stemming from high dependency on food imports and increased trade deficits. These instruments can improve food security in the region by reducing vulnerability of Arab countries and improving the role of domestic agriculture in both reducing trade imbalances and supporting rural livelihoods.

## Policy Recommendations

### National Policy Instruments

#### Increase domestic production

Arab countries with potential to increase food production can invest in the agriculture sector. Investments need to be targeted towards (a) research and development of better adapted high-value crop varieties and livestock, (b) supporting a technological shift to improved efficiency and competitiveness and (c) targeted market-based support to small and medium farms. Such support to the agricultural sector needs to contend with constraints in the region's inherent natural resource endowments – particularly the lack of water resources. As such, investment in domestic production should consider crop water efficiency and productivity. Budgetary constraints may also limit the capacity of poorer Arab countries to provide this kind of support to the agriculture sector. Investments coupled with pricing policies can be influential in providing appropriate incentives for change. Trade can contribute to the conservation of precious water resources by encouraging the production of crops for which the country has a natural comparative advantage and discouraging low value added, high water-intensive crops (box 6).

*Both investments and pricing policies are important to provide appropriate incentives.*

## Overseas investments

High income countries within the Arab region could consider investment alternatives such as promoting agricultural commodity Global Value Chains in the region as well as investing in the agricultural sector of other medium- and low-income countries to gain direct access to food supplies. Global Value Chain companies could specialize in food trading and processing for the benefit of Arab region consumers by developing and operating food procurement and processing facilities worldwide, as seen in developed countries and in East Asia. In this way, the region could build on the experience acquired by GCC countries, which, in lieu of increasing production domestically, have taken steps to control production beyond their borders, investing in land-abundant countries such as the Sudan, through the purchase or lease of land. However, the “outsourcing” of food production to poor and generally food-insecure countries has been a significant but controversial development. While it is often presented as a win-win enterprise, concerns have been expressed about the appropriateness and sustainability of some land acquisitions. Practical concerns revolve around how to regulate such investments to maximise both economic and social benefits while minimising risks. For such projects to be mutually beneficial, issues of land tenure rights, compensation, employment generation, distribution of harvests and other benefits should be appropriately considered. Careful planning and transparency by recipient and investing countries is needed for land acquisition projects to be successful and fair to both parties.

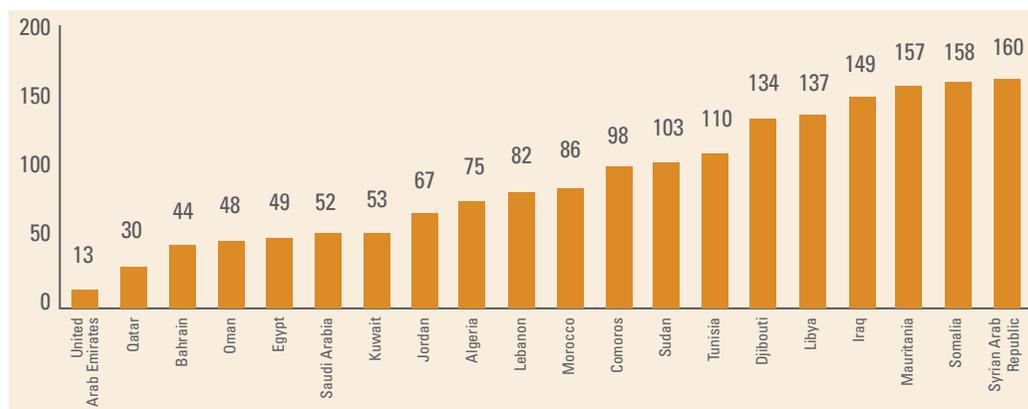
## Improve import infrastructure

Reducing cost of food imports can support food security. This is because affordability is the primary factor constraining imports. There is considerable room to reduce the cost of imported food by investing in the infrastructure to store and transport food, and generally improving the import supply chain management and logistics. The performance of the import supply chains varies considerably throughout the region.

