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User guide for the Global Food Security Index:
Understanding the index and leveraging it for your work

A. Understanding the GFSI: What is the Global Food Security Index (GFSI)?

The Global Food Security Index, developed by the Economist Intelligence Unit and sponsored by DuPont, considers three core pillars of food security—Affordability, Availability, and Quality & Safety—across 113 countries. The index is a dynamic quantitative and qualitative benchmarking model, constructed from 28 unique indicators, that provides an objective framework for evaluating food security across a wide range of countries worldwide. By creating a standardised metric around food security, we seek to empower users to explore the issues surrounding food security—including the rankings and results—and draw conclusions for policy, business operations and future research.

The model, in addition to assessing food affordability, availability and quality, includes a new category on natural resources and resilience. The Natural Resources & Resilience category measures a country's exposure to the impacts of a changing climate; its susceptibility to natural resource risks; and how a country is adapting to these risks. When applied, it acts as an adjustment factor on countries' food security scores.

I. How does the model define food security?

Food security is defined as the state in which people at all times have physical, social and economic access to sufficient and nutritious food that meets their dietary needs for a healthy and active life. This framework is based on the internationally accepted definition established at the 1996 World Food Summit.

II. How do I access the GFSI?

The Global Food Security Index (GFSI) has several different components, all of which can be found at http://foodsecurityindex.eiu.com/. On this site you can access:

- An overview of the GFSI;
- Results for the GFSI and for all three categories—Affordability, Availability, and Quality & Safety;
- Year-on-year trends;
- Individual country profiles;
- Impacts of natural resources and climate exposure on food security scores;
- Results across each Natural Resource & Resilience indicator;
- A resource library of reports, presentations, videos and key findings collated since 2012;
- The GFSI Findings and Methodology report;
- The underlying Excel model.

There are two key tools for exploring the GFSI data:

- The model (the Excel workbook, which can be downloaded throughout the website);
- The data visualisation tool (the features available online).

B. Leveraging information in the GFSI: EXCEL MODEL

The Excel model offers the richest and most in-depth look into the GFSI data and results. IT offers a comprehensive set of tools that will allow users to explore key results, year-on-year trends, indicator- and country-specific findings, and the underlying scores and data that drive the results.

I. How can I acquaint myself with the results of the GFSI model?

The following overview of the structure of the Excel workbook shows users where to find information in the model and how to best understand and use the results of the model. Results are provided for each category—Affordability, Availability, Quality & Safety and Natural Resources & Resilience—and indicator, and on a country basis. Note that each sub-tab of the model can be exported as either an Excel or PDF document by using the icons in the top right-hand corner.

The workbook is organised into eight main modules, each of which has a number of sub-tabs that can be accessed by clicking on the appropriate name in the menu bar at the top of each module's pages.

1) **2017 Ranking:** This module displays the overall results from the index. It provides the overall and category rankings across all 113 countries, which helps answer the initial question of "What is this index measuring?". Users can *highlight groups and countries* of interest and *filter by groups*.
2) **Series Explorer:** This module provides the most in-depth view of the individual metrics (called "indicators") across the Affordability, Availability and Quality & Safety categories and their definitions. Users can explore the Top and Bottom ten performers in each category and across each indicator on the **Overview** sub-tab. They can also see the ten most improved and the ten most declined countries between the 2016 and 2017 indices. In the **Data & Scores** sub-tab, the overall results, category results and indicator results are presented for all countries, as are year-on-year score changes and the raw data (where applicable). Results can be further refined by using the *country* and *group highlighters* and the *group filters*. Viewers can use the descriptions in the side-bar to understand what each indicator is measuring. The **Regional Scores** tab shows aggregated scores and year-on-year changes for geographic regions and income levels across all categories and indicators. Finally, the **Map** sub-tab divides the geographies included in the index into four quartiles based on their food security environments and provides a heat-map based on country performance.
3) **Country Profile**: This module explores the data on a country-specific basis. After users develop an understanding of the model framework in the Series Explorer, they can delve into the food security environment for specific countries. The **Overview** sub-tab provides an overall assessment of food security for each country, as well as scores and ranks for each indicator and background variable. The **Trends** sub-tab visualises each country's overall

score change and category score changes since 2012. These changes are benchmarked against average change and regional average change. The **Indicator** sub-tab shows how the country performs across each indicator relative to all 112 other countries. If the country is in the top quartile on an indicator, that indicator is listed in the "Very Good" quartile, while if the country is in the bottom quartile it is labelled as "Weak". The **Score Table** provides scores and year-on-year changes for a country across each indicator and category for all six years of the index, while the **Data Table** provides the raw data and sources for all six years (a full table of the raw data and sources for all countries and indicators across the 2012, 2013, 2014, 2015, 2016 and 2017 indices can be found in the **Dataset** explorer). The **Natural Resources & Resilience** sub-tab contains data on how the country performs across each indicator and sub-indicator in the adjustment factor relative to the other 112 countries in the index.

