Supplementary Files- Global WI Estimates

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Table S1: Descriptive Statistics of Observed Countries*

1A- Individual Level Statistics (N= 89,740 respondents)

Variable	level	type	Estimate	se	95% LCI	95% UCI	N missing	Pct Missing
Age (years)	Continuous	Mean/median (IQR)	38.88/ 36 (25-50)	0.15	38.59	39.17	399	0.44
Household size	Continuous	Mean/median (IQR)	4.57/ 4(3-6)	0.02	4.53	4.61	0	0.00
Gender	Men	%	50.85	0.42	50.02	51.68	0	0.00
Gender	Women	%	49.15	0.42	48.32	49.98	0	0.00
Income quintile	1	%	19.91	0.36	19.21	20.61	1003	1.12
Income quintile	2	%	19.95	0.35	19.26	20.63	1003	1.12
Income quintile	3	%	20.02	0.34	19.36	20.68	1003	1.12
Income quintile	4	%	20.01	0.32	19.38	20.64	1003	1.12
Income quintile	5	%	20.11	0.35	19.42	20.80	1003	1.12
Feelings about household income	Getting by	%	58.60	0.43	57.75	59.44	1413	1.57
Feelings about household income	Difficult	%	41.40	0.43	40.56	42.25	1413	1.57
Education	Elementary	%	43.96	0.43	43.12	44.80	553	0.62
Education	Secondary	%	45.27	0.42	44.44	46.10	553	0.62
Education	College	%	10.77	0.19	10.40	11.14	553	0.62
Marital status	Single	%	31.98	0.37	31.26	32.71	163	0.18
Marital status	Married/Partnered	%	58.81	0.40	58.04	59.59	163	0.18
Marital status	Separated/Widowed	%	9.20	0.23	8.75	9.66	163	0.18
Employment	Employed	%	48.60	0.43	47.75	49.44	0	0.00
Employment	Underemployed	%	7.93	0.21	7.52	8.34	0	0.00
Employment	Unemployed	%	8.10	0.23	7.66	8.54	0	0.00
Employment	Out of workforce	%	35.37	0.42	34.54	36.20	0	0.00
Dissatisfied with water quality	No	%	76.10	0.38	75.35	76.85	504	0.56
Dissatisfied with water quality	Yes	%	23.90	0.38	23.15	24.65	504	0.56
Urbanicity	Rural	%	25.20	0.48	24.25	26.14	7	0.01
Urbanicity	Towns/semi-dense	%	19.07	0.47	18.16	19.99	7	0.01
Urbanicity	Cities	%	55.73	0.52	54.71	56.75	7	0.01

1B- National Level Statistics

Variable	N countries	N missing	Mean	sd	Median	Q1	Q3	Min	Max
GNI per capita (log)	75	1	9.049	1.024	9.183	8.276	9.702	7.122	11.23
Water stress (log)	76	0	2.128	1.827	2.232	1.273	3.412	-3.596	6.706
Population density (log)	76	0	4.247	1.379	4.38	3.338	5.219	1.263	7.195
Basic drinking water (%)	76	0	85.178	14.967	90.454	75.019	96.775	35.681	100
Life expectancy	76	0	70.17	6.767	69.259	65.924	75.071	54.635	83.198
Fertility rate	76	0	2.98	1.326	2.713	1.938	3.943	0.988	6.028
Corruption index (low score = high corruption)	75	1	35.093	14.453	34	26	40.5	9	76
Under-5 mortality	76	0	36.374	28.691	30.55	14.8	49.85	3.3	115.6
WASH mortality	75	1	24.693	23.464	17.1	4.8	37.1	1.9	99.2
Mean annual rainfall	76	0	1157.62	771.765	1077	524.25	1743.75	18.1	3240
ND-GAIN index (high score = low vulnerability)	75	1	43.72	9.128	42.368	37.211	47.506	26.415	68.599

*Individual-level characteristics are survey-weighted using population projection weights, accounting for the survey design. National characteristics are unweighted summaries across countries.

