



Barilla
Center
FOR FOOD
& NUTRITION

FIXING FOOD: THE MEDITERRANEAN REGION

BUILDING SUSTAINABLE FOOD SYSTEMS
THROUGH CAPACITY-BUILDING AND CO-OPERATION



Written by

The
Economist

Intelligence
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LIST OF ABBREVIATIONS

ANSES: Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail	Superior de Investigaciones Cientificas (Institute of Marine Science)
BCFN: Barilla Center for Food & Nutrition	ICZM: Integrated coastal zone management
CA: Conservation agriculture	IOC: Intergovernmental Oceanographic Commission
EBRD: European Bank for Reconstruction and Development	JRC: Joint Research Centre
EC: European Commission	MAP: Mediterranean Action Plan
EU: European Union	MSSD: Mediterranean Strategy for Sustainable Development
ENP: European Neighbourhood Policy	NGOs: Non-government organisations
EPODE: Ensemble Prévenons l'Obésité Des Enfants	SCP: Sustainable consumption and production
FAO: Food and Agriculture Organisation of the UN	SDGs: Sustainable Development Goals
FLW: Food loss and waste	SEMCs: Southern and eastern Mediterranean countries
FSI: Food Sustainability Index	UNDP: UN Development Programme
GDP: Gross domestic product	UNEP: UN Environment Programme
GMOs: Genetically modified organisms	UNESCO: UN Educational, Scientific and Cultural Organisation
GNI: Gross national income	WHO: World Health Organisation
HDI: Human Development Index	WFP: World Food Programme
ICM-CSIC: Institut de Ciències del Mar-Consejo	

ABOUT THIS REPORT

Fixing Food: The Mediterranean Region investigates food sustainability issues in the Mediterranean in the context of the various social, economic and environmental challenges confronting the region. As a framework, it uses the three pillars—sustainable agriculture, nutritional challenges, and food loss and waste—of the Food Sustainability Index (FSI), developed by The Economist Intelligence Unit with the Barilla Center for Food & Nutrition Foundation (BCFN). Please refer to our earlier report, *Fixing Food: towards a more sustainable food system*, for a detailed explanation of the index and its composition.¹

The objectives of the Mediterranean Strategy for Sustainable Development (MSSD) 2016-25 provide a key reference point for the briefing paper.² The MSSD, formulated by the UN, seeks to achieve a sustainable future for the Mediterranean by ensuring that efforts to promote socio-economic development are also closely linked with moves to protect the environment. This briefing paper also draws on examples from the following countries: France, Greece, Italy, Portugal and Spain (in the northern Mediterranean) as well as Egypt, Israel, Jordan, Lebanon, Morocco, Tunisia and Turkey (the southern and eastern Mediterranean countries). Portugal and Jordan—which do not directly border the Mediterranean—have been included in the study, as they share many of the characteristics of the respective

sub-regions to which they have been allocated. All 12 of the aforementioned countries are included in the FSI (which covers 34 countries globally).

The Economist Intelligence Unit wishes to thank the following experts, who kindly agreed to participate in the interview programme for this report:

- Francesco Branca, director, Department of Nutrition for Health and Development, World Health Organisation
- Marta Coll, researcher, Institute of Marine Science
- Spyros Kouvelis, chief advisor, Business Development; senior advisor, Sustainable Development, UN Environment Programme-Mediterranean Action Plan (UNEP-MAP)
- Andrea Toreti, senior scientist and scientific officer, European Commission's Joint Research Centre
- Ivica Trumbic, chief technical advisor, UN Development Programme—The Intergovernmental Oceanographic Commission of the UN Educational, Scientific and Cultural Organisation; former director, Priority Actions Programme Regional Activity Centre, UNEP-MAP

This report was written by Neil Dougall and edited by Martin Koehring of The Economist Intelligence Unit.

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¹ Barilla Center for Food & Nutrition, *Fixing food: towards a more sustainable food system*, written by The Economist Intelligence Unit, 2016. Available at: <http://foodsustainability.eiu.com>

² UNEP/MAP, *Mediterranean Strategy for Sustainable Development 2016-2025: Investing in environmental sustainability to achieve social and economic development*, 2016. Available at: https://planbleu.org/sites/default/files/publications/mssd_2016-2025_final.pdf



FOREWORD BY THE BARILLA CENTER FOR FOOD & NUTRITION



Food systems today are facing the enormous challenge of feeding an increasingly growing and urbanised population generally demanding a more environmentally intensive diet, while restoring and preserving ecosystems for the health of the planet for present and future generations.

Nutritional challenges affect all countries in the world. Malnutrition affects one in three people. More than 815m people suffered from hunger in 2016, 38m more than the previous year,³ largely driven by violent conflicts and climate-related shocks. The level of people recorded as overweight and obese has reached epidemic proportions, with countries showing no decline in these trends. Food production, distribution and consumption patterns pollute the environment and contribute to climate change. Our food choices are responsible for about a third of man-made greenhouse gas emissions. Land, energy and water already face major competition and require a rethinking of the approach throughout the whole value chain. Last, but not least, food is lost and wasted along the supply chain, from production to consumer level, and at the same time food is losing quality and value in society.

The 17 Sustainable Development Goals (SDGs), adopted by the representatives of the 193 member states of the UN, guide the actions of governments, international organisations, civil society, academia and research, as well as other stakeholders, to guarantee long-term prosperity for people and the planet. From ending poverty and hunger to guaranteeing health and wellbeing, to responding to climate change and preserving life on land and under water, to fostering innovation and education, to assuring the inclusion of women and youth, to more responsible production and consumption patterns, food lays at the heart of the 2030 Agenda and connects all SDGs.

The current global food and nutrition challenges are particularly evident in the Mediterranean. First, the region is undergoing a “nutrition transition”, with eating habits shifting away from the traditional diet of fruits, vegetables, fish and healthy oils, globally recognised as a model for healthy living and environmental sustainability. Second, climate change brings about a number of challenges in terms of agriculture sustainability and food security, increasing competition for natural resources and putting agriculture at risk. There is an important economic, social and political gap between the countries of the northern and southern and eastern shores of the Mediterranean, which require policy intervention and co-operation among the region’s economies. Last, but not least, population growth, coupled with migratory flows, creates the need for a more comprehensive understanding of how food and migration are linked.

The BCFN has a sustainable food system at the core of its concerns, recognising it as a global challenge that requires systemic approaches to be tackled. This was also at the core of the Milan Protocol developed in 2015. With the FSI the BCFN acknowledges that we cannot consider food, livelihoods and the management of natural resources separately. By looking at food systems in their entirety, the FSI stresses the complexity of its dynamics and identifies openings for change. For this reason, the BCFN Foundation puts science and research in communication with all stakeholders, to create networks and facilitate synergistic relationships.

With the FSI, the BCFN Foundation aims to provide an assessment tool and foster dialogue, collaboration, knowledge sharing and concrete changes by representatives of different sectors: civil society, research, education, government, communication and the private sector, coming from different regions with different levels of development. The FSI also aims to increase awareness of the broader public on the food-related challenges analysed and has a major education purpose. Against this backdrop, rankings—far from being judgmental—have the purpose of helping to understand current food system trends and dynamics.

All stakeholders are called to contribute to the economic, societal and environmental sustainability of the global food system. The great ambition of the SDGs and the 2030 Agenda can only be achieved through co-operation: multidisciplinary problems require multidisciplinary actions. The youth are recognised as fundamental actors of change to achieve this change.

In this framework, the BCFN is joining forces with other actors to set the grounds for a joint multi-stakeholders observatory, to map trends, initiatives and best practices in achieving food system sustainability. Food is emphasised as an opportunity for societal development, and for more inclusive and healthier societies. The focus on the Mediterranean countries presented in this new edition of the FSI seeks to complement and deepen the research in this direction further.

³ FAO of the UN, *The State of Food Security and Nutrition in the World*, 2017. Available at: <http://www.fao.org/3/a-17695e.pdf>

EXECUTIVE SUMMARY

The 12 Mediterranean countries included in this study are by no means a homogenous group.

The five northern Mediterranean countries (France, Greece, Italy, Portugal and Spain) are all EU members. Their average per-head income is nearly fivefold the average for six southern and eastern Mediterranean countries (SEMCs), including Egypt, Jordan, Lebanon, Morocco, Tunisia and Turkey, but excluding Israel. There are also wide variations in population size between the countries in the region—ranging from 91m in Egypt to just over 6m in Lebanon among the SEMCs, and from 65m in France to a little over 10m in Portugal in the northern economies. Population growth in the five EU members was stagnant between 2007 and 2016, but expanded at an average rate of 2.5% a year in the SEMCs (excluding Israel) over the same period. These significant income and demographic differences are, in turn, key explanatory factors for the wide variations in food sustainability and nutritional standards that exist between the northern countries and those on the southern and eastern shores of the Mediterranean.

Food sustainability also depends heavily on the effectiveness of national public institutions, both at the central and local levels. In this respect, weak governance and a lack of institutional capacity are longstanding constraints in the SEMCs. Recent political instability in a number of countries, such as Syria, has added to these difficulties.

Despite these divergences, the Mediterranean countries also face a common set of challenges, such as climate change, soil and environmental degradation, water



shortages, rural depopulation and rapid urbanisation, global tourism, and significant migration flows. In addition, a sharp rise in obesity rates across the region has coincided with the demise of the traditional Mediterranean diet. Against this backdrop, there is a growing realisation that a shift towards more sustainable practices is urgently needed, together with a more

energetic approach to tackling food waste and nutritional challenges. Food represents a common thread linking the 17 Sustainable Development Goals (SDGs) adopted by UN member states in 2015. The UN strategy (officially titled *Transforming our world: the 2030 Agenda for Sustainable Development*) incorporates a number of far-reaching goals, including an end to poverty and hunger, improvements in

health, and the protection of the environment.⁴ The agenda sets the targets that all countries in the world are called on to achieve by 2030.

With the major food-related challenges in the region in mind, the Food Sustainability Index (FSI) can help shed light on the environmental, societal and economic sustainability of food systems in the Mediterranean. The FSI's ranking is not intended to be judgemental. It offers instead a tool to understand and monitor performance and progress of countries vis-à-vis the main challenges confronting the global food system. By measuring progress over time, the FSI therefore provides a valuable tool for policymakers and experts to orient their actions. The FSI also performs an educational role: by providing a detailed insight into the dynamics of complex food systems, the FSI can help inform the wider public debate. As a result, this will make it easier for governments to explain and justify their policy interventions (such as official attempts to reduce food waste or controls on advertising unhealthy foods).

Chapter 1 discusses the main food sustainability issues facing the region, including climate change.

Chapter 2 provides a summary of the broad FSI results for the region.

Chapter 3 (sustainable agriculture), Chapter 4 (nutritional challenges) and Chapter 5 (food loss and waste) will then examine each of the FSI's main dimensions, followed by a conclusion summarising the report's key findings.

⁴ UN Sustainable Development Knowledge Platform, *Transforming our world: the 2030 Agenda for Sustainable Development*. Available at: <https://sustainabledevelopment.un.org/post2015/transformingourworld>

KEY FINDINGS

Climate change is reinforcing the need for resilient, productive and sustainable farming solutions. The supply of cultivable land is limited, and the threat posed by climate change (especially reduced seasonal rainfall) is acute in the Mediterranean region. The importance of the water-for-food nexus is underlined by the fact that agriculture is estimated to account for over 80% of total water usage in many SEMCs (compared with a global average of 70%).⁵ Intensive tillage has also led to the depletion of organic matter and—together with an over-use of chemical fertilisers—resulted in a reduction in fertility.

However, a number of projects undertaken in recent years have indicated that it is possible to mitigate some of the negative effects of climate change. For example, the ACLIMAS project conducted in six Mediterranean countries (Morocco, Algeria, Tunisia, Egypt, Jordan and Lebanon) between 2012 and 2015, focusing on saving water. Precision agriculture can also make an important contribution, through applications such as water-stress monitoring and decision-support systems for farmers. Facilitating farmers' access to knowledge and information, technology, finance, and resources (including land tenure) is key, as is capacity-building. Research institutes have an important role to play in disseminating the knowledge about agro-ecological techniques that can help farmers cope with climate change. Close collaboration with the business community will also be essential if farmers are to receive the technical and practical assistance required for effective mitigation and adaptation strategies.