### Box 6. High-value crops

Many Arab countries have developed a high-value, export-oriented agriculture sector, with investment, production and marketing managed, for the most part, by the private sector. Countries have simultaneously protected the critical role of smallholders in agriculture livelihoods by maintaining rural development programmes and supporting agricultural research, extension projects, infrastructure support and input supply. In many countries, considerable progress has been made towards integrating these “two agricultures”: for example, one objective of Morocco’s Plan Vert is to enhance the livelihoods of smallholders by progressively bringing them into market-oriented production through the cultivation of high-value crops.

**Figure 1. Logistics Performance Index, 2016 (ranking out of a total of 160 countries)**



While some countries experience bottlenecks at ports, others have inefficient inland transportation systems. The Arab region scores poorly on the World Bank's Logistics Performance Index (figure 1). Three of the lowest ranking countries in the world are in the region, due in part to current ongoing conflict. Average import supply chain costs

*Average import supply chain costs of wheat in 2009 were \$40 per metric ton for ten Arab countries – four times the average of the Netherlands.*

of wheat in 2009 were \$40 per metric ton for 10 Arab countries – four times the average of the Netherlands.<sup>6</sup> Initiating awareness of improved transportation and storage practices has potential to improve the food supply and reduce the demand for foreign food, as well as have an indirect impact on the expansion of domestic agricultural production.

## Supplier diversification

The impact of global food systems and market shocks can be reduced by diversifying import partners. The global food crisis of 2007-2008 raised awareness of supply and price stability risks associated with dependence on the global market. One way to respond to supply risks is through greater diversification of trading partners and suppliers. For most countries, historical trade ties determine the bulk of both imports and exports. As a result, some countries' trade is concentrated with a limited number of suppliers, increasing vulnerability to supply risk. Diversification in the sourcing of imported supplies is an effective way to reduce such exposure to global price shocks. Sourcing bulk food supplies usually involves a public tendering process, in which supplies are obtained from the most competitive bidders. The more transparent and open-to-entry this process is, the more it encourages broader participation of traders and favours greater diversification of suppliers.

Additionally, price risks can be transferred to exporting trading partners through long-term arrangements, including forward contracts or options for the delivery of a certain quantity of a particular commodity at a certain price and at a given time. Arab countries need to hedge price risks through appropriate financial market instruments by paying a premium proportional to the degree of protection desired, which would be a viable and recommended strategy for food import.

### Develop strategic stocks

Countries can also invest in price stabilisation stocks or “buffer stocks” of food. The public sector buys commodities when prices are low and releases the food stocks into the market when prices are high, reducing shortage-induced price increases. Creating national or regional food security stocks in the Arab region have been frequently raised as an option in recent years. Some countries have already implemented sizeable food security stocks purchases. For instance, Saudi Arabia has a wheat reserve to cover eight months of national needs and is aiming to expand to 12 months’ supply.<sup>7</sup> Because stocks are expensive, the risk of tying up capital and food waste and loss is an issue, so careful management of stocks is of critical importance, particularly as releasing stocks during global price hikes can be viewed as equivalent to providing a price subsidy to the rest of the world.

## Regional policy instruments

A variety of instruments are also available at the regional level that can help Arab countries respond to the common challenge of growing dependence on imports. These include expanding intraregional trade, coordinating on market information and coordinating on physical stocks and developing food-related funds.

### Expand intra-regional trade

For most countries of the region, intraregional trade accounts for less than 10 per cent of total trade – significantly lower than what would be expected based on the region’s shared economic, cultural and geographic characteristics. Limited regional integration results between 1 and 2 per cent of forgone GDP growth. Some steps have been taken including removal of intraregional tariffs under the Greater Arab Free Trade Area (GAFTA) agreement and investments in roads and telecommunications that reduce the cost of trade.

*Limited regional integration results in forgone GDP growth between one and two percent.*



However, there is enormous untapped potential for regional cooperation, especially in reforming non-tariff measures and harmonising regulatory frameworks (for example, phytosanitary and technical regulations, testing and certification) and adopting regional good agricultural practices for improved food safety. Several World Trade Organization member countries in the region have signed the Trade Facilitation Agreement (TFA) which entered into force in February 2017, but all Arab countries need to be part of it. The TFA expedites the movement, release and clearance of goods across borders, streamlining and standardising clearance procedures and practices, reducing fees and formalities connected with the import and export of goods, putting faster clearance procedures in place and enhanced conditions for freedom of transit for goods. Reducing the time that food supplies spend in transit is critically important to food security as reducing the amount supplies in the pipeline allows a quicker response to market needs and emergencies. Such measures also have a positive impact by facilitating the export of products and making them more competitive in global markets.