Fig S1: Forest Plot of global and regional water insecurity prevalence with uncertainty intervals

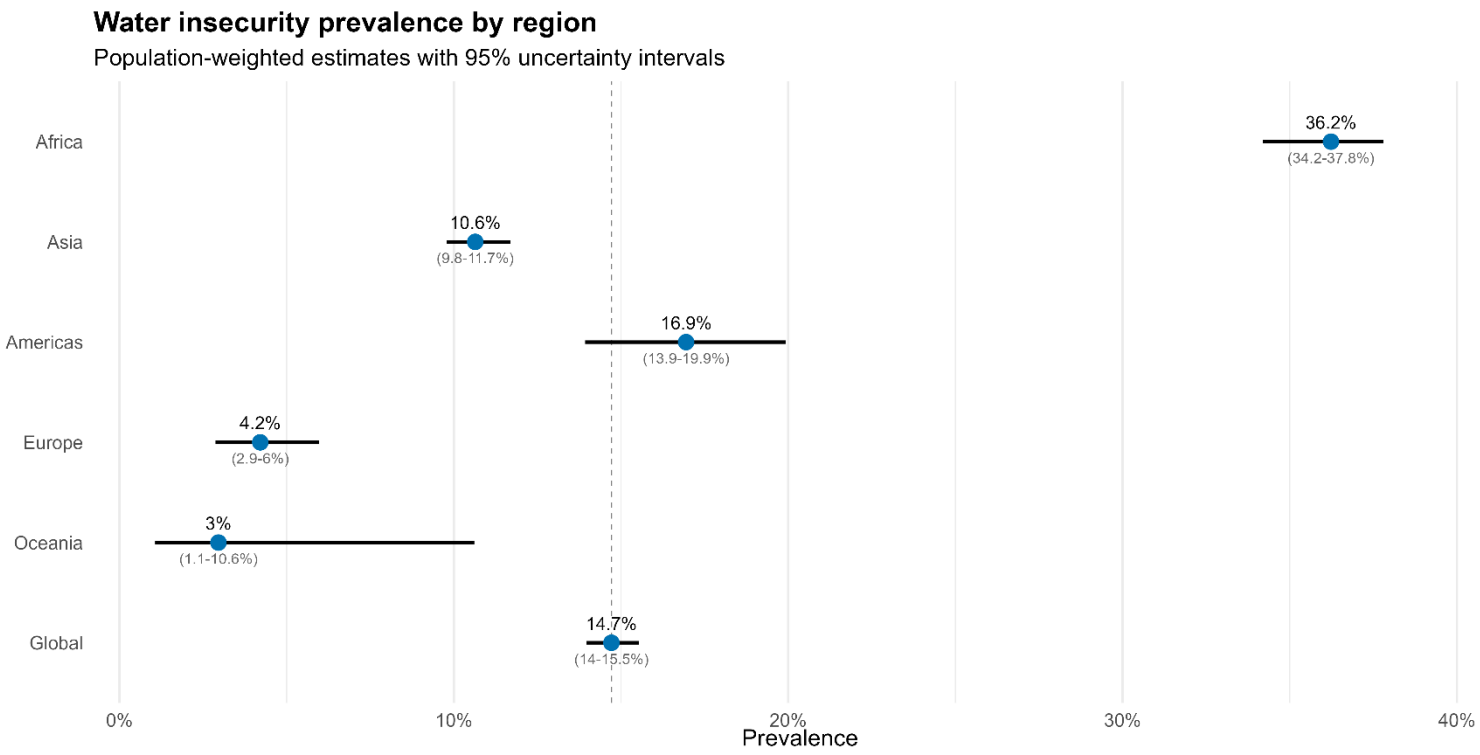


Fig S2: Global and regional water insecurity prevalence with uncertainty intervals broken down by M49 sub-region

