Environmental Sustainability of Food Consumption in Asia

Supplementary Materials:

Table 1. Data of per capita food consumption for each country and the dataset used.

		Per Capita Consumption (kg/person-yr)					
SN	**Item/Type**	**Thailand**	**India**	**China**	**Japan**	**Saudi Arabia**	**Dataset Used**
TOTAL		**581**	**492**	**896**	**603**	**618**	
1	**Cereals**	**136**	**148**	**150**	**115**	**154**	
a.	Wheat and Products	11	61	63	45	89	Wheat grain {GLO}| market for | APOS, U
b.	Rice	115	77	78	61	39	Rice {GLO}| market for | APOS, U
c.	Barley	0	1	0	1	0	Barley grain {GLO}| market for | APOS, U
d.	Maize	10	6	7	9	21	Maize grain {GLO}| market for | APOS, U
e.	Rye	0	0	0	0	0	Rye grain {GLO}| market for | APOS, U
f.	Oats	0	0	0	0	1	Oat grain {GLO}| market for | APOS, U
g.	Sorghum	0	4	1	0	4	Sweet sorghum stem {GLO}| market for | APOS, U
2	**Root Vegetables**	**23**	**31**	**68**	**31**	**24**	
a.	Cassava and products	13	6	2	0	0	Cassava, at farm/TH Economic
b.	Potatoes and products	10	25	66	31	24	Potato {GLO}| market for | APOS, U
3	**Legumes, nuts and oil-seeds**	**17**	**24**	**12**	**12**	**11**	
a.	Beans	3	13	1	2	6	Broad bean, at farm/DE Economic
b.	Peas	0	1	1	0	0	Broad bean, at farm/DE Economic
c.	Nuts and products	1	2	3	2	3	Almond {GLO}| market for almond | APOS, U
d.	Soyabeans	2	0	4	7	0	Soybean {GLO}| market for | APOS, U
e.	Ground-nuts	1	0	4	1	0	Groundnuts, seed, with shell, at farm/CN Economic
f.	Sunflower seed	0	0	0	0	0	Sunflower seed {GLO}| market for | APOS, U
g.	Rapeseed and Mustard seed	0	1	0	0	0	Rape seed {GLO}| market for | APOS, U
h.	Coconuts	10	6	0	0	1	Coconut, dehusked {GLO}| market for coconut, dehusked | APOS, U
i.	Olives	0	0	0	0	1	Olive {GLO}| market for olive | APOS, U
4	**Oils**	**8**	**9**	**7**	**15**	**20**	
a.	Soyabean Oil	3	2	2	4	4	Soybean oil, crude {GLO}| market for | APOS, U
b.	Groundnut Oil	0	1	1	0	0	Crude peanut oil, from crushing at plant/AR Economic
c.	Sunflowerseed Oil	0	1	0	0	2	Crude sunflower oil, from crushing (solvent), at plant/CN Economic