### Regional cooperation and coordination

Regional coordination of information and data collection could reduce the cost for each of the countries involved by taking advantage of economies of scale. Recent episodes of price volatility revealed major gaps in the capacity of Governments to assess and respond quickly to crisis situations and impeding market shocks.

Market information on basic foodstuffs at a regional level was inadequate and slow, creating uncertainty and panic behaviour among consumers. To improve the information base, Arab countries should develop a regional early warning system with more reliable estimates of regional stocks, domestic production and movement of food supplies, as well as setting up a mechanism for coordinating policy actions. A regional system could complement the Agricultural Market Information System, an international platform established to enhance food market transparency for food security, of which Saudi Arabia and Egypt are already members.

*A common regional position on trade issues needs to be identified*

Regional cooperation and coordination can also reduce investment costs for physical stocks of food. Developing regional reserves could entail the earmarking a percentage of each country's national reserve to be put into a regional food reserve. Regional food stocks provide greater price stability, facilitate movement of supplies across borders and make coordination of market information easier.

An Arab Food Security Fund was proposed by various international institutions and the League of Arab States but has yet to materialise. Such a fund could be designed to provide relief during food shortages or emergencies and ensure a rapid response, without the need to secure additional resources, as is currently the case for international humanitarian interventions.

Key investments in overseas operations can also be focused within the region. This may not only help secure supplies of produce grown overseas, but also further enhance regional cooperation, particularly around investment and strategic stock management. In countries suitable for hosting such investment, such as the Sudan, these investments can also provide important funding streams for improving domestic infrastructure and expanding productive capacity.

Multilateral trade issues, especially relating to the food sector, need to be assessed in a broader regional context given the similarities in trade profiles and existing regional integration agreements, such as GAFTA. Identifying common regional positions on trade issues will help increase the predictability of world food markets, improve the lobbying capacity of Arab countries and facilitate intraregional food trade.

Establishment of food assistance programmes for vulnerable Arab countries is essential given the high import dependency and frequent emergencies they face due to conflicts and other adversities.

This could take the form of in-kind Government-to-Government food assistance or a broadening of the food aid donor base beyond traditional contributors. Globally, proposals for the establishment of food import financing facilities should be looked at favourably to enable eligible countries to get short-term credit facilities to face soaring food import bills.

### Arab Horizon 2030: Prospects for Enhancing Food Security in the Arab Region report

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# Options to Reduce Food Loss and Waste in the Arab Region

## Summary

This brief outlines key policy options for tackling the issue of food loss and waste that is relevant to food security for Arab countries, as discussed in the report Arab Horizon 2030: Prospects for Enhancing Food Security in the Arab Region.<sup>8</sup> The report reviews the major trends, scenarios and policy options for responding to the region's food security challenges in a sustainable manner.

Food loss and waste received increased attention at national, regional and global levels after the global food crisis of 2007-2008 when nations recognized that the negative impact of price shocks on food availability would have been less harmful if less food was being lost or wasted.

Food loss and waste imposes multidimensional challenges on global food systems and affects the resiliency of markets, producers and vulnerable consumers. Across the different stages of the agricultural value chain, food loss and waste result in increased costs of production, reduced revenues and water productivity and decreased efficiency of agricultural systems that are the source of livelihoods for numerous stakeholders in the food value chain.

Addressing and reducing food loss and waste provides an entry point for tackling food availability, utilization and affordability issues in the Arab region. With a holistic approach to the development of food systems, namely from production to consumption and disposal, policymakers can directly increase food availability within the region and improve trade balances, indirectly improve the livelihoods of producers and retailers and physically reduce the rate of water and soil resource depletion.