Meanwhile, public authorities need to ensure that farmers are provided with the training and financial support to transition to more sustainable agricultural practices.

A “nutrition transition” is contributing to rising levels of people who are overweight or obese and have associated health problems. This transition takes the form of an ongoing shift throughout the region, away from a traditional Mediterranean diet towards one that is energy-rich and contains large amounts of animal proteins, fats and foodstuffs deficient in fibre. Often compounded by reduced physical activity, these dietary changes are resulting in an obesity epidemic. In response, government-led campaigns highlighting the importance of a healthy and balanced diet need to be strengthened. As part of an overall programme of educating the general public, a strong case can be made for making nutrition a mandatory element in the school curriculum. However, these efforts will need to be backed up by much tougher measures—for example, the imposition of taxes on sugar-sweetened beverages, and restrictions on advertising and marketing unhealthy foods (particularly those targeted towards children).

A multi-faceted and multidisciplinary approach is required when responding to the challenge of food waste and loss. Factors such as a lack of effective storage capacity and poor transport facilities still represent important constraints in the southern and many of the eastern Mediterranean countries. Investment in storage and communications represents an obvious response, pointing to the need for increased financial support from external agencies. Governments and international public institutions also need to encourage the formation of agricultural co-operatives, in order to make it easier for smallholder farmers to access markets on a timely basis.

Meanwhile, food waste at the retail and consumer stage is the biggest concern in the northern Mediterranean countries. Public awareness of the importance of cutting food waste has risen significantly in recent years, helped by the efforts of citizens' groups and government campaigns. However, more needs to be done to educate the general public—for example, by making a much clearer distinction between expiry and best-before dates. A legal framework, designed to militate against food waste, also needs to be rolled out in all countries. In 2016 France became the first country in the world to make it compulsory for supermarkets to distribute any excess food to food banks rather than discarding it.

Regional co-operation efforts will need to be stepped up for the protection of the Mediterranean marine environment. As recognised by the Barcelona Convention, the management of coastal zones demands integrated approaches. This reflects the pressures on the ecosystem resulting from rapid urbanisation, tourism and port developments. It also takes into account the fact that climate-driven environmental changes and problems, such as pollution, do not respect national boundaries. The depletion of Mediterranean fishing stocks represents another key challenge. The EU has recently taken the lead in organising a co-ordinated response to the problem (the “Malta MedFish4Ever Declaration”). Monitoring and enforcement will not be easy, particularly as the accord covers both EU and non-EU countries. However, successful implementation of the agreement could help to foster greater co-operation in other areas.

⁵ Istituto Affari Internazionali (IAI) and OCP Policy Centre (OCPPC), Building Sustainable Agriculture for Food Security in the Euro-Mediterranean Area: Challenges and Policy Options, 2015. Available at: <http://www.iai.it/sites/default/files/iai-ocp.pdf>

FOOD, NUTRITION AND THE SUSTAINABLE DEVELOPMENT GOALS

SDG	FOOD SYSTEM CHALLENGES
SDG 2: To end hunger and all forms of malnutrition by 2030	<ul style="list-style-type: none"> Access to affordable and nutritious food Food fortification and vitamin supplementation programmes for needy populations
SDG 3: To ensure health and well-being for all, at every stage of life	<ul style="list-style-type: none"> Early years nutrition education for mothers Encouraging exclusive breastfeeding Regulating marketing and sale of obesogenic foods Public education campaigns on optimal diets
SDG 10: Reduced inequalities	<ul style="list-style-type: none"> Nutritional deficits in the early years of life can cause lifelong deficits such as stunting and impaired cognitive development, deepening inequality cycles as malnourished children are unable to participate in the labour force
SDG 12: To ensure sustainable consumption and production patterns	<ul style="list-style-type: none"> Sustainable use of arable land Sustainable water management practices Limiting agriculture-related pollution and emissions
SDG 13: Take urgent action to combat climate change and its impacts	<ul style="list-style-type: none"> Agriculture is both a cause of climate change, through the emissions it produces, and a victim as changes in temperature and rainfall impact crop growth and agricultural productivity
SDG 15: To protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss	<ul style="list-style-type: none"> Managing deforestation related to food and non-food activities, including livestock, soy and biofuels Lower use of harmful chemicals and related substances in agriculture

FOOD SUSTAINABILITY INDEX 2017

KEY GLOBAL FINDINGS

The Food Sustainability Index (FSI) ranks 34 countries according to their food system sustainability. The FSI aims to highlight issues of concern across three pillars: food loss and waste; sustainable agriculture; and nutritional challenges. It is a quantitative and qualitative benchmarking model that allows for comparison between countries and pillars, thus contributing to the shift towards more sustainable food systems.

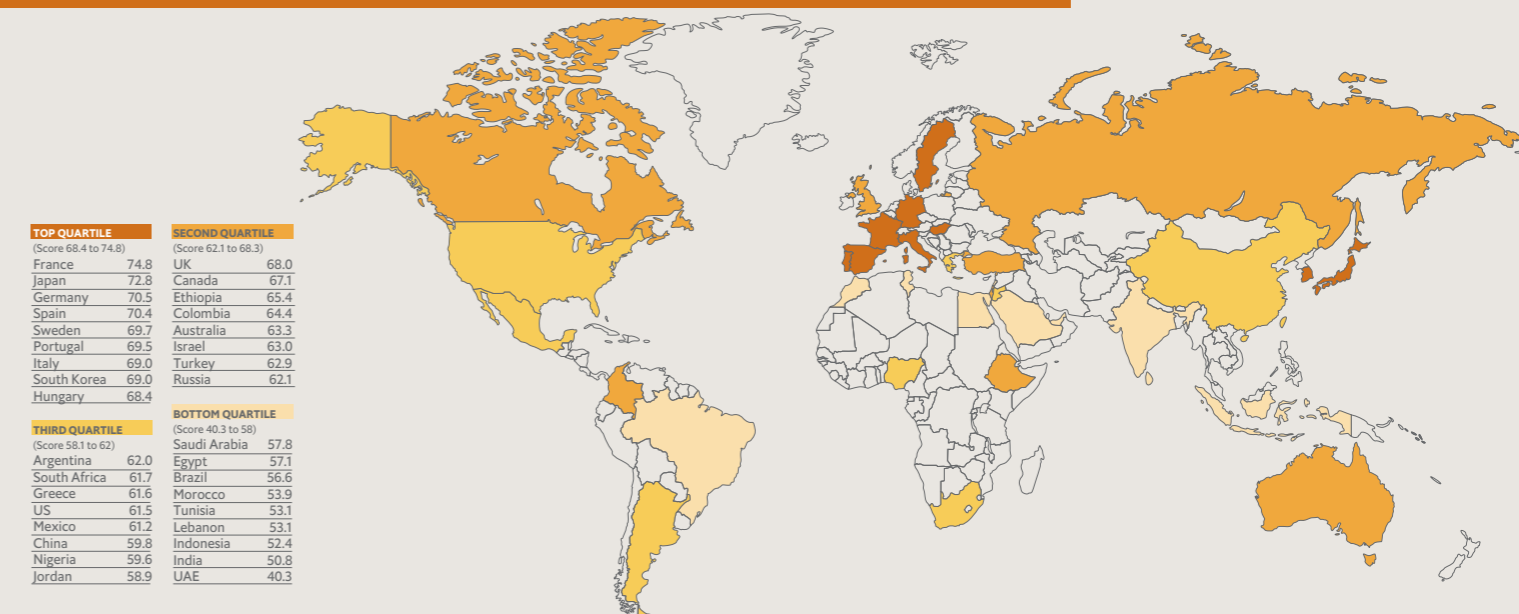
More details on the findings, scope and methodology can be found here: foodsustainability.eiu.com

FOOD AND NUTRITION ARE RELEVANT FOR ACHIEVING ALL SUSTAINABLE DEVELOPMENT GOALS (SDGS)

Food and nutrition represent a common thread linking the 17 SDGs adopted by UN member states in 2015. The UN's 2030 Agenda for Sustainable Development incorporates a number of far-reaching goals, including an end to poverty and hunger, improvements in health and the protection of the environment.



GLOBAL RESULTS



HUMAN DEVELOPMENT AND FOOD SUSTAINABILITY: MODERATE POSITIVE CORRELATION

The Human Development Index (HDI) combines three broad indicators: 1) health; 2) education; and 3) income. Countries with a high HDI tend to also perform relatively well in the FSI (the correlation coefficient is 0.45, with -1 representing a perfect negative correlation and 1 a perfect positive correlation).

Note: correlation does not prove causation.

GERMANY ranks **2ND** out of the 34 countries for the HDI and **3RD** for the FSI.

INDIA ranks **32ND** out of the 34 countries for the HDI and **33RD** for the FSI.

URBANISATION AND FOOD SUSTAINABILITY: MODERATE NEGATIVE CORRELATION

Countries experiencing rapid urbanisation tend to do moderately worse in the FSI ranking than countries with slower urban population growth (the correlation coefficient is -0.41, with -1 representing a perfect negative correlation and 1 a perfect positive correlation).

Note: correlation does not prove causation.

ETHIOPIA, the country with the **highest urbanisation rate** (4.8%), ranks **12TH** in the FSI.

FRANCE, the **top-performing country** in the overall FSI, ranks only **26TH** in terms of urbanisation.

CHAPTER 1:

KEY FOOD SUSTAINABILITY CHALLENGES FACING THE MEDITERRANEAN

The Mediterranean marks a confluence of three continents (Africa, Asia and Europe). With a coastline measuring 46,000 km, it is the world's largest semi-enclosed sea. The northern Mediterranean countries included in the study are all EU members and had an average per-head income of US\$26,100 (at market exchange rates) in 2016.⁶ This was nearly fivefold the average of US\$5,430 for the southern and eastern Mediterranean countries (SEMCs), excluding Israel, which had a per-head income of US\$37,190. Population growth in the five EU members averaged just 0.1% a year in 2007-16 (although this masks declines in both Greece and Portugal).⁷ By contrast, the population of the SEMCs (excluding Israel) expanded at an average rate of 2.5% a year over the same period, while Israel's population grew by an average of 1.9%. These significant income and demographic differences are, in turn, among the key explanatory factors for the wide variations in food sustainability and nutritional standards that exist between the northern countries and the SEMCs.

Despite these divergences, the Mediterranean countries also face a common set of challenges. These include climate change, soil and environmental degradation, water shortages, and rural depopulation. Rapid urbanisation (nearly 40% of the coastline now

consists of built-up areas), the region's popularity as a global tourist destination and (in recent years) significant migration flows only add to these pressures.⁸ Nutrition is also a topic of vital importance to all countries in the region.

A continuing shift away from the traditional Mediterranean diet is leading to rising risks of obesity, diabetes, heart diseases and other non-communicable diseases, and therefore places an increasing burden on health systems.