d.	Rape and Mustard Oil	0	2	1	8	0	Rape oil, crude {CH}| market for | APOS, U
e.	Cottonseed Oil	0	1	1	0	0	Cottonseed oil, crude {GLO}| market for | APOS, U
f.	PalmKernel Oil	0	0	0	1	0	Palm kernel oil, crude {GLO}| market for | APOS, U
g.	Palm Oil	3	1	2	1	12	Palm oil, crude {GLO}| market for | APOS, U
h.	Coconut Oil	0	0	0	0	0	Coconut oil, crude {PH}| production | APOS, U
i.	Ricebean Oil	0	0	0	1	0	Crude rice bran oil, from rice bran oil production, at plant/CN Economic
j.	Maize Germ Oil	0	0	0	1	2	Crude maize germ oil, from wet milling (germ oil production, pressing), at plant/DE Economic
5	**Vegetables**	**52**	**89**	**348**	**102**	**105**	
a.	Tomatoes	9	24	38	13	61	Tomato, fresh grade {GLO}| market for tomato, fresh grade | APOS, U
b.	Onions	5	25	17	14	27	Onion {CN}| onion production | APOS, U
c.	Aubergine	7	15	42	6	4	Aubergine {GLO}| market for | APOS, U
d.	Cabbage	13	15	194	58	13	Cabbage white {GLO}| market for | APOS, U
e.	Carrot	18	11	58	11	1	Carrot {CN}| carrot production | APOS, U
6	**Fruits**	**103**	**56**	**94**	**53**	**92**	
a.	Oranges, Mandarines	24	9	25	15	13	Mandarin {GLO}| market for mandarin | APOS, U; Orange, processing grade {GLO}| market for orange, processing grade | APOS, U
b.	Lemons, Limes and Products	14	5	11	5	6	Lemon {GLO}| market for lemon | APOS, U
c.	Bananas	34	34	12	8	12	Banana {GLO}| market for | APOS, U
d.	Apples and products	3	3	34	20	12	Apple {GLO}| market for | APOS, U
e.	Pineapples and Products	23	2	2	2	3	Pineapple {GLO}| market for | APOS, U
f.	Dates	0	0	0	0	40	Palm date {GLO}| market for palm date | APOS, U
g.	Grapes and Products (excl. wine)	6	3	10	3	7	Grape {GLO}| market for | APOS, U
7	**Coffee, tea, cocoa and spices**	**2**	**1**	**1**	**6**	**6**	
a.	Coffee and Products	0	0	0	4	3	Coffee, green bean {IN}| coffee green bean production, arabica | APOS, U
b.	Cocoa beans and Products	1	0	0	1	2	Cocoa bean {ID}| cocoa bean production, sun-dried | APOS, U
c.	Tea	1	1	1	1	1	Tea, dried {CN}| tea production, dried | APOS, U

8	**Meat and Meat Products**	**30**	**4**	**65**	**52**	**68**	
a.	Bovine Meat	4	1	10	12	12	Cattle for slaughtering, live weight {GLO}| market for | APOS, U
b.	Mutton and Goat meat	0	1	3	0	7	Sheep for slaughtering, live weight {GLO}| market for | APOS, U
c.	Pig meat	13	0	39	21	0	Swine for slaughtering, live weight {GLO}| market for | APOS, U
d.	Poultry meat	14	2	14	19	49	Chicken for slaughtering, live weight {GLO}| market for | APOS, U
9	**Fish and other seafood and products**	**26**	**5**	**45**	**50**	**13**	(Francesca et al., 2017)
10	**Eggs, milk and milk products and others**	**42**	**90**	**54**	**93**	**94**	
	a. Butter, Ghee	0	3	0	1	2	Butter, from cow milk {GLO}| butter production, from cream, from cow milk | APOS, U
	b. Cream	0	0	0	0	2	Cream, from cow milk {GLO}| market for | APOS, U
	c. Raw Animal Fats	0	0	2	1	1	Fat from animals, consumption mix, at feed compound plant/NL Economic
	f. Eggs	12	3	19	19	5	Consumption eggs, broiler parents >20 weeks, at farm/NL Economic
	g. Milk - Excluding Butter	29	85	33	72	84	Cow milk {GLO}| market for | APOS, U
11	**Sugar and Confectionery**	**101**	**33**	**7**	**27**	**32**	
	a. Sugarcane	61	10	0	0	0	Sugarcane {IN}| sugarcane production | APOS, U
	Sugar from Sugarcane	40	23	7	27	32	Sugar, from sugarcane {GLO}| market for | APOS, U
12	**Beverages**	**41**	**2**	**45**	**47**	**0**	
	a. Wine	0	0	2	3	0	(Ardente et al., 2006)
	b. Beer	41	2	43	44	0	(Amienyo & Azapagic, 2016)

Remarks: Data refers to the total amount of the commodity available as human food during the reference period. This does not include the food available for feed, food losses or the commodity being used for other purposes (such as oil for soap). Data include the commodity in question, as well as any commodity derived from it by processing, unless stated otherwise [1]. Classification of each commodity into aggregated food items were done primarily on the basis of the FAO classification, but modified in accordance to existing articles regarding food consumption. To model the food items into SimaPro, several food items whose life cycle inventory data were not available were merged into other food items.