### Key policy recommendations

1. Promote a food chain-wide approach.
2. Mobilise new and appropriate technologies and techniques in storage, conservation, packaging, processing, infrastructure and cold chain.
3. Promote consumer behaviour change.
4. Promote education, training and research including setting up national research programmes, building capacity and recognising the crucial role of women.
5. Avoid food waste by promoting alternative use such as donating to food banks or adding value to by-products.

## Introduction

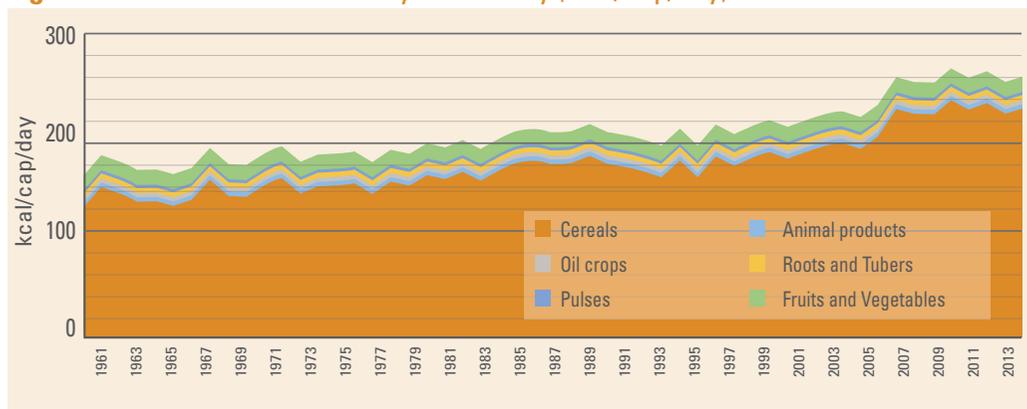
Food loss refers to decreases in food mass occurring during the stages of production, harvest, post-harvest handling and storage, processing and retail, all prior to consumption, because of inappropriate practices and technologies. Food waste refers to decreases in food mass occurring at the end of the food supply chain at the consumption stage due to inappropriate practices. Both significantly reduce the quantities of available and accessible food, through poor handling, storage, processing and behavioural practice resulting in food degradation, contamination, deterioration or wastage. They negatively affect income and revenues of food producers and retailers, increase prices for consumers and waste the water, energy and soil nutrients used in the production, handling, processing and delivery systems. In weight terms, it is estimated that about one third of food produced globally is either lost or wasted, which is about one quarter of the global food produced in caloric terms. The issue of food loss and waste is central to socioeconomic development and features in the Sustainable Development Goals, in which countries committed to “halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains including post-harvest losses” by 2030 (SDG 12.3).

For the Arab region, the key drivers of food loss are mainly inadequate farming and post-harvest handling, practices resulting in damages during transportation and processing and/or pest infestations during storage. Food loss at the retail level is a result of deficient market infrastructures, including inadequate refrigeration, poor transportation and reliance on open air stalls where food products are exposed to heat, humidity, etc. leading to accelerated food degradation. At the consumption level, food waste is invariably due to overstocking and oversupply.

The Mashreq countries have the largest amount of food loss and waste in the Arab region, followed by the Maghreb, and the GCCs and finally LDCs subregion. At country level, the highest levels of food loss and waste are found in the United Arab Emirates and Egypt. For commodities, cereals contribute most to the observed food loss and waste, followed by fruits and vegetables and then roots and tubers (see figure 2).

Tackling the challenge of food loss and waste is essential as member States attempt to improve the sustainability of food systems and ultimately food security. The following sections discuss core policy areas where interventions can be made to significantly reduce food loss and waste in the Arab region.

**Figure 2. Food loss and waste by commodity (kcal/cap/day)**



## Policy Recommendations

### A food chain approach

Food loss and waste accumulate progressively along the food chain – from production to consumption. As such, a food chain approach whereby interventions and their impacts are considered along the whole food supply chain through an integrated manner must be promoted and adopted. There are many causes of food loss and waste that are associated with the lack of coordination and management in food chains. A systemic approach helps to trace the causes of loss and waste back to specific stages and to ensure improvements at one stage of the chain can be sustained along other stages to reach consumers at the end of the chain. For instance, capacity-building efforts at the farm level could improve post-harvest handling of products but may not be maintained by traders handling the produce subsequently. A food chain approach will highlight the need to prioritise capacity-building and awareness efforts for traders and middlemen in addition to targeting farmers. Sometimes, traders and middlemen handle products for greater lengths of time, and with greater risk when bulk buying, aggregating, handling, processing and reselling is practiced by the same actor.