The Mediterranean is widely acknowledged to be a "hot spot" for global climate change.⁹ As noted by Andrea Toreti, senior scientist at the Joint Research Centre of the European Commission (EC), mean temperatures in the region are rising at a faster pace than the global average. Mediterranean farmers, therefore, face a daunting challenge as they seek to adapt to the consequences of higher temperatures, changes to seasonal rainfall and possible new threats from pests and disease. With rapid population growth and urbanisation also fuelling increased demand for water for non-agricultural purposes, it will be the SEMCs that face the biggest threat of growing water shortages. Rising sea levels pose a further challenge, including the potential loss of arable land.¹⁰

decline in fish stocks. A gradual warming of the Mediterranean Sea is affecting the production of phytoplankton, which are a crucial part of the marine food chain.¹¹ According to Marta Coll, a researcher at the Institute of Marine Science in Barcelona, Spain, climate change is also leading to "an acceleration in the number of invasive species entering the Mediterranean, from both the Red Sea and the Atlantic", thereby placing additional pressure on indigenous fish species. However, the main driver of the overall decline is over-fishing. Over 90% of the assessed stocks of fish in the European Mediterranean areas, and around half in the southern Mediterranean, are now estimated to be overexploited, according to Dr Coll.¹² To address these issues, in March 2017 the EC secured a ten-year pledge on measures aimed at saving the Mediterranean fish stocks and protecting the region's ecological and economic wealth (the "Malta MedFish4Ever Declaration").¹³

The protection of fragile ecosystems along the Mediterranean coast represents one of the biggest challenges facing policymakers in the region. The coastline and adjacent marine areas remain under heavy environmental strain from tourism, port development and expanding coastal cities. Urbanisation is also resulting

in a loss of agricultural land. The displacement of smallholder farmers in the environs of rapidly growing cities, such as the Tunisian capital, Tunis, is a region-wide phenomenon.¹⁴

Huge migration flows are adding to population pressures in the region. Around 1.7m migrants have arrived on European shores since 2014—many of which are refugees fleeing conflict in countries such as Syria and Iraq—leading to the need for emergency relief and creating sharp divisions among EU governments on how best to handle the inflow.¹⁵ Jordan and Lebanon, for example, have been hosting a disproportionately large number of refugees relative to the size of their own populations, adding to pressures on local food supplies. Meanwhile, flows of economic migrants will also continue to pose challenges: according to the International Organisation for Migration, there are between 700,000 and 1m potential migrants using Libya as a staging-post in their attempts to reach Europe.¹⁶

⁶ Based on estimates from national sources and The Economist Intelligence Unit.

⁷ UN Population Division, World Population Prospects 2017. Available at: <https://esa.un.org/unpd/wpp/>

⁸ International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM) and Food and Agriculture Organisation of the UN (FAO), Zero Waste in the Mediterranean: Natural Resources, Food and Knowledge, 2016 Mediterra report. Available at: <http://www.fao.org/3/a-bq976e.pdf>

⁹ IAI and OCPPC, Building Sustainable Agriculture for Food Security in the Euro-Mediterranean Area.

¹⁰ *Ibid.*

¹¹ Piroddi, C et al, "Historical changes of the Mediterranean Sea ecosystem: modelling the role and impact of primary productivity and fisheries changes over time", *Sci Rep.* 2017; 7: 44491.

¹² See also "Saving our heritage, our future: The worrying state of Mediterranean fish stocks", EU Science Hub, April 3rd 2017. Available at: <https://ec.europa.eu/jrc/en/news/saving-our-heritage-worrying-state-mediterranean-fish-stocks>

¹³ "European Commission secures 10-year pledge to save Mediterranean fish stocks", EC press release, March 30th 2017. Available at: http://europa.eu/rapid/press-release_IP-17-770_en.htm

¹⁴ CIHEAM and FAO, Zero Waste in the Mediterranean

¹⁵ "Europe migrant crisis: EU presents legal migration plan", BBC, September 27th 2017.

Available at: <http://www.bbc.co.uk/news/world-europe-41413303>

¹⁶ "IOM Director General Visits Tripoli as Crisis Worsens for Libyans and Vulnerable Migrants", IOM, March 22nd 2017. Available at: <https://www.iom.int/news/iom-director-general-visits-tripoli-crisis-worsens-libyans-and-vulnerable-migrants>

SUSTAINABLE DEVELOPMENT STRATEGY

Against this backdrop, there is a growing realisation that a shift towards more sustainable agricultural practices is urgently needed. Given that food loss and waste (FLW), as well as nutritional challenges, also need to be tackled, it is apparent that changes will need to occur across the entire food system. To this effect, the Mediterranean Strategy for Sustainable Development (MSSD) for 2016-25 was adopted by 21 Mediterranean countries, together with the EU, in February 2016.¹⁷ The strategy, which was formulated by the UN Environment Programme (UNEP) in conjunction with the co-ordinating unit of the Mediterranean Action Plan (MAP), is based on the principle that socio-economic development needs to be harmonised with the environment and protection of natural resources. It draws heavily on the Sustainable Development Goals (SDGs) agreed by UN member states in September 2015.¹⁸

The SDGs stress the importance of fostering the green economy in the context of sustainable development and poverty eradication. Food has important linkages with all 17 SDGs. Specifically, SDG 2 urges countries to “end hunger, achieve food security and improved nutrition, and promote sustainable agriculture” by 2030.¹⁹ Moreover, a reduction in poverty (SDG 1) is required in order to ensure better access to adequate nutrition. The availability of food, the quality of nutrition and agricultural practices are also closely connected with SDG 3 (good health and wellbeing), SDG 12 (responsible production and consumption) and SDG 13 (climate action).²⁰

Similarly, the MSSD highlights the interdependence of sustainable agriculture, development and food security: “the sustainable use, management and conservation of natural resources, rural development and food production and security are interdependent aspects that ensure the wellbeing of rural communities.” The MSSD also emphasises the importance of adapting to climate change, and calls for development in marine and coastal areas in the Mediterranean to be undertaken on a more sustainable basis.²¹

The current MSSD represents the latest in a series of regional initiatives that commenced with the MAP of 1975, followed by the Barcelona Convention of 1995 (Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean).²² The adoption by the Mediterranean countries of the Integrated Coastal Zone Management (ICZM) protocol, as part of the Barcelona Convention, has been hailed as a significant step forward in protecting fragile coastal ecosystems, for example. As noted by Ivica Trumbic, the former director of the Priority Actions Programme Regional Activity Centre for UNEP-MAP (with special responsibility for the ICZM), initiatives such as these have been based on the premise that an effective response to common challenges, such as environmental degradation, require a high level of regional and institutional co-ordination.

A number of projects undertaken in recent years have indicated that it is possible to mitigate some of the negative effects of climate change. One example is the ACLIMAS project conducted in six Mediterranean countries (Morocco, Algeria, Tunisia, Egypt, Jordan and Lebanon) between 2012 and 2015. This showed that it is possible to achieve higher yields while simultaneously making significant water savings by adopting varieties of cereals and legumes more resistant to drought and by altering cultivation methods.²³

That said, the goal of establishing a zone of “shared prosperity” (as set out in the original Barcelona declaration) remains elusive. Moreover, uniform

sustainable development can hardly be expected in a region characterised by differing resource endowments, large income inequalities (both among and within countries) and significant variations in administrative capacity. The MSSD acknowledges that a “one policy fits all” approach would not be appropriate and that solutions will need to be tailored to specific needs and contexts.²⁴

Balancing the need for food production and security against environmental concerns and the preservation of rural communities clearly represents a formidable challenge. There has already been a wide range of different responses and outcomes, as the examples from the 12 countries featured in this study will demonstrate.



¹⁷ UNEP-MAP, Mediterranean Strategy for Sustainable Development 2016-2025

¹⁸ CIHEAM and FAO, Zero Waste in the Mediterranean

¹⁹ UN, SDGs, Available at: <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>

²⁰ “Linking up the SDGs: The key to food and nutrition security”, International Food Policy Research Institute (IFPRI) Blog, July 7th 2017. Available at: <http://www.ifpri.org/blog/linking-sdgs-key-food-and-nutrition-security>

²¹ UNEP-MAP, Mediterranean Strategy for Sustainable Development 2016-2025

²² CIHEAM and FAO, Zero Waste in the Mediterranean

²³ *Ibid.*

²⁴ UNEP-MAP, Mediterranean Strategy for Sustainable Development 2016-2025

HOW CLIMATE CHANGE THREATENS FOOD SUSTAINABILITY IN THE MEDITERRANEAN

The Mediterranean is one of the most vulnerable regions in the world to the impacts of climate change, as well as one of the most affected by human demand for water. It includes some of the most water-scarce countries in the world. Rapid urbanisation, tourism, migration flows, port developments and competition for energy put further pressures on fragile ecosystems.

IMPORTANCE OF WATER-FOR-FOOD NEXUS IN THE REGION:



Agriculture accounts for **80%+** of total water withdrawals in many southern and eastern Mediterranean countries (global average: 70%)

CLIMATE CHANGE EXACERBATES GROWING WATER SHORTAGES IN THE REGION:



Mean temperatures rising at a faster pace than the global average



Changes to seasonal rainfall



Threats from pests and disease



Reduced land fertility amid intensive tillage and overuse of chemical fertilisers



More and more frequent extreme weather events, such as droughts

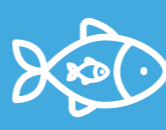
RISING SEA LEVELS POSE FURTHER CHALLENGES:



Potential loss of arable land



Warming affects production of phytoplankton (crucial part of the marine food chain)



Acceleration in number of invasive species entering Mediterranean

CLIMATE CHANGE CONTRIBUTES TO AN ALARMING DECLINE IN FISH STOCKS (ALONGSIDE OVER-FISHING):

ACTION TO MITIGATE AGAINST SOME OF THE NEGATIVE EFFECTS OF CLIMATE CHANGE



Mediterranean Strategy for Sustainable Development 2016-25



Research institutes disseminating knowledge about agro-ecological techniques



“Malta Medfish4ever Declaration” by Mediterranean governments to save fish stocks and protect region's ecological and economic wealth



Precision agriculture, e.g. water-stress monitoring



Training and financial support for farmers to transition to more sustainable agricultural practices



Private-sector involvement to help with roll-out of new technologies and financing mechanisms to support investment in sustainable solutions

CHAPTER 2:

THE FOOD SUSTAINABILITY INDEX: HIGHLIGHTS FOR THE MEDITERRANEAN

The first edition of the Food Sustainability Index (FSI), published in 2016, ranked 25 countries according to their food system sustainability. In the 2017 edition The Economist Intelligence Unit is adding nine new countries—including seven from the wider Mediterranean region (Greece, Jordan, Lebanon, Morocco, Portugal, Spain and Tunisia), plus Hungary and Sweden. The FSI is not intended to be judgemental, but rather offers a benchmark against which the performance of countries can be evaluated vis-à-vis the main challenges confronting the global food system. The FSI's three pillars—sustainable agriculture, nutritional challenges, and FLW—remain the same, but a weighting scheme based on consultations with experts has been added. This has an impact on the indicator results and rankings. A more detailed explanation of the methodology and indicators included in the 2017 edition can be found in the appendix.²⁵ In future, it is envisaged that the FSI will be expanded further and an even more longitudinal analysis created.

FRANCE LEADS THE WAY, BOTH REGIONALLY AND GLOBALLY

EU countries in the north of the region secure the first four places in the overall FSI ranking for the Mediterranean (see Table 1). **France** is in top position (both regionally and globally), reflecting its high scores in terms of controlling food waste and achieving high levels of nutrition; it is also a leading proponent of sustainable

agriculture. **Spain** follows in second place regionally (and fourth place globally), helped by a particularly strong performance on the food waste criterion and its high rankings for both sustainable agriculture and nutrition. **Portugal** (in third place regionally) emerges ahead of **Italy** by virtue of its superior showing in terms of nutrition; this is despite Italy's high ranking for sustainable agriculture (where it is the regional and global leader).

Israel and **Turkey** follow in, respectively, fifth and sixth positions in the index. Israel has a slight edge over Turkey in terms of both sustainable agriculture and nutritional challenges. However, it falls just behind Turkey with respect to FLW.

Lebanon is the lowest-ranked country in the region (and 31st out of 34 countries globally); it scores particularly badly with respect to FLW. **Jordan**, **Egypt**, **Morocco** and **Tunisia** are also in the bottom half of the overall ranking (25th, 27th, 29th and 30th, respectively). In terms of sustainable agriculture, Jordan (18th globally) and Egypt (23rd) actually do better than their overall global ranking would suggest. Morocco's ranking is affected by a comparatively weak performance in food loss and waste (31st), while Tunisia has significant room for improvement in sustainable agriculture (33rd), in particular.

²⁵ The full index, including data sources, methodologies and interactive tools to explore results, can be accessed on the FSI hub at www.foodsustainability.eiu.com.