Regarding the vegetables, FAO had data for only Tomatoes and Onions while majority of the vegetables were classified under "Others". Therefore, the agricultural census of Thailand, India, Japan and Saudi Arabia was taken, and three other items were added: Aubergine, Cabbage/lettuce/cauliflower/spinach and Carrots [2–5]. All other vegetables apart from Tomatoes, Onions, Aubergine, Cabbage/lettuce/cauliflower/spinach and Carrots, classified under the "Others" category were distributed proportionately for each of the category

mentioned and added. A reliable national vegetable consumption database was not found for China, so, the proportion of Aubergine, Cabbage and Carrots were based as average proportions from each country and equally distributed among the five categories. (For example, Aubergine was, on average, 11% of "Other" vegetables for the four countries, and this proportion was used to estimate Aubergine amounts in China. So, 11% of all other vegetables in China was assumed to be Aubergine, i.e. 11% of 303 kg).

Similarly, "Fruits – Others" from the FAO balance sheets were also proportionately distributed to the seven fruit items for each country

Table 2. Life cycle inventory used for one kilogram of fish and seafood [6].

Materials/Fuels/Electricity	Amount	Unit
Roundwood, eucalyptus ssp. from sustainable forest management, under bark {GLO}| market for | APOS, U	0.0000103	m^3
Acrylic varnish, without water, in 87.5% solution state {RER}| acrylic varnish production, product in 87.5% solution state | APOS, U	0.000226	kg
Alkyd paint, white, without solvent, in 60% solution state {GLO}| market for | APOS, U	0.000102	kg
Steel, low-alloyed {RER}| steel production, converter, low-alloyed | APOS, U	0.000104	kg
Cast iron {RER}| production | APOS, U	0.000432	kg
Aluminium, primary, ingot {CN}| production | APOS, U	0.0000299	kg
Aluminium alloy, AlMg3 {RER}| production | APOS, U	0.0000246	kg
Synthetic rubber {RER}| production | APOS, U	0.00000627	kg
Nylon 6-6 {GLO}| market for | APOS, U	0.00877	kg
Lead {GLO}| primary lead production from concentrate | APOS, U	0.00702	kg
Polyethylene, LDPE, granulate, at plant/RER	0.0439	kg
Polypropylene, granulate {RER}| production | APOS, U	0.00439	kg
Diesel {CH}| market for | APOS, U	0.102	kg

Table 3. Life cycle inventory used for one litre of Wine [7].

Materials/Fuels/Electricity	Amount	Unit
Grape {GLO}| market for | APOS, U	1.33	kg
Compost {CH}| treatment of biowaste, composting | APOS, S	0.19	kg
Potassium sulphate (NPK 0-0-50), at regional storehouse/RER Economic	0.057	kg
[sulfonyl]urea-compound {GLO}| market for | APOS, U	0.038	kg
Phosphate fertiliser, as P2O5 {RER}| monoammonium phosphate production | APOS, U	0.038	kg
Ammonium nitrate, as 100% (NH4)(NO3) (NPK 35-0-0), at plant/RER Economic	0.016	kg
Expanded perlite {CH}| production | APOS, U	0.00133	kg
Sodium sulfite {GLO}| market for | APOS, U	0.000233	kg
Fodder yeast {CH}| ethanol production from whey | Cut-off, U	0.102	kg
Packaging glass, brown {GLO}| market for | APOS, U	275.95	g
Carton board box production, with gravure printing {CA-QC}| carton board box production service, with gravure printing | APOS, U	20.13	g
Wood pellet, measured as dry mass {RER}| market for wood pellet | APOS, U	11.33	g
Tap water {CA-QC}| market for | APOS, U	105.31	kg
Calcium chloride {RER}| soda production, solvay process | APOS, U	2.63	g
Aluminium hydroxide {GLO}| market for | APOS, U	0.396	g
Pesticide, unspecified {GLO}| market for | APOS, U	0.0041	kg
Diesel, burned in agricultural machinery {GLO}| market for diesel, burned in agricultural machinery | APOS, U	4.51	MJ
Electricity, medium voltage {CH}| market for | APOS, U	6.48	MJ
Heat, central or small-scale, natural gas {GLO}| propane extraction, from liquefied petroleum gas | APOS, U	0.25	MJ

Table 4. Life cycle inventory used for one litre of Beer [8].