4) **Country Comparison**: This module allows the results of two countries to be compared. A high-level comparison of the overall and category ranks, scores and year-on-year changes for two selected countries and more detailed comparisons of any two countries are provided.
5) **Scatterplot**: This module also contains a scatterplot that allows users to examine the correlations among the overall GFSI scores, individual category scores, the underlying data of individual indicators and the dependent variables. These correlations can be filtered by geographic region and income levels.
6) **Weights:** This tab shows the weights assigned to each indicator and category that are used to calculate scores and ranks in the GFSI. Two pre-set weighting schemes—neutral weights and peer panel (default)—are provided. Users can further explore the index and test alternative scenarios by assigning their own weights with one of six customisable weighting schemes.
7) **Dataset**: This tab presents all raw data, normalised scores and data years in tabular form for all countries, regions and income levels, allowing a user to readily compare countries or export data for external use.
8) **Natural Resources & Resilience**: This module displays the results from the new category and the impact of the Natural Resources & Resilience adjustment factor on food security. The **Overview** sub-tab provides the overall and indicator rankings across all 113 countries for the new category, which helps answer the initial question of "What is this category measuring?". Users can *highlight groups and countries* of interest and *filter by groups*. **The Adjustment to Overall Score** sub-tab shows the new set of country rankings when the Natural Resources & Resilience adjustment factor is applied to the overall score, showcasing rank changes and score deteriorations. The **Series Data** tab shows indicator results for all countries for each metric in the category and the raw data (where applicable). Results can be further refined by using the country and group highlighters and the group filters. Viewers can use the descriptions in the side-bar to understand what each indicator is measuring. The **Series Map** sub-tab divides the geographies included in the index into four quartiles based on their performance on each metric in the category and provides a heat-map.

II. How can I explore country issues with the GFSI Excel model?

Users can assess country performance and explore strengths and weaknesses through the following:

- **Country scores and ranks**: Use the *country highlight* function on the **Data & Scores** sub-tab (in the **Series Explorer**) to show a country's performance relative to other countries across each category and indicator. A country's performance within its region or income level can be assessed by using the *group filter* function on the same sub-tab..
- **Strengths and weakness**: Relative strengths and weaknesses (measured by quartiles) can be found in the **Indicator** sub-tab in the **Country Profile**.
- **Year-on-year changes**: The **Trends** sub-tab in the **Country Profile** shows a country's score improvements and declines from 2012 through 2017. If users want to identify overall, category or indicator score changes compared with all other countries in the GFSI or a group of countries, the **Data & Scores** sub-tab in the **Series Explorer** can be used. The *country highlight*, *group highlight* and *group filter* function facilitate these comparisons.
- **Raw data**: The **Data Table** sub-tab in the **Country Profiles** simultaneously provides data and sources for all years of the index for each indicator. In the **Dataset** module, users can examine the full GFSI dataset across countries. Each sub-tab provides raw data, normalised scores and data year.

The country scores and ranks and relative score comparisons help provide an overview of food security in the country. The strengths and weaknesses by indicator and the year-on-year changes are the most useful for building a conversation.

III. How can I explore thematic issues with the GFSI Excel model?

There are two main avenues for exploring thematic issues within the Excel model.

First, users can use the **Data & Scores** sub-tab in the **Series Explorer** to examine the relative performance of all countries in the index on a single issue (indicator) at a time and to assess where the greatest advances and declines have occurred in food security over the past year.

For example, vitamin A and iron availability are two of the leading nutritional deficiencies in the world. By selecting each indicators on the top of the page (see "Select Series"), users can see the countries with the highest vitamin A deficiencies: Bangladesh, Burkina Faso, Cote d'Ivoire, etc. (all countries with a "0" score). Users can see similar results for both animal and vegetal iron deficiencies.

Secondly, the **Scatterplot** tab allows users to explore the relationship between particular topics. The sub-tab provides simple correlations, which show the strength of the relationship between two variables, as quantified by the correlation coefficient. A correlation coefficient above 0.7 shows a strong, positive relationship between the two variables. A correlation coefficient below -0.7 shows a strong, inverse relationship.

For example, compare the Overall score (for food security) with the percentage of children stunted. Select "Overall score" in the "select x-axis indicator" box and "BG02) Percentage of children stunted" in the "select y-axis indicator" box. At the side of the plot under "Correlation Co-Efficient", users will see that the correlation coefficient is -0.83. This means that the model suggests there is a negative

relationship between stunting and food security: countries with high stunting may be less food secure.

An important note when using the Scatterplot tab: Establishing a correlation is not sufficient to establish causation. A correlation can be evidence of a possible causal relationship, but cannot tell us what that causal relationship may be. Its only value, then, is to suggest relationships between the variables that might prompt further investigation or allow the development of new theories. Correlations can still be important, as they point to a relationship that could be meaningful. The validity of these relationships and theories, however, has to be tested outside of the index and the correlation tool.