TABLE 1
FOOD SUSTAINABILITY INDEX 2017:
RANKINGS AND SCORES FOR
MEDITERRANEAN COUNTRIES

FSI RANKING	OVERALL		SUSTAINABLE AGRICULTURE		NUTRITIONAL CHALLENGES		FOOD LOSS AND WASTE	
1	France	74.8	Italy	73	France	68	France	84.9
2	Spain	70.4	France	71.5	Portugal	68	Spain	77.1
3	Portugal	69.5	Spain	69.2	Greece	65.6	Italy	76.7
4	Italy	69	Israel	68.9	Spain	64.9	Portugal	72.1
5	Israel	63.1	Portugal	68.5	Israel	62.3	Turkey	59.6
6	Turkey	62.9	Turkey	68.3	Turkey	60.8	Israel	58
7	Greece	61.6	Greece	67.9	Tunisia	58.7	Jordan	56.7
8	Jordan	58.9	Jordan	64.9	Italy	57.4	Egypt	56.3
9	Egypt	57.1	Lebanon	61.9	Jordan	55.1	Greece	51.5
10	Morocco	53.9	Egypt	61	Lebanon	55	Tunisia	49.7
11	Tunisia	53.1	Morocco	60.6	Egypt	53.9	Morocco	47.5
12	Lebanon	53.1	Tunisia	51	Morocco	53.6	Lebanon	42.3

Note: Scores are scaled from 0 to 100, where 100 = the highest sustainability and greatest progress towards meeting environmental, societal and economic Key Performance Indicators.

Source: Economist Intelligence Unit, Food Sustainability Index 2017.

In terms of the global FSI, the EU economies (with the exception of Greece) are again the strongest performers. France secures the premier position in the world ranking, helped by a solid performance across all three pillars of the index: it is first globally for FLW, third for sustainable agriculture and fourth for nutritional challenges. Spain is in fourth place in terms of the overall global ranking, followed by Portugal (sixth) and Italy (seventh).

The other Mediterranean member of the EU, Greece—a country that has been in economic crisis since 2009—is much further down the global ranking, in 20th position. Israel (15th) is ranked just ahead of Turkey (16th) in the global league table. The remaining countries to the south and east of the Mediterranean—including Jordan (25th), Egypt (27th), Morocco (29th) and Tunisia (30th)—linger in the bottom half of the global FSI. Lebanon (31st) is the lowest-placed Mediterranean country in the worldwide ranking, dragged down by its poor score for FLW (where it is ranked 32nd out of 34 countries globally).

As mentioned previously, there is considerable economic, social, political and demographic heterogeneity among countries included in the FSI. Looking at the global rankings, observers will notice that there is little correlation between FSI ranking and population size: countries with relatively large population sizes are not more or less likely to do well in food sustainability. In terms of size of the economy (measured in GDP), larger economies generally perform better in the FSI, but some medium-sized economies such as Sweden, Portugal and Hungary, and even small economies such as Ethiopia, do well too, while large economies such as Brazil and India are relatively lowly ranked. Income (in terms of GDP per head) is more strongly correlated with a high ranking in the FSI, but again there are outliers such as the relatively well-performing Colombia (medium-income) and Ethiopia (low-income) and the relatively low-ranked UAE (high-income).

Although the Human Development Index (HDI), published by the UN, and the FSI are not directly comparable due to different underlying methodologies, comparing them may provide some interesting insights that can shed light on the development and sustainability challenges of today. The FSI shows a slightly stronger correlation with the HDI than with the size of either the population or the economy. However, there are once more a number of clear exceptions: Ethiopia, which is ranked in the lowest HDI category by the UN, secures

12th place in the FSI, while UAE, ranked “very high” by the UN in its HDI index, is in bottom place in the FSI.

There is a weaker correlation between the pace of urbanisation and the overall standings in the FSI. Nevertheless, there is a clear tendency for countries with rapid expanding urban populations (such as India and Indonesia) to fare less well in terms of food sustainability than economies (such as Japan and Spain) where urban population growth is more modest (see Table 2).



TABLE 2
**FOOD SUSTAINABILITY INDEX 2017:
 FSI RANKINGS AND OTHER KEY INDICATORS**

FSI RANKING	COUNTRY	POPULATION (M)		GDP (US\$ BN)		GDP PER HEAD (US\$)		HDI		URBAN GROWTH RATE (%)	
1	France	High	64.7	High	2,464	High	38,078	Very high	0.90	Medium	0.70
2	Japan	High	127.7	High	4,938	High	38,658	Very high	0.90	Low	0.34
3	Germany	High	82.6	High	3,473	High	42,047	Very high	0.93	Medium	1.47
4	Spain	Medium	46.3	High	1,233	High	26,594	Very high	0.88	Low	0.27
5	Sweden	Low	9.8	Medium	124	High	12,733	Very high	0.91	Medium	1.23
6	Portugal	Medium	46.3	Medium	1,233	High	26,594	Very high	0.84	Medium	0.54
7	Italy	High	59.4	High	1,852	High	31,157	Very high	0.89	Low	0.01
8	South Korea	High	50.8	High	1,411	High	27,773	Very high	0.90	Medium	0.59
9	Hungary	Low	9.8	Medium	124	High	12,733	Very high	0.84	Low	0.37
10	UK	High	65.1	High	2,657	High	40,809	Very high	0.91	Medium	1.07
11	Canada	Medium	36.3	High	1,530	High	42,148	Very high	0.92	Medium	1.43
12	Ethiopia	High	102.4	Low	70	Low	687	Low	0.45	High	4.79
13	Colombia	Medium	48.7	Medium	282	Medium	5,803	High	0.73	Medium	1.23
14	Australia	Medium	24.1	High	1,262	High	52,299	Very high	0.94	High	1.56
15	Israel	Low	8.5	Medium	318	High	37,190	Very high	0.90	High	2.04
16	Turkey	High	79.5	Medium	862	Medium	10,840	High	0.77	High	2.24
17	Russia	High	147.0	High	1,280	Medium	8,708	Very high	0.80	Low	0.30
18	Argentina	Medium	43.8	Medium	545	High	12,431	Very high	0.83	Medium	1.14
19	South Africa	High	56.0	Medium	296	Medium	5,280	Medium	0.67	High	2.38
20	Greece	Medium	11.2	Medium	194	High	17,371	Very high	0.87	Low	-0.28
21	US	High	323.9	High	18,624	High	57,503	Very high	0.92	Medium	0.90
22	Mexico	High	127.5	High	1,047	Medium	8,206	High	0.76	High	1.64
23	China	High	1,366.3	High	11,232	Medium	8,221	High	0.74	High	2.61
24	Nigeria	High	186.0	Medium	405	Low	2,180	Low	0.53	High	4.32
25	Jordan	Low	9.8	Low	39	Low	3,930	High	0.74	High	3.46
26	Saudi Arabia	Medium	31.8	Medium	646	High	20,636	Very high	0.85	High	2.49
27	Egypt	High	91.0	Medium	269	Low	2,955	Medium	0.69	High	2.22
28	Brazil	High	206.1	High	1,796	Medium	8,713	High	0.75	Medium	1.10
29	Morocco	Medium	35.3	Medium	104	Low	2,946	Medium	0.65	High	2.16
30	Tunisia	Medium	11.4	Low	42	Low	3,690	High	0.72	Medium	1.45
31	Lebanon	Low	6.1	Low	51	Low	8,311	High	0.76	High	2.76
32	Indonesia	High	258.3	Medium	932	Low	3,610	Medium	0.69	High	2.48
33	India	High	1,324.2	High	2,262	Low	1,708	Medium	0.62	High	2.33
34	UAE	Low	9.3	Medium	349	High	37,635	Very high	0.84	High	1.56

Notes:

Population: Low = <10m; Medium = 10-49m; High = >50m
 GDP: Low = <100m; Medium = 101-1,000m; High = >1,000m
 GDP per head: based on World Bank definitions (low-income and lower middle-income economies are those with a GNI per head between \$1,006 and \$3,955 in 2016; upper-middle-income economies are those

with a GNI per head between \$3,956 and \$12,235; and high-income economies are those with a GNI per head of \$12,236 or more. See <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups>.

Classification of countries by HDI follows the definitions used by the UN.
 Urban growth rate: Low = <0.5% per annum; Medium = 0.5-1.5% per annum
 High = >1.5% per annum
 Sources: Economist Intelligence Unit, UN, UNDP, World Bank.

CHAPTER 3:

SUSTAINABLE AGRICULTURE

Italy, France and Spain are the top three performers in the FSI in terms of sustainable agriculture (see Table 3). All three countries have shown a growing inclination to adopt sustainable farming practices that ensure a low environmental impact, such as organic farming, combined with a limited use of manufactured fertilisers. Although **Israel** (in fourth position) suffers from a scarcity of freshwater, the country's farmers have developed innovative ways of overcoming this particular deficiency. **Portugal** (fifth) is the top performer in the region in terms of environmental impact of agriculture on the atmosphere. Its biggest weaknesses are in the water category, especially water management and sustainability of fisheries.

Turkey (in sixth position) is continuing to make significant progress with respect to the adoption of techniques such as conservation agriculture (CA).²⁶ Assuming this trend is maintained, it should help mitigate the impact of desertification and pollution, as well as encouraging biodiversity. **Greece** (in seventh place in the regional ranking) fares relatively poorly in terms of water scarcity and water management. In particular, initiatives to recycle water for agricultural use need to be strengthened, as reflected by the lower score that Greece secures under this particular heading compared with countries in the top half of the ranking.

Meanwhile, **Jordan, Lebanon, Egypt, Morocco and Tunisia** trail at the bottom end of this category in the index. Soil erosion and low soil fertility—together with shortages of freshwater—represent serious constraints on

agriculture in all of these countries. With the exception of **Egypt** (and, to a lesser extent, **Tunisia**), the use of sustainable agricultural methods (including organic farming) is also limited.

TABLE 3
FOOD SUSTAINABILITY INDEX 2017: “SUSTAINABLE AGRICULTURE” CATEGORY

RANK	COUNTRY	SCORE (OUT OF 100)
1	Italy	73
2	France	71.5
3	Spain	69.2
4	Israel	68.9
5	Portugal	68.5
6	Turkey	68.3
7	Greece	67.9
8	Jordan	64.9
9	Lebanon	61.9
10	Egypt	61
11	Morocco	60.6
12	Tunisia	51

Note: Scores are scaled from 0 to 100, where 100 = the highest sustainability and greatest progress towards meeting environmental, societal and economic Key Performance Indicators.

Source: Economist Intelligence Unit, Food Sustainability Index 2017.

A SHIFT TOWARDS SUSTAINABLE CONSUMPTION AND PRODUCTION

Sustainable and integrated land and water management practices are a vital necessity in a region where climate change poses an increasing threat (see Chapter 1). A number of initiatives are under way, both at the national and regional levels. The EU-funded SwitchMed programme has been an important vehicle for encouraging the shift towards sustainable consumption and production (SCP) in the SEMCs.²⁷ As explained by Spyros Kouvelis, senior advisor for sustainable development at UNEP-MAP, SwitchMed has developed a regional roadmap that is used by the participating countries to formulate national action plans. A key aim of the SwitchMed programme is to educate consumers and civil society about the benefits of SCP.

Reflecting the need for a more sustainable management of water and agro-food systems, a new Partnership on Research and Innovation in the Mediterranean Area (PRIMA) is due to be launched in early 2018. Partly funded by the EU's research and innovation programme Horizon 2020, the partnership is made up of 19 participating countries (including all of those covered by our study). The initiative (which will run for ten years until 2028) stems from a recognition that the health and stability of communities in the region will suffer unless a more concerted attempt is made to ensure the provision of clean water and nutritious food.²⁸

Traditional methods of farming, as practised in the Mediterranean for many generations, provide some important lessons on how to ensure that food security does not come at the expense of preserving the environment and maintaining biodiversity. For example, techniques such as rainwater harvesting have been deployed for many centuries by farmers in the region.²⁹ The use of terracing (often bounded by dry stone walls) is also a common and longstanding feature of Mediterranean agricultural landscapes, partly reflecting the benefits it brings in reducing soil erosion.³⁰ Nonetheless, technological solutions—such as precision agriculture—also have an important role to play in ensuring the success of sustainable agriculture practices. As noted by Mr Kouvelis, the uptake of agri-tech and biotechnology has so far been much more widespread in the northern Mediterranean countries, by dint of their more developed status. But technological innovation clearly has the potential to provide important benefits in the southern Mediterranean countries, too, given the problems they face of drought, soil degradation and low agricultural productivity. For example, advanced engineering solutions can be utilised to alleviate water shortages. Plant science can also assist in developing crop varieties suitable for arid conditions. However, it should be noted that serious concerns exist regarding the introduction of genetically modified organisms (GMOs), as mentioned in UNEP-MAP's strategy for sustainable development.³¹

²⁶ Promoted by the FAO, conservation agriculture seeks to secure high crop yields while reducing production costs, maintaining soil fertility and conserving water. It is based on an integrated approach to soil management, including minimum mechanical soil disturbance, permanent organic cover and crop diversification. See also FAO, Conservation Agriculture. Available at: <http://www.fao.org/ag/ca/>

²⁷ SwitchMed website, SwitchMed Programme In Short. Available at: <https://www.switchmed.eu/en/Switchmed-programme-in-short>

²⁸ EC, The PRIMA initiative. Available at: <http://ec.europa.eu/research/environment/index.cfm?pg=prima>

²⁹ R Reitano, “Water Harvesting and Water Collection Systems in Mediterranean Area. The case of Malta”, *Procedia Engineering*, Vol 21, 2011, pp. 81-88.

