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Supplementary information

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Governance and resilience as entry points for transforming food systems in the countdown to 2030

In the format provided by the authors and unedited

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Supplementary Table 1. Monitoring global food systems indicator summary statistics by income group and metadata

Indicator metadata with income group and global weighted means. Categorical indicators (Right to Food and Health-related food environment policies) are excluded. These data reflect the latest data point per country per indicator (with any latest data point prior to 2010 excluded). Many of the variables used for weighting (e.g., population) are not yet available for 2023 or 2024, therefore some indicators with data in 2023 or 2024 are not included as the latest data point per country-indicator due to lack of a weighting variable. **Supplementary Data 1** shows the year of the latest available data point per country-indicator since 2010 and data sources.

Theme	Domain	Indicator	Unit	Weighted by	Desirable direction of change	Low income	Lower middle income	Upper middle income	High income	Global mean
Diets, Nutrition, and Health	Food environments	Cost of a healthy diet per capita	PPP dollar per day	Total population	-1	3.5	3.8	3.6	3.6	3.7
		Availability of fruits and vegetables per capita, fruits	g/day	Unweighted	1	158.9	201.7	331.2	328.1	267.3
		Availability of fruits and vegetables per capita, vegetables	g/day	Unweighted	1	133.6	227.8	356.3	406.9	300.0
		Retail value of ultra-processed foods per capita	current PPP US$/year	Total population	-1	1.2	4.8	54.9	858.9	153.6
		% population using safely managed drinking water services (SDG 6.1.1)	% population	Total population	1	17.6	51.8	85.5	97.4	67.9
	Food security	% Population experiencing moderate or severe food insecurity (SDG 2.1.2)	%	Total population	-1	66.3	37.7	21.5	7.2	29.9
		% Population who cannot afford a healthy diet	%	Total population	-1	71.0	52.0	18.7	6.4	35.8
		PoU: Prevalence of Undernourishment (SDG 2.1.1)	%	Total population	-1	27.8	12.6	5.9	3.4	13.3
	Diet quality	All-5: consumption of all 5 food groups	%	Total population	1	25.0	32.0	49.9	43.5	38.6
		MDD (IYCF): minimum dietary diversity for infants and young children	% population, 6-23 months	Total population	1	19.7	32.9	60.5	69.8	41.1
		MDD-W: minimum dietary diversity for women	%	Total population	1	47.5	55.0	83.6	84.1	66.4
		NCD-Protect	score (points out of 9)	Total population	1	3.1	3.5	4.4	3.9	3.8
		NCD-Risk	score (points out of 9)	Total population	-1	1.3	1.8	2.5	3.4	2.1

Theme	Domain	Indicator	Unit	Weighted by	Desirable direction of change	Low income	Lower middle income	Upper middle income	High income	Global mean
		Soft drink consumption	%	Total population	-1	14.5	18.4	17.1	41.7	19.3
		Zero fruit or vegetable consumption, adults	%	Total population	-1	14.0	15.4	4.3	6.4	10.9
		Zero fruit or vegetable consumption, children 6-23 months	% population, 6-23 months	Total population	-1	47.4	46.8	19.0		45.7
Environment, natural resources, and production	Greenhouse gas emissions	Emissions intensity, beef	kg CO2eq/kg product	Total production	-1	91.7	34.3	29.6	16.5	28.3
		Emissions intensity, cereals (excl. rice)	kg CO2eq/kg product	Total production	-1	0.1	0.2	0.2	0.2	0.2
		Emissions intensity, milk	kg CO2eq/kg product	Total production	-1	4.2	1.3	0.9	0.6	1.0
		Emissions intensity, rice	kg CO2eq/kg product	Total production	-1	1.5	1.1	1.0	1.3	1.1
		Agri-food systems greenhouse gas emissions	kt CO2eq (AR5)	Unweighted	-1	63,507.3	88,292.5	118,763.2	57,909.9	83,275.5
	Production	Yield, beef	kg/animal	Producing animals	1	119.6	162.6	205.0	322.9	221.0
		Yield, cereals	tonnes/ha	Area harvested	1	0.1	0.3	0.5	0.6	0.4
		Yield, fruit	tonnes/ha	Area harvested	1	0.7	1.3	1.6	1.4	1.4
		Yield, milk	kg/animal	Producing animals	1	480.2	1,732.2	2,974.5	7,467.4	2,262.9
		Yield, vegetables	tonnes/ha	Area harvested	1	1.0	1.3	2.6	3.2	2.0
	Land	Cropland area change	%	Cropland	-1	0.8	0.3	0.1	-0.3	0.1
	Water	Agricultural water withdrawal as % of total renewable water resources	% total renewable	Cropland	-1	17.8	24.8	10.9	14.1	16.8
	Biosphere integrity	Fishery health index progress score	score	Total population	1	9.3	21.1	15.9	35.8	21.2
		Functional integrity: agricultural land with minimum level of natural habitat	% agricultural land	Agricultural land area - ESA	1	0.5	0.3	0.5	0.4	0.4
	Pollution	Pesticide use per area of cropland	kg/ha	Cropland	-1	0.3	1.6	3.2	3.1	2.4
		Cropland nitrogen use efficiency	%	Cropland	1	74.6	60.3	63.3	62.0	63.1
Livelihoods, Poverty, and Equity	Poverty and income	Share of agriculture in GDP	% GDP	GDP	-1	26.8	15.1	6.9	1.3	4.4
	Employment	Underemployment rate, rural	% working age population	Total population	-1	12.8	5.5	7.3	2.8	6.0

Theme	Domain	Indicator	Unit	Weighted by	Desirable direction of change	Low income	Lower middle income	Upper middle income	High income	Global mean
		Unemployment rate, rural	% working age population	Total population	-1	2.8	3.8	7.7	4.3	4.4
	Social protection	Social protection adequacy	% of total welfare of beneficiary households	Total population	1	17.5	11.9	36.7	44.7	23.0
		Social protection coverage	% of population	Total population	1	19.3	60.3	64.1	71.7	58.7
	Rights	% of children 5-17 engaged in child labor	% population 5-17 years	Total population	-1	21.7	16.0	4.2	5.0	13.2
		Share of women among owners or rights-bearers of agricultural land (SDG 5.a.1)	% landholdings	Land area	1	39.9	26.5	13.7		30.7
Governance	Shared vision and strategic planning	Civil society participation index	index	Total population	1	0.6	0.7	0.4	0.8	0.6
		Presence of a national food system transformation pathway	binary	Unweighted	1	0.7	0.8	0.6	0.5	0.6
		% urban population living in cities signed onto the Milan Urban Food Policy Pact	% urban population	Urban population	1	5.2	3.5	13.5	14.5	8.5
	Effective implementation	Food safety capacity	index	Total population	1	41.2	58.3	82.1	90.3	69.5
		Government effectiveness index	binary	Unweighted	1	-1.2	-0.1	0.1	1.2	0.0
	Accountability	Guarantees for public access to information (SDG 16.10.2)	index	Total population	1	0.6	0.6	0.7	0.9	0.7
		V-Dem Accountability index	index	Total population	1	-0.1	0.4	-0.4	1.5	0.2
		Open Budget Index Score	number	Land area	1	25.1	42.3	39.4	64.9	43.0
Resilience	Exposure to shocks	Ratio of total damages from all disasters to GDP	ratio	GDP	-1	1.3	0.3	0.1	0.4	0.3
	Agro- and Food Diversity	Number of (a) plant genetic resources for food and agriculture secured in either medium- or long-term conservation facilities (SDG 2.5.1)	number	Land area	1	16,608.0	91,924.2	136,812.2	262,537.1	166,534.7

Theme	Domain	Indicator	Unit	Weighted by	Desirable direction of change	Low income	Lower middle income	Upper middle income	High income	Global mean
		Number of (b) animal genetic resources for food and agriculture secured in either medium- or long-term conservation facilities (SDG 2.5.1)	number	Agricultural land area - Minimum species richness	1	0.7	11.1	1.6	6.0	5.1
		Proportion of agricultural land with minimum level of species diversity (crop and pasture)	%	Agricultural land area - Minimum species richness	1	35.2	48.2	20.3	16.7	24.5
	Resilience capacities	Dietary sourcing flexibility index	index	Total population	1	0.6	0.6	0.7	0.8	0.7
		Mobile cellular subscriptions	Number per 100 people	Unweighted	1	68.3	102.2	117.6	131.0	110.1
		Social capital index	index	Total population	1	0.4	0.4	0.6	0.6	0.5
	Resilience responses/strategies	Prevalence of severe coping strategies	% population	Total population	-1	0.4	0.3	0.3		0.4
	Long-term outcomes	Food supply variability per capita	kcal/day	Unweighted	-1	35.4	26.0	26.1	30.1	29.3
		Food price volatility	index	Unweighted	-1	0.7	0.7	0.7	0.6	0.7

* Values multiplied by 1,000 for display purposes.

Supplementary Table 2. Monitoring global food systems indicator summary statistics by region and metadata

Indicator metadata with region and global weighted means. Categorical indicators (Right to Food and Health-related food environment policies) are excluded. These data reflect the latest data point per country per indicator (with any latest data point prior to 2010 excluded). Many of the variables used for weighting (e.g., population) are not yet available for 2023 or 2024, therefore some indicators with data in 2023 or 2024 are not included as the latest data point per country-indicator due to lack of a weighting variable. **Supplementary Data 1** shows the year of the latest available data point per country-indicator since 2010 and data source.

Domain	Indicator	Unit	Weighted by	Desirable direction of change	Southern Asia	Northern America and Europe	Northern Africa & Western Asia	Sub-Saharan Africa	Latin America & Caribbean	Oceania	South-eastern Asia	Eastern Asia	Central Asia	Global mean
Food environments	Cost of healthy diet	PPP dollar per day	Total population	-1	3.5	3.1	4.0	3.6	4.1	3.0	4.4	3.7	4.5	3.7
	Fruit availability	g/day	Unweighted	1	195.1	318.7	271.0	183.4	397.9	245.1	183.7	169.6	174.5	267.3
	Vegetable availability	g/day	Unweighted	1	246.0	445.5	424.2	144.6	228.3	225.8	227.8	534.2	623.3	300.0
	Ultra-processed food sales	current PPP US$/year	Total population	-1	1.1	877.3	115.3	3.8	71.0	577.3	11.2	43.1	15.5	153.6
	Access to safe water	% population	Total population	1	61.8	93.5	62.1	21.5	58.3	96.2	36.5	97.0	74.8	67.9
Food security	Experience food insecurity	%	Total population	-1	39.9	7.8	30.0	61.6	30.3	23.1	16.5	4.8	11.1	29.9
	Cannot afford healthy diet	%	Total population	-1	53.1	4.6	26.5	72.1	27.1	5.1	36.6	16.4	16.3	35.8
	Prevalence of under-nourishment	%	Total population	-1	14.1	4.5	11.5	22.1	6.8	23.9	5.9	10.2	4.1	13.3
Diet quality	All 5 food groups	%	Total population	1	27.4	37.8	40.0	25.0	47.0		49.6	54.7	43.7	38.6
	Minimum dietary diversity, child	% population, 6-23 months	Total population	1	27.4	71.1	37.5	24.1	62.1	34.3	51.9	60.3	51.2	41.1
	Minimum dietary diversity, women	%	Total population	1	44.5	80.3	73.9	52.0	82.2		84.4	86.2	88.3	66.4
	NCD-Protect	score (points out of 9)	Total population	1	3.3	3.7	3.5	3.1	4.4		4.4	4.6	3.8	3.8
	NCD-Risk	score (points out of 9)	Total population	-1	1.5	3.3	1.8	1.7	2.8		3.0	2.4	3.7	2.1
	Soft drink consumption	%	Total population	-1	14.2	35.6	24.9	25.1	37.1		21.0	11.6	43.4	19.3
	Zero fruits or vegetables, adult	%	Total population	-1	19.8	6.3	7.4	13.8	5.6		4.4	3.7	2.0	10.9
	Zero fruits or vegetables, child	% population, 6-23 months	Total population	-1	50.9	25.7	35.8	43.6	20.3	51.4	27.6			45.7
Greenhouse gas emissions	Emissions intensity, beef	kg CO2eq/kg product	Total production	-1	29.5	14.9	17.5	63.3	42.4	25.1	64.3	13.5	16.3	28.3
	Emissions intensity, cereals (excl. rice)	kg CO2eq/kg product	Total production	-1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Emissions intensity, milk	kg CO2eq/kg product	Total production	-1	1.2	0.6	1.0	3.6	1.0	0.8	2.8	0.8	1.1	1.0
	Emissions intensity, rice	kg CO2eq/kg product	Total production	-1	0.8	2.0	1.1	1.5	0.9	1.1	1.5	0.9	3.0	1.1
	Food system emissions	kt CO2eq (AR5)	Unweighted	-1	216,683.4	74,185.8	32,321.9	52,416.6	85,465.8	20,297.4	150,226.5	520,631.0	32,377.2	83,275.5
Production	Yield, beef	kg/animal	Producing animals	1	128.5	318.8	208.6	154.0	237.1	242.9	179.6	157.0	189.3	221.0

Domain	Indicator	Unit	Weighted by	Desirable direction of change	Southern Asia	Northern America and Europe	Northern Africa & Western Asia	Sub-Saharan Africa	Latin America & Caribbean	Oceania	South-eastern Asia	Eastern Asia	Central Asia	Global mean
	Yield, cereals	tonnes/ha	Area harvested	1	0.4	0.5	0.2	0.2	0.5	0.3	0.4	0.6	0.2	0.4
	Yield, fruit	tonnes/ha	Area harvested	1	1.4	1.3	1.4	0.8	1.7	1.3	1.5	1.6	1.4	1.4
	Yield, milk	kg/animal	Producing animals	1	1,825.4	6,970.9	2,184.0	383.3	2,583.3	4,827.6	1,578.4	2,480.3	2,326.7	2,262.9
	Yield, vegetables	tonnes/ha	Area harvested	1	1.6	2.9	2.8	0.6	1.9	2.0	1.2	2.6	3.6	2.0
Land	Cropland change	%	Cropland	-1	-0.1	-0.3	0.0	1.0	0.4	0.4	0.4	-0.3	-0.1	0.1
Water	Agricultural water withdrawal	% total renewable	Cropland	-1	40.6	3.2	101.3	4.3	3.7	1.7	8.4	12.6	28.8	16.8
Biosphere integrity	Fisheries health index	score	Total population	1	27.2	38.3	13.5	10.1	24.2	27.2	13.7	12.2		21.2
	Functional integrity	% agricultural land	Agricultural land area - ESA	1	0.1	0.4	0.4	0.5	0.6	0.5	0.6	0.5	0.5	0.4
Pollution	Pesticide use	kg/ha	Cropland	-1	0.4	2.2	1.2	0.7	7.5	2.0	4.7	2.2	0.3	2.4
	Nitrogen use efficiency	%	Cropland	1	41.6	66.9	60.0	81.9	63.7	80.5	55.3	50.6	82.8	63.1
Poverty and income	Share of agriculture in GDP	% GDP	GDP	-1	16.2	1.5	4.6	18.0	6.0	3.1	9.7	6.0	10.6	4.4
Employment	Rural underemployment	% working age population	Total population	-1	2.6	2.5	3.3	10.9	10.0	6.5	5.6	2.4		6.0
	Rural unemployment	% working age population	Total population	-1	4.4	4.9	7.9	4.3	4.9	3.1	1.7	2.1	5.2	4.4
Social protection	Social protection adequacy	% of total welfare of beneficiary households	Total population	1	8.1	40.4	26.3	21.1	31.6	12.2	20.0	36.8	31.3	23.0
	Social protection coverage	% of population	Total population	1	73.6	71.7	68.6	23.7	59.6	37.8	50.5	63.1	36.5	58.7
Rights	Child labor	% population 5-17 years	Total population	-1	8.1	6.1	5.2	25.6	4.7	16.9	9.2	5.4	18.3	13.2
	Female landholdings	% landholdings	Land area	1	24.9	48.4	24.3	34.1	9.4	58.7	26.7		62.6	30.7
Shared vision and strategic planning	Civil society participation	index	Total population	1	0.6	0.8	0.4	0.7	0.6	0.8	0.7	0.4	0.3	0.6
	Food system pathway	binary	Unweighted	1	0.7	0.4	0.6	0.8	0.6	0.9	0.6	0.8	0.8	0.6
	Milan urban food policy pact	% urban population	Urban population	1	1.9	12.7	6.7	8.5	29.1	1.7	5.3	8.3	3.5	8.5
Effective implementation	Food safety capacity	index	Total population	1	57.3	88.7	71.8	44.9	85.0	82.0	69.3	81.9	42.5	69.5
	Government effectiveness index	binary	Unweighted	1	0.0	0.8	-0.6	-0.8	-0.5	0.9	0.1	0.6	-0.4	0.0
Accountability	Access to information	index	Total population	1	0.9	1.0	0.7	0.5	0.8	0.4	0.5	0.8	0.8	0.7
	Government accountability index	index	Total population	1	0.3	1.2	-0.3	0.4	0.9	1.5	0.3	-0.9	-0.5	0.2
	Open budget index	number	Land area	1	37.5	67.1	30.5	37.4	65.8	71.9	59.1	25.1	50.0	43.0

Domain	Indicator	Unit	Weighted by	Desirable direction of change	Southern Asia	Northern America and Europe	Northern Africa & Western Asia	Sub-Saharan Africa	Latin America & Caribbean	Oceania	South-eastern Asia	Eastern Asia	Central Asia	Global mean
Exposure to shocks	Ratio of total damages from all disasters to GDP*	ratio	GDP	-1	0.1	0.4	0.5	0.9	0.3	0.5	0.0	0.1	0.0	0.3
Agro- and Food Diversity	Conservation of genetic resources, plants	number	Land area	1	279,885.9	237,131.5	18,881.0	12,978.3	109,762.5	272,872.4	12,279.5	59,968.7	40,246.9	166,534.7
	Conservation of genetic resources, animals	% agricultural land	Agricultural land area - Minimum species richness	1	43.5	6.1	0.2	1.2	0.6	0.0	5.2	1.3	6.5	5.1
	Minimum species diversity	%	Agricultural land area - Minimum species richness	1	62.5	13.6	28.3	38.1	29.6	11.8	60.1	33.5	17.9	24.5
Resilience capacities	Dietary sourcing flexibility	index	Total population	1	0.7	0.7	0.8	0.6	0.7	0.7	0.6	0.7	0.7	0.7
	Mobile phones per 100 people	Number per 100 people	Unweighted	1	110.1	124.2	126.1	92.1	112.8	74.5	126.3	121.3	116.3	110.1
	Social capital index	index	Total population	1	0.4	0.6	0.4	0.4	0.3	0.6	0.4	0.7	0.5	0.5
Resilience responses/ strategies	Reduced coping strategies	% population	Total population	-1	0.3	0.4	0.4	0.4	0.4		0.1		0.5	0.4
Long-term outcomes	Food supply variability	kcal/day	Unweighted	-1	24.7	30.4	33.0	28.9	30.0	20.2	26.7	31.4	26.0	29.3
	Food price volatility	index	Unweighted	-1	0.8	0.6	0.7	0.7	0.6	0.8	0.7	0.6	0.8	0.7

* Values multiplied by 1,000 for display purposes.