### Technology and techniques

For the Arab region to effectively reduce food loss and waste, it needs to adopt appropriate technology and innovative practices and learn from successful initiatives within the region and from other regions of the world.

## Improve storage and conservation

Storage conditions must be improved all along the food chain. In the grain chain, there are several post-harvest technologies that can help preserve stored grains from pest infestation and contamination. There are numerous examples, which include, among others, metal silos and grain bags (box 7) and low-cost evaporative cool storage for fruits and vegetables, which controls humidity and reduces air temperature below 10°C to conserve the quality of fruits, vegetables and horticultural produce, extending the shelf life up to 90 days. Other low-cost pre-cooling methods, controlled atmosphere storage facilities and ripening chambers have been developed for rural areas to help producers maximise their export opportunities.

## Mobilise technology in transport and packaging facilities

The adoption of technological innovations during transportation and handling can greatly reduce food loss and waste in the Arab region. These can range from costly cold chain refrigerated shipping units, to the use of simple tarpaulins drawn over trucks when transporting grains or to ensuring adequate ventilation in trucks when transporting livestock or fresh produce. By encouraging food traders to transport food in the cooler evening hours, product deterioration can be greatly reduced due to lower temperatures and less time spent in traffic.

In addition to facilitating the storage and transportation of food (reducing shipping times and produce damage), improved packaging can also maintain food hygiene and safety levels. Thus, Arab countries can reduce losses incurred at most stages of the food chain by supporting the use of improved packaging.

### Box 7. Egypt's experience with post-harvest storage

Egypt has been at the forefront in the reduction of food loss through the dissemination of post-harvest storage improvement. Low-cost horizontal silage field bags have offered a rapid response to local and regional storage issues. Suffering from up to 25 per cent grain storage loss, Egypt successfully tested their effectiveness, which resulted in the storing of some 2,000 tons of wheat in Dakahlia province. The cost was significantly lower than for both burlap and metal silo storage systems. Changes in CO<sub>2</sub> levels inside the silo bags, grain moisture content, fungal and microbial load count, percentage of aflatoxins, insect count, and physical, mechanical and other qualitative changes to the grain were monitored, with minimal losses in grain quality and quantity reported. Long distances between production areas, ports and processing facilities also make horizontal wheat silo bags an important instrument for expanding national storage capacity and efficacy. It also has potential for reducing storage losses affecting other grains and legumes.

## Invest in infrastructure

Improving infrastructure and trading facilities is necessary to reduce food losses. Improving roads, market infrastructure, access to electricity, water and sanitation networks in addition to developing food processing and packing centres, local storage facilities and providing rural financing to access such services are just some of the many ways governments can help reduce the rates of food loss across the Arab region. Improving the agro-logistics infrastructure allows producers to more accurately and timely respond to market demand for a particular produce, reducing the likelihood of the wrong quantities and specifications of food being taken to market. This also reduces the likelihood of quality decay and complements other interventions along the food chain, such as the establishment of processing centres, warehouses and collective storage units. Collective storage units offer smaller producers options to store produce near wholesale markets, rather than transporting unsold produce back to the farm, thus reducing damage and deterioration during transit.

*Almost one quarter of perishable foods are lost in the Arab region due to the lack of use of refrigeration.*

## Invest in cold chain improvements

Almost one quarter of perishable foods are lost in the Arab region due to the lack of use of refrigeration. By maintaining optimal temperature ranges for produce from the point of production to the point of consumption, Arab countries can reduce this figure considerably, and support producer livelihoods. From pre-cooling, to cold storage, to refrigerated transportation, to the chilled display of produce in supermarkets – Governments of the region can work with the private sector and development partners to both reduce food loss and improve food safety by investing in cold chain development (box 8). In addition to regulation, financing incentives and capacity-building around the cold chain, governments could also introduce collective cold storage facilities as a way of supporting smaller producers in improving the shelf life of their products.