³⁰ A Bevana and J Conolly, “Terraced fields and Mediterranean landscape structure: an analytical case study from Antikythera, Greece”, *Ecological Modelling*, Vol 222, No 7, 10 April 2011, pp. 1303-1314.

³¹ UNEP-MAP, *Mediterranean Strategy for Sustainable Development 2016-2025*



SUSTAINABLE AGRICULTURE INITIATIVES IN INDIVIDUAL COUNTRIES

In the northern Mediterranean, an agro-ecology project launched in **France** in 2012 is an attempt to promote a more sustainable approach to farming in which improvements in agricultural performance do not come at the expense of environmental and social conditions.³² Meanwhile, in **Greece**, the Mediterranean Agronomic Institute of Chania is heading a three-year research project into sustainable olive oil production, as intensified olive farming has been one of the factors leading to widespread soil erosion and desertification in the Mediterranean region.³³ In **Italy**, the Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria (the Council for Agricultural Research and Agricultural Economic Analysis, CREA), a specialised research centre in the capital, Rome, is carrying out a three-year research programme into sustainable biotechnology-applied techniques. CREA is collaborating with the Italian Ministry for Agricultural Policy and Forestry on this project.³⁴

In **Portugal**, where over 700,000 ha of land are sown with annual crops, such as wheat, using CA techniques,³⁵ a significant improvement in soil structure and fertility—and consequently agricultural productivity—has been observed.³⁶ Meanwhile, CA techniques are applied to nearly 8% of the land used for crop cultivation in **Spain**: the highest proportion among the EU Mediterranean countries.³⁷ Rapid growth in organic farming and CA have been combined with (unusually for Europe) a relatively relaxed attitude on the part of the Spanish government towards the use of GMOs.³⁸

Meanwhile, farmers in the SEMCs face a number of daunting challenges, including climate change, desertification and environmental degradation. Notwithstanding a shortage of land available for cultivation, in **Egypt** SwitchMed is collaborating with the country's Ministry of Environment and the Centre for Environment and Development for the Arab Region and Europe in devising a national action plan based on sustainable principles. The Ministry of Agriculture and Land Reclamation is also helping to support the shift towards sustainable agriculture through a variety of measures, including a phasing out of subsidies on chemical fertilisers.³⁹

³² Ministry of Agriculture, Agrifood and Forestry (France), The Agroecology Project in France, April 2016. Available at: <http://agriculture.gouv.fr/sites/minagri/files/1604-aec-aeenfrance-dep-gb-bd1.pdf>

³³ "Sustainable Olive Oil Production in Greece", Ecozine, January 16th 2015. Available at: <https://hmdecozine.com/2015/01/16/sustainable-olive-oil-production-greece/>

³⁴ "Italy Bets on Agriculture and Invests €21M in Sustainable-Biotech", Labiotech.eu, February 18th 2016. Available at <http://labiotech.eu/italian-government-agriculture-e21m-sustainable-biotech/>

³⁵ European Conservation Agriculture Federation, Uptake of conservation agriculture in Europe. Available at: <http://www.ecaf.org/ca-in-europe/uptake-of-ca-in-europe>

³⁶ Carvalho, M, and Lourenço, E, "Conservation Agriculture – A Portuguese Case Study", Journal of Agronomy and Crop Science, Vol 200, No 5, October 2014, pp 317-324.

³⁷ European Conservation Agriculture Federation, Uptake of Conservation Agriculture in Europe

³⁸ "Organic farming and agricultural movements in Spain", Green European Journal, Vol 5, March 1st 2013.

³⁹ "How is Egypt implementing sustainable agriculture practices?", SwitchMed, Available at: <https://www.switchmed.eu/en/country-hubs/egypt/actions/agriculture?c=policy&q=egypt>

Israel lacks favourable natural resources for agricultural production, but has nevertheless transformed itself into a successful food producer.

This is thanks to different innovations, including the drip irrigation system combined with the application of fertilisers (“fertigation”), and the construction of terraces and contour ploughing in order to enhance soil conservation in arid areas.⁴⁰ In **Jordan**, agricultural experts are calling for the authorities to promote a shift to more sustainable farming methods, including CA, in order to mitigate the effects of climate change and intensive tillage (the dominant method of farming).⁴¹

Meanwhile, SOILS is a non-profit organisation in **Lebanon** that encourages the country’s farmers to adopt the ethics and principles of permaculture. Among other things, this involves ecologically harmonious methods of agricultural production.⁴²

Morocco encapsulates many of the problems facing the agricultural sector in the SEMCs generally, including regular droughts, soil degradation, intensive cropping under irrigation and problems with land registration (leaving many smallholders without access to official agricultural support programmes or credit). In its Green Morocco Plan, launched in 2008, the government has

adopted a two-pronged approach, which is trying to balance the needs of the large-scale intensive farms with those of smaller producers.⁴³ Nonetheless, critics claim that the government is failing to give sufficient support to smaller producers and those who wish to transition from intensive methods to a more sustainable approach, with a lack of training and finance frequently cited as key constraints.⁴⁴

In **Tunisia**, rapid urban expansion has reduced the availability of arable land and displaced many low-income families.⁴⁵ CA methods—deployed in some of the rainfed cereal areas since the late 1990s—are proving to be an effective response to this problem, but now need to be rolled out elsewhere in the country.⁴⁶

In **Turkey**, one of the main structural problems impeding the performance of the agricultural sector has been the fragmentation of agricultural lands through inheritance. In response, new legislation aiming at preventing land fragmentation was introduced in 2013. Efforts are also being made to encourage the consolidation of existing holdings.⁴⁷ Meanwhile, CA is on track to become the national standard for farming in Turkey.⁴⁸

⁴⁰“Sustainable Agriculture—The Israeli Experience”, SACOG (Sustainable Agriculture Consulting Group). Available at: <http://conference.ifas.ufl.edu/ifsa/papers/c/c7.doc>

⁴¹“Practicing conservation agriculture to mitigate and adapt to climate change in Jordan”, EGU General Assembly, April 2016. Available at: <http://adsabs.harvard.edu/abs/2016EGUGA...18..685K>

⁴² SOILS Permaculture Association Lebanon website. Available at: <http://www.soils-permaculture-lebanon.com/about-soils.html>

⁴³ “Green Morocco Plan focuses on sustainable agriculture”, Al-Monitor, October 12th 2014. Available at: <http://www.al-monitor.com/pulse/business/2014/10/http://alhayat.com/articles/4906517---.html>

⁴⁴“Morocco’s Future in Farming Co-operatives”, The Globalist, July 19th 2014. Available at: <https://www.theglobalist.com/moroccos-future-in-farming-cooperatives/>

⁴⁵ “Greywater, greenhouses increase food production in Tunisia”, International Development Research Centre. Available at: <https://www.idrc.ca/en/article/greywater-greenhouses-increase-food-production-tunisia>

⁴⁶“Can conservation agriculture reduce the impact of soil erosion in northern Tunisia?”, EGU General Assembly, April, 2016. Available at: <http://adsabs.harvard.edu/abs/2016EGUGA...1812234B>

⁴⁷ “Food Losses and Waste in the Mediterranean”, CIHEAM Watch Letter No.30, September 2014. Available at: https://www.ciheam.org/en/publications/watch_letter/details?pub=WL_30&id=13

⁴⁸ “Turkey set to expand ‘conservation agriculture’”, FAO, November 27th 2014. Available at: <http://www.fao.org/europe/news/detail-news/en/c/270897/>

⁴⁹ “Sovrappeso e obesità infantile, i dati del Sistema di Sorveglianza OKkio alla Salute” (in Italian), Ministry of Health (Italy), March 4th 2017. Available at: http://www.salute.gov.it/portale/news/p3_2_1_1_1.jsp?lingua=italiano&menu=notizie&p=dalministero&id=2929

⁵⁰ CIA World Factbook, Population below poverty line (%). Available at: <https://www.cia.gov/library/publications/the-world-factbook/fields/2046.html>

CHAPTER 4: NUTRITIONAL CHALLENGES

France and **Portugal** secure the top two places in the region for the FSI’s nutrition category (see Table 4). Their elevated ranking reflects high scores for nutritional adequacy, low levels of micronutrient deficiency and relatively low rates of obesity. **Greece** is in third place: its comparatively poor performance in terms of obesity is more than offset by a low prevalence of malnourishment (reflected in low levels of stunting and wasting in children under the age of five).

Spain and **Israel** follow in fourth and fifth places respectively. Their lowing rankings compared with the regional leaders, Portugal and France, largely reflect an inferior performance in terms of the overnutrition component of the index (reflected in a higher prevalence of overweight children and adults). **Turkey** and **Tunisia** (in sixth and seventh place respectively) achieve broadly similar overall scores for nutrition, despite a varying performance in terms of individual indicators. Turkey scores more highly with respect to prevalence of malnutrition and dietary patterns, but fares worse than Tunisia in terms of micronutrient deficiencies and prevalence of overweight children and adults.

Italy’s surprisingly low ranking (eighth) is largely due to its underperformance in terms of childhood obesity (despite a slight improvement in recent years),⁴⁹ as well as a relatively low score for dietary patterns (in particular, relatively weak nutrition education and a relatively high number of people per fast food restaurant). Partly as a result of the 2008-09 global financial crisis, the high number of people in Italy living below the national poverty line (29%, compared with 14% in France and 19% in Portugal) could be a factor influencing its low score for dietary patterns.⁵⁰

Jordan, Lebanon, Egypt and **Morocco** occupy the bottom four places in the region in the FSI’s nutrition

category. Undernourishment is a major problem in all four countries, but is particularly severe in **Egypt** and **Lebanon**. **Morocco** performs especially poorly with respect to micronutrient deficiencies (both Vitamin A and iodine). This factor more than offsets Morocco’s superior performance (compared with Lebanon, Jordan and Egypt) in terms of the prevalence of overweight children.

TABLE 4
FOOD SUSTAINABILITY
INDEX 2017: “NUTRITIONAL
CHALLENGES” CATEGORY

RANK	COUNTRY	SCORE (OUT OF 100)
1	France	68
2	Portugal	68
3	Greece	65.6
4	Spain	64.9
5	Israel	62.3
6	Turkey	60.8
7	Tunisia	58.7
8	Italy	57.4
9	Jordan	55.1
10	Lebanon	55
11	Egypt	53.9
12	Morocco	53.6

Note: Scores are scaled from 0 to 100, where 100 = the highest sustainability and greatest progress towards meeting environmental, societal and economic Key Performance Indicators.

Source: Economist Intelligence Unit, Food Sustainability Index 2017.



MEDITERRANEAN DIET UNDER THREAT

The beneficial health effects of the Mediterranean diet have long been recognised. UNESCO, for example, has recognised the diet as an intangible cultural heritage, given strong links between local food and local heritage and identity.⁵¹ Together with olive oil, the key ingredients in the Mediterranean diet are vegetables, fruits, legumes, cereals (mostly unrefined) and whole grains. Dairy products (mainly cheese and yoghurt), seafood and poultry are consumed in low to moderate quantities, while red meat plays a minor role. Numerous studies have indicated that this traditional dietary pattern is closely correlated with a lower incidence of chronic disease—in particular, coronary heart disease (CHD) and type-2 diabetes—compared with a Western diet. Another important consideration is that, unlike a meat-based, high-protein Westernised pattern of consumption, the Mediterranean diet is also less resource-intensive (in terms of soil, water and energy inputs) and has a much lower carbon footprint.⁵²

The origins of the Mediterranean diet have their roots in traditional patterns of rural life, agricultural production and food preparation. And all of these are now under increasing threat. Around two-thirds of the inhabitants of Mediterranean countries now live in urban areas.