Supplementary Table 3. Search terms and returned results for automated literature search of indicator pairs.

Search queries and results for the pairs of indicators identified as having a direct causal connection. Queries searched title and abstract only. Automated screening eliminated posters and results not in English. Further manual screening to eliminate irrelevant results was carried out only for the search pairs including at least one governance indicator.

Indicator 1	Indicator 2	Number of results
Civil society participation	Prevalence of undernourishment	2
Civil society participation	Experience food insecurity	145
Civil society participation	Food system emissions	111
Civil society participation	Emissions intensity	48
Civil society participation	Functional integrity	75
Civil society participation	Pesticide use	68
Civil society participation	Nitrogen use efficiency	9
Civil society participation	Rural unemployment	238
Civil society participation	Rural underemployment	8
Civil society participation	Social protection coverage	346
Civil society participation	Social protection adequacy	513
Civil society participation	Child labor	1,453
Civil society participation	Female landholdings	10
Civil society participation	Milan urban food policy pact	5
Civil society participation	Right to food	913
Civil society participation	Food system pathway	111
Civil society participation	Government effectiveness index	360
Civil society participation	Food safety capacity	257
Civil society participation	Healthy food environment policies	218
Civil society participation	Reduced coping strategies	95
Milan urban food policy pact	Fruit and vegetable availability	2
Milan urban food policy pact	Experience food insecurity	3
Milan urban food policy pact	Food system emissions	10
Milan urban food policy pact	Pesticide use	4
Milan urban food policy pact	Nitrogen use efficiency	1
Milan urban food policy pact	Right to food	13
Milan urban food policy pact	Reduced coping strategies	3
Milan urban food policy pact	Food supply variability	3
Right to food	Cost of healthy diet	6,436
Right to food	Prevalence of undernourishment	76
Right to food	Experience food insecurity	1,443
Right to food	Cannot afford healthy diet	3
Right to food	Cropland change	2,664
Right to food	Agricultural water withdrawal	298
Right to food	Fisheries health index	111
Right to food	Pesticide use	10,166
Right to food	Share of agriculture in GDP	438
Right to food	Rural unemployment	467
Right to food	Rural underemployment	15
Right to food	Social protection coverage	594
Right to food	Social protection adequacy	1,421
Right to food	Reduced coping strategies	231
Right to food	Food price volatility	358
Right to food	Food supply variability	695
Food system pathway	Milan urban food policy pact	7
Food system pathway	Government effectiveness index	31
Food system pathway	Healthy food environment policies	111
Food system pathway	Minimum species diversity	34
Government effectiveness index	Access to safe water	231
Government effectiveness index	Prevalence of undernourishment	2
Government effectiveness index	Experience food insecurity	224
Government effectiveness index	Fisheries health index	26

Indicator 1	Indicator 2	Number of results
Government effectiveness index	Rural unemployment	50
Government effectiveness index	Rural underemployment	1
Government effectiveness index	Social protection coverage	124
Government effectiveness index	Social protection adequacy	105
Government effectiveness index	Milan urban food policy pact	1
Government effectiveness index	Open budget index	196
Government effectiveness index	Social capital index	457
Government effectiveness index	Food price volatility	85
Food safety capacity	Government effectiveness index	107
Healthy food environment policies	Ultra-processed food sales	136
Healthy food environment policies	Cannot afford healthy diet	10
Healthy food environment policies	Soft drink consumption	376
Healthy food environment policies	Milan urban food policy pact	9
Access to information	Government accountability index	7,419

Source: Dimensions.ai database.

Supplementary Table 4. Weighted linear regression of indicators on time.

Results of a weighted linear regression by indicator on year. Color coding aligns to manuscript Figure 1 where green indicators have a time trend that is statistically significantly different from zero towards the desirable direction of change and red indicators have a time trend that is statistically significantly different from zero away from the desirable direction of change. Weights defined in **Extended Data Table 1**. Regression model includes regional fixed effects. Excluded indicators do not have time series data and are: All 5, minimum dietary diversity (women and children), soft drink consumption, zero fruits or vegetabls (adult and children), NCD-Protect, NCD-Risk, functional integrity, fisheries health index, social protection coverage, social protection adequacy, child labor, female landholdings, and reduced coping strategies.

Indicator	Coef.	SE	p val.		95% Conf.	Int.	Desirable direction	N countries	Years		N years
Cost of healthy diet	2.538	0.192	0.000	***	2.160	2.916	-1	165	2017	2022	6
Fruit availability	0.149	0.058	0.010	**	0.036	0.262	1	184	2010	2022	13
Vegetable availability	0.343	0.070	0.000	***	0.207	0.480	1	184	2010	2022	13
Ultra-processed food sales	0.316	0.163	0.053		-0.004	0.635	-1	180	2017	2021	5
Access to safe water	0.683	0.038	0.000	***	0.609	0.757	1	137	2000	2022	23
Experience food insecurity	1.268	0.233	0.000	***	0.811	1.726	-1	151	2015	2021	7
Cannot afford healthy diet	-0.991	0.243	0.000	***	-1.467	-0.515	-1	149	2017	2022	6
Prevalence of undernourishment	-0.483	0.036	0.000	***	-0.553	-0.414	-1	137	2001	2021	21
Emissions intensity, beef	-0.048	0.007	0.000	***	-0.062	-0.033	-1	183	2000	2021	22
Emissions intensity, cereals (excl. rice)	0.000	0.000	0.000	***	0.000	0.000	-1	174	2000	2021	22
Emissions intensity, milk	-0.046	0.005	0.000	***	-0.055	-0.036	-1	179	2000	2021	22
Emissions intensity, rice	0.000	0.000	0.000	***	0.000	0.000	-1	117	2000	2021	22
Food system emissions	0.018	0.024	0.457		-0.029	0.064	-1	194	2000	2021	22
Yield, beef	0.307	0.034	0.000	***	0.241	0.373	1	182	2000	2022	23
Yield, cereals	0.156	0.008	0.000	***	0.140	0.173	1	177	2000	2022	23
Yield, fruit	0.348	0.020	0.000	***	0.308	0.387	1	187	2000	2022	23
Yield, milk	0.216	0.024	0.000	***	0.169	0.262	1	179	2000	2022	23
Yield, vegetables	0.188	0.008	0.000	***	0.172	0.204	1	187	2000	2022	23
Cropland change	-0.013	0.007	0.055		-0.027	0.000	-1	193	2005	2022	18

Indicator	Coef.	SE	p val.		95% Conf. Int.		Desirable direction	N countries	Years		N years
Agricultural water withdrawal	0.001	0.003	0.811		-0.006	0.008	-1	175	2000	2020	21
Pesticide use	0.107	0.012	0.000	***	0.084	0.130	-1	180	2000	2022	23
Nitrogen use efficiency	0.025	0.005	0.000	***	0.016	0.035	1	187	2000	2021	22
Share of agriculture in GDP	0.010	0.010	0.314		-0.009	0.029	-1	192	2000	2022	23
Rural underemployment	0.120	0.055	0.029	*	0.012	0.228	-1	111	2000	2022	23
Rural unemployment	0.083	0.043	0.056		-0.002	0.168	-1	140	2000	2022	23
Civil society participation	-0.416	0.043	0.000	***	-0.500	-0.332	1	172	2000	2022	23
Food system pathway	-1.546	2.344	0.510		-6.155	3.062	1	194	2022	2024	2
Milan urban food policy pact	0.000	0.000			0.000	0.000	1	194	2020	2023	2
Food safety capacity	-0.630	0.840	0.454		-2.281	1.021	1	191	2018	2020	3
Government effectiveness index	0.226	0.028	0.000	***	0.170	0.281	1	193	2000	2022	22
Access to information	8.432	2.710	0.002	**	3.107	13.756	1	194	2021	2023	3
Government accountability index	-0.419	0.039	0.000	***	-0.496	-0.342	1	172	2000	2022	23
Open budget index	0.216	0.561	0.700		-0.887	1.318	1	120	2017	2021	3
Disaster damages share of GDP	0.000	0.001	0.983		-0.002	0.002	-1	155	2000	2022	23
Conservation of genetic resources, plants	0.220	0.066	0.001	***	0.089	0.350	1	116	2000	2022	12
Conservation of genetic resources, animals	0.466	0.083	0.000	***	0.303	0.629	1	100	2000	2022	23
Minimum species diversity	0.352	0.232	0.130		-0.104	0.807	1	183	2010	2020	2
Dietary sourcing flexibility	-0.124	0.097	0.205		-0.315	0.068	1	167	2011	2019	9
Mobile phones per 100 people	2.131	0.033	0.000	***	2.066	2.196	1	193	2000	2022	23

Indicator	Coef.	SE	p val.		95% Conf. Int.		Desirable direction	N countries	Years		N years
Social capital index	0.367	0.042	0.000	***	0.285	0.449	1	165	2007	2021	15
Food supply variability	-0.206	0.024	0.000	***	-0.254	-0.158	-1	175	2000	2022	23
Food price volatility	0.071	0.019	0.000	***	0.033	0.109	-1	183	2000	2022	23

Supplementary Table 5. Direct and indirect indicator connections and total network density

Table of connections from each indicator to other indicators, classified as direct, indirect via one intermediating indicator, or indirect via two intermediating indicators. The "Percent direct" reflects the percentage of total connections from the indicator to other indicators that are direct connections. Network density represents the total number of direct connections relative to the total number of edges (potential direct connections, in this case all other indicators). Indicators are sorted in descending order by network density.

Theme	Indicator	Direct	Indirect via 1	Indirect via 2	Total connections	Percent direct	Network density
Governance	Civil society participation	22	24	2	48	46	0.45
Resilience	Food price volatility	19	13	4	36	53	0.39
Governance	Right to food	17	23	8	48	35	0.35
Governance	Government effectiveness index	16	25	7	48	33	0.33
Environment, Natural resources, & Production	Yield	15	19	2	36	42	0.31
Resilience	Disaster damages share of GDP	15	19	1	35	43	0.31
Resilience	Reduced coping strategies	15	10	10	35	43	0.31
Governance	Milan urban food policy pact	14	34	0	48	29	0.29
Diets, Nutrition, & Health	Experience food insecurity	12	16	6	34	35	0.24
Diets, Nutrition, & Health	Cost of healthy diet	11	17	7	35	31	0.22
Diets, Nutrition, & Health	Cannot afford healthy diet	10	12	10	32	31	0.20
Livelihoods, Poverty, & Equity	Social protection coverage	10	11	11	32	31	0.20
Diets, Nutrition, & Health	Fruit and vegetable availability	9	18	8	35	26	0.18
Environment, Natural resources, & Production	Cropland change	9	20	6	35	26	0.18
Resilience	Social capital index	9	30	7	46	20	0.18
Resilience	Food supply variability	9	12	11	32	28	0.18
Livelihoods, Poverty, & Equity	Social protection adequacy	8	14	10	32	25	0.16
Resilience	Minimum species diversity	8	22	7	37	22	0.16
Environment, Natural resources, & Production	Pesticide use	7	25	5	37	19	0.14
Environment, Natural resources, & Production	Nitrogen use efficiency	7	21	6	34	21	0.14
Diets, Nutrition, & Health	Prevalence of undernourishment	5	10	10	25	20	0.10
Diets, Nutrition, & Health	Zero fruits or vegetables	5	0	0	5	100	0.10
Livelihoods, Poverty, & Equity	Rural unemployment	5	21	9	35	14	0.10
Livelihoods, Poverty, & Equity	Rural underemployment	5	21	9	35	14	0.10
Governance	Food system pathway	5	33	10	48	10	0.10
Governance	Government accountability index	5	23	18	46	11	0.10
Environment, Natural resources, & Production	Agricultural water withdrawal	4	19	11	34	12	0.08
Environment, Natural resources, & Production	Functional integrity	4	26	7	37	11	0.08
Governance	Healthy food environment policies	4	13	12	29	14	0.08
Resilience	Conservation of genetic resources, plants	4	23	9	36	11	0.08
Resilience	Conservation of genetic resources, animals	4	23	9	36	11	0.08
Governance	Open budget index	3	19	24	46	7	0.06
Governance	Access to information	3	24	19	46	7	0.06
Resilience	Mobile phones per 100 people	3	21	10	34	9	0.06
Diets, Nutrition, & Health	Ultra-processed food sales	2	4	16	22	9	0.04
Diets, Nutrition, & Health	Soft drink consumption	2	0	0	2	100	0.04
Environment, Natural resources, & Production	Food system emissions	2	18	12	32	6	0.04

Theme	Indicator	Direct	Indirect via 1	Indirect via 2	Total connections	Percent direct	Network density
Environment, Natural resources, & Production	Emissions intensity	2	16	11	29	7	0.04
Environment, Natural resources, & Production	Fisheries health index	2	20	11	33	6	0.04
Livelihoods, Poverty, & Equity	Share of agriculture in GDP	2	4	23	29	7	0.04
Livelihoods, Poverty, & Equity	Child labor	2	13	10	25	8	0.04
Livelihoods, Poverty, & Equity	Female landholdings	2	8	22	32	6	0.04
Resilience	Dietary sourcing flexibility	2	19	11	32	6	0.04
Diets, Nutrition, & Health	NCD-Protect	1	0	0	1	100	0.02
Diets, Nutrition, & Health	NCD-Risk	1	0	0	1	100	0.02
Diets, Nutrition, & Health	Access to safe water	0	0	0	0	0	0.00
Diets, Nutrition, & Health	Minimum dietary diversity, women	0	0	0	0	0	0.00
Diets, Nutrition, & Health	Minimum dietary diversity, child	0	0	0	0	0	0.00
Diets, Nutrition, & Health	All 5 food groups	0	0	0	0	0	0.00
Governance	Food safety capacity	0	0	0	0	0	0.00

Supplementary Table 6. Text strings used to classify economic and regulatory policies to construct the health-related food environment policies indicator.

The following terms were used to identify whether policies apply nationally and are regulatory or voluntary. Economic tools are classified as mandatory. Only policies applied nationally are included as well as only mandatory regulatory policies. The necessary information is contained in the original NOURISHING database in multiple classification columns termed "Sub-policy area" and "Policy action". The latter includes extensive text describing the policy.

Panel A: Text searches used to code voluntary, mandatory, and subnational policies.

Text string	**Database column searched**	**Coding**
Mandator*	Sub-policy area	Code as mandatory
Voluntary	Sub-policy area	Code as voluntary
compuls*	Policy action	Code as mandatory
law	Policy action	Code as mandatory
Act	Policy action	Code as mandatory
legislat*	Policy action	Code as mandatory
Regulation*	Policy action	Code as mandatory
EU-wide rules	Policy action	Code as mandatory
ban	Policy action	Code as mandatory
standards	Policy action	Code as mandatory
rules	Policy action	Code as mandatory
voluntar*	Policy action	Code as voluntary
guideline	Policy action	Code as voluntary
guidance*	Policy action	Code as voluntary
recommend*	Policy action	Code as voluntary
award*	Policy action	Code as voluntary
Bans specific to vending machines in schools	Sub-policy area	If not already classified as mandatory or voluntary based on more specific text strings above, code as mandatory
Clearly visible "interpretative" labels and warning labels	Sub-policy area	If not already classified as mandatory or voluntary, code as voluntary
memorandum of	Policy action	If not already classified as mandatory or voluntary based on more specific text strings above, code as voluntary
discretion of local authorities	Policy action	If not already classified as mandatory or voluntary based on more specific text strings above, code as voluntary
participating schools	Policy action	If not already classified as mandatory or voluntary based on more specific text strings above, code as voluntary
at*discretion of	Policy action	Code as voluntary
local level	Policy action	Code as subnational (exclude), unless it also contains "EU" or "national"
subnational	Policy action	Code as subnational (exclude), unless it also contains "EU" or "national"

Panel B: Coding applied to specific countries based on visual inspection.

Country	Case	Coding
UK	Government engage with industry to develop self-regulation to restrict food marketing to children	Code as mandatory
South Korea	Warning labels on menus and displays in out-of-home venues	Code as voluntary
Mexico	Standards in social support programmes with "Subsidised milk" in the policy action	Code as voluntary
USA	The Food Labelling Guide	Code as voluntary
Canada	The Northern Fruit and Vegetable Program	Code as voluntary
Canada	Fruit & vegetable initiatives in schools with "Manitoba" or "British Columbia" in the policy action	Code as voluntary
Ireland	Healthier vending policy	Code as mandatory
Romania	ORDIN Nr. 25/2019	Code as voluntary
Netherlands	The National Prevention act	Code as mandatory
Portugal	Healthy Eating in Higher Education	Code as voluntary
Australia & New Zealand	Nutrition, Health and Related Claims Standard 1.2.7	Code as mandatory
Australia	Crunch & Sip	Code as mandatory
Croatia	Nutrition standards in hospitals	Code as mandatory
Estonia	Health protection requirements	Code as mandatory
Ghana	Standards on level of fat in meat	Code as mandatory
Latvia	Salt levels limits for food served in hospitals	Code as mandatory
Switzerland	Swiss quality standards	Code as voluntary
UK	School Fruit and Vegetable Scheme	Code as mandatory
USA	Policies including reference to San Francisco, NYC, Detroit, WIC	Code as mandatory
USA	Policies including reference to Santa Clara, California USA, Berkeley, Davis, Stockton, Perris	Code as voluntary

Panel C: Sub-national policies identified by manual review occur in the following places.