### Box 8. The Tunisian cold chain

The Tunisian Government identified raising food safety and cold chain development to international standards as a core element of their national food security strategy. By developing a national cold chain plan and providing incentives for investors, the government has increased the country's cold chain capacity by 65 per cent in a decade. The country now has some 3,000 refrigerated and 1,500 isothermal vehicles, though most are used in the export market for high-value crops.

## Improve food processing capacity

Effective food processing is an important way of conserving perishable produce, adding value to agricultural commodities, and reducing food loss in the supply chain. The shelf life of produce can be extended through pasteurisation, sterilisation, waxing, canning, drying and other processing and packaging techniques.

During peak harvesting seasons or with bumper crops, efforts to reduce post-harvest losses should be pursued through the effective processing of fruits and vegetables into value added produce such as jams, juices, concentrates, dried products and purees. These efforts can, again, be supported through the dissemination of knowledge, training and financing so that a greater range of producers can access packaging technologies along different stages of the food chain. Supporting the processing of food can also support food security by making locally sourced processed food available to urban consumers thereby supporting rural livelihoods and reducing trade imbalances. Efforts should also be made to promote information-sharing and market insights on consumer preferences, demands and retail sector trends.

## Changing behaviours

### Promote retailer and consumer behaviour change

Retailers and consumers must be more actively involved in reducing food waste. Retailers and retail associations should be encouraged to reduce their inventories notably for perishable commodities and to donate unsold perishable products those close to their expiry dates to foodbanks and other such entities. They should also be engaged with raising awareness to consumer food waste issues. Such campaigns could include promoting the purchasing of sound produce that does not meet the high cosmetic and uniformity standards often expected in supermarkets.

For consumers, change can be promoted by supporting improved household level consumer behaviour through public awareness campaigns, cooking programmes and other social media efforts. Consumers can be encouraged to better plan food purchases and portion sizes, more efficiently store food at home, share recipe ideas on how to use leftovers and learn more nutritious methods for preparing food. Consumers can also be helped to overcome confusion about different food date labels, which can lead to the premature disposal of food (box 9).

### Box 9. A Babel of Labels?

In 1985, the Codex Alimentarius outlined a general, voluntary international standard for labelling prepackaged food. It included the following distinctions between labelling dates:

**Date of Manufacture** – the date on which the food becomes the described product.

**Date of Packaging** – the date the food is packaged in the retail container.

**Sell-by Date** – the last date of offer for sale to the consumer (but after which there is a reasonable storage period at home).

**Best Before** (also “Date of Minimum Durability”) – the end date of the period under which the product is fully marketable and will retain any specific qualities for which tacit or express claims have been made. The food may, however, remain fully safe for consumption after this date.

**Use-by Date** (or “Expiration Date”) – the end date of the estimated period after which the product will not likely retain the quality attributes usually expected by consumers, and not regarded as marketable.

The Codex is voluntary, and unevenly followed across the world. Some manufacturers use other terminology such as ‘display until’ or ‘freeze-by’ which further adds to the confusion.

**Source:** [www.fao.org/fao-who-codexalimentarius/code-texts/list-standards/en](http://www.fao.org/fao-who-codexalimentarius/code-texts/list-standards/en).

## Other ways to reduce waste

### Support food banks

Food banks offer a means of reducing food waste by collecting and redistributing otherwise discarded edible food to people in need. Their promotion can also prove vital in raising public awareness about both food loss and waste and food insecurity. In Egypt, a food bank initiative takes advantage of leftover food from hotels and restaurants by sorting, repackaging and redistributing it to the needy. The food bank has partnered with the Egyptian Hotel Association, reaching around 400 hotels, restaurants and local coffee shops and serving more than 17 million meals per month.

### Adding Value to by-products

Further industrialisation of different stages of the food processing sector – pre-cooling, washing and disinfection, peeling, trimming, deseeding, cutting to specific sizes, sorting defects, dipping, drying, storage, packaging, labelling and distribution – will allow Arab countries to generate new revenue streams from production of by-products, reducing food waste. When localised in rural areas, transportation costs and urban waste can also be reduced. When organic food waste is composted, it can be used as organic fertiliser. Such waste can also be used to generate methane for energy production and to reduce landfill.