Most of the population growth is occurring along the coast, where the majority of economic activity is concentrated and employment opportunities are at their greatest. Increased urbanisation and changing working and social habits have also been accompanied by the expansion of large supermarket chains. In combination, these factors have resulted in a “nutrition transition” towards an energy-rich Westernised diet that contains large amounts of animal proteins, fats and refined cereals.⁵³ Combined with lower levels of physical activity, the change in dietary patterns has been accompanied by rising levels of obesity.⁵⁴

This is also resulting in the “multiple burden” of malnutrition. In Egypt, for example, figures published by the Food and Agriculture Organisation of the UN (FAO) reveal a high level of stunting (with over 22% of children under five too short for their age) due to a chronic state of undernutrition. At the same time, the prevalence of overweight children under the age of five is starting to increase (it is currently around 16%), while over 29% of adults in Egypt are categorised as obese.⁵⁵

⁵¹ FAO and CIHEAM, *Mediterranean food consumption patterns: Diet, environment, society, economy and health*, 2015. Available at: <http://www.fao.org/3/a-i4358e.pdf>

⁵² CIHEAM and FAO, *Zero Waste in the Mediterranean*

⁵³ *Ibid.*

⁵⁴ FAO, *Europe and Central Asia: Regional Overview of Food Insecurity*, 2017. Available at: <http://www.fao.org/3/a-i6877e.pdf>

⁵⁵ FAO, *The state of food security and nutrition in the world*, 2017. Available at: <https://docs.wfp.org/api/documents/WFP-0000022419/download/?ga=2.28861628.1041603109.1506095962-391355870.1506095962>

HOW MEDITERRANEAN COUNTRIES ARE RESPONDING TO THE "NUTRITION TRANSITION"

Shift away from **traditional Mediterranean diet**: olive oil; vegetables; fruits; legumes; cereals (mostly unrefined); whole grains; moderate amounts of dairy products (preferably cheese and yoghurt); low to moderate quantities of seafood and poultry.

Towards **energy-rich diet** containing large amounts of animal proteins, fats and foodstuffs deficient in fibre:

REASONS



Increased urbanisation and rising incomes



Changing working and social habits



Expansion of large supermarket chains

CONSEQUENCES



Rising levels of people who are overweight or obese



Higher incidence of coronary heart disease, type-2 diabetes and other chronic diseases



Western diet is more resource-intensive (in terms of soil, water and energy inputs) and has a much higher carbon footprint



Higher risk of micronutrient deficiencies (such as lower intake of some vitamins, especially folates, vitamins A and D)

GENERAL RESPONSES



Imposition of taxes on sugar-sweetened beverages



Restrictions on advertising and marketing of unhealthy foods (particularly those targeted at children)



Food fortification and vitamin supplementation to address micronutrient deficiencies



Nutrition education programmes targeting school curricula, cities, workplaces and food providers

EXAMPLES OF INITIATIVES IN NORTHERN MEDITERRANEAN COUNTRIES



FRANCE: Ensemble Prévenons l'Obésité Des Enfants (Together Let's Prevent Childhood Obesity), a multi-faceted, multi-stakeholder approach to promote healthy lifestyles in children



ITALY: Guadagnare salute: rendere facili le scelte salutari (Gaining health: making healthy choices easier), a programme by the Ministry of Health that promotes fruit and vegetable intake; reducing the concentration of salt, sugars and fats in foods; and reducing alcohol abuse

EXAMPLES OF INITIATIVES IN SOUTHERN AND EASTERN MEDITERRANEAN COUNTRIES



LEBANON: Agency for Technical Co-operation and Development promotes "vertical gardening" to cultivate a diverse range of fresh food in urban areas



TUNISIA: World Food Programme provides nutritious local produce to school canteens and encourages the creation of school gardens

NUTRITION INITIATIVES IN INDIVIDUAL COUNTRIES

To counter these trends, a number of measures are needed. In particular, there is a compelling case for early intervention. By raising the awareness of young people about the importance of good nutrition, there will be a greater chance of ensuring that they adopt healthy eating habits when they become adults. According to Francesco Branca, director at the Department of Nutrition for Health and Development at the World Health Organisation (WHO), “the negative trends in poor nutrition and childhood obesity evident in a number of countries are not irreversible if effective public policies [are] put in place.”

Dr Branca cites **France** as a stand-out country in this respect. Ensemble Prévenons l’Obésité Des Enfants (EPODE, Together Let’s Prevent Childhood Obesity) is a prime example of the kind of public intervention that is helping to make a real difference. First launched in France in ten pilot communities in 2004, EPODE is now being copied by more than 500 communities worldwide. Recognising the complex nature of the obesity problem, EPODE adopts a multi-faceted, multi-stakeholder approach in which local communities and families are directed and encouraged to promote the adoption of healthy lifestyles in children (notably, improved eating habits and increased physical activity).⁵⁶

Moreover, in January 2017, ANSES (the French Agency for Food, Environmental and Occupational Health and Safety) released updated food consumption guidelines. Among its recommendations was the need to limit the consumption of meat (excluding poultry), and especially of delicatessen meats and sugar-sweetened beverages.

Instead, ANSES advocated a greater focus on pulses, wholegrain cereal products, vegetables and fruits, as well as certain vegetable oils.⁵⁷

In **Greece**, a move back to home cooking in the face of a period of economic crisis and protracted austerity has led to sales of fast food—including souvlaki (skewered meat) and pizza—falling by over a quarter.⁵⁸ At the same time, obesity—particularly among the country’s youth—constitutes a significant problem. With 37.3% of individuals aged 5-19 estimated to be overweight, Greece has the highest prevalence of overweight young people in the 12 Mediterranean countries included in our study.

Meanwhile, the north-south divide in **Italy** extends to nutritional challenges, with inferior nutritional standards in the south (including the relatively high per-head consumption of fast food) reflected in a much higher prevalence of obesity than in the north, according to Dr Branca. The programme “Guadagnare salute: rendere facili le scelte salutari” (Gaining health: making healthy choices easier) of the Ministry of Health focuses, among other things, on encouraging fruit and vegetable intake; reducing the concentration of salt, sugars and fats in foods; and reducing alcohol abuse.⁵⁹ Meanwhile, the Società Italiana dell’Obesità (SIO) believes that the treatment of obesity requires an inter-disciplinary approach in which diet is just one of the elements. SIO is creating a national network of specialised treatment centres that will collaborate with policymakers in an attempt to come up with solutions.⁶⁰

In **Portugal**, a national survey is being undertaken to assess the risk of malnutrition among citizens aged above 65, including those living in nursing homes.⁶¹ With around one-fifth of the EU population already in this particular age-group—and the proportion steadily rising—the promotion of a healthy diet for senior citizens clearly represents a wider European challenge.

Around a quarter of Spaniards are now obese,⁶² so it is surprising that obesity in Spain had, until recently, received little attention among policymakers and the public. However, with child obesity on the rise, policymakers have focused on promoting healthier diets and lifestyles (for example, as part of the Strategy for Nutrition, Physical Activity and the Prevention of Obesity), as well as restrictions on advertising to young people.⁶³

As far as the SEMCs are concerned, undernutrition and obesity increasingly exist side by side, paradoxically. In **Egypt**, for example, the quality of the diet is skewed heavily towards subsidised wheat and sugar. Although the risk of famine may have decreased, fruit and vegetables remain expensive. A subsidy programme still favours food items rich in simple carbohydrates (such as sugar), exacerbating the risk of obesity.⁶⁴

Jordan has received substantial support from international agencies in recent years, as part of an attempt to bolster national food security in the wake of an influx of around 1.4m Syrian refugees. A joint UN programme led by the UN Development Programme

(UNDP) has specifically targeted smallholder farmers, with the aim of increasing sustainable food production and raising overall levels of nutrition.⁶⁵

Despite **Israel’s** high per-head GDP, major income inequalities mean that a significant number of Israelis suffer from a poor diet. Estimates suggest that around one-fifth of the population (representing the lowest socio-economic group) are unable to purchase wholesome foods, with the prevalence of diabetes among this particular cohort at around 25%. Hence, the Israeli Forum for Sustainable Nutrition (IFSN) has been working on providing evidence-based information on the complexity of the food chain and the double burden of obesity and food insecurity in the country.⁶⁷

In **Lebanon**, the need to accommodate around 1.5m Syrian refugees has led to added pressures on food supplies—making it difficult (despite international support) for the authorities to ensure adequate levels of nutrition. The Agency for Technical Co-operation and Development has been promoting innovative solutions, including the concept of “vertical gardening”, which is used to cultivate a diverse range of fresh food in urban areas.⁶⁸ Meanwhile, the World Food Programme (WFP) is using a debit-style card to distribute food to vulnerable families who are unable to meet their basic food needs. The cards, which are loaded each month with US\$27 per person, can be used in 500 contracted food shops across the country. Around 700,000 children and adults currently benefit from the programme. Despite these efforts, the WFP estimates that around a third of Syrian refugees in Lebanon are failing to obtain sufficient nutrients.^{69,70}

⁵⁶ “EPODE approach for childhood obesity prevention: methods, progress and international development”, *Obes Rev.*, 2012 Apr; 13(4): 299-315.

⁵⁷ “ANSES updates its food consumption guidelines for the French population”, ANSES, January 24th 2017. Available at: <https://www.anses.fr/en/content/anses-updates-its-food-consumption-guidelines-french-population>

⁵⁸ “Greek financial crisis: consequences in the healthcare of diabetes and its complications”, *Hippokratia*. 2014 Jan-Mar; 18(1): 4-6.

⁵⁹ CHRODIS, *Gaining Health: Making Healthy Choices Easier Italy*, 2017. Available at: <http://chrodis.eu/wp-content/uploads/2017/03/gaining-health-making-health-choices-easier.pdf>

⁶⁰ European Association for the Study of Obesity website, Obesity in Italy. Available at: <http://easo.org/media-portal/country-spotlight/obesity-in-italy/>

⁶¹ “National survey of the Portuguese elderly nutritional status: study protocol”, *BMC Geriatrics*, 2016:139.