Country	Subnational localities
USA	San Francisco, NYC, New York City, Philadelphia, Detroit, Boston, Puerto Rico, Maine, Santa Clara, Berkeley, Davis, Stockton, Perris, California, Seattle, Oakland, Boulder, Albany, Navajo Nation, Cook County, Massachusetts, San Bernadino, Arkansas
Australia	Crunch & Sip, local health district, Queensland, Western district, New South Wales
Belgium	French region
Canada	Ontario, British Columbia, Manitoba, North Canada
New Zealand	Cook Islands
Spain	Catalonia
China	Taiwan
UAE	Abu Dhabi
UK	Brighton, England, Scotland, Wales, Northern Ireland

Supplementary Table 7. Participants and affiliations in country case-study expert elicitations

List of food system expert participants in the Ethiopia and Mexico expert elicitation processes. Participants were selected based on their knowledge and involvement in national food system transformation pathways, policies, and research, as well as their availability to participate. Experts represent government officials, research, and civil society. Structured facilitation of the process (**Supplementary Table 5**) by a group of facilitators focused on creating space for inputs from all participants and equal consideration of inputs across participants.

Panel A: Ethiopia expert elicitation (2 April 2024, Addis Ababa, Ethiopia, ILRI campus)

Main facilitator: Tesfaye Haile Bekele supported by Yonas Getaneh and Kalkidan Mulatu		
	Name	**Institutional Affiliation**
1	Getachew Diriba	Ministry of Agriculture
2	Professor Ali Mohammed	Ministry of Agriculture
3	Ato Fisseha Tekle	Ministry of Health - SD
4	Ato Abdurahman Seid	Ministry of Trade and Regional Integration
5	Senait Zemenu	Agricultural Transformation Institute
6	Naomi Berhanu	Alliance2015
7	Misbaha Kedir	EIAR
8	Yirgalem Nigusse	Policy Studies Institute
9	Mekonen Bekele	Policy Studies Institute
10	Mulugeta Teamir	MoA, Senior Food System Transformation advisor
11	Akalu Teshome	SWR, Advisor, Food System Transformation
12	Genet Gebremedhin	GAIN, Head of Policy and Advocacy,
13	Aregash Samuel	EPHI, Senior researcher and NIPN coordinator
14	Maru Bekele	FAO, Project coordinator
15	Alemtsehay Sergawi	MOA Head, Food and Nutrition Office
16	Maya Haile	FAO
17	Tsion Temane	ILRI
18	Daniel Tsegaye	MoH
19	Mengesha, Belay Terefe	Alliance Bioversity & CIAT
20	Getachew Legese Feye	ILRI

Panel B: Mexico expert elicitation (17 April 2024, Mexico DF, Mexico, National Public Health Institute)

Main facilitator: Isabel Valero supported by Ana Munguía, Mariana Arellano, Ana Paula Domínguez, Simón Barquera		
1	Amanda Gálvez	Coordinator of the University Food Program- Universidad Nacional Autónoma de México
2	Anabelle Bonvecchio	Director of nutrition policy area at the Nutrition and Health Research Center - INSP
3	Laura Ramírez	Researcher CONAHCYT (Mexican Science Agency)
4	Natividad Díaz	Ministry of Agriculture
5	Paulina Magaña	Alianza por la Salud Alimentaria
6	Sonia Rodriguez Ramirez	Researcher at the Nutrition and Health Research Center – INSP, FABLE
7	Ana Laura González Alejo	Posdoctoral researcher, UNAM
8	Doré Castillo	ContraPESO
9	Hugo López Gatell	Former Undersecretary of Health
10	Lizbeth Díaz	Ministry of Health (REPRESENTATIVE)
11	Mishel Unar	Researcher at the Nutrition and Health Research Center - INSP
12	Rolando Herrera y Saldaña	Ministry of Agriculture
13	Charlotte Gonzalez-Abraham	FABLE
14	Ileana Guadalupe Fajardo Niquete	Director of Nutrition and Chronic Diseases of the Yucatan Health Services
15	Rebeca Monroy Torres	University of Guanajuato

Panel C: Netherlands expert elicitation (9 July, 2024, Utrecht, Netherlands, Space to Create)

Main facilitator: Roseline Remans, Silvia Martinez, Maaike van Houtert, Janne Vervaeke		
1	Annie Trevenen Jones	Global Alliance for Improved Nutrition
2	Corne van Dooren	Wageningen University & World Wildlife Fund
3	Daan Boezeman	PBL Netherlands Environmental Assessment Agency
4	Evelien de Olde	Wageningen University
5	Frederike Praasterink	HAS Applied sciences
6	Hanneke Muilwijk	Rekenkamer Oost
7	Henk Westhoek	PBL Netherlands Environmental Assessment Agency
8	Herman Lelieveldt	University College Roosevelt (UCR)
9	Jeroen Candel	Wageningen University
10	José Mogollón	Leiden University
11	Krijn Poppe	Wageningen Economic Research
12	Maartje Poelman	Wageningen University
13	Marieke van Bakel	National Institute for Public Health and the Environment (RIVM)
14	Simone Eijsink	Ministry of Agriculture, Nature, & Food Quality

Supplementary Table 8. Country case study elicitation guidelines

Agenda, Instructions and facilitation materials for the Ethiopia and Mexico expert elicitation processes. For Mexico, main materials were translated in Spanish.

Panel A: Agenda

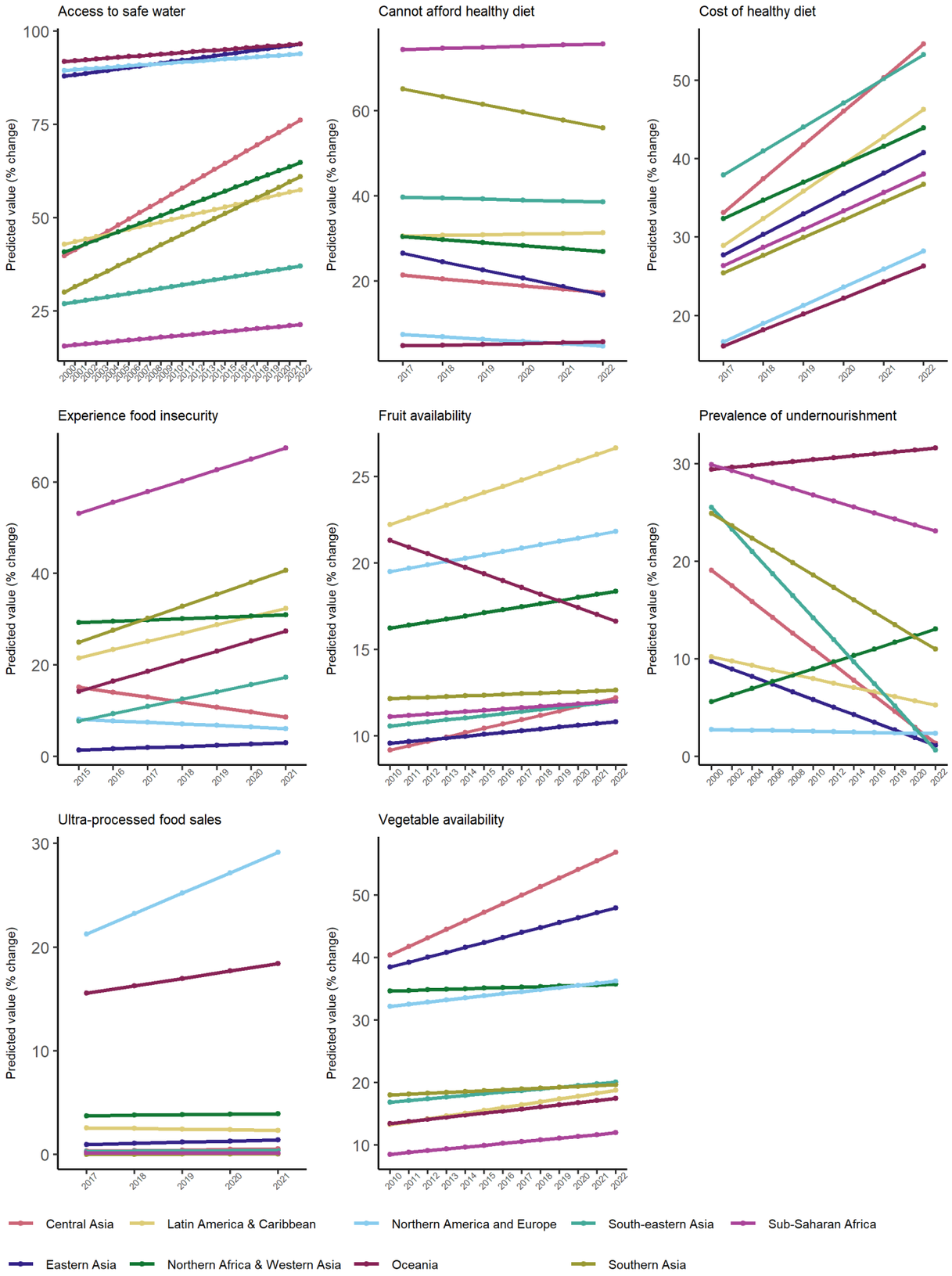
Step	Time (approximate)	Topic
1	60 min.	Welcoming Workshop agenda and objectives Participants introductions Short introduction to the Food Systems Countdown Initiative and how it serves to complement national processes Introduction to the workstream on interactions and the specific ask for this workshop with time for questions and answers
2	60 min.	Breakout groups: How do these interactions between FSCI indicators play out in the Mexican context? (logic and ranking) Qualitative mapping of interactions between indicators along two axes: 1) increasing, maintaining or decreasing over time, 2) relevance of interaction for the Mexican food system pathway/in the Mexican context
3	60 min.	Breakout groups continued: How do these interactions between FSCI indicators play out in the Mexican context? (logic and ranking) Qualitative mapping of interactions between indicators along two axes: 1) increasing, maintaining or decreasing over time, 2) relevance of interaction for the Mexican food system pathway/in the Mexican context
4	60 min.	Feedback presentation from each group in plenary, clarifications, integration and convergence
5	45 min.	Roundtable on reflections and adaptations in qualitative mapping Plus additional insights, comments, learnings and suggestions
6	15 min.	Synthesis and wrap up

Panel B: Instructions and facilitation materials

Step	Content	Guidance
1	2 core questions addressed in elicitation process	1. If you would rank the relationship between these two indicators in terms of importance/relevance for national food systems pathways/ future positive food systems change in the country, how would you rank it on the graph? In order to achieve the vision from the food system pathways, how important is the dependence of indicator A on indicator B? 2. Over the last ten years, has the interaction between these two indicators for food systems change been increasing, decreasing, or remaining the same? How does the relationship between these two indicators play out in the Mexican context?
2	Print-outs of graphic and pairs of indicators to plot interactions for ranking to X and Y axis	Large print-out posters with the empty graph structure of Figure 5 and Supplementary Figure 24, in combination with circle printouts of the 63 interactions of pairs of indicators (illustrated in Supplementary Figure 24), were used as facilitation supporting materials.
3	Online Miro	In addition to the printouts an online Miro with the graphic and the circles with the pairs of indicators served to enable and support 1) online participants (there were three online participants in Mexico, 2) consolidation and reflection after the in-person session.
4	Facilitators	For each of the sessions there was a main facilitator, supported by additional facilitators for the breakout groups. The facilitators also took notes on the discussions and the reasoning behind the plotting and on any other insights into how the interactions play out in the country context. Facilitators had three preparation meetings in advance to the workshops to align on and fine-tune the process. Facilitators Ethiopia session: Tesfaye Haile Bekele supported by Yonas Getaneh and Kalkidan Mulatu Facilitators Mexico session: Isabel Valero supported by Ana Munguía, Mariana Arellano, Ana Paula Domínguez, Simón Barquera
5	Notes and reports	Synthesized workshop reports with qualitative notes and a link to the compiled Miro were compiled by the main facilitators and shared with the participants for further reflections and inputs.

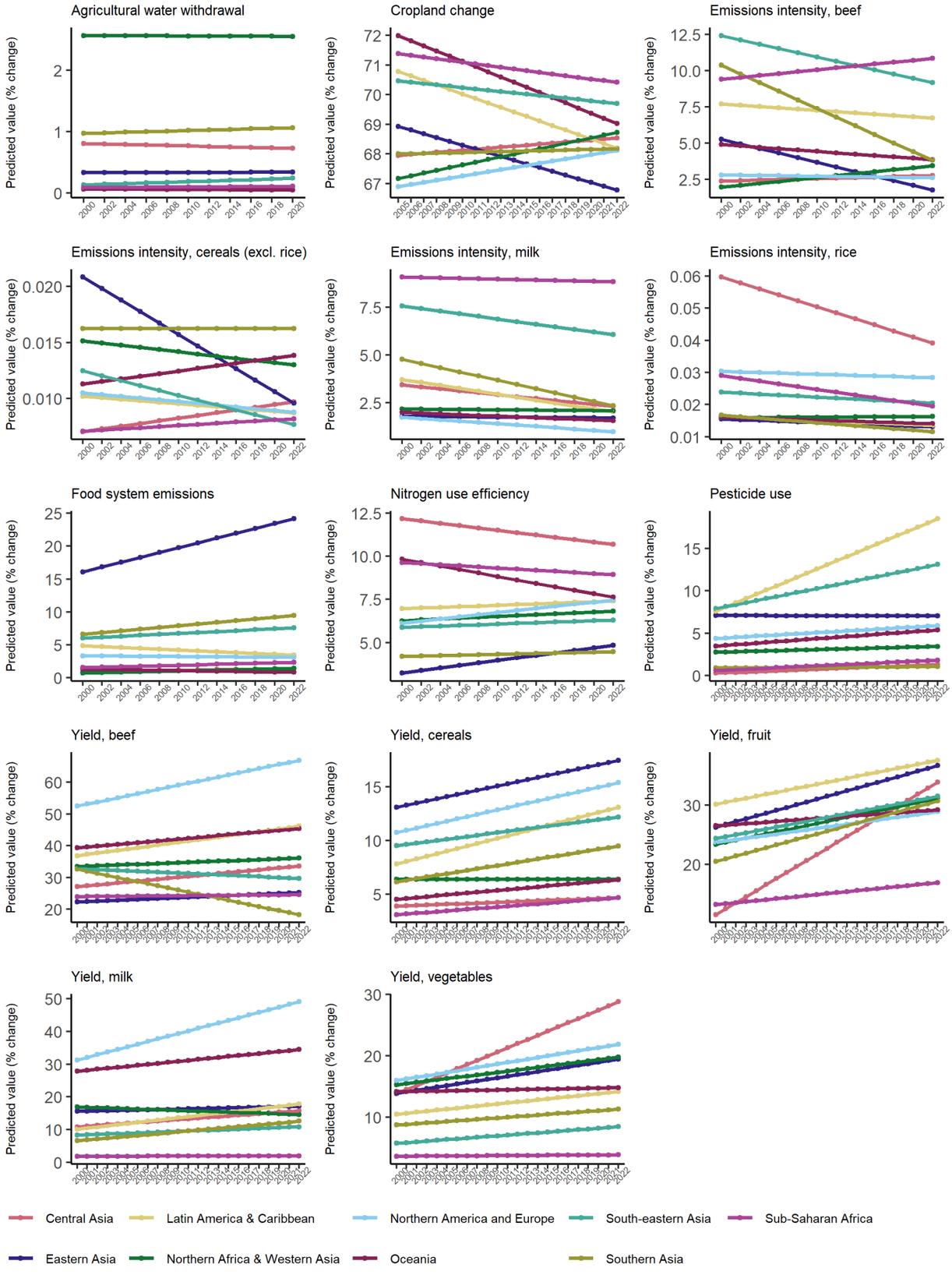
Supplementary Figure 1. Trends over time, marginal effects, 2000-2022: Diets, Nutrition & Health.

Predicted values of pooled linear weighted regression with an interaction term between region and time illustrate the heterogeneity in intercepts and trends per indicator across regions over time. All diet quality indicators are excluded because data are collected in different countries each year and cannot be analyzed as trends.



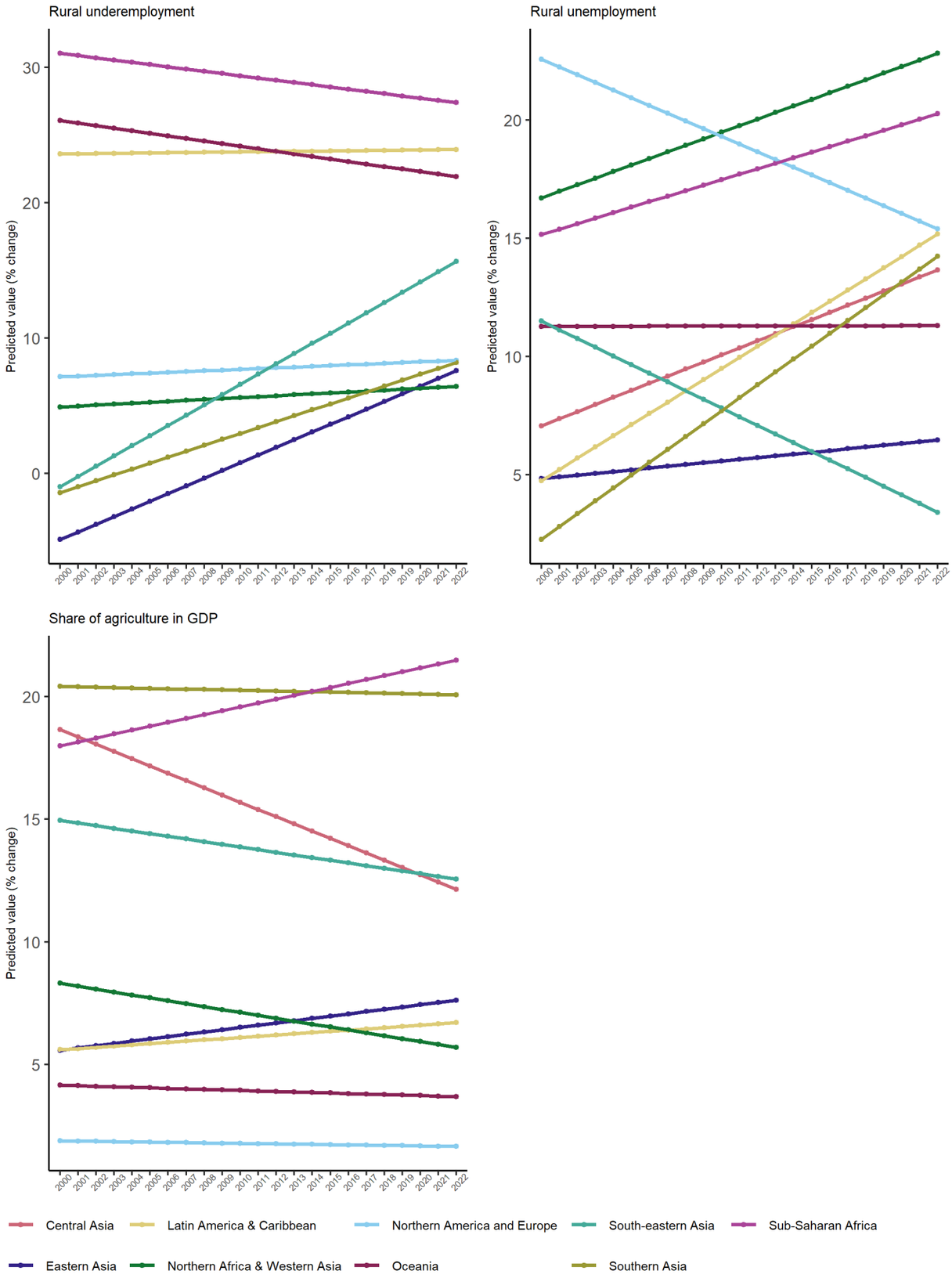
Supplementary Figure 2. Trends over time, marginal effects, 2000-2022: Environment, Natural resources, & Production.