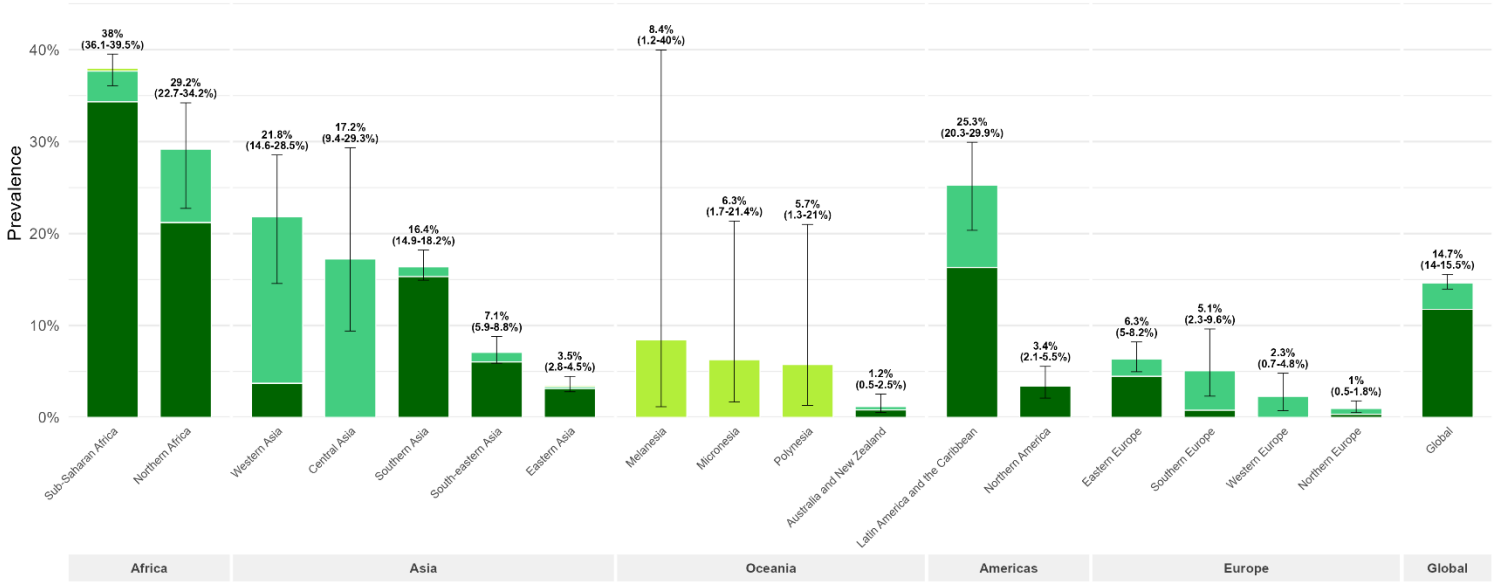


Fig S3: Global and regional water insecurity populations affected with uncertainty intervals broken down by M49 sub-region

