Barilla Center FOR FOOD & NUTRITION

FOOD SUSTAINABILITY INDEX 2017

GLOBAL EXECUTIVE SUMMARY

Written by The Economist Intelligence Unit

ABOUT THE FOOD SUSTAINABILITY INDEX

Food represents a common thread linking the 17 Sustainable Development Goals adopted by UN member states in 2015. The Food Sustainability Index (FSI), developed by The Economist Intelligence Unit with the Barilla Center for Food & Nutrition, is a model designed to assess the sustainability of national food systems in a qualitative and quantitative manner. The FSI aims to highlight best practices among different countries, establish a comparable benchmark and measure progress over time.

The first edition of the 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's ranking is not intended to be judgemental, but rather offers a benchmark against which the performance of countries can be monitored *vis-à-vis* the main challenges confronting the global food system.

The FSI's three pillars—sustainable agriculture, nutritional challenges, and food loss and waste—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. The FSI's three pillars are divided into eight categories, which are in turn divided among 35 indicators scaled from 0 to 100, where 100 equals fully sustainable. The overall score for each country is then calculated from a weighted average of the categories.

A more detailed explanation of the methodology and indicators included in the 2017 edition can be found in a dedicated methodology report.[1] In future, it is envisaged that the FSI will be expanded further and an even more longitudinal analysis created.

This executive summary was written by Laurence Blair and edited by Martin Koehring of The Economist Intelligence Unit.

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[1] 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.

KEY FINDINGS

1) The global top performer is France

The top scored countries overall are France, Japan, Germany, Spain, Sweden, Portugal, Italy, South Korea and Hungary (top quartile). In general, those countries that place in the first quartile typically demonstrate strong and effectively implemented government policy on food waste and loss, agriculture-related conservation and research, and nutrition education. Scores on lifestyle, as well as social and climate-related categories and indicators, such as *physical activity* and *diet composition*, the *participation rate of women in farming*, and *monthly freshwater scarcity*, are important in determining the ranking, but the presence or absence of the above-mentioned governmental factors tend to be even more influential for the final ranking.

2) Countries with a high level of food sustainability tend to demonstrate high incomes, high levels of human development, smaller populations and slower rates of urbanisation

The FSI is developed in conjunction with a range of background indicators, including income (in terms of GDP per head at purchasing power parity in 2017), the Human Development Index (HDI, which combines three broad indicators involving health, education and income), population size (both in 2017 and projected for 2027) and the rate of urbanisation (in terms of annual urban population growth in 2016). Comparison with the FSI data reveals several correlations of varying strength between food sustainability and these indicators:[2]

- **Income and food sustainability: slight positive correlation (correlation coefficient: 0.25).** Although high-income countries tend to perform somewhat better in the FSI ranking than poorer countries, there are several major outliers. Despite having the highest GDP per head (US$74,330), the **UAE** ranks last (34th) in the FSI, while **Ethiopia** (US$1,830), easily the poorest country in the FSI (34th), ranks relatively highly overall (12th). In most cases, however, **high-income countries tend to prove better at ensuring food sustainability.**

- **Human development and food sustainability: moderate positive correlation (correlation coefficient: 0.45). Germany** ranks second out of 34 for the HDI and 3rd for the FSI, while India ranks 32nd and 33rd respectively. For 52% of countries surveyed, their FSI and HDI rankings differ by only five places or less. **Countries with a high HDI tend to be better at ensuring food sustainability.**

- **Population size and food sustainability: slight negative correlation (correlation coefficient for 2017 population: -0.24; correlation coefficient for 2027 population: -0.26). China**, the most populous country in 2017, ranks 23rd in the FSI, while **India**, the most populous country in 2027, ranks 33rd. Nevertheless, there are some outliers, with **Japan** (the 9th most populous in 2017) performing well in the FSI, coming 2nd overall. **High-population countries tend to find it harder to ensure food sustainability.**

- **Urbanisation and food sustainability: moderate negative correlation (correlation coefficient: -0.41).** Apart from **Ethiopia** (12th) and **Turkey** (16th), the top ten-fastest urbanising countries all rank in the lower half of the FSI. **France**, the top-performing country overall, ranks just 26th in terms of the pace of urbanisation. **Rapidly urbanising countries tend to find it harder to ensure food sustainability.**

[2] Please note that correlation does not prove causation. In order to measure the degree of correlation, the correlation coefficient can vary between -1 and 1, with -1 representing a perfect negative correlation, 0 no correlation and 1 a perfect positive correlation).