Predicted values of pooled linear weighted regression with an interaction term between region and time illustrate the heterogeneity in intercepts and trends per indicator across regions over time. Functional integrity and the fisheries health index are excluded because they do not have time series.

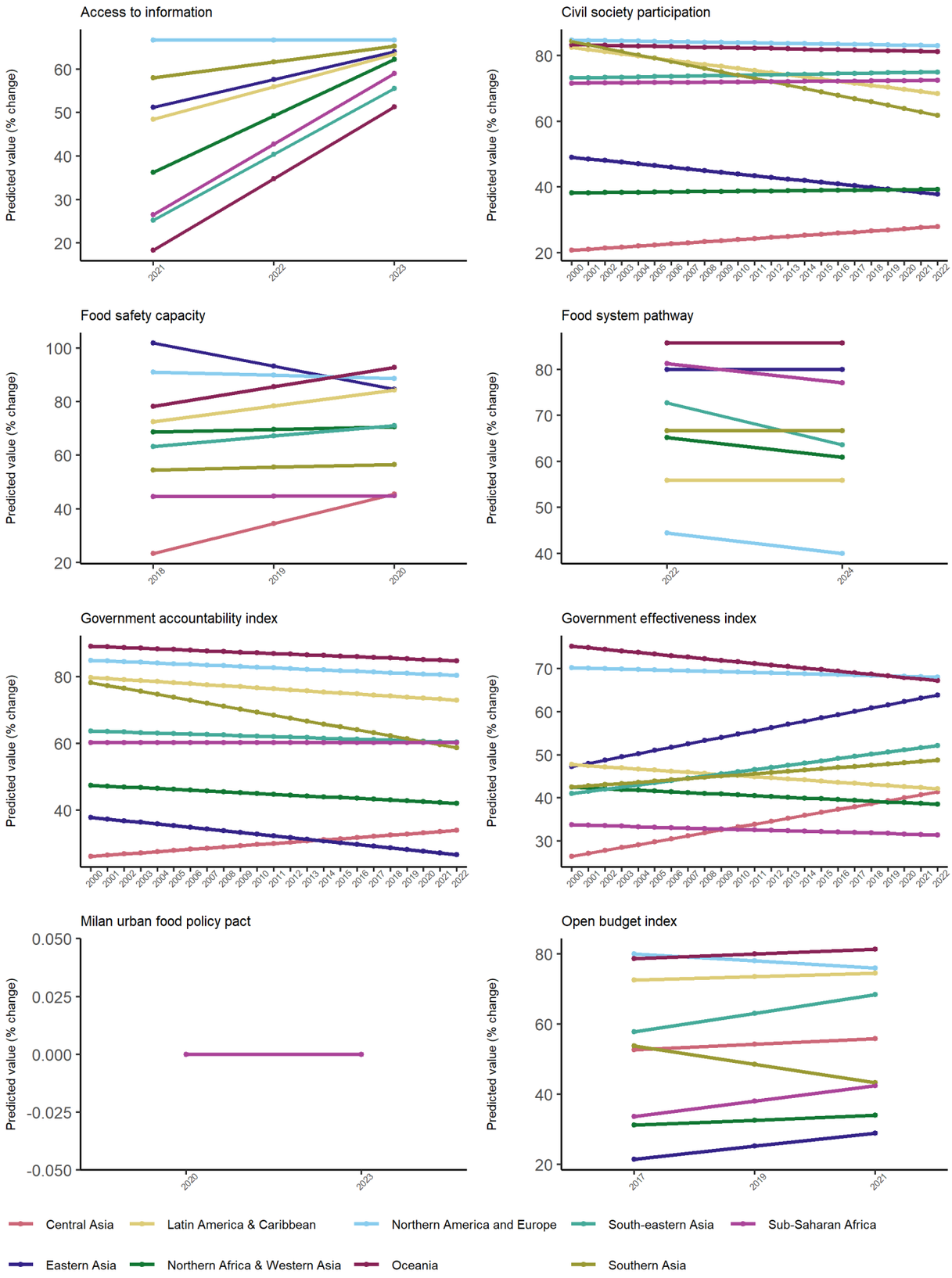


Supplementary Figure 3. Trends over time, marginal effects, 2000-2022: Livelihoods, Poverty, & Equity.

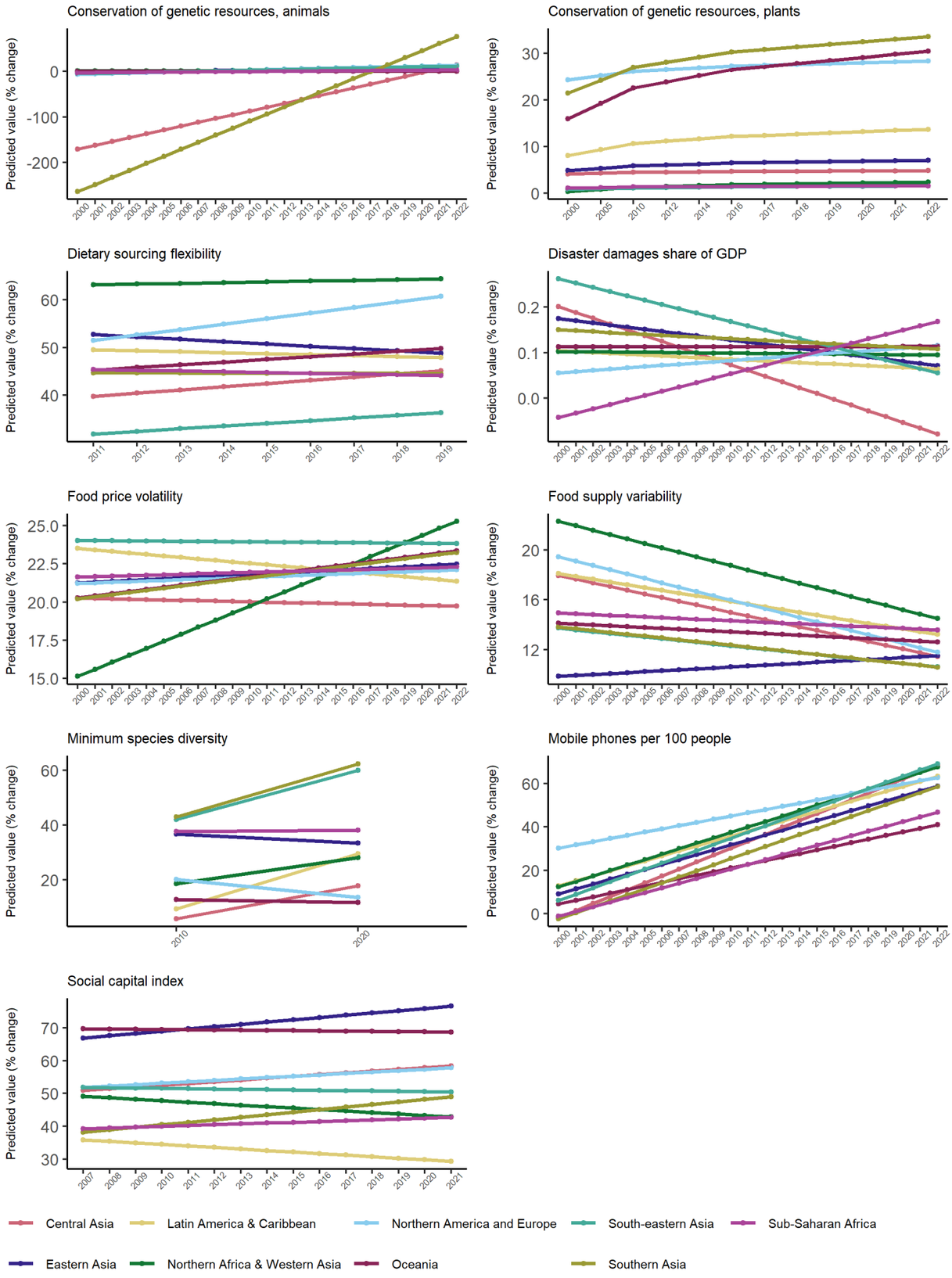
Predicted values of pooled linear weighted regression with an interaction term between region and time illustrate the heterogeneity in intercepts and trends per indicator across regions over time. Indicators excluded where data are collected in different countries each year and cannot be analyzed as trends. Social protection coverage, social protection adequacy, child labor, and female landholdings are excluded for lack of time series.



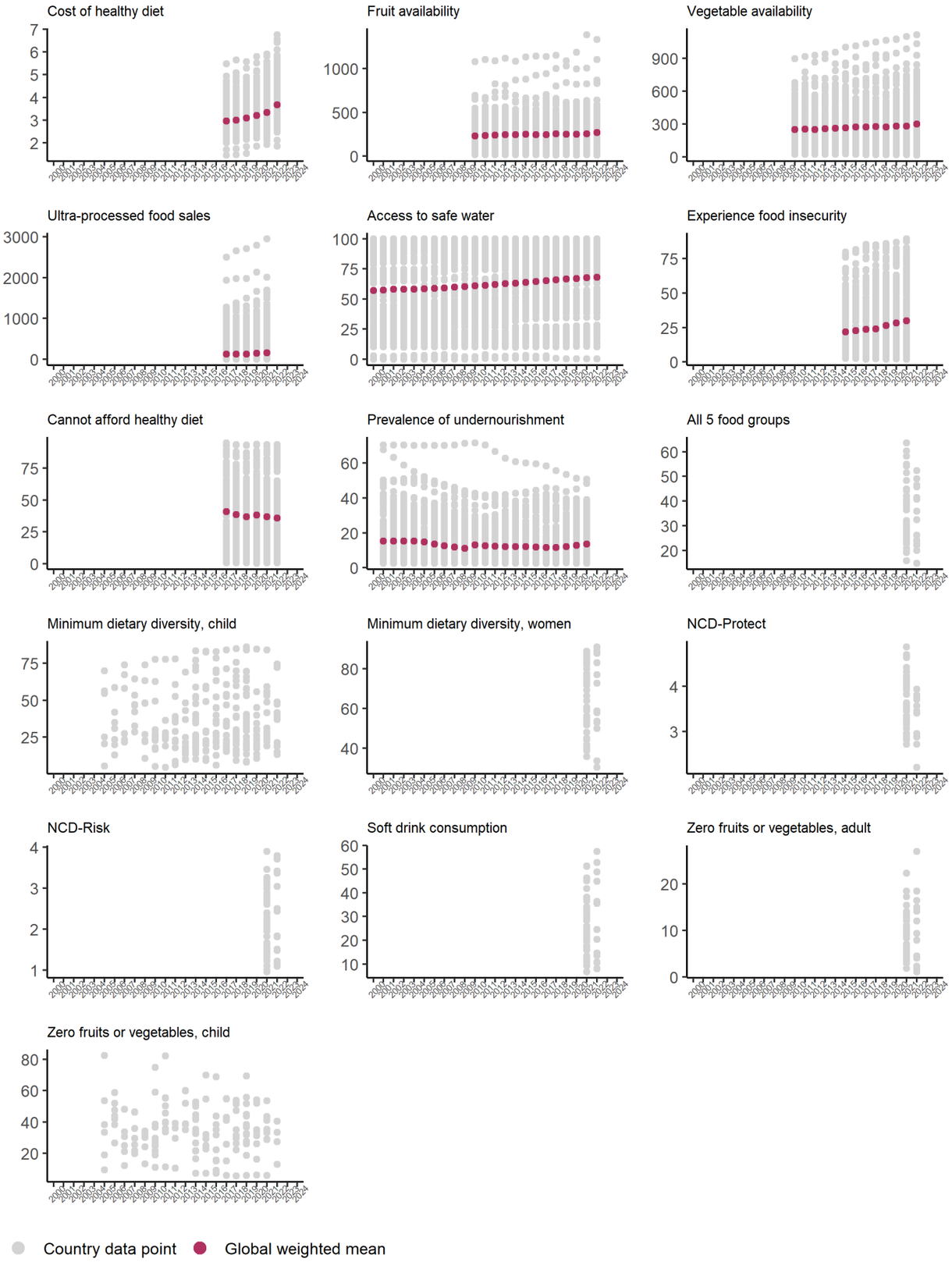
Supplementary Figure 4. Trends over time, marginal effects, 2000-2022: Governance.
Predicted values of pooled linear weighted regression with an interaction term between region and time illustrate the heterogeneity in intercepts and trends per indicator across regions over time.



Supplementary Figure 5. Trends over time, marginal effects, 2000-2022: Resilience.
Predicted values of pooled linear weighted regression with an interaction term between region and time illustrate the heterogeneity in intercepts and trends per indicator across regions over time. Indicators are excluded where data are collected in different countries each year and cannot be analyzed as trends. Reduced coping strategies are excluded for lack of time series.

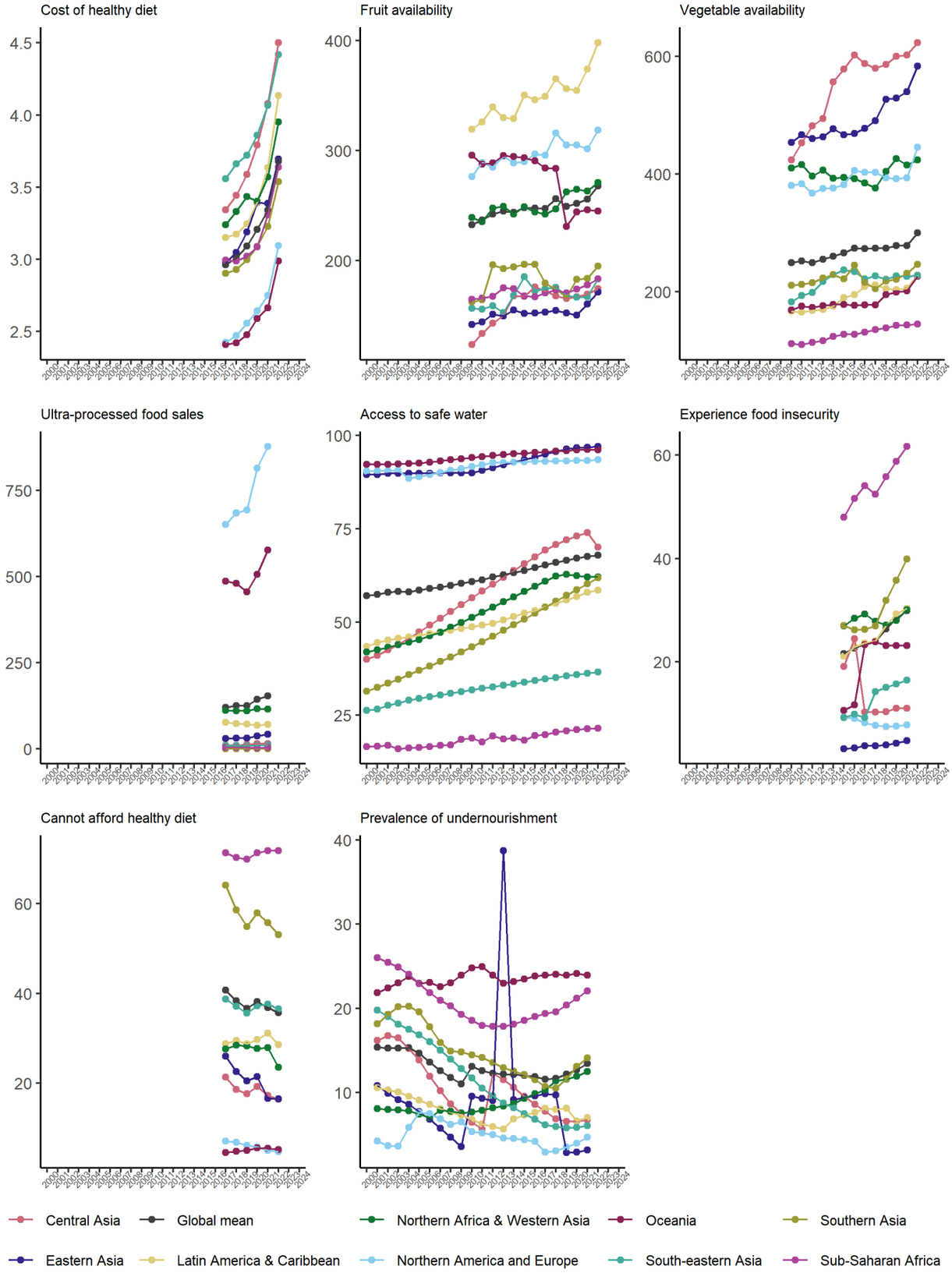


Supplementary Figure 6. All data with global weighted mean: Diets, Nutrition, & Health
All country-year observations shown for every indicator in light gray. Maroon points show the global weighted mean, excluded for all diet quality indicators where data are collected in different countries each year and cannot be analyzed as trends. Weighting variables defined as shown in **Extended Data Table 1**, no weighted mean shown in 2023 or 2024 if the weighting variable is not yet available for that year. All diet quality indicators excluded for lack of time series.



