

Supplementary Table 1 Indicators and data sources of the components of the 2019 GFSI

Component/sub-component/indicator	Primary source of data	Year
Affordability		
Change in average food costs	Food and Agricultural Organisation (FAO)	2014-2018
Percentage of population under global poverty line	World Bank, World Development Indicators	2008-2017
Gross domestic product per capita	Economist Intelligence Unit (EIU)	2018
Agricultural import tariffs	World Trade Organisation (WTO)	2012-2018
Presence and quality of food safety net programmes	EIU scoring	2019
Presence of food safety-net programmes	EIU qualitative scoring	2019
Funding for food safety net programmes	EIU qualitative scoring	2019
Coverage of food safety net programmes	EIU qualitative scoring	2019
Operation of food safety-net program	EIU qualitative scoring	2019
Access to financing for farmers	EIU qualitative scoring	2019
Availability		
Sufficiency of supply	EIU scoring	-
Average food supply	FAO	2016-2018
Change in dependency on chronic food aid	OECD	2013-2017
Public expenditure on agricultural R&D	United Nations	2010-2017
Agricultural infrastructure	EIU scoring	2004-2015
Existence of adequate crop storage facilities	EIU qualitative scoring	2019
Road infrastructure	EIU Risk Briefing	2019
Port infrastructure	EIU Risk Briefing	2019
Air transport infrastructure	EIU Risk Briefing	2019
Rail infrastructure	EIU Risk Briefing	2019
Irrigation infrastructure	FAO	2016
Volatility of agricultural production	US Department of Agriculture (USDA)	2012-2016
Political stability risk	EIU Risk Briefing	2019
Corruption	EIU Risk Briefing	2019
Urban absorption capacity	World Bank, World Development Indicators, EIU	2015-2019
Food loss	FAO	2013
Quality and safety		
Dietary diversity	FAO	2011-2013
Nutritional standards	EIU scoring	-
Component/sub-component/indicator		
Primary source of data		
Year		
National dietary guidelines	EIU qualitative scoring based on WHO, FAO and national health ministry documents	2019
National nutrition plan or strategy	EIU qualitative scoring based on WHO, FAO and national health ministry documents	2019
Nutrition monitoring and surveillance	EIU qualitative scoring based on WHO, FAO and national health ministry documents	2019
Micronutrient availability	EIU scoring	-
Dietary availability of vitamin A	Global Nutrient Database	2013
Dietary availability of iron	Global Nutrient Database	2013
Dietary availability of zinc	Global Nutrient Database	2013
Protein quality	EIU calculation based on data from WHO, FAO and USDA Nutrient Database	2011-2013
Food safety	EIU scoring	-
Agency to ensure the safety and health of food	EIU qualitative scoring	2019
Proportion of population with access to potable water	World Bank	2017
Ability to store food safely	United Nations	2017

Natural resources and resilience		
Exposure to climate change risks	EIU scoring	-
Temperature rise	Notre Dame Global Adaptation Initiative (ND-GAIN)	2017
Drought	World Resources Institute (WRI)	2014
Flooding	ND-GAIN	2017
Storm severity	Global Assessment Report on Disaster Risk Reduction	2015
Sea level rise	ND-GAIN	2015
Commitment to managing exposure	Consultative Group on International Agricultural Research (CGIAR)	2016
Water	EIU scoring	-
Agricultural water risk - quantity	WRI	2014
Agricultural water risk – quality	World Resources Institute (WRI)	2014
Land	EIU scoring	-
Land degradation	United Nations	2015
Grassland	FAO	2016
Forest change	World Bank	2001-2016
Oceans	EIU scoring	-
Ocean eutrophication	United Nations	2000-2010
Marine biodiversity	Yale Environmental Performance Index	2018
Marine protected areas	United Nations	2014
Sensitivity to natural resource risks	EIU scoring	-
Food import dependency	FAO	2017
Dependence on natural capital	World Bank	2017
Disaster risk management	United Nations	2017-2018
Adaptive capacity	EIU scoring	-
Early warning measures/ climate-smart agriculture	Consultative Group on International Agricultural Research Program on Climate Change, Agriculture and Food Security (CGIAR-CCAFS)	2017
National agricultural risk management system	World Bank Climate-smart Agriculture Indicators	2017
Demographic stresses	EIU scoring	-
Population growth (2016-2021)	United Nations	2019
Urbanisation (2016-2021)	United Nations	2019

Source: EIU (2019).