3) The top performer in the food loss and waste pillar is France

France scores the highest in the food loss and waste pillar among the 34 countries surveyed for the FSI. France's overall score reflects its consistently high scores in the pillar's constituent categories and indicators. In particular, France scores highly for its *policy response to food loss* and *policy response to food waste*, reflecting the pro-active response taken by successive governments to limit distribution-level loss and end-user waste; the country loses only 1.8% of its total food production to wastage annually. New legislation passed in early 2016 prohibits supermarkets from throwing away food approaching its sell-by-date, and instead requires them to donate it to charities or food banks.[3] Other measures have reduced food wastage in schools and prompted companies to include data on this in their social and environmental reports.[4] Annual food waste per head is 106 kg, less than a third of that of Australia.

Close behind France are **Germany**, **Spain** and **Italy**. Germany, which scores highly for *food waste at end-user level*, has funded a range of initiatives as part of plans to halve food wastage by 2030.[5] A Spanish manufacturers' and distributors' association, AECOC, has taken steps to reduce food loss in production and consumer food waste,[6] while Spain is one of four pilot countries in an EU-funded program, REFRESH, which is trialling projects to limit food wastage throughout the value chain[7]; achievements that are reflected in this country's high FSI score for *causes of distribution-level loss*. Italy, which scores the maximum possible for its *policy response to food loss*, has made it easier for companies and restaurants to donate unused food by relaxing regulations that made food donations to charity cumbersome and encouraging greater use of "doggy bags" at restaurants.[8]

4) The top performer in the sustainable agriculture pillar is Italy

Italy comes out on top in the sustainable agriculture pillar, having come close to the top of the pack in the categories of *water* and *air*, although it performs less well in the *land* category. Within *water*, Italy scores highly across the *environmental impact of water on agriculture, sustainability of water withdrawal, water scarcity* and *water management* sub-indicators, while its score for *sustainability of fisheries* compares favourably with other countries. Italy has pioneered new techniques to reduce water loss in domestic and agricultural contexts,[9] and, as the biggest consumer of seafood in the euro zone, is continually updating its policies to ensure the industry's sustainability.[10] However, water scarcity in some areas of Italy, for example during the summer of 2017, exposed issues with inadequate water infrastructure, especially in central and southern regions.[11]

Meanwhile, Italy scores the maximum available for its implementation of *agricultural techniques for climate change mitigation and adaptation*, with common measures nationwide including crop diversification, changes in livestock diets and adopting new agronomic practices.[12]

[3] "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

[4] Ministry of Agriculture (France), French new food waste prevention regulatory framework, EU Platform on Food Losses and Waste, June 14th 2017. Available at: https://ec.europa.eu/food/sites/food/files/safety/docs/fw_eu-platform_20170331_pres-10.pdf

[5] "Germany Has An Ambitious Strategy To Halve Food Waste By 2030", HuffPost Germany, December 19th 2016. Available at: https://www.huffingtonpost.com/entry/germany-food-waste_us_577e9650e4b0344d514e5558

[6] "Spain: The consumer sector is fighting food waste", Fresh Plaza, September 9th 2016. Available at: http://www.freshplaza.com/article/162906/Spain-The-consumer-sector-is-fighting-food-waste

[7] "Spain: Pilot project to reduce food waste , Fresh Plaza, December 10th 2016". Available at: http://www.freshplaza.com/article/164859/Spain-Pilot-project-to-reduce-food-waste

[8] "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

[9] "Italy: The Lisygrow soil-less irrigation system", Fresh Plaza, February 11th 2017. Available at: http://www.freshplaza.com/article/184253/Italy-The-Lisygrow-soil-less-irrigation-system

[10] Ministry of Agriculture (Italy), Italy: Operational programme for Fisheries and Maritime 2014-2020. Available at: https://ec.europa.eu/fisheries/sites/fisheries/files/docs/body/op-italy-summary_en.pdf

[11] "'Drastic' water rationing looms for Rome as drought blights Italy", France 24, July 25th 2017. Available at: http://www.france24.com/en/rome-famous-fountains-could-be-shut-off-drought-threatens-water-italy-farmers

The country's middling score in the *land* category reflects positives across several indicators: for example, 10.5% of arable land is dedicated to *organic agriculture*, according to 2014 data from the UN's Food and Agriculture Organisation (FAO), while strong laws exist to protect smallholders' *land rights*. At the same time, there are weaknesses. *Total private and public agricultural sciences R&D expenditure* adds up to the equivalent of just 0.7% of GDP, while the *participation rate of women in farming* (1%, according to 2013 data from the FAO) is fractional and that of *youth* (3.1%) is minimal compared with that of similar economies such as Spain (28.8%).