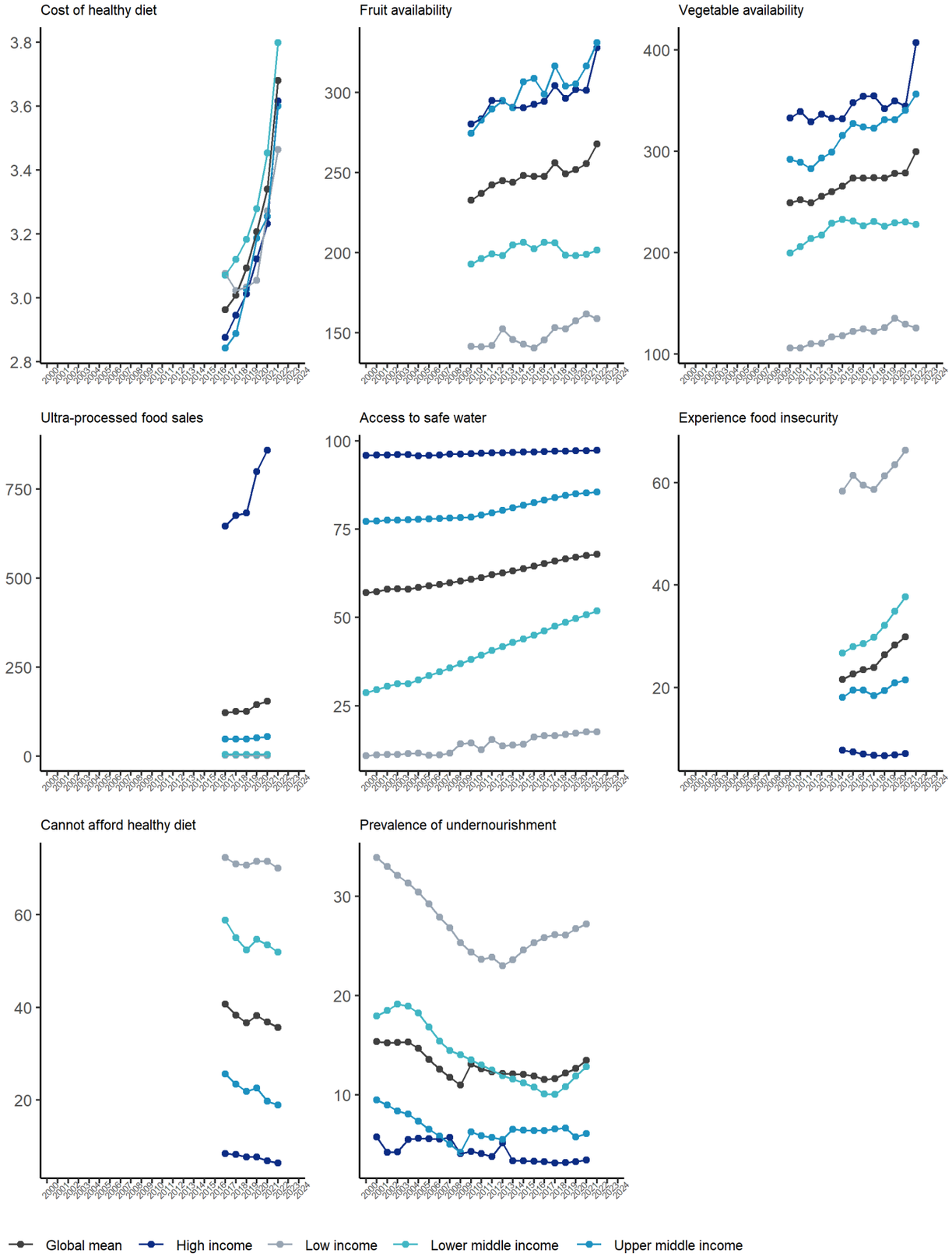
Supplementary Figure 7. Regional weighted mean: Diets, Nutrition, & Health

Time trends for all indicators, by region. Excluded for all diet quality indicators where data are collected in different countries each year and cannot be analyzed as trends.Weighting variables defined in **Extended Data Table 1.** All diet quality indicators excluded for lack of time series.



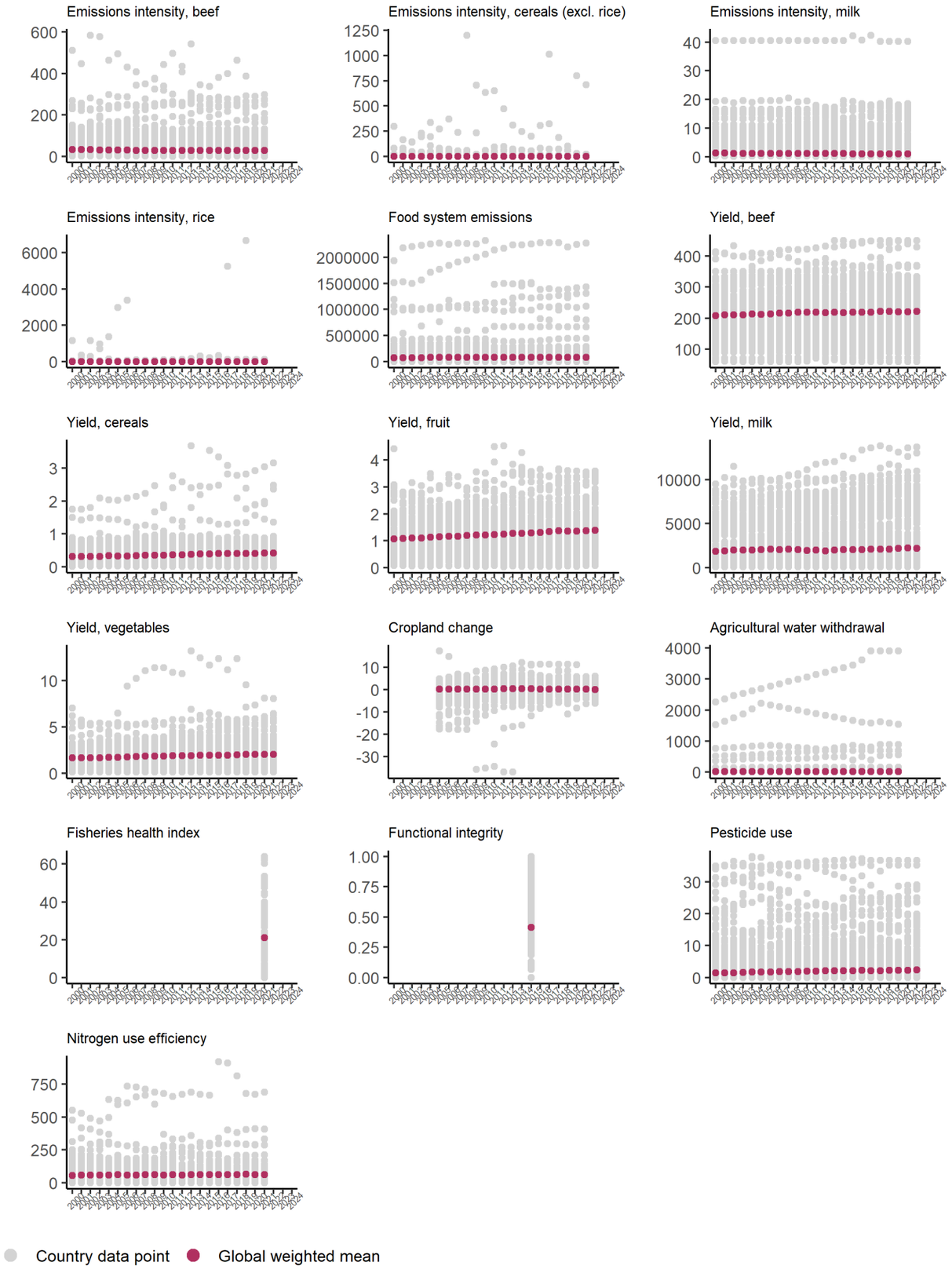
Supplementary Figure 8. Income group weighted mean: Diets, Nutrition, & Health

Time trends for all indicators, by income group. Excluded for all diet quality indicators where data are collected in different countries each year and cannot be analyzed as trends. Weighting variables defined in **Extended Data Table 1.** All diet quality indicators excluded for lack of time series.



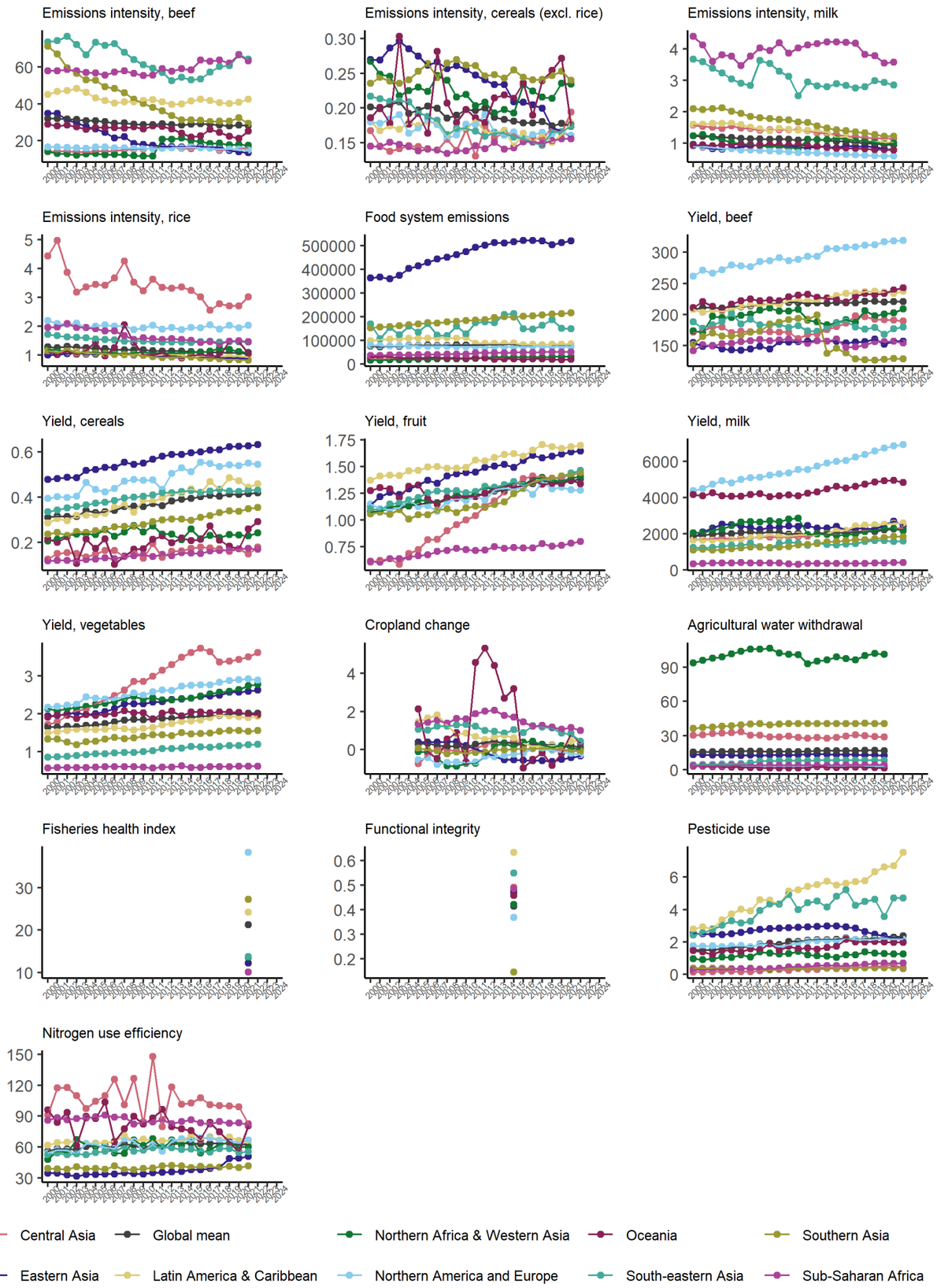
Supplementary Figure 9. All data with global weighted mean: Environment, Natural resources, & Production

All country-year observations shown for every indicator in light gray. Maroon points show the global weighted mean. Weighting variables defined as shown in **Extended Data Table 1**, no weighted mean shown in 2023 or 2024 if the weighting variable is not yet available for that year. Functional integrity and fisheries health index excluded for lack of time series.



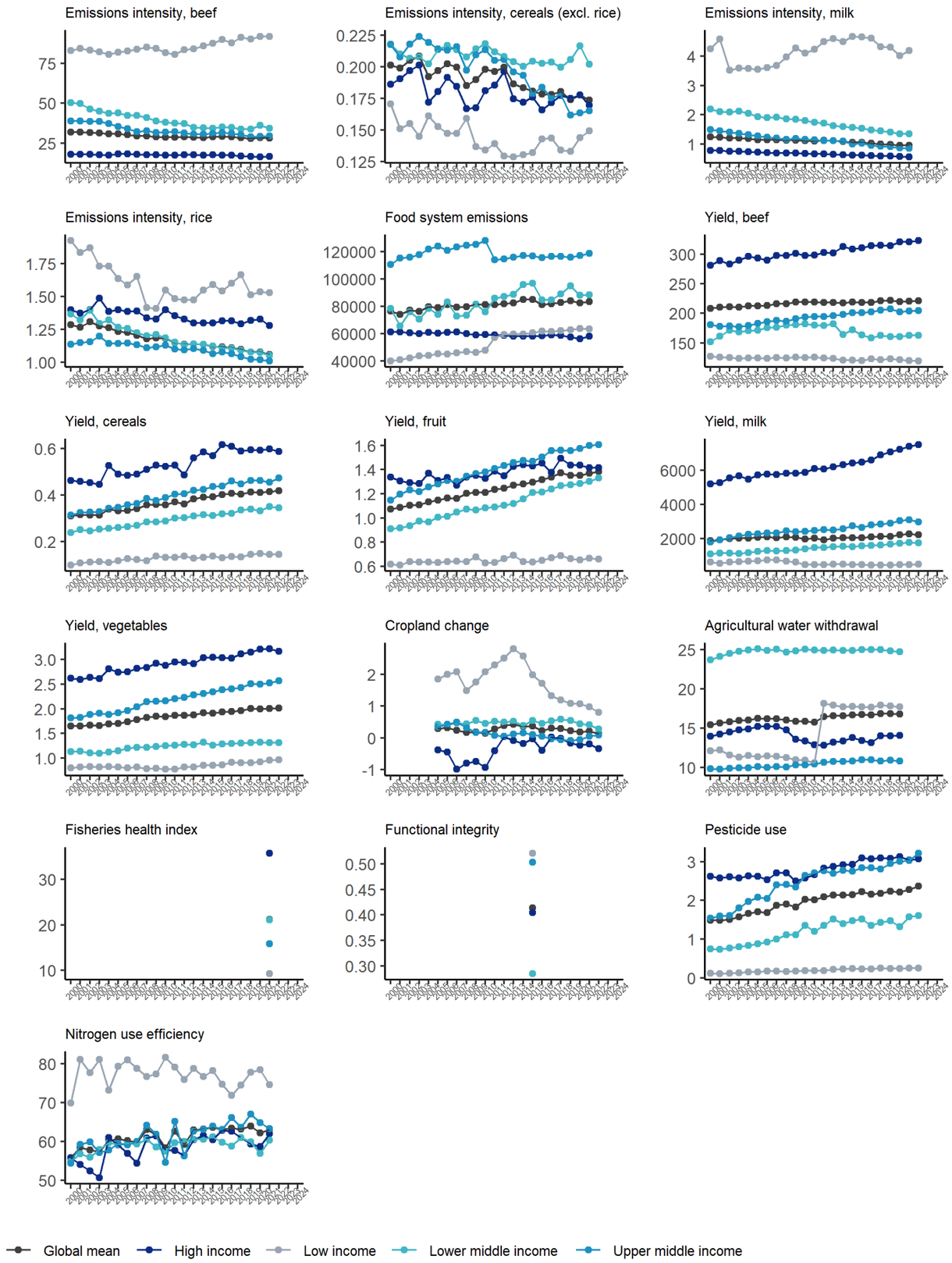
Supplementary Figure 10. Regional weighted mean time trends: Environment, Natural resources, & Production

Time trends for all indicators, by region. Weighting variables defined in **Extended Data Table 1.** Functional integrity and fisheries health index excluded for lack of time series.