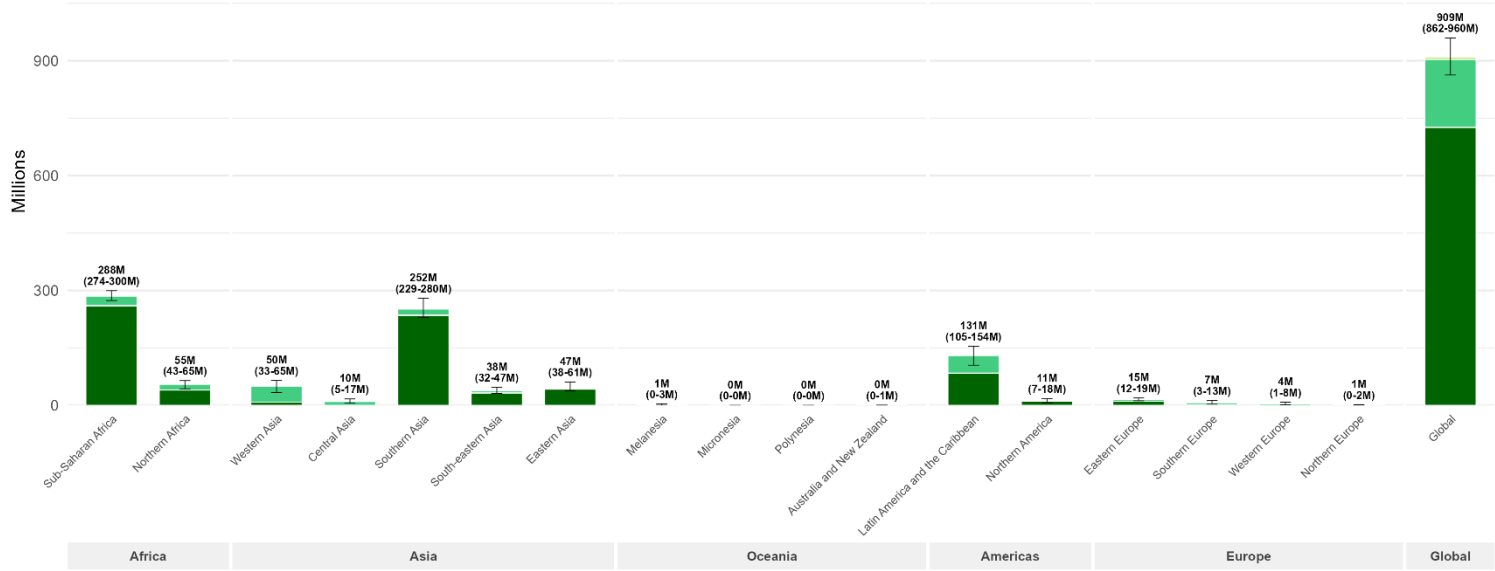


Fig S4: Partial Correlations adjusted for GNI between Water Insecurity Prevalence with: A) Level of Water Stress; B) Prevalence of Population Without Access to At Least Basic Drinking Water Services; C) Prevalence of Population Without Access to Safely Managed Drinking Water Services; C1) Prevalence of population without water available when needed; C2) Prevalence of population without water on premises; C3) Prevalence of population without water free from contamination

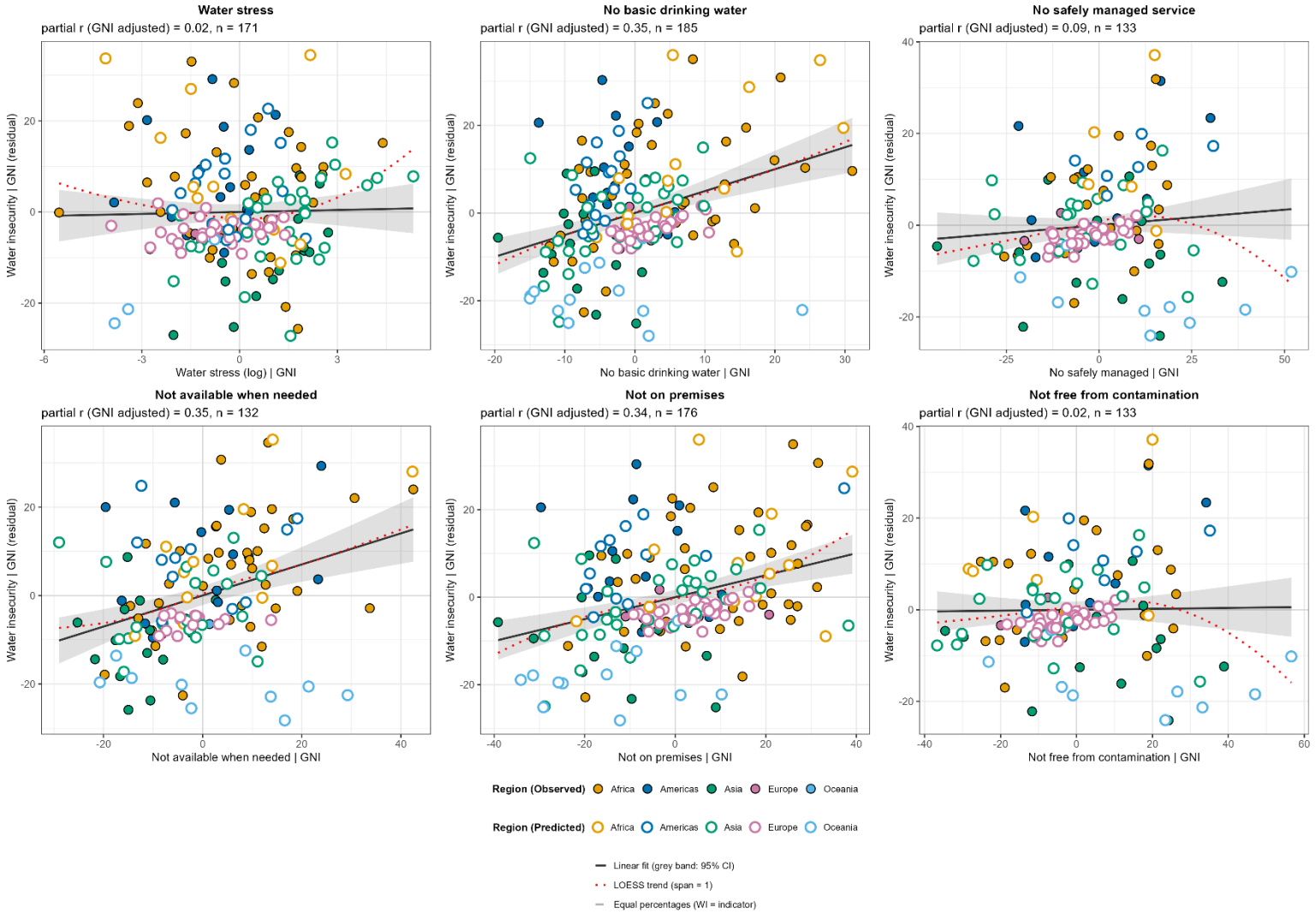


Fig S5: Correlations between Water Insecurity Prevalence (observed data only) with: A) Level of Water Stress; B) Prevalence of Population Without Access to At Least Basic Drinking Water Services; C) Prevalence of Population Without Access to Safely Managed Drinking Water Services; C1) Prevalence of population without water available when needed; C2) Prevalence of population without water on premises; C3) Prevalence of population without water free from contamination