⁶² “Healthy diet? A quarter of Spaniards are obese”, *The Local*, June 30th 2015. Available at: <https://www.thelocal.es/20150630/nearly-a-quarter-of-spaniards-are-obese-world-health-organization>

⁶³ The Economist Intelligence Unit, *Confronting obesity in Spain: the need for greater awareness and policy integration*, June 2016. Available at: <https://www.eiuperspectives.economist.com/healthcare/confronting-obesity-europe-taking-action-change-default-setting/case-study/case-study/confronting-obesity-spain>

⁶⁴ “Egypt’s working poor are facing a silent killer”, *Agora MedSpring*, January 9th 2017. Available at: <http://agora.medspring.eu/en/articles/egypts-working-poor-are-facing-silent-killer-bad-food>

⁶⁵ UNDP, Food and nutrition security in Jordan towards poverty alleviation. Available at: http://www.jo.undp.org/content/jordan/en/home/operations/projects/poverty_reduction/foodsecurity.html

⁶⁶ “What Israel – and you – can do about food security”, *Israel 21c*, July 16th 2017. Available at: <https://www.israel21c.org/what-israel-and-you-can-do-about-food-security/>

⁶⁷ IFNS website. Available at: http://www.ifsn.org/il/?page_id=227 ⁶⁸ “Innovative solutions to food and nutrition issues in densely populated urban areas”, Agency for Technical Co-operation and Development (ACTED), March 17th 2017. Available at: <http://reliefweb.int/report/lebanon/innovative-solutions-food-and-nutrition-issues-densely-populated-urban-areas>

⁶⁹ WFP website, What the World Food Programme is doing in Lebanon. Available at: <http://www1.wfp.org/countries/lebanon>

⁷⁰ “Syrian refugee children reduced to selling on Beirut’s streets to feed their families”, *The Guardian*, May 31st 2017. Available at: <https://www.theguardian.com/global-development/2017/jan/25/syrian-refugee-children-selling-beirut-streets-lebanon-support-families>

In **Morocco**, nutrient deficiencies are a major problem, particularly among women and children, amid a lack of food diversity and an overreliance on sugar, refined flour and fatty foods.^{71,72} The Global Alliance for Improved Nutrition has been targeting vulnerable groups by supporting programmes providing fortified food supplements.⁷³



As part of an early intervention strategy, primary school children in **Tunisia** are benefitting from support from the WFP. The aim is to provide nutritious local produce to school canteens, while at the same time empowering women in rural agricultural communities and encouraging the creation of school gardens.⁷⁴

Despite **Turkey's** relatively high regional ranking in the FSI's nutrition category (sixth position), nutrition-related education remains an issue, with primary-school children failing to receive sufficient guidance regarding the importance of good nutrition from their teachers. For example, the topic of nutrition is absent from the curriculum in the training courses for primary-school teachers.⁷⁵

Across the whole region, efforts to increase agrobiodiversity at the local level can play an important role in raising nutritional standards, especially in the SEMCs, where micronutrient deficiencies are a particular problem.⁷⁶ For example, wild plant varieties, which have traditionally played a key role in the Mediterranean diet, are much richer than the corresponding cultivated ones in terms of micronutrients.⁷⁷ Plant breeding can also be used to increase the micronutrient content of crops through a process known as bio-fortification.⁷⁸ The most effective

way of addressing such deficiencies in the short term is through programmes deploying food fortification and vitamin supplementation—targeted especially at children and adolescents.⁷⁹ Such an approach is well established in a number of the SEMCs, including Egypt, Jordan, Lebanon and Morocco. As noted by Dr Branca, however, such programmes do not always reach all of the intended beneficiaries.

Much stronger public interventions will be needed in order to tackle the problem of overnutrition and rising obesity; the latter is a general trend throughout the region. This could include education programmes on food, better dissemination of information on food and nutrition (for example in schools, by parents and in the media), and improved access to healthier foods. National governments will also need to ensure that they have an effective nutritional surveillance programme in place. Without regular monitoring of nutritional data (across the population as a whole, as well as different socio-economic groups) it will be difficult for the public health authorities to determine whether progress is being made towards meeting recommended dietary standards. Improved data and monitoring will also make it easier to devise specific interventions. For example, evidence of a continuing rise in childhood obesity could point to the need for stricter regulations on the marketing of unhealthy foods.

⁷¹ Aboussaleh, Y et al, "Food Diversity and Nutritional Status in School Children in Morocco", *Sustainable Food Security in the Era of Local and Global Environmental Change*, May 2013, pp 203-215.

⁷² "Morocco's Disappearing Mediterranean Diet", *HuffPo*, June 21st 2013. http://www.huffingtonpost.com/rachel-newcomb/mediterranean-diet_b_3473792.html

⁷³ Global Alliance for Improved Nutrition (GAIN) website, Morocco. Available at: <http://www.gainhealth.org/knowledge-centre/country/morocco/>

⁷⁴ WFP website, What the World Food Programme is doing in Tunisia. Available at: <http://www1.wfp.org/countries/tunisia>

⁷⁵ Kucukkomurler, S and Boran, NS, "Evaluation of nutrition education in Turkish public primary education programs", *European Journal of Research on Education*, 2014, Special Issue: Contemporary Studies in Education, 27-34.

⁷⁶ UN Economic and Social Commission for Western Asia, Annual Report 2013: 40 years with the Arab World, 2013. Available at: https://www.unescwa.org/sites/www.unescwa.org/files/page_attachments/escwa_annual_report_2013.pdf

⁷⁷ CIHEAM and FAO, Zero Waste in the Mediterranean

⁷⁸ FAO, Europe and Central Asia: Regional Overview of Food Insecurity, 2017. Available at: <http://www.fao.org/3/a-i6877e.pdf>

⁷⁹ "The Prevalence of Micronutrient Deficiencies and Inadequacies in the Middle East and Approaches to Interventions", *Nutrients*. 2017 Mar 3;9(3). pii: E229.

CHAPTER 5:

FOOD LOSS AND WASTE

Four of the five EU members in our regional study emerge as the best performers in the FSI for FLW. The exception among the EU members is Greece, which falls into the lower half of the ranking. **France** leads the region (see Table 5), supported by robust government initiatives to combat FLW. Its food losses at the farm and pre-market stage are very low. This is also the case at the end-user (retail and consumer) level, where it achieves the highest score in the region for the effectiveness of its policy response.

Spain, Italy and **Portugal** take up the next three slots in the ranking. Like France, food losses at the pre-market stage are low, reflecting their relatively good storage and transport infrastructure. That said, Spain and Portugal have a slight edge over Italy in terms of the quality of their road infrastructure. Spain also comes out ahead of both Italy and Portugal with regard to the amount of investment in transport with private participation (measured as a percentage of GDP). Meanwhile, end-user per-head food waste in Italy (at 145 kg/person/year) is slightly above that in Portugal (135 kg/person/year) but falls below that in Spain (165 kg/person/year). Italy also scores more highly than both Spain and Portugal in terms of its relatively strong policy response to end-user waste.

Turkey (in fifth position) achieves a higher ranking than **Israel** (in sixth position) despite incurring much larger pre-market food losses. Although the quality of Turkey’s response to these food losses is judged to be weaker than in Israel, Turkey has a clear lead over Israel when it comes to dealing with food waste at the end-user level. Food waste in Israel (at 294 kg/person/year) is the highest in the region, and nearly double the level in Turkey (168 kg/person/year). Turkey also scores more highly than Israel in terms of the quality of its policy response to food waste.

The final six positions in the ranking are occupied by the poorer countries in the SEMCs, together with **Greece**. All of these countries suffer from high food losses at the pre-market stage. This reflects a combination of climatic factors (such as drought), poor transport infrastructure and inadequate storage and refrigeration facilities. The policy response in terms of addressing end-user food waste is also generally weak—especially in **Morocco** and **Lebanon**.



TABLE 5
FOOD SUSTAINABILITY
INDEX 2017: “FOOD LOSS
AND WASTE” CATEGORY

RANK	COUNTRY	SCORE (OUT OF 100)
1	France	84.9
2	Spain	77.1
3	Italy	76.7
4	Portugal	72.1
5	Turkey	59.6
6	Israel	58
7	Jordan	56.7
8	Egypt	56.3
9	Greece	51.5
10	Tunisia	49.7
11	Morocco	47.5
12	Lebanon	42.3

Note: Scores are scaled from 0 to 100, where 100 = the highest sustainability and greatest progress towards meeting environmental, societal and economic Key Performance Indicators.

Source: Economist Intelligence Unit, Food Sustainability Index 2017.



GROWING PUBLIC PRESSURE TO ACT ON FOOD LOSS AND WASTE

The high rankings achieved by the EU countries have been helped by growing public support in recent years for measures designed to reduce FLW. Pressure from citizens' groups has played an important role in raising public awareness of the high economic and environmental costs. For example, more than 50 organisations in 18 EU countries—led by the campaign group “This is Rubbish”—have been pressing for the EU to adopt binding targets to cut food waste.⁸⁰ At the end of 2015 the EU published a revised Waste Framework Directive that requires member states to adopt a common methodology for food waste measurement.⁸¹ Then, in March 2017, the European Parliament approved a motion calling on the EC to set binding targets for the reduction of food waste by the end of 2020.⁸²

Although food waste in richer countries typically occurs mostly at the retail and consumer level, it is losses at the farm and pre-market stage that constitute the main problem in poorer countries. Such losses can be considerable. In Egypt, for example, the FAO estimates that around 15% of cereals are lost between harvesting and final consumption. Perishable foods are also subject to significant losses as a result of a deficient transport infrastructure and a lack of storage capacity.⁸³

An obvious way of tackling this problem would be to step up the level of investment in transport and storage infrastructure.

However, this is not always an easy option, particularly in those countries (such as Jordan and Lebanon) that are still struggling to cope with the economic fallout from the conflict in Syria and political turbulence in the Middle East.

Food banks—spurred by civil-society initiatives—have been a long-established feature of the more developed countries of the region. The 2008-09 global financial crisis provided added impetus, particularly in those countries suffering from a sharp rise in unemployment (Greece, Italy, Portugal and Spain). However, food banks have also sprung up in the SEMCs in recent years. Rapid urbanisation—together with changes in the way that food is consumed and distributed (including the spread of supermarkets)—means that food waste at the consumption stage is on a rising trajectory. With food shortages among vulnerable groups even more pressing than in the developed northern countries, the network of food banks in the SEMCs is set to grow.

Meanwhile, surveys indicate that food losses increase sharply at the time of religious festivals.⁸⁴ Publicity campaigns aimed at encouraging more efficient planning by households in the lead-up to such festivals could therefore do much to reduce food wastage.

RESPONSES IN INDIVIDUAL COUNTRIES

France has been in the vanguard of attempts to reduce food losses, launching in mid-2013 its National Pact against Food Waste.⁸⁵ In 2016 it approved legislation making it compulsory for supermarkets and grocery stores that exceed 400 sq metres to pass on unsold food to food banks or charities.⁸⁶ Restaurants above a certain size are also obliged to recycle left-over food, and must issue “doggy bags” to customers if they request them.⁸⁷

In **Greece**, the National Waste Prevention Strategic Plan for 2014-20 cites a reduction in food waste as one of its four main objectives.⁸⁸ However, it is non-government organisations (NGOs) that have been taking the lead—by channelling unsold food from shops and restaurants to the needy via sophisticated logistics networks staffed by volunteers.⁸⁹

A number of major official initiatives aimed at reducing food waste in Italy have been launched in recent years, including the establishment of a national task force by the Ministry of the Environment in 2013.⁹⁰ In August 2016 a law against food waste was approved by parliament. Unlike the French law, however, the Italian one operates through incentives, while in France violators are subject to fines.⁹¹

In **Portugal**, NGOs have taken the lead in tackling the problem of food waste. DARIACORDAR—a civil society non-profit association—was instrumental in launching the Zero Waste Movement in April 2012. Surplus food (with an emphasis on cooked food) is collected and distributed through a network.⁹² In early 2017 Luís Capoulas Santos, Portugal's agriculture minister, announced that a national commission would be tasked with developing a strategy for cutting food waste in the corporate and public sectors.⁹³

Operating under the umbrella of the Spanish Federation of Food Banks (FESBAL), **Spain's** 56 food banks distributed a record 53m kg of food to 1.5m recipients in 2015.⁹⁴ For its part, the government has issued a series of practical guides aimed at specific groups—including the retail sector, education centres and the consumer—as part of its “More food, less waste” initiative, based on recommendations and voluntary agreements rather than compulsion (as in France).^{95,96}

⁸⁰ “Array of campaign groups call for EU to get tougher on waste”, *The Grocer*, June 1st 2017. Available at: <https://m.thegrocer.co.uk/home/topics/waste-not-want-not/array-of-campaign-groups-call-for-eu-to-get-tougher-on-waste/553479.article>

⁸¹ CIHEAM and FAO, *Zero Waste in the Mediterranean*

⁸² “Small signs of progress: Europe moves towards clearer targets on reducing food waste”, *Slow Food*, March 15th 2017. Available at: <https://www.slowfood.com/sloueuropa/en/small-signs-of-progress-europe-moves-towards-clearer-targets-reducing-food-waste/>

⁸³ CIHEAM and FAO, *Zero Waste in the Mediterranean*

⁸⁴ “Bread and Bakery Products Waste in Selected Mediterranean Arab Countries”, *American Journal of Food and Nutrition*, Vol. 4, No. 2, 2016, pp 40-50.