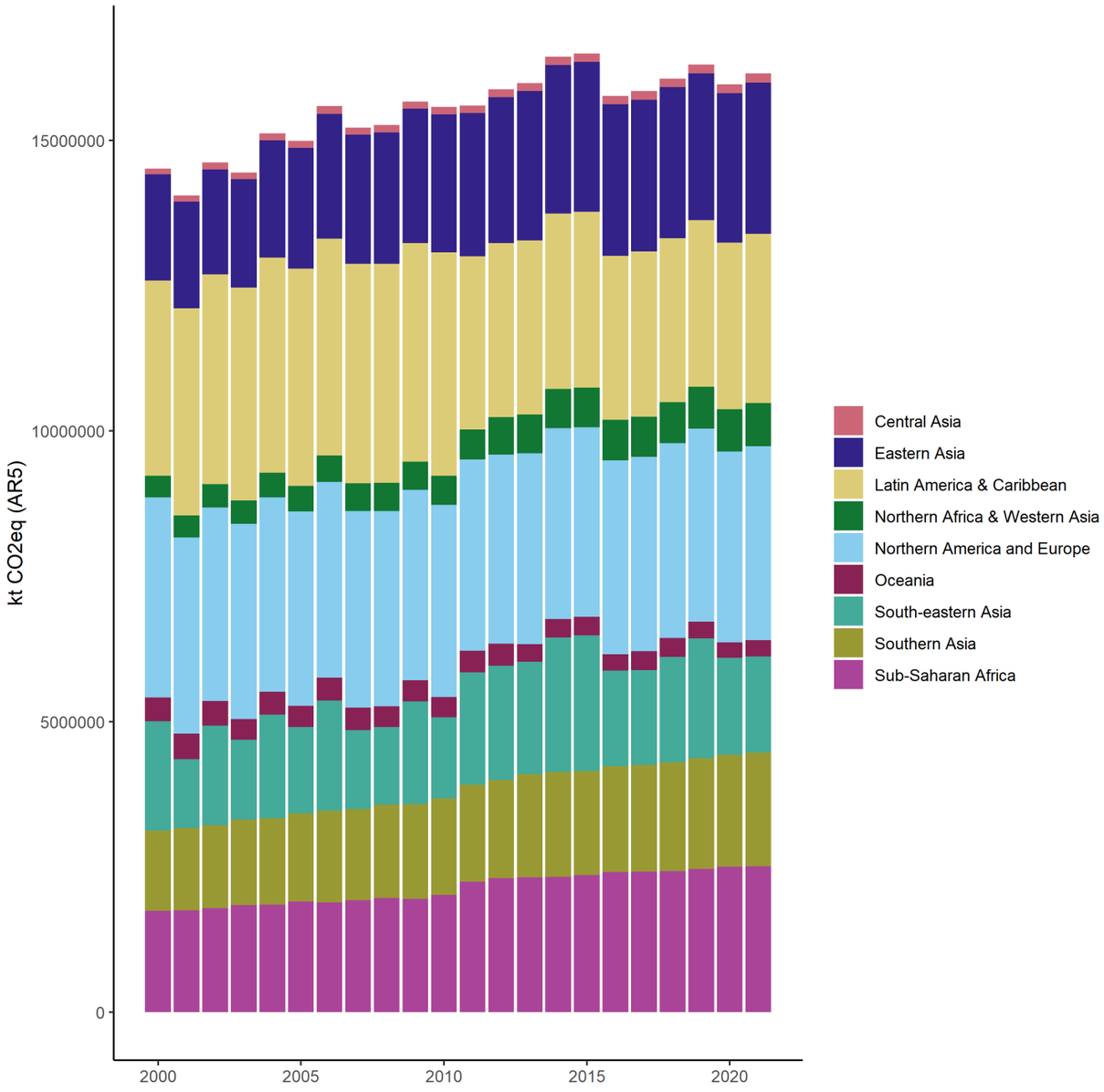
Supplemetary Figure 11. Income group weighted mean time trends: Environment, Natural resources, & Production

Time trends for all indicators, by income group. Weighting variables defined in **Extended Data Table 1.** Functional integrity and fisheries health index excluded for lack of time series.

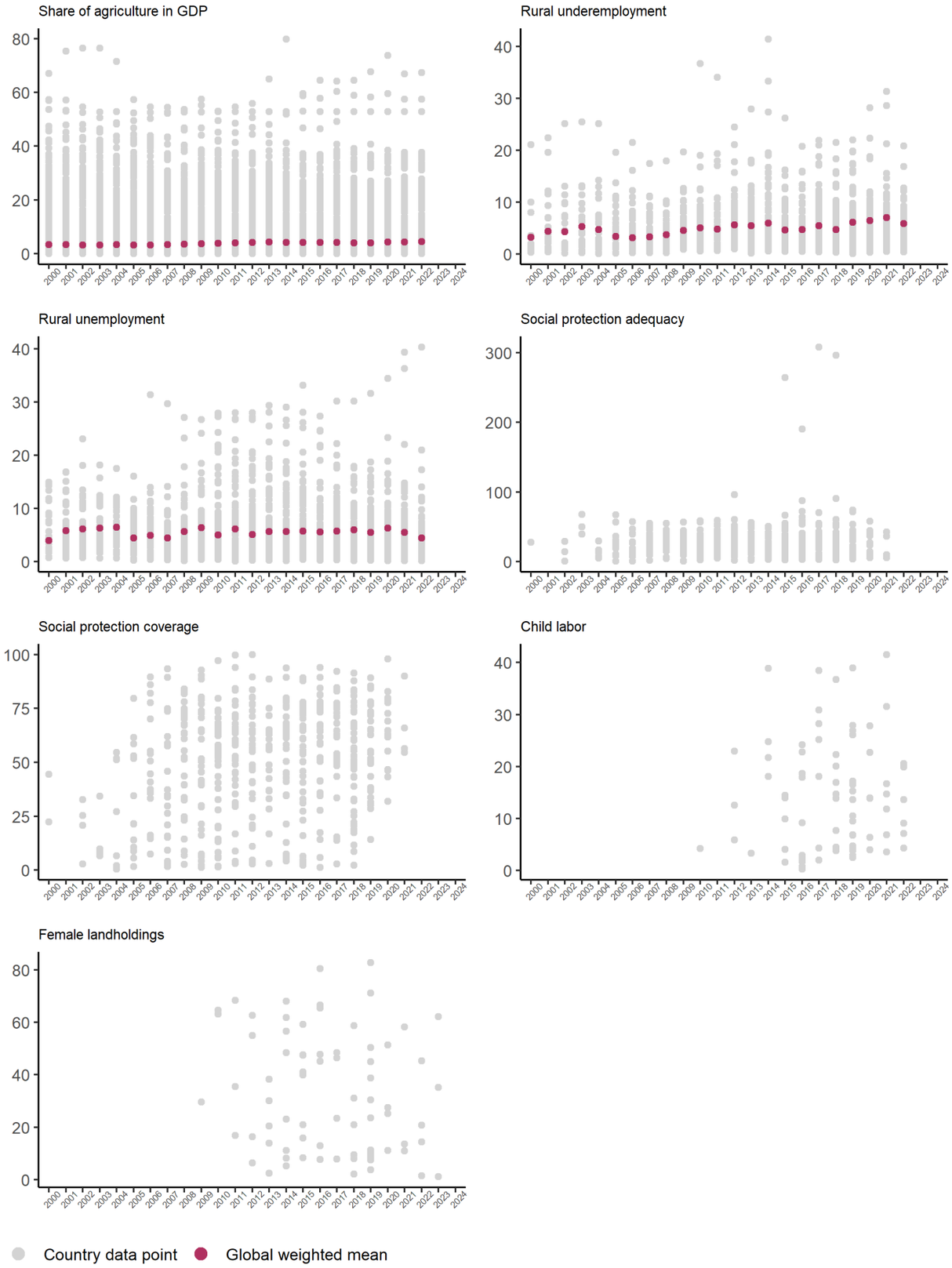


Supplementary Figure 12. Total GHG Emissions from Agrifood Systems over time

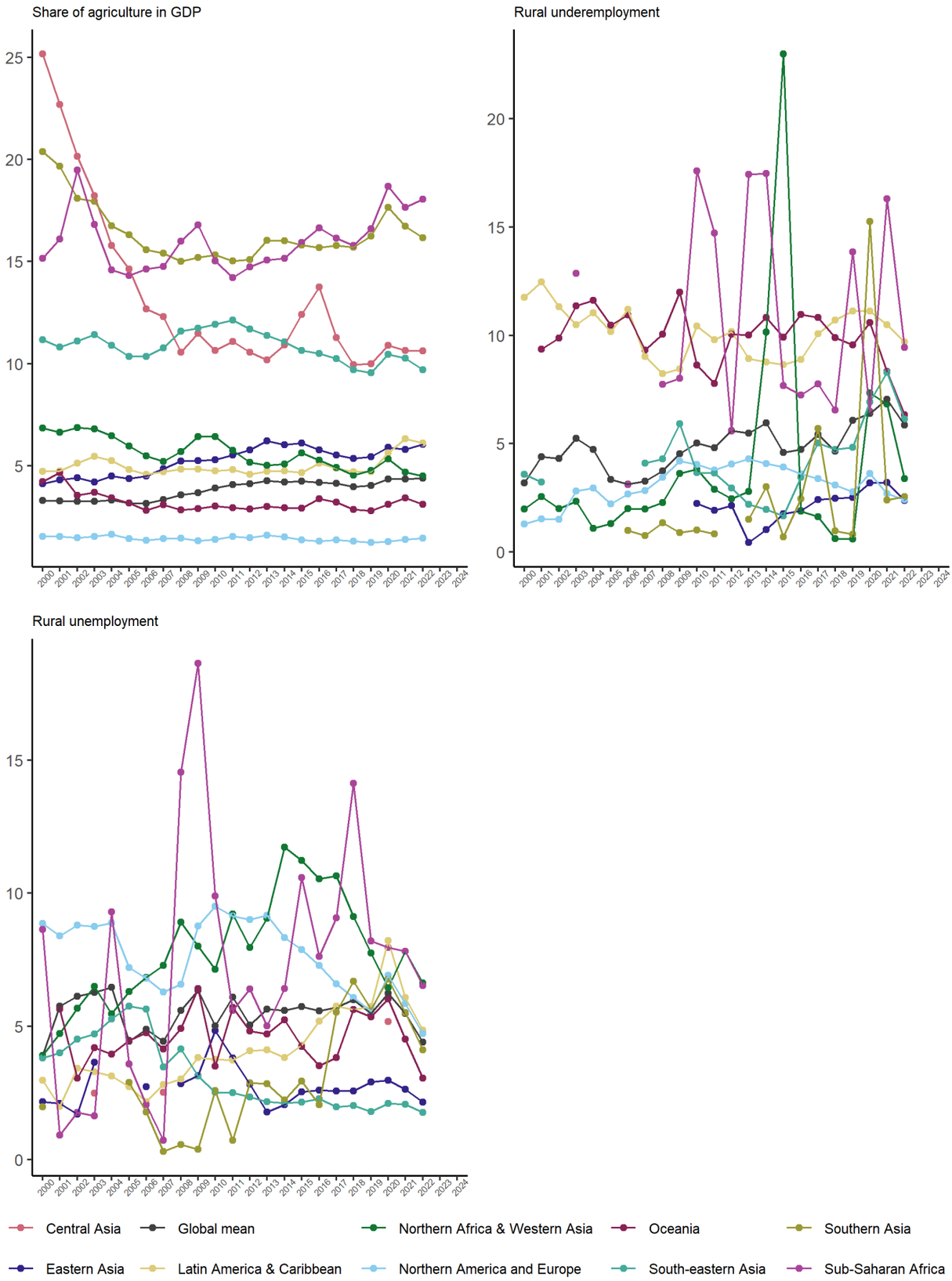
Time trends for greenhouse gas emissions from agrifood systems are best analyzed in terms of totals, rather than weighted means.



Supplementary Figure 13. All data with global weighted mean: Livelihoods, Poverty, & Equity
All country-year observations shown for every indicator in light gray. Maroon points show the global weighted mean, excluded for indicators where data are collected in different countries each year and cannot be analyzed as trends. Weighting variables defined as shown in **Extended Data Table 1**, no weighted mean shown in 2023 or 2024 if the weighting variable is not yet available for that year. Social protection coverage, social protection adequacy, child labor, and female landholdings excluded for lack of time series.

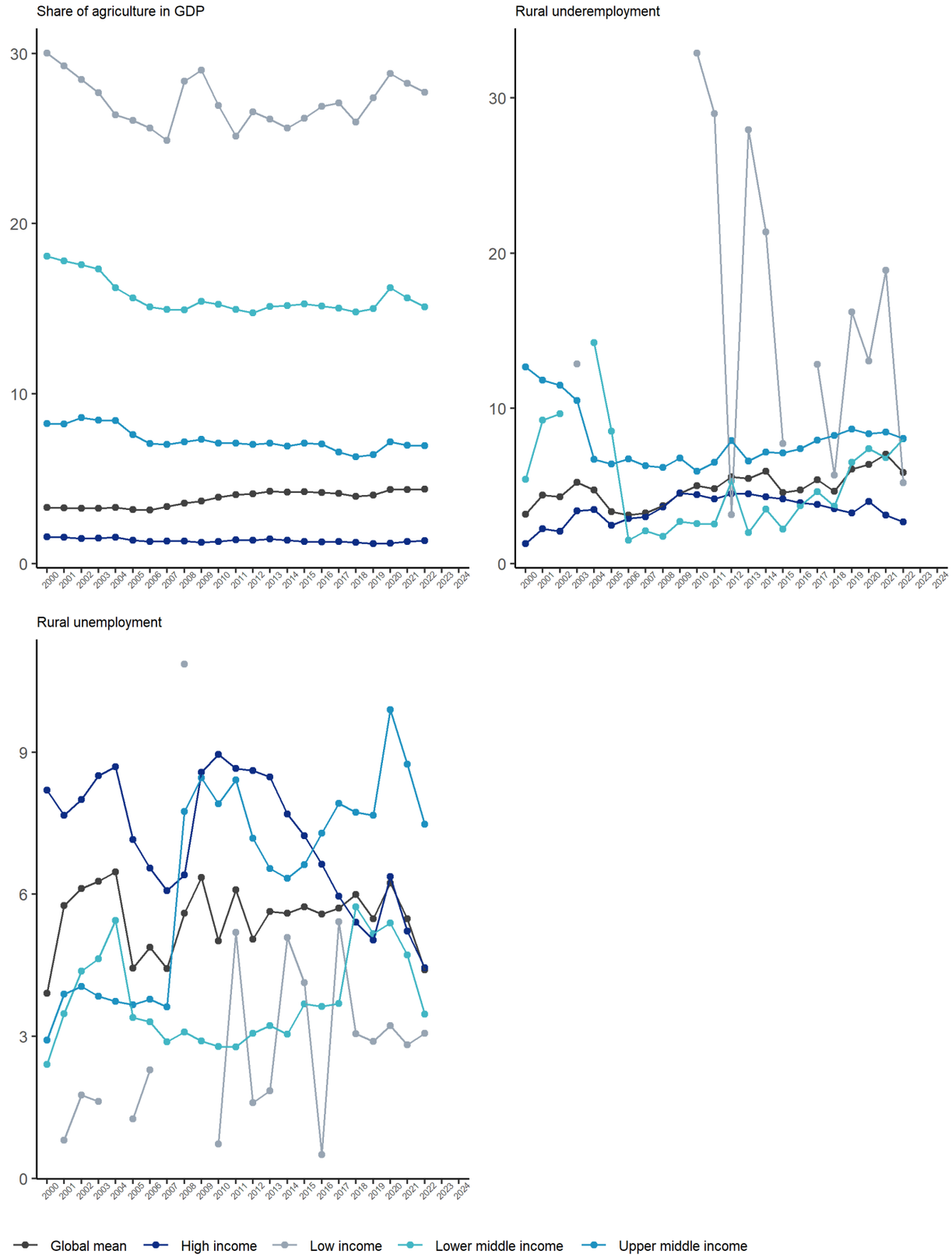


Supplementary Figure 14. Regional weighted mean time trends: Livelihoods, Poverty, & Equity
Time trends for all indicators with time series data, by region. Excluded for indicators where data are collected in different countries each year and cannot be analyzed as trends Weighting variables defined in **Extended Data Table 1.** Social protection coverage, social protection adequacy, child labor, and female landholdings excluded for lack of time series.



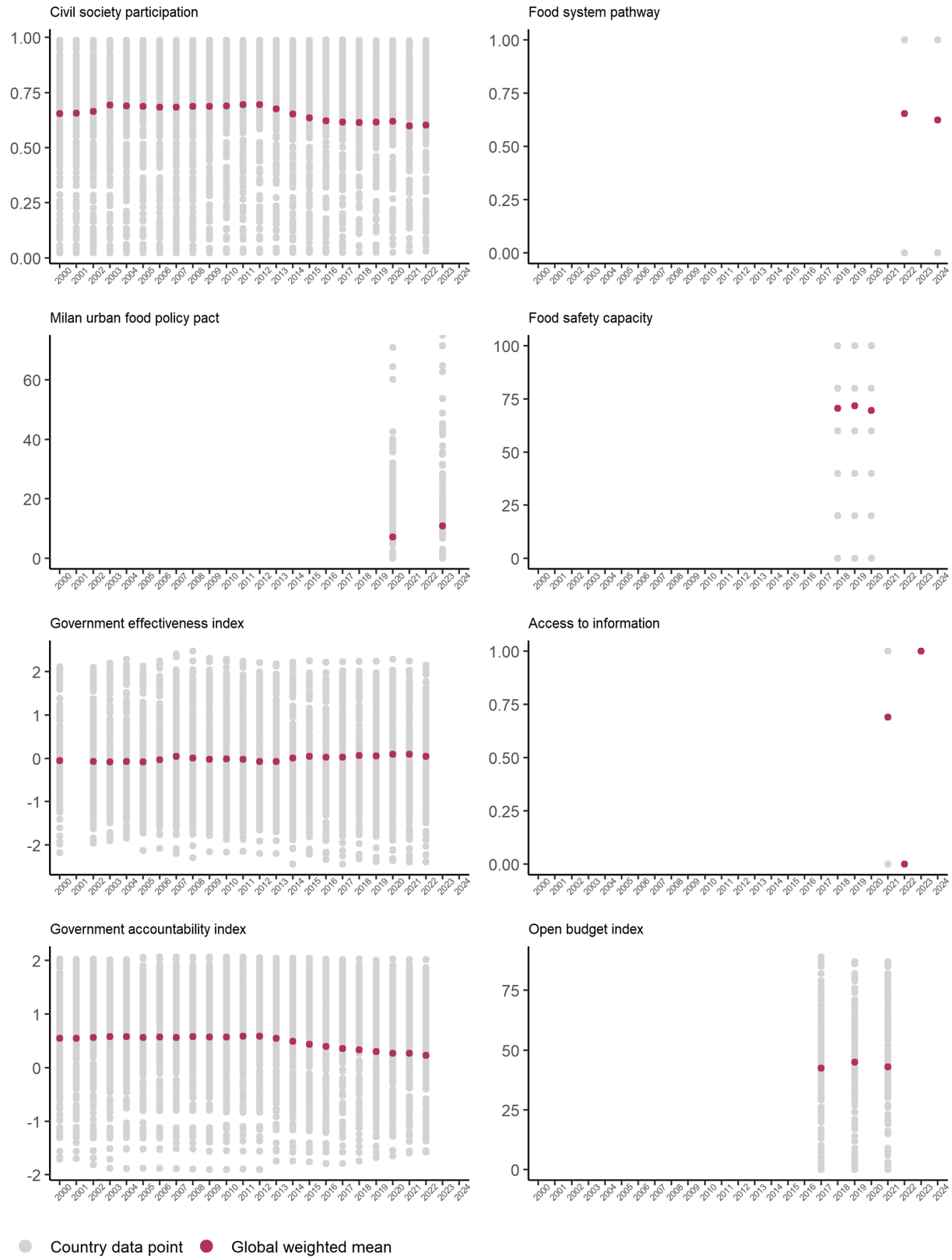
Supplementary Figure 15. Income group weighted mean time trends: Livelihoods, Poverty, & Equity

Time trends for all indicators with time series data, by region. Excluded for indicators where data are collected in different countries each year and cannot be analyzed as trends Weighting variables defined in **Extended Data Table 1.** Social protection coverage, social protection adequacy, child labor, and female landholdings excluded for lack of time series.