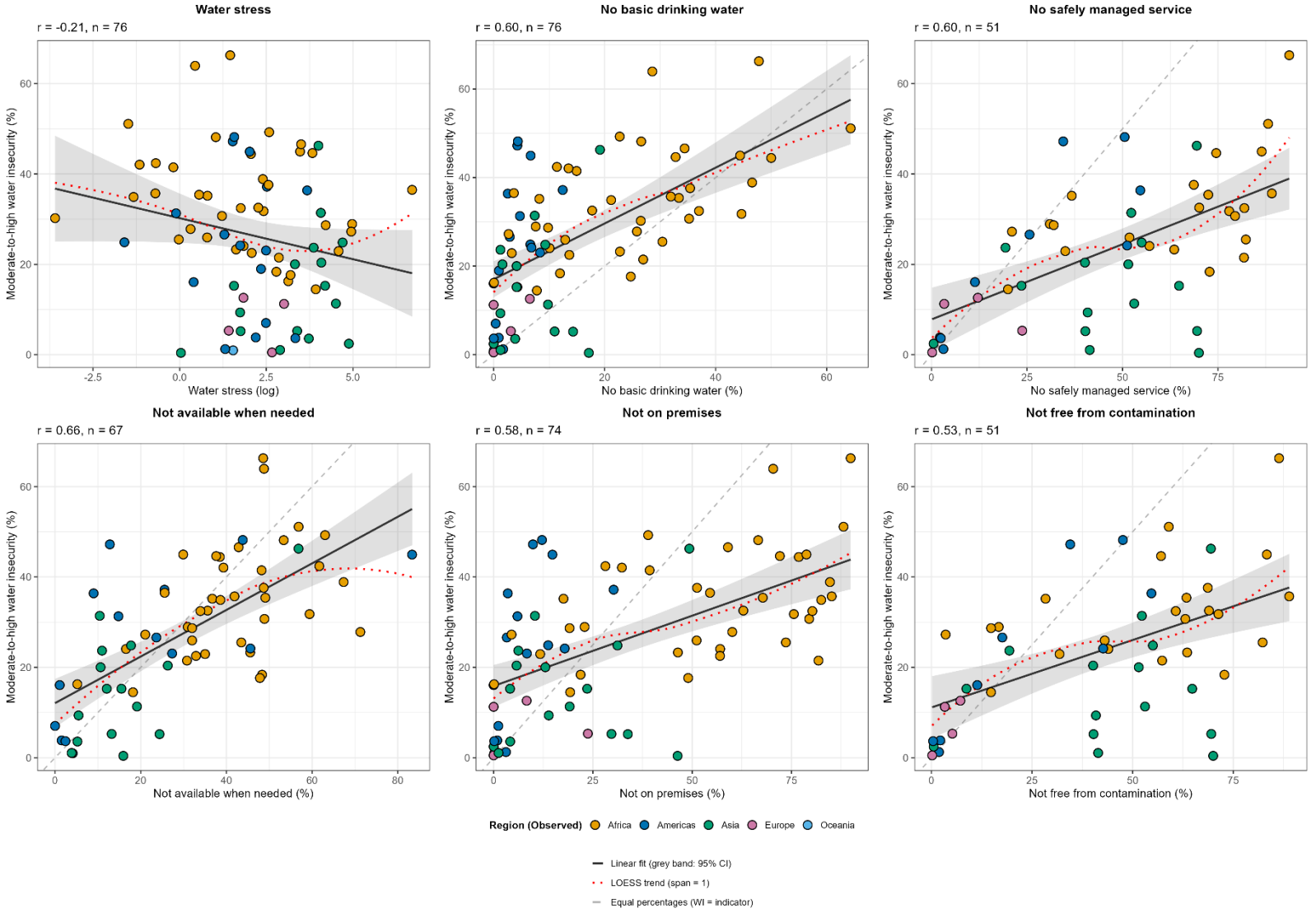


Fig S6: Partial Correlations adjusted for GNI between Water Insecurity Prevalence (observed data only) with: A) Level of Water Stress; B) Prevalence of Population Without Access to At Least Basic Drinking Water Services; C) Prevalence of Population Without Access to Safely Managed Drinking Water Services; C1) Prevalence of population without water available when needed; C2) Prevalence of population without water on premises; C3) Prevalence of population without water free from contamination