Materials/Fuels/Electricity	Amount	Unit
Barley grain {GLO}| market for | APOS, U	74.3	g
Tap water {CA-QC}| market for | APOS, U	8.43	kg
Fodder yeast {GLO}| market for | Cut-off, U	21	g

Clay {CH}| market for clay | APOS, U	1.7	g
Sodium hydroxide (50% NaOH), production mix/RER Economic	9	g
Phosphoric acid, fertiliser grade, without water, in 70% solution state {GLO}| market for | APOS, U	2	g
Sulfuric acid {GLO}| market for | APOS, U	2.5	g
Carbon dioxide, liquid {RER}| market for | APOS, U	30	g
Light fuel oil {CH}| market for | APOS, U	0.04	kg
Container glass (delivered to the end user of the contained product, reuse rate: 7%), technology mix, production mix at plant RER S	691	g
Aluminium removed by drilling, computer numerical controlled {GLO}| market for | APOS, U	36	g
Aluminium alloy, AlLi {GLO}| market for | APOS, U	76	g
Transport, truck >20t, EURO3, 50%LF, default/GLO Economic	0.6	tkm
Electricity grid mix 1kV-60kV, AC, consumption mix, at consumer, 1kV - 60kV AT S	0.236	kWh
Process steam from light fuel oil, heat plant, consumption mix, at plant, MJ CH S	0.006	MJ
Compressed air, 1000 kPa gauge {GLO}| market for | APOS, U	0.01	m3

Table 5. Identified Literature that uses the LCA approach to evaluate environmental impacts of food consumption (GWP = Global Warming Potential, ODP = Ozone Depletion Potential, POCP = Photochemical Ozone Creation Potential, AP = Acidification Potential.

S.N.	Aim of the Study	Region/ Country (and City)	Impact Assessment Methodology	Assessed Impact Category	Reference
1	Hotspot analysis for environmental impact, choice of functional unit and affects in conclusion, analysis of prospects for adjustments in emission levels from food systems	Sweden	Not mentioned	GWP	[9]
2	Assistance to consumers on buying environmentally friendly food products through LCA study	Switzerland	Eco-indicator 95	Every Impact category from Eco-Indicator 95	[10]
3	Analysis of how energy efficient meals and diets can be composed through Swedish food system study	Sweden	Not mentioned	CED	[11]
4	Comparison of environmental impact of current Swedish diet with a sustainable diet	Sweden	Not mentioned	GHGs	[12]
5	Comparison of three meal preparation methods: Homemade, semi-prepared and ready to eat	Sweden	Not mentioned	CED, GWP, EP, AP, POCP	[13]
6	Comparison of environmental impacts from 3 diet patterns (omnivorous, vegetarian, vegan) and 2 agricultural practices (conventional, organic)	Italy	Ecoindicator 99 W	GWP, ODP, AP, EP, LU Carcinogens, Respiratory Organics, Respiratory Inorganics, Radiation	[14]
7	Comparison of environmental impacts of two different chicken meals (home-made and semi-prepared)	Sweden	Not mentioned	CED, EP, AP, POCP	[15]
8	Comparison of impacts on the environment from four meals with different protein sources	Sweden, Spain	Not mentioned	CED, GWP, EP, AP, POCP, ODP	[16]
9	Analysis of the relevance to consider human excretion into the system boundary of a food system life cycle study	Spain	CML 2001	GWP, EP, AP, CED	[17]
10	Analysis of the environmental effects due to changes to recommended diets in Austria	Austria	Not mentioned	LU, CED, GWP	[18]
11	Comparison of environmental impacts of three alternative "healthy" diet scenarios	27 Countries in the EU	CMI 2002	GWP, ODP, AP, EP, Human Toxicity, POCP, Ecotoxicity,	[19]