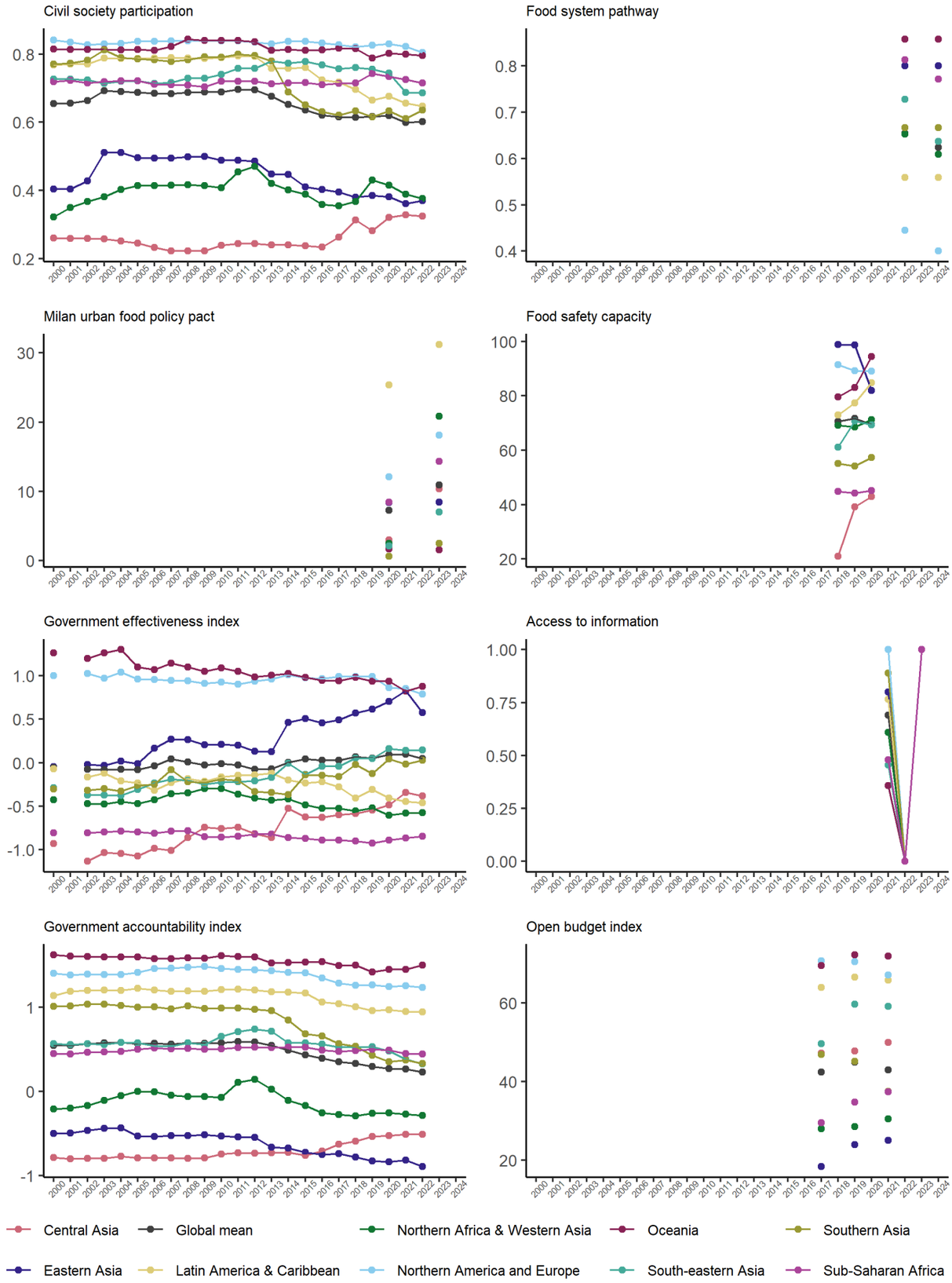
Supplementary Figure 16. All data with global weighted mean: Governance

Time trends for all indicators. Light gray points illustrate all country-year observations. Maroon points show the global weighted mean. Weighting variables defined in **Extended Data Table 1.**



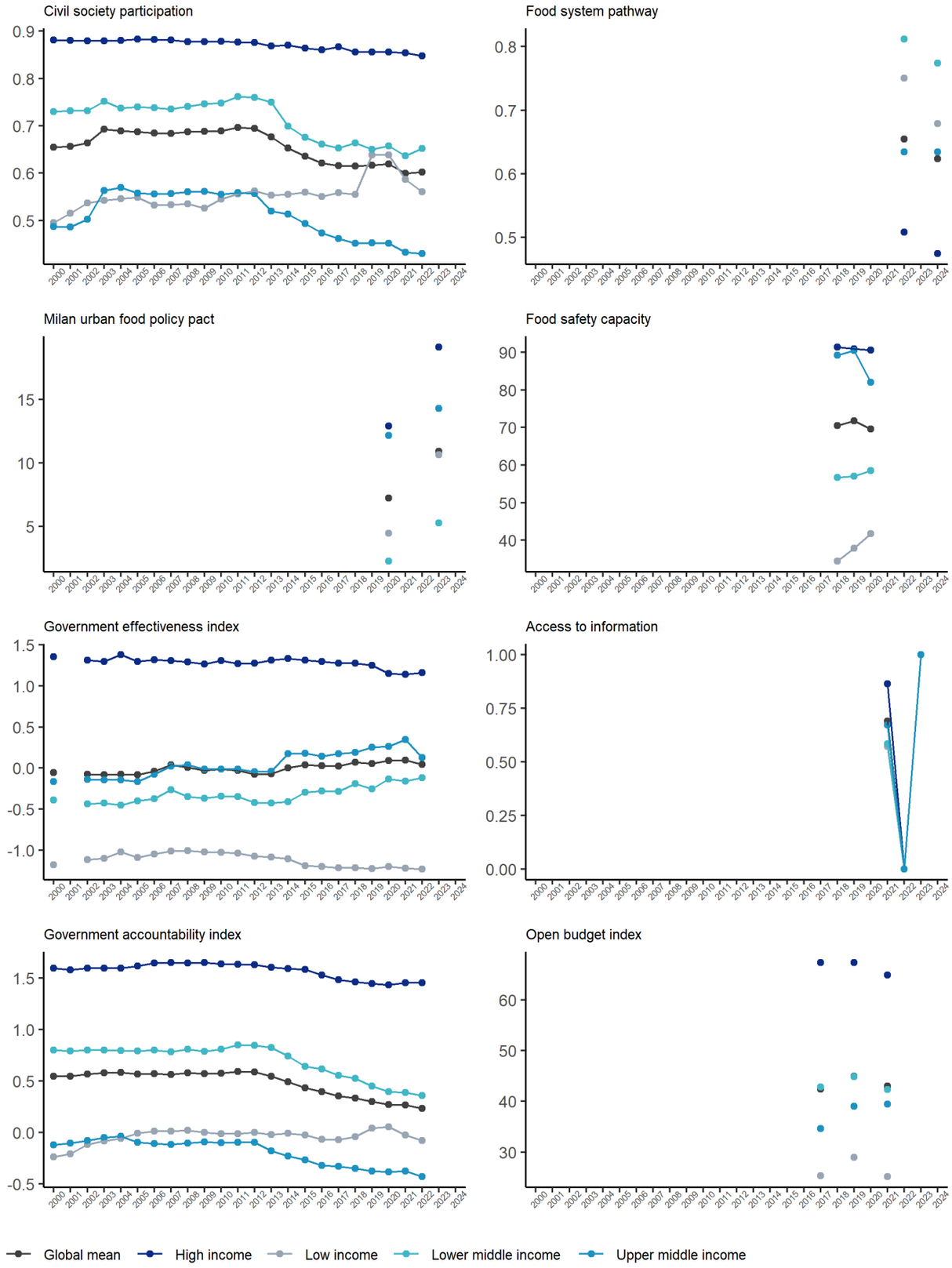
Supplementary Figure 17. Regional weighted mean time trends: Governance

Time trends for all indicators, by region. Weighting variables defined in **Extended Data Table 1.**



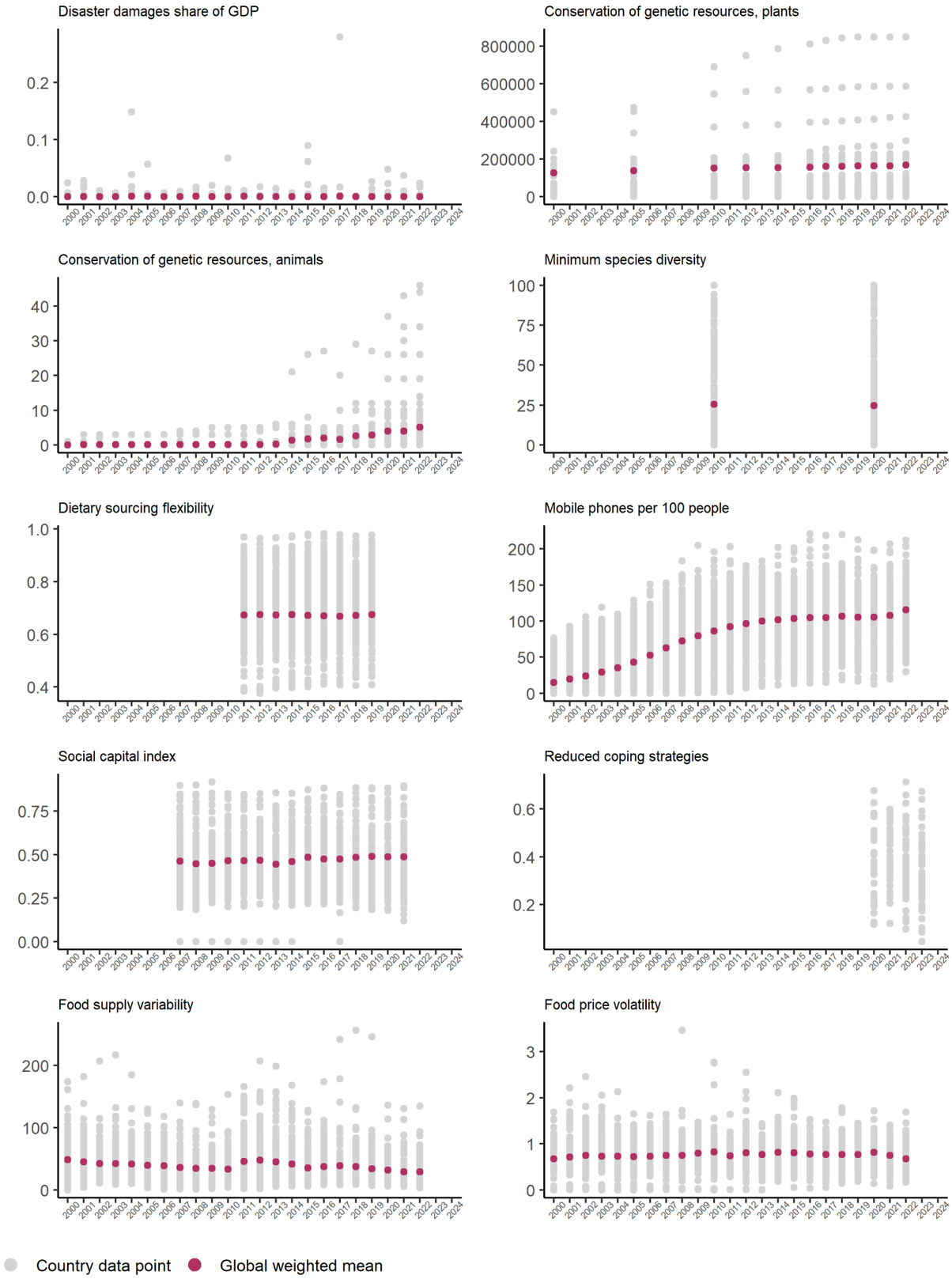
Supplementary Figure 18. Income group weighted mean time trends: Governance

Time trends for all indicators, by income group. Weighting variables defined in **Extended Data Table 1.**



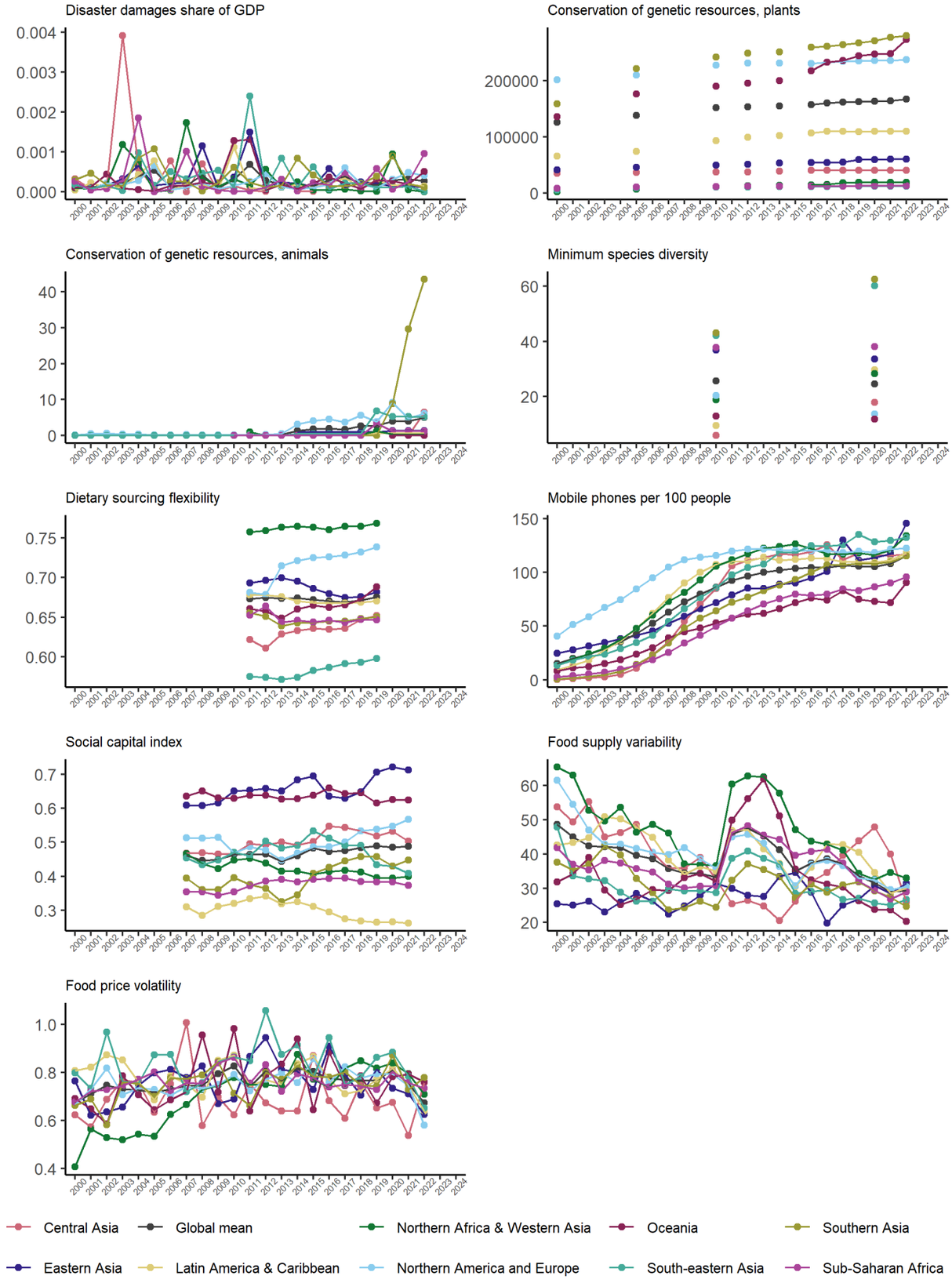
Supplementary Figure 19. All data with global weighted mean: Resilience

All country-year observations shown for every indicator in light gray. Maroon points show the global weighted mean, excluded for indicators where data are collected in different countries each year and cannot be analyzed as trends. Weighting variables defined as shown in **Extended Data Table 1**, no weighted mean shown in 2023 or 2024 if the weighting variable is not yet available for that year. Reduced coping strategies excluded for lack of time series.