C. Leveraging information in the GFSI: DATA VISUALISATION TOOL

The data visualisation tool on the website offers an alternative way for users to engage with the data. It presents scores, ranks, year-on-year changes and country profiles through a series of unique features. The data visualisation tool is best used as a way to introduce users to the breadth of the GFSI. To answer data specific questions that arise from exploring the tool, it is recommended that users download the Excel model.

I. How can I explore overall results and year-on-year changes with the GFSI data visualisation tool?

The **Baseline index** section visualises the overall results of the GFSI, the results across each category, regional performance and year-on-year changes. The Key findings page has three components: **2017 Rankings & trends**, the **2017 Findings** and **Explore countries**.

- The **2017 findings** module provides key findings from the 2017 GFSI, while the **2017 Rankings & trends** page allows users to interact with the results of the index.
- The **Rankings & trends** page contains the **Country rankings 2017** view, which presents country scores and rankings for the overall index and each of the three categories. The sorting tool allows countries to be sorted by their performance in each of the three categories rather than by their overall scores. The score and rank toggle allows ranks to be substituted for scores to provide users with a better understanding of where countries stand within each category. The global and regional filter permits a user to compare the countries within a region by score and rank across the categories.
- Within the Rankings and trends, users can also explore **Year-on-year trends**. Yearly changes may be viewed either graphically or numerically. Filtering tools allow countries to be assessed by global rank over the past six years. Regional performance is also available.
- The **Biggest changes** view shows those countries whose overall score have increased or declined the most from 2016 to 2017.
- The **Visual analysis** page provides an interactive tool that allows users to explore the relationships between different indicators and categories with the GFSI. It provides both a global and regional perspective on important interactions within the GFSI. It also contains an interactive chart to examine key linkages with other variables. Users can change the variables under consideration in each chart and the relevant regions in the Regional section.

By clicking on a particular country, users can ascertain additional information about its performance in the GFSI.

II. How can I explore country performance and thematic issues with the GFSI data visualisation tool?

i. Country performance

The **Baseline index** page provides access to the country profiles that allow users to explore the performance of individual countries through the **Explore countries** option. Selecting a specific country leads to its country profile page (the interactive map can also be used to navigate to individual country profiles). A country profile page includes:

- Overall food security ranking (out of 113);
- Regional performance;
- Individual rankings in each core issue: Affordability, Availability, and Quality & Safety;
- Food security strengths and weaknesses;
- Summary statistics on GDP (at PPP), population, land area, prevalence of malnourishment, intensity of food deprivation and the Human Development Index. Each statistic is compared to the global average.

Selecting one of the three categories (Affordability, Availability or Quality & Safety) will expand the webpage to include all the individual indicators that are evaluated within a category. For example, selecting Affordability will reveal the country's score on: food consumption as a share of household expenditure, proportion of population under global poverty line, gross domestic product per capita, agricultural import tariffs, presence of food system net programmes and access to financing for farmers. It also shows, in parenthesis, the difference between the country's score and the global average, highlighting countries' strengths and deficiencies to identify areas that need to be addressed.

ii. Thematic exploration

At the bottom of each country profile page is a graph that visually brings thematic topics within the index to life. The chart is customisable along four dimensions: the vertical-axis, the horizontal-axis, the size of the bubble and the bubble brightness. The chart denotes the country profile that the user is viewing in orange. All countries in the same region are purple; the rest of the world is grey. The default settings show each country's overall score (x-axis), its longitude (y-axis) and its population (bubble size). The bubble brightness default is neutral.

With this tool, users can examine the relationship between key variables and food security.

For example, users may be interested in visualising how population size and poverty relate to the affordability of food in different regions around the world. Users can select % of the population in poverty (for the horizontal axis), Affordability score (for the vertical axis) and population (for bubble size). The graph illustrates a relatively linear relationship between Affordability scores in the index

and the percentage of the population in poverty. If users then select Population density for the horizontal access, it will become apparent that there is very little relationship between population density and a country's Affordability score.

iii. How do I find more information about the indicators?

To obtain the definitions and individual scores for all countries and all indicators, users need to register and download the Excel model.

III. How do I explore the impact of Natural resources & resilience on food security?

The **Adjustment factor** page allows users to see how the Natural resources & resilience adjustment factor impacts food security. The **Explore the impact** option allows user to see food security performance in each of the 113 countries in the index (split into quartiles). By using the "Factor on" and "Factor off" toggles, the user can see how the adjustment factor affects countries' ranks. When the factor is on, countries whose ranks improve are dark green (eg, Canada), while countries whose ranks fall are red (eg, Australia). Countries whose ranks remain constant (eg, China) are light green.

The Natural resources & resilience rankings show how countries perform within the category and across each indicator within the category. Performance can be explored globally or by regions.

C. Understanding the significance of the indicators in the index

How can I explain the importance of each of these data points to food security?

The Economist Intelligence Unit's *Global Food Security Index 2017: Measuring food security and the impact of resource risks* findings and methodology report provides a wealth of information that can add context and depth to the data in the index. The report explains the relevance of every indicator in the index for food security. A quick "Find" search through the report for the name of an indicator can return valuable context on the components of the index.