				Abiotic Resource Depletion	
12	Analyses the reduction in GHGs due to shifts in realistic dietary choices	UK	Not mentioned	GHGs	[20]
13	Comparison of the environmental impacts of Nordic Nutritional Recommendations (NNR) and New Nordic Diet (NND) with the Average Danish Diet	Denmark	Stepwise 2006	GHGs	[21]
14	Comparison of environmental impacts of recommended diets with Average German diet	Germany	Not mentioned	GHGs, NH3, LU Blue water use, phosphorus use, primary energy use	[22]
15	Comparison of environmental impacts of ready-made dish v/s home cooked dish for roast dinner	UK	CML 2011	GWP, AP, EP, ODP, POCP Abiotic Depletion Potential, Human Toxicity, Ecotoxicity	[23]
16	Assessment of environmental impacts due to food consumption and food losses in Germany along the whole life cycle	Germany	ReCiPe	GWP, EP, ODP, Particulate Matter Formation, POCP, AP, LU, Resource Depletion	[24]
17	Evaluation of the environmental impact of food consumption of an average EU-27 citizen in one year	27 EU countries	ILCD version 1.04	GWP, ODP, human toxicity, Particulate Matter Formation, Ionizing Radiation HH, POCP, AP, EP, ecotoxicity, LU, resource depletion	[25]
18	Analysis of contribution of Urban and Peri-urban agriculture to mitigate the environmental impacts of urban food systems	Portugal (Lisbon)	ReCiPe Midpoint	GWP, LU	[26]

Table 6. Result of ALCA for the diet patterns of each country.

Impact Category	Unit	Thailand	India	China	Japan	Saudi Arabia
Global warming	kg CO_2 eq	811.44	675.96	1420.55	1109.13	1122.47
Terrestrial acidification	kg SO_2 eq	4.96	3.79	9.27	7.21	7.78
Marine eutrophication	kg N eq	0.91	0.87	1.41	1.35	1.44
Terrestrial ecotoxicity	kg 1,4-DCB	1378.79	1120.25	2579.92	1933.19	1805.74
Freshwater ecotoxicity	kg 1,4-DCB	18.15	12.85	32.47	25.25	20.87
Marine ecotoxicity	kg 1,4-DCB	20.73	14.67	38.81	28.79	23.47
Human carcinogenic toxicity	kg 1,4-DCB	23.83	14.69	45.25	31.14	23.97
Human non-carcinogenic toxicity	kg 1,4-DCB	395.37	457.02	890.32	677.67	685.14
Fossil resource scarcity	kg oil eq	109.78	82.07	212.14	145.22	126.52

Table 7. Result of CLCA for the diet patterns of each country.

Impact Category	Unit	Thailand	India	China	Japan	Saudi Arabia
Global warming	kg CO_2 eq	685.14	552.60	1032.11	884.10	814.53
Terrestrial acidification	kg SO_2 eq	3.72	3.40	5.89	5.58	5.24
Marine eutrophication	kg N eq	0.89	0.98	1.23	1.23	1.38
Terrestrial ecotoxicity	kg 1,4-DCB	1663.51	1349.80	2875.29	2178.94	1870.70
Freshwater ecotoxicity	kg 1,4-DCB	8.87	10.95	20.39	15.79	18.17
Marine ecotoxicity	kg 1,4-DCB	17.87	12.75	32.84	26.59	20.08
Human carcinogenic toxicity	kg 1,4-DCB	16.76	5.15	31.66	25.12	12.31
Human non-carcinogenic toxicity	kg 1,4-DCB	128.70	437.30	590.68	475.42	684.61
Fossil resource scarcity	kg oil eq	93.01	56.85	170.15	130.74	92.90

Table 8. Result of LCA for a diet with 1kg of each food Item.