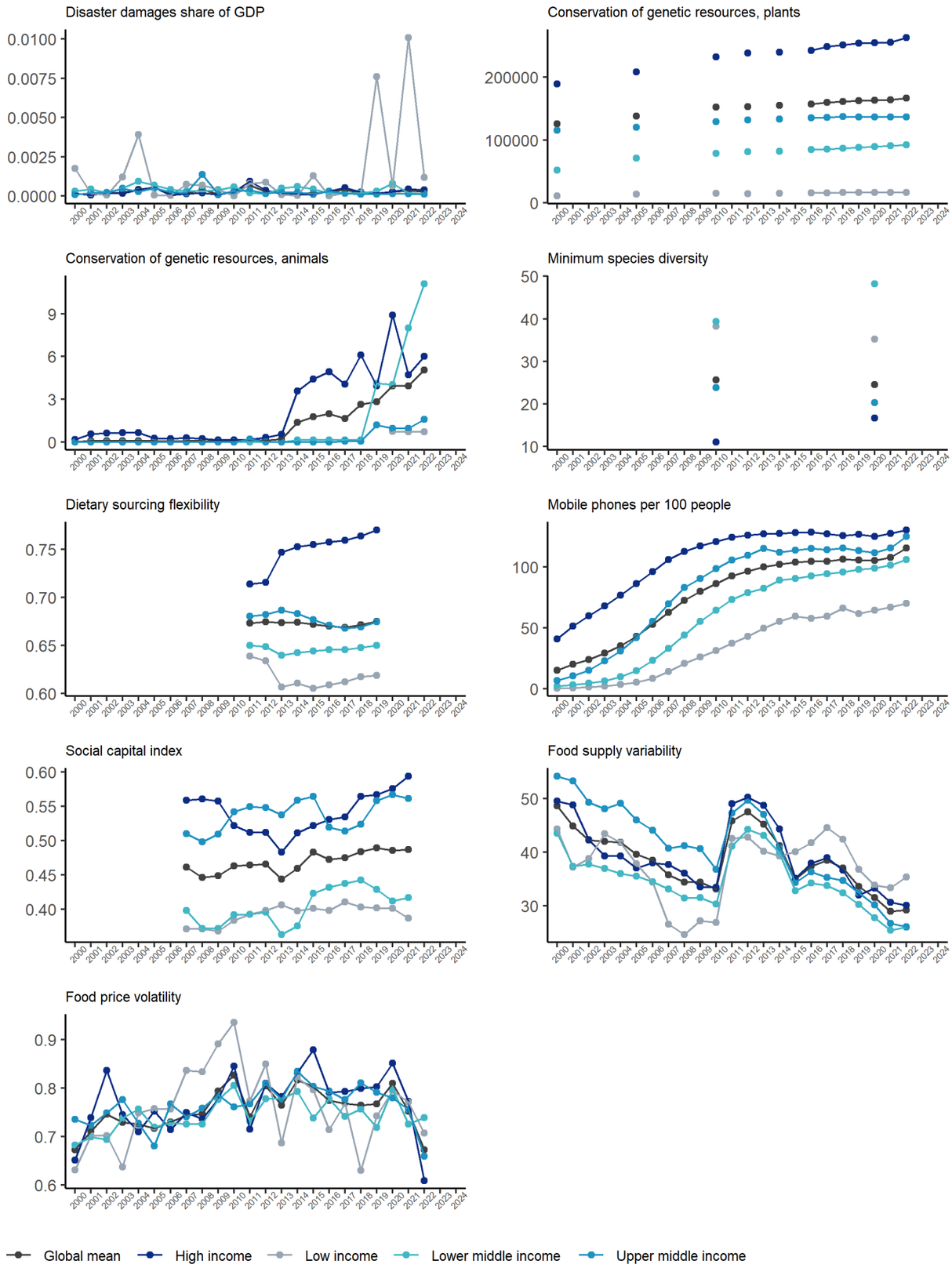
Supplementary Figure 20. Regional weighted mean time trends: Resilience

Time trends for all indicators with time series data, by region. Excluded for indicators where data are collected in different countries each year and cannot be analyzed as trends Weighting variables defined in **Extended Data Table 1.** Reduced coping strategies excluded for lack of time series.



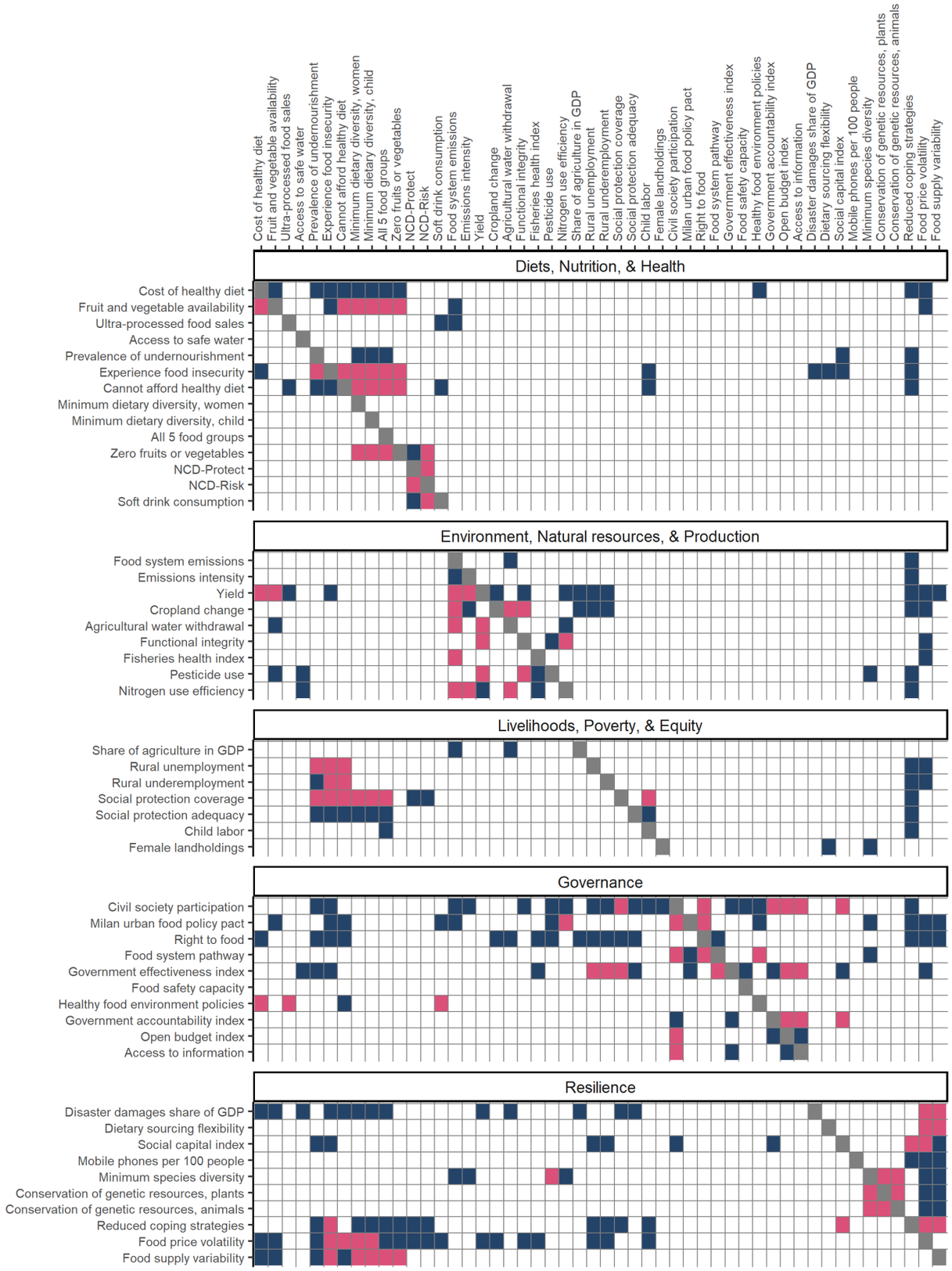
Supplementary Figure 21. Income group weighted mean time trends: Resilience

Time trends for all indicators, by income group. Weighting variables defined in **Extended Data Table 1.** Reduced coping strategies excluded for lack of time series.



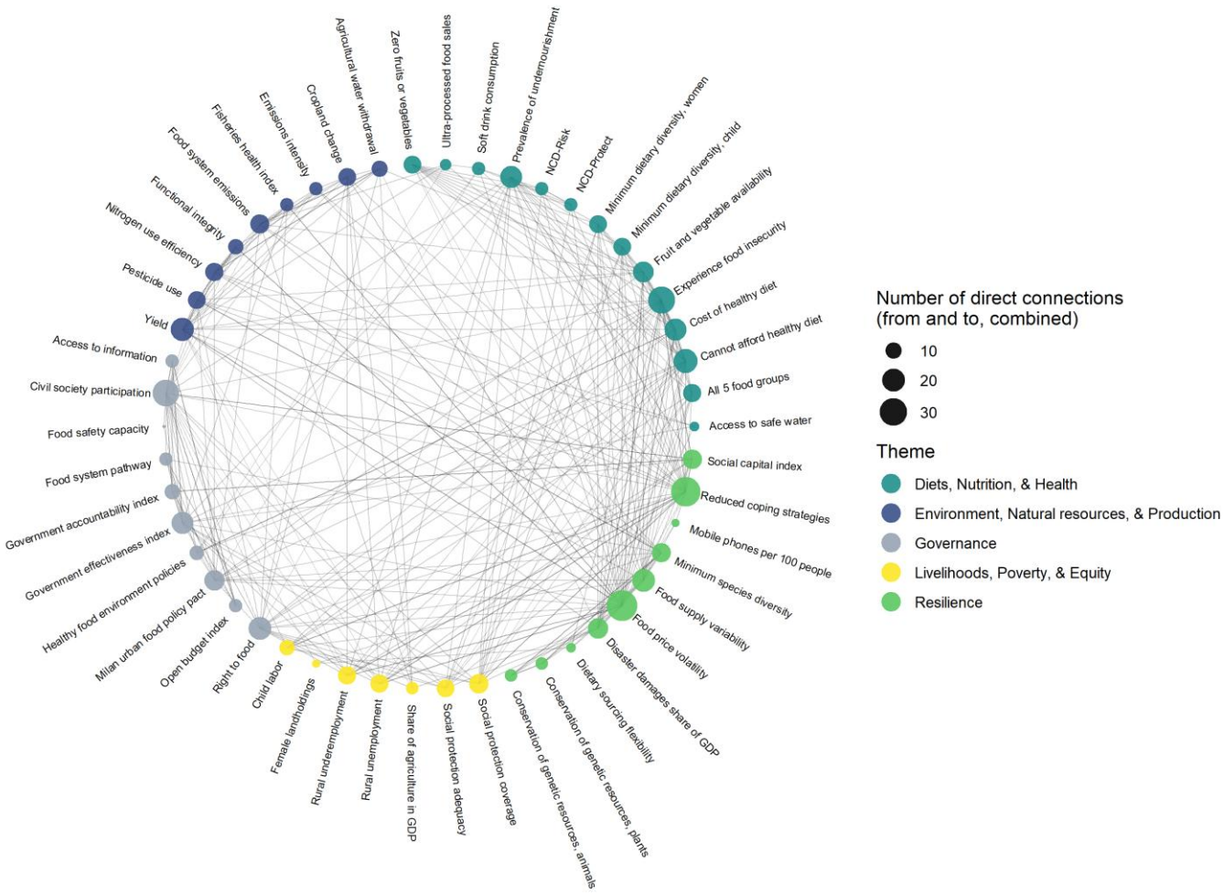
Supplementary Figure 22. Direct relationships between indicators including bidirectional causality.

Direct relationships identified through the expert elicitation process, including where causality was identified from the row variable to the column variable and in the other direction as well. Blue cells show causality from row to column only. Maroon cells indicate causality in both directions. Identity cells are dark gray.

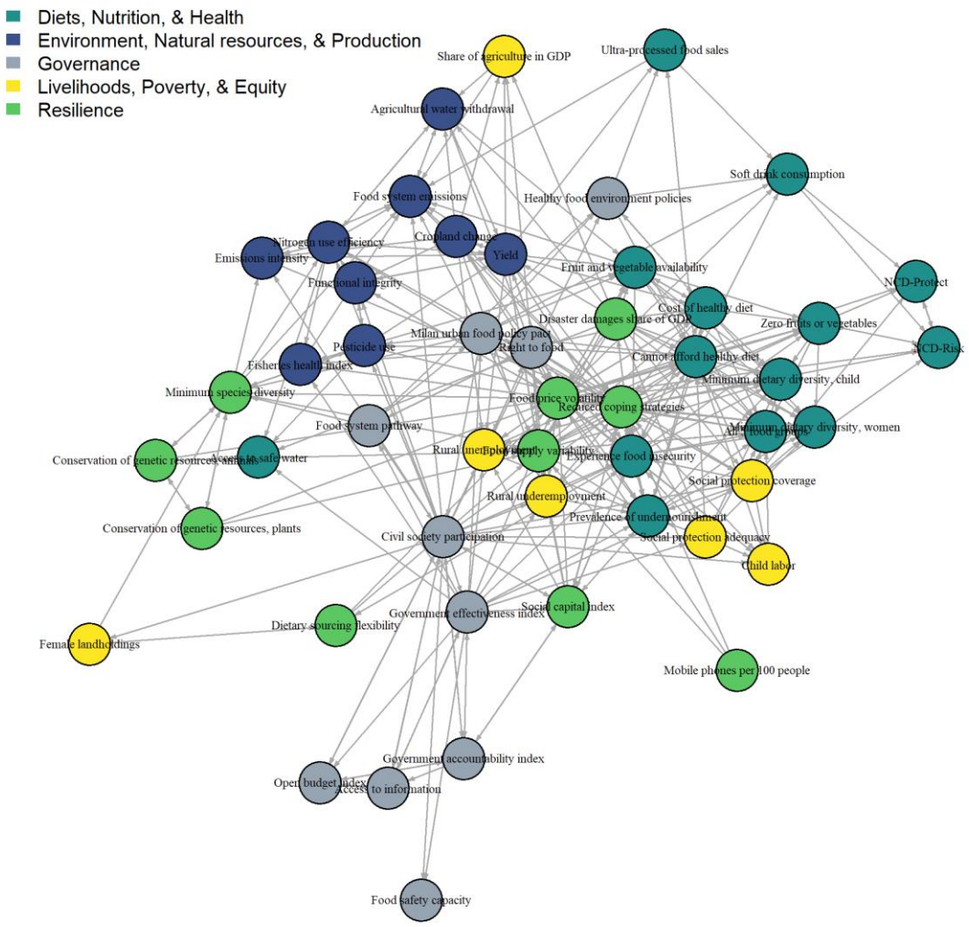


Supplementary Figure 23. Direct connections between indicators

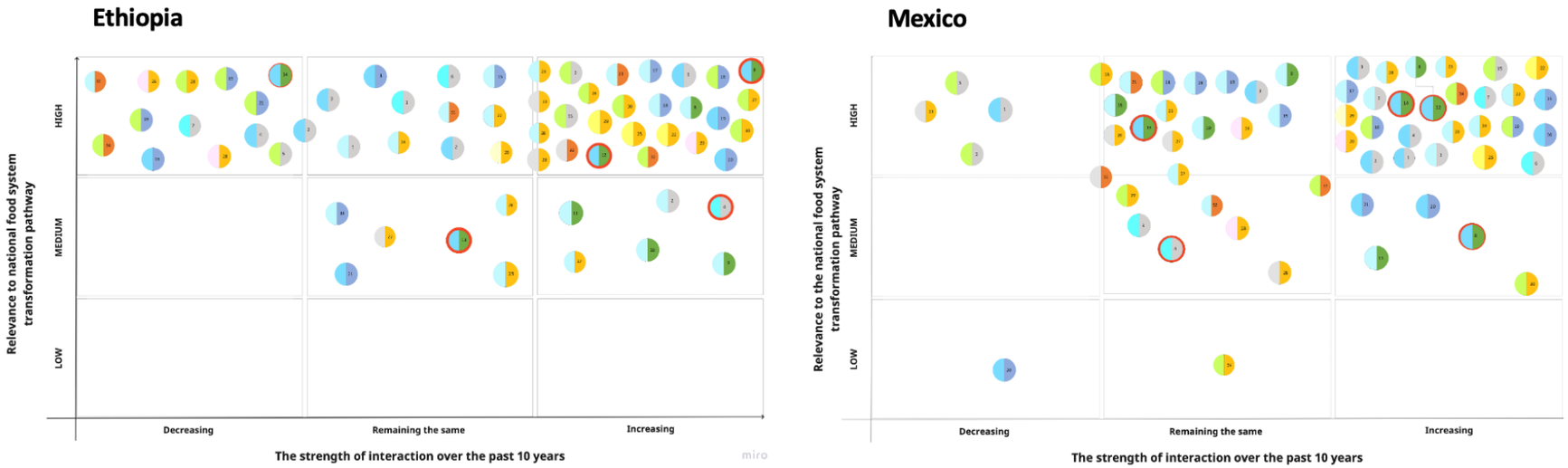
Illustration of all direct connections between indicators. Directionality has been combined such that the size of connections with each indicator includes assessed causal connections from that indicator to others plus those from other indicators affecting that indicator.



Supplementary Figure 24. Network diagram of direct connections between indicators
Network illustration of all direct connections between indicators, as assessed through global expert elicitation of proposed causal relationships.



Supplementary Figure 25. Map of food system governance interactions in food in Ethiopia and Mexico.
Maps from each qualitative consultation showing relevance to achieving the national food systems transformation pathway and whether the strength of the interaction has been increasing, remained the same, or been decreasing over the last 10 years. Created through expert elicitation with 15 to 20 in-country experts reflecting on the interactions of FSCI governance indicators with other FSCI indicators. Maps illustrate ranking in terms of relevance to achieving the food systems transformation pathway (Y-axis) and if the relationship has been decreasing, maintaining the same, or increasing over the last 10 years according to expert opinion. Color keys represent different governance indicators (key for governance indicators) and FSCI thematic areas (key for thematic areas). Negative interactions (tradeoffs) are indicated with a red perimeter.



Key for governance indicators

- Civil society participation index
- Degree of legal recognition of the right to food
- Presence of a food system transformation pathway)
- Government effectiveness index
- Presence of health-related food taxes
- V-Dem accountability index
- Open budget index score
- Guarantees for public access to information
- Negative interaction (tradeoff)

Key for indicators per theme

Theme	FSCI indicators (Code used)
Diet, nutrition, and health	Prevalence of Undernourishment (1), % Population experiencing moderate or severe food insecurity (2), Cost of a healthy diet (3), % Population who cannot afford a healthy diet (4), % Population using safely managed drinking water services (5), Retail value (total sales) of ultra-processed foods (6), Sugar-sweetened soft drink consumption (7),
Environment, natural resource and production	Total pesticides per unit of cropland (8), Food systems greenhouse gas emissions (9), Greenhouse gas emissions intensity, by product group (10), Sustainable nitrogen management index (11), Agriculture water withdrawal as % of total renewable water resources (12), Cropland expansion (13), Fishery health index progress score (14), Functional integrity: % agricultural land with minimum level of natural habitat (35)
Livelihoods, poverty, and equity	Social protection coverage (15), Social protection adequacy (16), % Children 5-17 engaged in child labor (17), Female share of landholdings (18), Unemployment, rural (19), Share of agriculture in GDP (20), Underemployment rate, rural (21),
Governance	Degree or legal recognition of the Right to Food (22), Government effectiveness index (23), Food safety capacity (24), Presence of health-related food taxes (25), V-Dem Accountability index (26), Open Budget Index Score (27), Guarantees for public access to information (28), Civil society participation index (29), Presence of a national food system transformation pathway (30)
Resilience	Ratio of total damages of all disasters to GDP (31), Social capital index (32), Coping strategies index (21), Food price volatility (34)