Italy is closely followed in the sustainable agriculture pillar by **South Korea**, **France** and **Colombia**. Although with a low weighting attached to the metric, South Korea's score benefits from a comparatively high level of *diversification of agricultural system*, with its top three crops constituting 55.5% of total agricultural production (according to 2014 data from the FAO). France's score within the *agro-economic indicators* indicator of the *land* category is boosted by a high score for the *average education level of farmers* and a high level of *total private and public agricultural sciences R&D expenditure* (2.7% of GDP). Colombia benefits from high scores within the *impact of land on animal feed and biofuels indicator*, with limited land use and imports devoted to biofuels.

5) The top performer in the nutritional challenges pillar is Japan

Japan scores the highest in the nutritional challenges pillar, reflecting its leading position and high scores in the *life quality* and *life expectancy* categories, as well as a strong performance in the *dietary patterns* category. Japan's score in the first category is lifted by the complete absence of *Vitamin A Deficiency* and *Iodine Deficiency* (the comparative figures for these deficiencies in China are 9.3% and 15.7%, respectively, according to World Health Organisation data). Meanwhile, 100% of the population has *access to an improved water source* (World Bank data). Within the *life expectancy* category, Japan comes out on top of both the *life expectancy at birth* (84 years) and the *healthy life expectancy* indicators (74.9 years). Just 14.2% of 5-19 year-olds are measured as overweight, the fourth-lowest figure for surveyed countries, with the comparable figure at 27.2% for adults (the third-lowest figure overall). Within the *dietary patterns* category, a low *number of people per fast food restaurant* (at 30,345, the joint second-lowest figure; this reflects a relatively low annual penetration rate of fast food restaurants), comparatively low income inequality (measured by the *GINI Coefficient, part of the economic determinant of dietary patterns* indicator) and the inclusion of compulsory *nutrition education* in schools help to mitigate a somewhat weaker score for the *dietary composition* indicator.

6) The top performer in the *Physical Activity* Category is Hungary

South Korea, Hungary, France and **Portugal** also fall within the top quartile in the nutritional challenges pillar. A low *prevalence of stunting* (5th lowest, 2.5% of children aged under 5) and prevalence of wasting (4th lowest, 0.9%) contribute to South Korea's high scores. Hungary's position in the rankings is, amid other strong indicators, in large part secured by its high score within the *physical activity* category: 85.4% of the population reach their *recommended physical activity per week*, the highest level of the countries surveyed, while Hungarians spend just 2.4 hours in front of TVs, PCs and tablets, with only Greece (2) and Ethiopia (0) maintaining fewer *hours of inactivity/ fixed screen time per week*.

[12] Nguyen, T.P.L., Adaptation to Climate Change of Italian Agricultural Systems: The Role Of Adaptive Governance And Social Learning, doctoral thesis in Governance and Complex Systems, Doctoral School in Social Sciences, XXVI CICLO, Università degli Studi Di Sassari (Italy). Available at: http://eprints.uniss.it/9533/1/Nguyen_T_Adaptation_to_climate_change.pdf

SPOTLIGHT ON MEDITERRANEAN COUNTRIES

Within the Mediterranean region group, clear divergences emerge between different sub-regions. The **northern Mediterranean countries** tend to perform well across the different pillars of the index, with **France, Spain, Portugal** and **Italy** among the top quartile in terms of overall score. This is in large part due to their strong scores in the food loss and waste pillar, and in turn the product of proactive government policies to limit food loss and waste among businesses and consumers. **France** tops the pillar, followed by **Spain** (3rd), **Italy** (4th), **Portugal** (13th) and **Greece** (20th).

By contrast, the **southern and eastern Mediterranean countries** (SEMCs) perform less well in the overall FSI. **Israel** (15th) and **Turkey** (16th) are ranked in the lower half of the second quartile, with **Jordan** (25th) in the third. **Egypt** (27th), **Morocco** (29th), **Tunisia** (30th) and **Lebanon** (31st) are among the lowest-ranked countries surveyed. The sub-region fares particularly badly in the food loss and waste pillar, with none of the eight countries placing above 23rd in the rankings. Lebanon (32nd), for example, received minimal scores in the *quality of road infrastructure, investment in transport with private participation* (0.4% of GDP) and *quality of policy response to food waste* sub-indicators.

Nevertheless, the SEMCs score somewhat better within the nutritional challenges pillar. Turkey's score is lifted by *low meat consumption levels* (just 6.2g per head per day, compared with 225.4g for the US), effectively implemented *nutrition education* and a low proportion of the population below the *national poverty line* (1.6%). Moreover, the SEMCs regularly achieve some of the highest scores for individual sub-indicators, particularly in those grouped around healthy lifestyles, diets, and measures to improve the efficiency and sustainability of agriculture. The *water footprint* of Jordan (1st) and Lebanon (2nd) is among the lowest of the countries surveyed.