Impact Category	Unit	Total	Cereals	Root Vegetables	Legumes, Nuts, Oil Seeds	Oils	Vegetables	Fruits	Coffee, and Tea	Meat	Fish and Seafood	Animal Products	Sugar and Confectionary	Alcoholic Beverages
Global warming	kg CO_2 eq	30.47	0.82	0.24	1.54	4.16	1.27	0.74	6.11	9.36	0.22	3.00	0.65	2.36
Terrestrial acidification	kg SO_2 eq	0.23	0.01	0.00	0.01	0.02	0.01	0.00	0.06	0.08	0.00	0.02	0.00	0.01
Marine eutrophication	kg N eq	0.04	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00
Terrestrial ecotoxicity	kg 1,4-DCB	52.86	1.45	1.33	3.84	3.46	2.07	1.90	14.44	11.15	0.29	5.01	1.60	6.32
Freshwater ecotoxicity	kg 1,4-DCB	0.96	0.02	0.02	0.04	0.14	0.03	0.03	0.41	0.12	0.00	0.05	0.01	0.08
Marine ecotoxicity	kg 1,4-DCB	0.88	0.02	0.01	0.05	0.10	0.03	0.02	0.30	0.15	0.01	0.07	0.01	0.11
Human carcinogenic toxicity	kg 1,4-DCB	0.83	0.02	0.01	0.03	0.03	0.04	0.03	0.28	0.18	0.01	0.05	0.01	0.13
Human non-carcinogenic toxicity	kg 1,4-DCB	28.18	0.26	0.50	10.76	3.04	0.78	0.50	6.25	1.44	0.22	1.17	0.46	2.81
Fossil resource scarcity	kg oil eq	4.25	0.12	0.05	0.20	0.40	0.25	0.14	1.21	0.69	0.22	0.32	0.06	0.59

Table 9. Result of LCA for food consumption of Thailand.

Impact Category	Unit	Total	Cereals	Root Vegetables	Legumes, Nuts, Oil Seeds	Oils	Vegetables	Fruits	Coffee, and Tea	Meat	Fish and Seafood	Animal Products	Sugar and Confectionary	Alcoholic Beverages
Global warming	kg CO_2 eq	811.44	233.60	5.35	23.57	35.56	50.11	42.93	12.67	210.36	5.82	67.43	53.30	70.74
Terrestrial acidification	kg SO_2 eq	4.96	1.10	0.06	0.14	0.08	0.25	0.36	0.12	1.78	0.02	0.37	0.33	0.34
Marine eutrophication	kg N eq	0.91	0.31	0.02	0.05	0.04	0.02	0.06	0.02	0.24	0.00	0.08	0.05	0.01
Terrestrial ecotoxicity	kg 1,4-DCB	1378.79	246.83	28.49	45.47	21.31	87.40	159.43	29.35	349.63	7.69	96.40	130.71	176.08
Freshwater ecotoxicity	kg 1,4-DCB	18.15	2.99	0.34	1.01	0.57	1.11	2.07	0.84	3.96	0.13	0.88	0.91	3.34
Marine ecotoxicity	kg 1,4-DCB	20.73	3.86	0.22	0.78	0.39	1.44	1.70	0.60	4.94	0.18	1.06	1.05	4.50
Human carcinogenic toxicity	kg 1,4-DCB	23.83	4.92	0.14	0.54	0.21	1.64	1.65	0.60	7.06	0.14	0.87	1.26	4.81
Human non-carcinogenic toxicity	kg 1,4-DCB	395.37	23.53	10.26	99.89	2.81	36.05	34.03	12.31	54.66	5.79	12.84	32.83	70.37
Fossil resource scarcity	kg oil eq	109.78	25.21	1.14	2.55	1.55	10.00	9.79	2.54	23.90	5.68	5.13	5.21	17.08

Table 10. Result of LCA for food consumption of India.