Supplementary Table 2 Comparative weights for the NRR component of the GFSI based on the subjective GFSI and objective PCA weighting models

Component/indicator	GFSI model			PCA model		
	Weight within NRR (g)	Weight within Exposure (f)	Overall weight (g*f)	Weight within NRR (g)	Weight within Exposure (f)	Overall weight (g*f)
1. Exposure						
Temperature rise	21.82%	21.43%	4.68%	10.80%	9.10%	0.98%
Drought		19.64%	4.29%		5.28%	0.57%
Flooding		17.86%	3.90%		21.26%	2.30%
Storm severity		7.14%	1.56%		11.08%	1.20%
Sea level rise		19.64%	4.29%		34.79%	3.76%
Commitment to managing exposure		14.29%	3.12%		18.50%	2.00%
2. Water						
Agricultural water risk – quantity	14.55%	80.00%	11.64%	11.61%	52.51%	6.10%
Agricultural water risk – quality		20.00%	2.91%		47.49%	5.51%
3. Land						
Land degradation	14.55%	60.00%	8.73%	16.53%	14.81%	2.45%
Grassland		20.00%	2.91%		51.06%	8.44%
Forest change		20.00%	2.91%		34.14%	5.64%
4. Oceans						
Ocean eutrophication	12.73%	42.86%	5.45%	8.61%	19.30%	1.66%
Marine biodiversity		42.86%	5.45%		51.05%	4.40%
Marine protected areas		14.29%	1.82%		29.65%	2.55%
5. Sensitivity						
Food import dependency	10.91%	30.00%	3.27%	32.56%	35.54%	11.57%
Dependence on natural capital		20.00%	2.18%		8.92%	2.90%
Disaster risk management		50.00%	5.45%		55.54%	18.08%
6. Adaptive capacity (AC)						
Early warning measures/ climate-smart agriculture	18.18%	50.00%	9.09%	10.34%	50.34%	5.20%
National agricultural risk management system		50.00%	9.09%		49.66%	5.14%
7. Demographic stresses (DS)						
Population growth (2016-2021)	7.27%	75.00%	5.45%	9.56%	52.76%	5.04%
Urbanisation (2016-2021)		25.00%	1.82%		47.25%	4.52%

Note: g = weight of the NRR component, f = weight of indicator within the NRR component.

Source: Author's calculations, PCA using Stata 15 statistical software and EIU (2019).

Supplementary Table 3 Results of paired t-test for the objective PCA weights and subjective GFSI weights for the NRR component of the GFSI

Weight	Observation	Mean	Standard error	Standard deviation	95% confidence interval	
					Lower bound	Upper bound
PCA weight	28	0.208	0.029	0.153	0.148	0.267
GFSI weight	28	1.991	0.172	0.912	1.638	2.345
Difference		-1.784	0.179	0.950	-2.152	-1.415

t -value = -9.938 and p -value = 0.000 at 95% confidence level

Source: Author's calculations, using Stata 15 statistical software.

Supplementary Table 4 A comparison of the NRR component scores and ranks of countries based on the objective PCA and subjective GFSI weighting models for 2019

Country	GFSI model		PCA model		Score difference	Rank difference
	Score	Rank	Score	Rank		
Czech Republic	75.5	1	80.0	1	4.5	0
Finland	74.0	2	74.5	3	0.5	-1
Denmark	73.9	3	61.4	18	-12.5	-15
New Zealand	73.9	3	74.4	4	0.5	-1
Slovakia	73.1	5	64.7	14	-8.4	-9
Sweden	72.1	6	58.3	33	-13.8	-27
Switzerland	72.1	6	67.2	13	-4.9	-7
Uruguay	71.6	8	76.1	2	4.5	6
Ireland	71.0	9	70.2	7	-0.8	2
Austria	69.6	10	58.7	31	-10.9	-21
Poland	69.6	10	60.0	25	-9.6	-15
Hungary	69.5	12	63.9	15	-5.6	-3
Norway	69.0	13	69.7	9	0.7	4
Malawi	68.7	14	63.2	16	-5.5	-2
Japan	68.5	15	70.5	6	2.0	9
Myanmar	68.5	15	69.3	10	0.8	5
Niger	68.5	15	68.6	11	0.1	4
Germany	68.4	18	57.6	34	-10.8	-16
France	68.3	19	59.8	27	-8.5	-8
Netherlands	67.4	20	67.8	12	0.4	8
Cote d'Ivoire	67.1	21	54.2	44	-12.9	-23
Spain	66.3	22	54.6	43	-11.7	-21
Romania	66.2	23	58.8	29	-7.4	-6
Bulgaria	65.3	24	60.1	23	-5.2	1
Canada	65.3	24	57.1	37	-8.2	-13
Russia	65.1	26	56.3	39	-8.8	-13
Uganda	65.0	27	55.2	41	-9.8	-14
Greece	64.8	28	54.9	42	-9.9	-14
Portugal	64.8	28	52.6	51	-12.2	-23
Italy	64.5	30	53.8	46	-10.7	-16
Burundi	64.2	31	60.8	19	-3.4	12
United Kingdom	63.8	32	53.7	48	-10.1	-16
Belgium	62.9	33	51.6	55	-11.3	-22
Kazakhstan	62.9	33	70.1	8	7.2	25
Burkina Faso	62.6	35	50.7	58	-11.9	-23
Rwanda	62.6	35	53.8	46	-8.8	-11
Serbia	62.2	37	58.5	32	-3.7	5
Laos	62.1	38	53.5	49	-8.6	-11
Honduras	61.5	39	47.0	74	-14.5	-35
United States	61.4	40	49.7	62	-11.7	-22
Venezuela	61.2	41	51.3	57	-9.9	-16
Mali	61.0	42	51.5	56	-9.5	-14
Zambia	61.0	42	48.8	64	-12.2	-22
Country	GFSI model		PCA model			