Israel and Turkey are among those placed joint-first for *initiatives to recycle water for agricultural use*. Egypt is alone with Japan in *utilised agricultural area* representing 100% of total agricultural land (according to 2014 data from the FAO), while Israel, Jordan, Lebanon and Morocco all earn the full score available for the widespread existence of *sustainable urban farming initiatives* in major cities. Israel (31.5%) and Lebanon (35.9%) demonstrate some of the highest *diversification of the agricultural systems* measured (where % is the top three crops as a share of total agricultural production). Meanwhile, Jordan (84.4%), Tunisia (76.5%) and Lebanon (61.2%) register comparatively high percentages of the population reaching the recommended amount of physical activity per week.

FOOD SUSTAINABILITY INDEX 2017
KEY GLOBAL FINDINGS

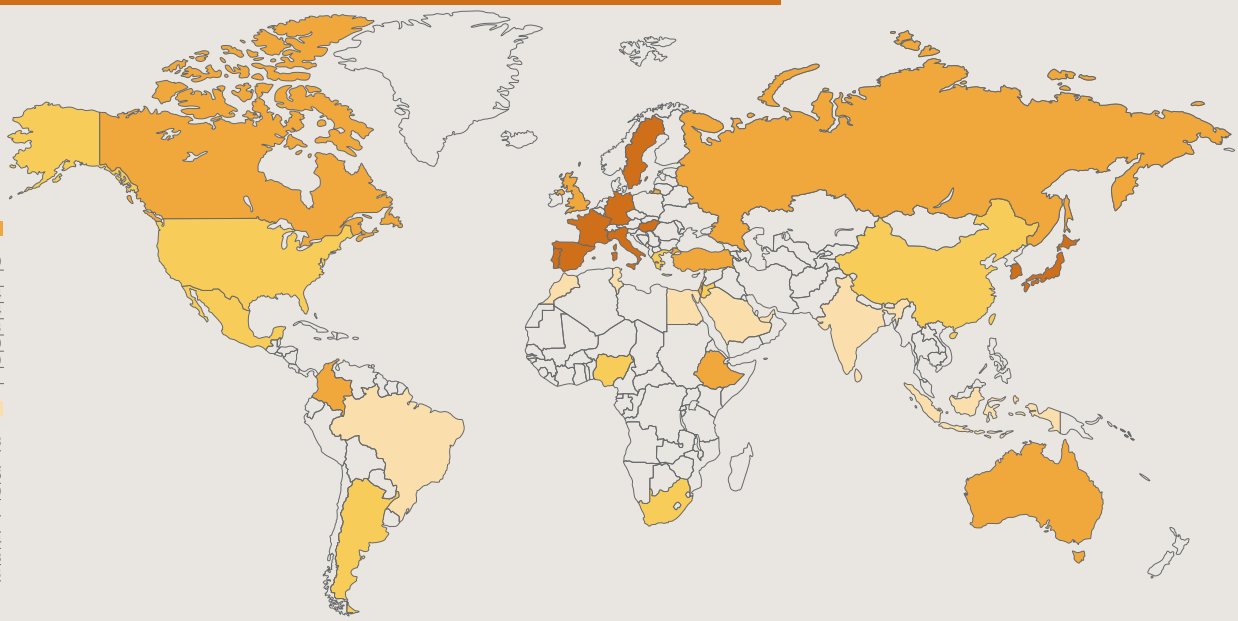
The Food Sustainability Index (FSI) ranks 34 countries according to their food system sustainability. The FSI aims to highlight issues of concern across three pillars: food loss and waste; sustainable agriculture; and nutritional challenges. It is a quantitative and qualitative benchmarking model that 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



TOP QUARTILE (Score 68.4 to 74.8)	
France	74.8
Japan	72.8
Germany	70.5
Spain	70.4
Sweden	69.7
Portugal	69.5
Italy	69.0
South Korea	69.0
Hungary	68.4

SECOND QUARTILE (Score 62.1 to 68.3)	
UK	68.0
Canada	67.1
Ethiopia	65.4
Colombia	64.4
Australia	63.3
Israel	63.0
Turkey	62.9
Russia	62.1

THIRD QUARTILE (Score 58.1 to 62)	
Argentina	62.0
South Africa	61.7
Greece	61.6
US	61.5
Mexico	61.2
China	59.8
Nigeria	59.6
Jordan	58.9

BOTTOM QUARTILE (Score 40.3 to 58)	
Saudi Arabia	57.8
Egypt	57.1
Brazil	56.6
Morocco	53.9
Tunisia	53.1
Lebanon	53.1
Indonesia	52.4
India	50.8
UAE	40.3

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.**

Sources: Economist Intelligence Unit data searches (national policy documents, literature searches, primary research), UN, UNDP, World Bank.

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