Impact category	Unit	Total	Cereals	Root Vegetables 1 kg	Legumes, nuts, Oil seeds	Oils	Vegetables	Fruits	Coffee, and tea	Meat	Fish and Seafood	Animal Products	Sugar and Confectionary	Alcoholic Beverages
Global warming	kg CO_2 eq	675.96	204.87	9.95	21.84	37.80	98.91	26.30	4.21	34.06	1.13	204.24	29.17	3.48
Terrestrial acidification	kg SO_2 eq	3.79	1.16	0.13	0.22	0.17	0.47	0.20	0.03	0.27	0.00	0.96	0.16	0.02
Marine eutrophication	kg N eq	0.87	0.31	0.03	0.07	0.06	0.04	0.04	0.01	0.04	0.00	0.25	0.02	0.00
Terrestrial ecotoxicity	kg 1,4-DCB	1120.25	270.14	58.53	56.68	28.91	174.78	89.24	8.13	38.36	1.49	312.72	72.61	8.66
Freshwater ecotoxicity	kg 1,4-DCB	12.85	2.98	0.73	0.95	0.82	2.15	1.06	0.25	0.41	0.02	2.88	0.43	0.16
Marine ecotoxicity	kg 1,4-DCB	14.67	3.89	0.53	0.81	0.59	2.83	1.01	0.16	0.48	0.03	3.57	0.53	0.22
Human carcinogenic toxicity	kg 1,4-DCB	14.69	4.57	0.34	0.52	0.26	3.40	1.08	0.22	0.50	0.03	2.88	0.66	0.24
Human non-carcinogenic toxicity	kg 1,4-DCB	457.02	66.63	24.45	191.29	25.64	62.85	16.54	2.30	4.06	1.12	35.01	23.66	3.46
Fossil resource scarcity	kg oil eq	82.07	24.69	2.20	3.21	2.71	19.90	5.95	0.94	2.36	1.10	15.54	2.64	0.84

Table 11. Result of LCA for food consumption of China.

Impact Category	Unit	Total	Cereals	Root Vegetables 1 kg	Legumes, nuts, Oil seeds	Oils	Vegetables	Fruits	Coffee, and Tea	Meat	Fish and Seafood	Animal Products	Sugar and Confectionary	Alcoholic Beverages
Global warming	kg CO_2 eq	1420.55	209.13	24.33	28.88	31.14	326.74	44.73	7.09	570.71	9.94	80.22	8.60	79.03
Terrestrial acidification	kg SO_2 eq	9.27	1.18	0.32	0.14	0.10	1.51	0.37	0.05	4.66	0.04	0.47	0.05	0.38
Marine eutrophication	kg N eq	1.41	0.32	0.06	0.05	0.05	0.14	0.06	0.01	0.59	0.00	0.10	0.01	0.02
Terrestrial ecotoxicity	kg 1,4-DCB	2579.92	276.87	146.66	67.14	21.90	624.86	160.72	14.37	926.00	13.14	108.74	21.54	197.98
Freshwater ecotoxicity	kg 1,4-DCB	32.47	3.05	1.86	0.68	0.40	7.54	2.81	0.44	10.69	0.22	1.01	0.12	3.66
Marine ecotoxicity	kg 1,4-DCB	38.81	3.99	1.37	0.79	0.31	9.96	2.06	0.29	13.46	0.31	1.20	0.15	4.93
Human carcinogenic toxicity	kg 1,4-DCB	45.25	4.67	0.87	0.51	0.20	10.39	1.98	0.36	19.57	0.24	0.98	0.19	5.30
Human non-carcinogenic toxicity	kg 1,4-DCB	890.32	68.93	63.17	233.59	13.62	205.42	38.47	4.62	147.65	9.89	17.39	7.64	79.92
Fossil resource scarcity	kg oil eq	212.14	25.26	5.43	2.81	1.63	67.18	10.60	1.54	61.64	9.70	6.45	0.75	19.15

Table 12. Result of LCA for food consumption of Japan.