⁸⁵ “F Ministry of Agriculture, Agrifood and Forestry (France), French National Pact to Fight Against Food Waste, June 2013. Available at: https://www.oecd.org/site/agrfcn/Session%205_Perrine%20Coulomb.pdf

⁸⁶ “French law forbids food waste by supermarkets”, *The Guardian*, February 4th 2016. Available at: <https://www.theguardian.com/world/2016/feb/04/french-law-forbids-food-waste-by-supermarkets>

⁸⁷ “‘Doggy bag’ law comes into force in France”, *France24*, January 4th 2016. Available at: <http://www.france24.com/en/20160104-france-doggy-bag-law-restaurants-food-waste>

⁸⁸ European Environmental Agency, *Greece fact sheet waste prevention*, October 2016. Available at: <https://www.eea.europa.eu/themes/waste/waste-prevention/countries/greece-fact-sheet-waste-prevention-oct2016/view>

⁸⁹ “Greek crisis prompts a rethink on food waste”, *ekathimerini.com*, September 7th 2015. Available at: <http://www.ekathimerini.com/201260/article/ekathimerini/community/greek-crisis-prompts-a-rethink-on-food-waste>

⁹⁰ CIHEAM and FAO, *Zero Waste in the Mediterranean*

⁹¹ “Italy tackles food waste with law encouraging firms to donate food”, *The Guardian*, August 3rd 2016. Available at: <https://www.theguardian.com/world/2016/aug/03/italy-food-waste-law-donate-food>

⁹² Lorena, D and Pires, I, “Combating food waste in Portugal: a case study of a civil society initiative”. In: *Food futures: ethics, science and culture*, edited by Olsson, IAS et al, 2016.

⁹³ “Portugal creates commission to tackle food waste”, *just-food*, February 6th 2017. Available at: https://www.just-food.com/news/portugal-creates-commission-to-tackle-food-waste_id135678.aspx

⁹⁴ “FESBAL grants BBVA its Espiga de Oro award for its support for food banks”, *BBVA website*, November 7th 2016. Available at: <http://bancaresponsable.com/en/fesbal-bbva-espiga-de-oro-award-food-banks/>

⁹⁵ CIHEAM and FAO, *Zero Waste in the Mediterranean*

⁹⁶ “Food Losses and Waste in the Mediterranean”, *CIHEAM Watch Letter No.30*

With regard to the SEMCs, the authorities in **Egypt** launched a smartcard system in April 2015, covering nearly 80% of the country's population and setting a maximum limit for the daily amount of subsidised bread that can be claimed by each family member. The new approach has reportedly reduced the demand for bread by around 15-20% and led to significant savings in the amount of food waste and subsidies.⁹⁷

According to Leket, the largest food bank in **Israel**, 2.4m tonnes of food (equivalent to around a third of domestic food production) were wasted in the country in 2016. Around half this amount could be rescued. New proposed legislation—in the form of the Law to Encourage the Rescue of Food Surpluses—could address the issue.⁹⁸

Jordan has expressed interest in following the example of Egypt in adopting a smartcard system to reduce the wastage frequently associated with subsidised basic food items.⁹⁹ The country is also taking steps to ensure that non-rescuable food is also put to use. A waste-to-energy plant is being built with support from the EU and the European Bank for Reconstruction and Development (EBRD).¹⁰⁰

In **Lebanon**, civil-society organisations—such as Food Establishments Recycling Nutrients, Food Blessed and the Lebanese Food Bank (LFB)—have taken the lead in

tackling the problem of food waste. As well as distributing surplus food, the LFB promotes an awareness campaign, “Not to Waste Food”, aimed at businesses (hotels, restaurants and food-processing companies), schools and households. Meanwhile, the Med-3R project, financed by the EU, is seeking to encourage Lebanese restaurants and their customers to adopt the doggy bag habit.¹⁰¹ As far as **Morocco** is concerned, the government—supported by the FAO—is planning to develop an action plan aimed at halving FLW by 2024.¹⁰²

In **Tunisia**, the National Consumer Institute (INC), operating under the Ministry of Industry and Trade, was created in 2008 to provide technical assistance and information on the consumer culture in the country. The INC has calculated that around 900,000 loaves of bread are thrown away on a daily basis, with a spike during Ramadan.¹⁰³

A good example of the progress that can be made on combatting food waste simply by raising public awareness is provided by **Turkey**. In January 2013 the authorities launched the Campaign for Preventing Bread Waste. Although implemented on a voluntary basis without any legal sanctions, the campaign is estimated to have reduced the number of discarded loaves by 384m in its first year of operation.¹⁰⁴

CONCLUSION

Our analysis clearly indicates that the Mediterranean region as a whole faces multiple challenges in terms of food sustainability. Threats common to all of the countries (albeit to varying degrees) include: **climate change; water scarcities; mounting environmental pressures** (particularly along the coast); **soil degradation; unsustainable farming practices; and poor nutrition**. This latter is marked by rising rates of obesity, and the **“multiple burden” of obesity, undernutrition and micronutrient deficiencies** in many of the SEMCs.

A number of these problems will require **close collaboration** between Mediterranean countries themselves, as well as regional and multilateral institutions. Through its European Neighbourhood Policy (ENP), the EU will have a particularly crucial role to play in fostering regional co-operation.¹⁰⁵ One of the key goals of the ENP is to reduce intra-regional disparities while safeguarding the environment. This approach is also closely aligned with the objectives of the MSSD for 2016-25 and the UN's 2030 Agenda for Sustainable Development. Sustainable agriculture, improved nutrition and a reduction in food loss and waste constitute key elements in the SDGs.

The adoption of more sustainable agricultural practices will depend heavily on the **effectiveness of national public institutions**, both at the central and local levels. In this respect, weak governance and a lack of institutional

capacity are longstanding constraints in the SEMCs. Recent political instability in a number of countries has added to these difficulties. Multilateral and regional institutions will therefore need to ensure that the SEMCs receive sufficient financial and technical support. Without such assistance, the authorities in these countries will have little incentive to press ahead with more sustainable policies. Close co-operation will be required with research institutions, which have a vital role in facilitating knowledge transfer and ensuring the spread of best practice. Private-sector involvement will also be essential if new technologies are to be rolled out successfully, and financing mechanisms put in place to support increased investment in sustainable solutions.

Governments will also need to continue the process of educating their own citizens about the benefits of sustainable development. Public awareness campaigns have been shown to be effective in cutting food waste and loss in a number of countries. However, these efforts may need to be reinforced by more concerted moves; legislation passed in France that obliges supermarkets and restaurants to recycle left-over food serves as a prime example.

Public education campaigns can also help to address the problem of rising obesity. In Turkey, for example, the Ministry of Health is attempting to overcome a general

⁹⁷ “Bread rationing and smartcards: Egypt takes radical steps to tackle food waste”, *The Guardian*, March 20th 2015. Available at: <https://www.theguardian.com/global-development-professionals-network/2015/mar/20/bread-rationing-egypt-food-waste-grain-wheat>

⁹⁸ Leket Israel, *Food Waste and Rescue in Israel: the Economic, Social and Environmental Impact*, National Report 2016, January 2017. Available at: https://www.leket.org/wp-content/uploads/2017/01/Sum_Eng_Digital.pdf

⁹⁹ “Bread rationing and smartcards: Egypt takes radical steps to tackle food waste”.

¹⁰⁰ “EU and EBRD support renewable energy in Jordan's municipal services”, EBRD website, December 7th 2016. Available at: <http://www.ebrd.com/news/2016/eu-and-ebrd-support-renewable-energy-in-jordans-municipal-services.html>

¹⁰¹ Charbel, L et al, “Preliminary Insights on Household Food Wastage in Lebanon”, *Journal of Food Security*, Vol. 4, No. 6, 2016, pp 131-137.

¹⁰² “UN Study: Nearly Half of All Food in Morocco Goes to Waste”.

¹⁰³ “Arab countries face problem of food waste during Ramadan”, *The Arab Weekly*, June 4th 2017. Available at: <http://www.thearabweekly.com/Opinion/8602/Arab-countries-face-problem-of-food-waste-during-Ramadan>

¹⁰⁴ CIHEAM and FAO, *Zero Waste in the Mediterranean*

¹⁰⁵ *Ibid.*

APPENDIX: METHODOLOGY

lack of knowledge about nutrition through a series of publicity campaigns. According to the health authorities, a poor understanding of nutrition is one of the main reasons why individuals make the wrong food choices.¹⁰⁶ But again, this will need to be backed up by additional measures. A recent study carried out on behalf of the WHO reveals that, at a global level, childhood obesity has increased tenfold over the past four decades.¹⁰⁷ Some of the highest rates of childhood obesity can be found in the SEMCs, including Egypt. Against this backdrop, much stronger public interventions are needed. These could include the imposition of taxes on sugar-sweetened beverages and the introduction of regulations that prohibit the marketing of unhealthy foods to children.

NGOs and professional membership associations, such as the European Association for the Study of Obesity (EASO), also have a vital part to play in publicising the health risks associated with a poor diet and fostering collaboration with government agencies and other stakeholders. EASO, together with the SIO and the Center for Study and Research on Obesity of the University of Milan, played a key role in formulating the 2015 Milan Declaration: A Call to Action on Obesity.¹⁰⁸

Local initiatives can also help to encourage the shift back to healthier diets. An obvious example is the establishment of farmers' markets. As well as strengthening civic engagement and reducing transport and storage costs, these can help to spur the consumption of more locally produced and fresh foods.

Meanwhile, the private sector—for example, in the form of food processors, supermarkets and fast-food chains—has a **shared responsibility for ensuring that consumers are offered a range of healthy and nutritious foods.** There is a need to replicate good practices and accelerate innovative thinking in order to scale up best-practice solutions. Increased urbanisation has inevitably coincided with a proliferation of supermarkets, low-cost “convenience” foods and fast-food outlets. This is an ongoing trend, particularly in the SEMCs. Nonetheless, popular convenience foods can often be reformulated to improve their nutritional value. Improved nutritional labelling of food products can also help consumers to make an informed choice—particularly if this is backed up with practical guidance from supermarkets and other purveyors of food on how to meet dietary recommendations.

¹⁰⁶ “Obesity: Breaking the cycle of shame in Turkey”, *Daily Sabah*, February 24th 2016. Available at: <https://www.dailysabah.com/health/2016/02/25/obesity-breaking-the-cycle-of-shame-in-turkey>

¹⁰⁷ “Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128·9 million children, adolescents, and adults”, *The Lancet*, October 10th 2017.

¹⁰⁸ EASO, 2015 Milan Declaration: A Call to Action on Obesity. Available at: <http://easo.org/2015-milan-declaration-a-call-to-action-on-obesity/>

The Food Sustainability Index (FSI), developed by The Economist Intelligence Unit with the Barilla Center for Food & Nutrition (BCFN), measures the sustainability of food systems in 34 countries around three key issues outlined in the 2015 BCFN Milan Protocol and related to the SDGs: food loss and waste (FLW), sustainable agriculture and nutrition. The index looks at policies and outcome around sustainable food systems and diets through a series of Key Performance Indicators that consider environmental, social and economic sustainability.

The three primary categories in the index—FLW, sustainable agriculture, and nutritional challenges—were defined in the Milan Protocol. The individual indicators and underlying metrics have been selected on the basis of Economist Intelligence Unit expert knowledge and analysis, consultation with external food sustainability and nutrition experts, and with input from the BCFN and their Advisory Board members.

The FSI evaluates food sustainability in 34 countries that were carefully selected by The Economist Intelligence Unit and the BCFN, in consultation with experts. The country choice reflects a mix of high-income, middle-income and low-income countries, with geographic representation. These countries make up over 85% of global GDP and two-thirds of the global population.

The index contains 35 indicators, and over 55 sub-indicators, organised across these three categories. Each category receives a score, calculated from a weighted mean of the underlying indicator scores, and scores are scaled from 0 to 100, where 100 represents the highest sustainability and greatest progress towards meeting environmental, societal and economic Key Performance Indicators.

Indicator scores are normalised and then aggregated across categories to enable a comparison of broader concepts across countries. Normalisation rebases the raw indicator data to a common unit so that it can be aggregated. All indicators in this model are normalised to a 0 to 100 scale, where 100 indicates the highest sustainability and 0 represents the lowest.

The list of indicators and how to interpret the scores, as well as full definitions and sources of the indicators, are available in the downloadable Excel workbook on the FSI content hub. A full index methodology is also available.

¹⁰⁹ Food Sustainability Index. Available at: <http://foodsustainability.eiu.com/>

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