	Score		Score		Score	Rank
	Rank	Rank	Rank	Rank	difference	difference
Chile	60.1	44	58.8	29	-1.3	15
Turkey	60.0	45	50.0	61	-10.0	-16
Thailand	59.0	46	57.4	35	-1.6	11
Egypt	58.9	47	54.1	45	-4.8	2
Costa Rica	58.5	48	62.2	17	3.7	31
Botswana	58.3	49	52.3	52	-6.0	-3
Paraguay	58.3	49	52.8	50	-5.5	-1
Tanzania	57.7	51	48.6	66	-9.1	-15
Nicaragua	57.5	52	47.3	71	-10.2	-19
Pakistan	57.0	53	47.3	71	-9.7	-18
Ukraine	57.0	53	72.1	5	15.1	48
Uzbekistan	57.0	53	48.8	64	-8.2	-11
El Salvador	56.9	56	46.9	75	-10.0	-19
Colombia	56.4	57	60.6	21	4.2	36
Madagascar	56.3	58	45.3	81	-11.0	-23
Belarus	56.0	59	52.0	53	-4.0	6
Togo	56.0	59	47.3	71	-8.7	-12
South Korea	55.8	61	60.8	19	5.0	42
Bolivia	55.6	62	49.7	62	-5.9	0
Brazil	55.6	62	50.2	60	-5.4	2
Argentina	55.5	64	51.8	54	-3.7	10
Australia	55.5	64	57.1	37	1.6	27
Nigeria	55.2	66	48.3	67	-6.9	-1
Senegal	55.0	67	46.6	76	-8.4	-9
Jordan	54.9	68	46.2	79	-8.7	-11
China	54.5	69	47.4	69	-7.1	0
Cambodia	53.3	70	44.7	84	-8.6	-14
Haiti	53.2	71	43.9	88	-9.3	-17
Ghana	53.0	72	46.5	77	-6.5	-5
Chad	52.9	73	47.6	68	-5.3	5
Malaysia	52.8	74	60.0	25	7.2	49
Angola	52.1	75	50.3	59	-1.8	16
Sudan	52.1	75	44.0	87	-8.1	-12
Cameroon	52.0	77	45.0	82	-7.0	-5
Kuwait	51.5	78	57.3	36	5.8	42
Ethiopia	51.2	79	46.3	78	-4.9	1
Mexico	50.8	80	59.7	28	8.9	52
Kenya	50.6	81	44.6	85	-6.0	-4
South Africa	50.4	82	60.6	21	10.2	61
Bangladesh	50.2	83	44.4	86	-5.8	-3
Sierra Leone	50.2	83	42.9	91	-7.3	-8
Azerbaijan	49.9	85	43.9	88	-6.0	-3
Guatemala	49.7	86	42.3	95	-7.4	-9
Tunisia	49.5	87	42.5	94	-7.0	-7
Mozambique	49.0	88	55.6	40	6.6	48
Panama	49.0	88	42.7	93	-6.3	-5

Country	GFSI model		PCA model		Score difference	Rank difference
	Score	Rank	Score	Rank		
Qatar	48.7	90	38.3	105	-10.4	-15
Ecuador	48.4	91	60.1	23	11.7	68
Algeria	48.3	92	40.3	103	-8.0	-11
Guinea	48.3	92	41.7	96	-6.6	-4
Vietnam	48.2	94	44.9	83	-3.3	11
Morocco	47.9	95	41.6	97	-6.3	-2
Sri Lanka	47.7	96	43.5	90	-4.2	6
Nepal	47.5	97	45.9	80	-1.6	17
India	46.7	98	42.9	91	-3.8	7
Congo (Dem. Rep.)	45.4	99	40.6	101	-4.8	-2
Syria	45.2	100	41.5	98	-3.7	2
Israel	44.8	101	37.5	108	-7.3	-7
Peru	44.4	102	47.4	69	3.0	33
Saudi Arabia	44.4	102	38.2	106	-6.2	-4
Dominican Republic	44.2	104	40.9	99	-3.3	5
Benin	44.1	105	40.8	100	-3.3	5
United Arab Emirates	43.9	106	37.3	109	-6.6	-3
Oman	43.8	107	36.0	110	-7.8	-3
Philippines	42.5	108	39.5	104	-3.0	4
Singapore	42.4	109	37.8	107	-4.6	2
Indonesia	40.7	110	32.9	112	-7.8	-2
Tajikistan	40.5	111	40.5	102	0.0	9
Yemen	40.4	112	34.5	111	-5.9	1
Bahrain	39.0	113	30.2	113	-8.8	0

Note: Rank 1 = best, the score ranges 0-100 where 100 = best

Source: Author's calculations and EIU (2019).