Impact Category	Unit	Total	Cereals	Root Vegetables 1 kg	Legumes, nuts, Oil seeds	Oils	Vegetables	Fruits	Coffee, and Tea	Meat	Fish and Seafood	Animal Products	Sugar and Confectionary	Alcoholic Beverages
Global warming	kg CO_2 eq	1109.13	161.10	11.27	36.38	49.48	66.50	24.95	42.01	425.07	11.10	164.71	32.85	83.72
Terrestrial acidification	kg SO_2 eq	7.21	0.91	0.15	0.09	0.33	0.33	0.21	0.51	3.21	0.05	0.86	0.17	0.40
Marine eutrophication	kg N eq	1.35	0.25	0.03	0.03	0.14	0.04	0.04	0.09	0.50	0.00	0.20	0.02	0.02
Terrestrial ecotoxicity	kg 1,4-DCB	1933.19	211.88	68.17	51.71	54.89	154.73	90.25	109.74	646.45	14.66	237.70	82.26	210.74
Freshwater ecotoxicity	kg 1,4-DCB	25.25	2.35	0.87	0.57	1.03	1.82	1.59	3.01	7.35	0.24	2.17	0.45	3.81
Marine ecotoxicity	kg 1,4-DCB	28.79	3.06	0.64	0.63	0.86	2.37	1.16	2.29	9.10	0.34	2.62	0.58	5.13
Human carcinogenic toxicity	kg 1,4-DCB	31.14	3.61	0.41	0.40	0.51	2.34	1.10	1.81	12.25	0.26	2.16	0.73	5.56
Human non-carcinogenic toxicity	kg 1,4-DCB	677.67	50.65	29.49	158.80	67.12	47.20	21.46	54.57	93.24	11.04	29.16	29.21	85.72
Fossil resource scarcity	kg oil eq	145.22	19.49	2.52	2.06	3.98	14.41	5.91	7.69	42.65	10.83	12.45	2.88	20.34

Table 13. Result of LCA for food consumption of Saudi Arabia.

Impact Category	Unit	Total	Cereals	Root Vegetables 1 kg	Legumes, nuts, Oil seeds	Oils	Vegetables	Fruits	Coffee, and Tea	Meat	Fish and Seafood	Animal Products	Sugar and Confectionary	Alcoholic Beverages
Global warming	kg CO_2 eq	1122.47	168.19	8.65	14.78	68.55	63.66	136.59	39.76	377.38	3.00	203.44	38.47	0.00
Terrestrial acidification	kg SO_2 eq	7.78	1.14	0.11	0.13	0.25	0.35	0.49	0.48	3.63	0.01	0.98	0.20	0.00
Marine eutrophication	kg N eq	1.44	0.30	0.02	0.03	0.11	0.04	0.04	0.08	0.54	0.00	0.24	0.03	0.00
Terrestrial ecotoxicity	kg 1,4-DCB	1805.74	272.48	52.36	65.26	42.95	182.21	237.26	102.67	443.23	3.97	307.02	96.32	0.00
Freshwater ecotoxicity	kg 1,4-DCB	20.87	2.85	0.67	0.59	0.75	2.12	3.26	2.83	4.41	0.07	2.81	0.53	0.00
Marine ecotoxicity	kg 1,4-DCB	23.47	3.69	0.49	0.79	0.56	2.79	3.63	2.14	5.12	0.09	3.47	0.68	0.00
Human carcinogenic toxicity	kg 1,4-DCB	23.97	4.05	0.31	0.51	0.33	3.38	4.77	1.73	5.13	0.07	2.83	0.86	0.00
Human non-carcinogenic toxicity	kg 1,4-DCB	685.14	90.78	22.66	254.52	21.00	55.69	70.34	50.33	47.49	2.99	35.21	34.13	0.00
Fossil resource scarcity	kg oil eq	126.52	23.15	1.93	2.69	4.06	14.76	21.16	7.34	29.56	2.93	15.54	3.38	0.00

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