## Education, training, research

### Develop national research programmes

Arab countries should support national research programmes assessing the quantities, causes and opportunities for reducing food loss and waste. More accurate measurement of food loss and waste issues, at all stages of the food supply chain and at the retail and consumption stages, is needed on a country by country basis. Development of new and more efficient methods to reduce food waste and loss is also needed along the entire food supply chain from both the private and public sectors. Equipped with better information, policymakers, the private sector and consumers can then mobilise efforts.

### Capacity-building, training and extension services

Through education, training and the provision of extension services to farmers and food chain stakeholders, capacity is improved around the issues of food losses and waste. This can entail the dissemination of improved production practices, processing procedures and agro-logistics techniques, not least around post-harvest issues (box 10). Capacity-building efforts should not neglect training for essential maintenance, repairs and handling of machinery employed along the food chain.

### Support the crucial role of women

Given the key role women play in the food supply chain, notably in food production, processing, retail and consumption, additional efforts need to be made to remove all barriers hindering their participation and contributions. Women working in these fields often lack adequate knowledge of good practices and lack access to capital and resources that could help them reduce food loss and waste. Regional policymakers can contribute positively to reducing food loss and waste by giving more prominence to gender issues affecting the food sector.

### Box 10. Training of trainers in post-harvest handling of perishables

The Postharvest Education Foundation (PEF) is a private sector initiative and a non-profit organization training young people on various aspects of post-harvest handling of perishable commodities including fruits, vegetables and root crops. It offers trainings on topics relating to different aspects of post-harvest handling, including optimal harvest times, food safety, and perishable food processing for longer shelf life. Farmers, food traders and marketers are all taught, and encouraged to deliver training in their countries.

Source: [www.postharvest.org](http://www.postharvest.org).

## Arab Horizon 2030: Prospects for Enhancing Food Security in the Arab Region report

The Arab Horizon 2030: Prospects for Enhancing Food Security in the Arab Region report provides insights and perspectives on the central food security issues affecting the region presently. The report - a collaboration between ESCWA, the FAO Regional Office for Near East and Northern Africa and experts working on the region - also evaluates the potential implications of differing scenarios up to 2030. The core discussions include:

- Expanding populations are increasingly reliant on food imports;
- Access to food is primarily an economic challenge;
- Undernutrition and micronutrient deficiencies exist side by side with obesity;
- Continued important role of domestic agriculture;
- Reliable trade is critical to the region's food security;
- Food loss and waste is an additional concern for the region;
- Simulating future prospects of food security in the region.

The full text of the report can be found at <https://www.unescwa.org/publications/arab-horizon-2030-prospects-enhancing-food-security-arab-region>.

(Full citation: E/ESCWA/SDPD/2017/1).

## Endnotes

1. David Molden, ed., *Water for Food, Water for Life: A Comprehensive Assessment of Water Management in Agriculture*. (London, Earthscan, and Colombo, International Water Management Institute, 2007).
2. Christopher Ward and Sandra Rucksthuhl, *Water Scarcity, Climate Change and conflict in the Middle East: Securing Livelihoods, Building Peace*. (London, I.B. Tauris & Co., Ltd, 2017).
3. [https://www.soas.ac.uk/cedep-demos/000\\_P535\\_SRL\\_K3736-Demo/module/pdfs/p535\\_unit\\_01.pdf](https://www.soas.ac.uk/cedep-demos/000_P535_SRL_K3736-Demo/module/pdfs/p535_unit_01.pdf).
4. United Nations Economic and Social Commission for Western Asia, *Arab Horizon 2030: Prospects for Enhancing Food Security in the Arab Region*. (E/ESCWA/SDPD/2017/1).
5. The average degree of concentration in sourcing is 0.89.
6. World Bank and FAO, *The Grain Chain: Food Security and Managing Wheat imports in Arab Countries*. (Washington, D.C., the World Bank, 2012).

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