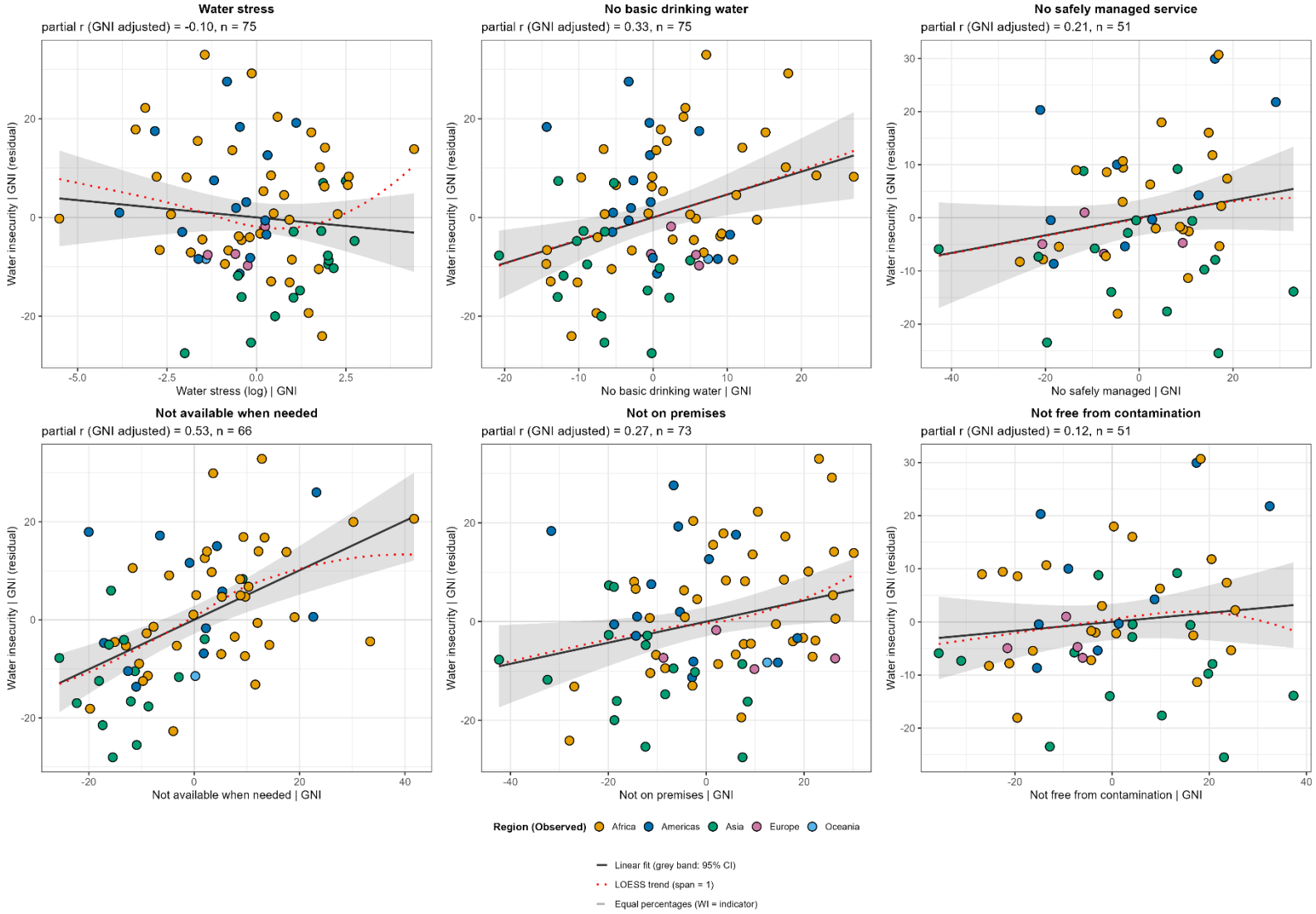
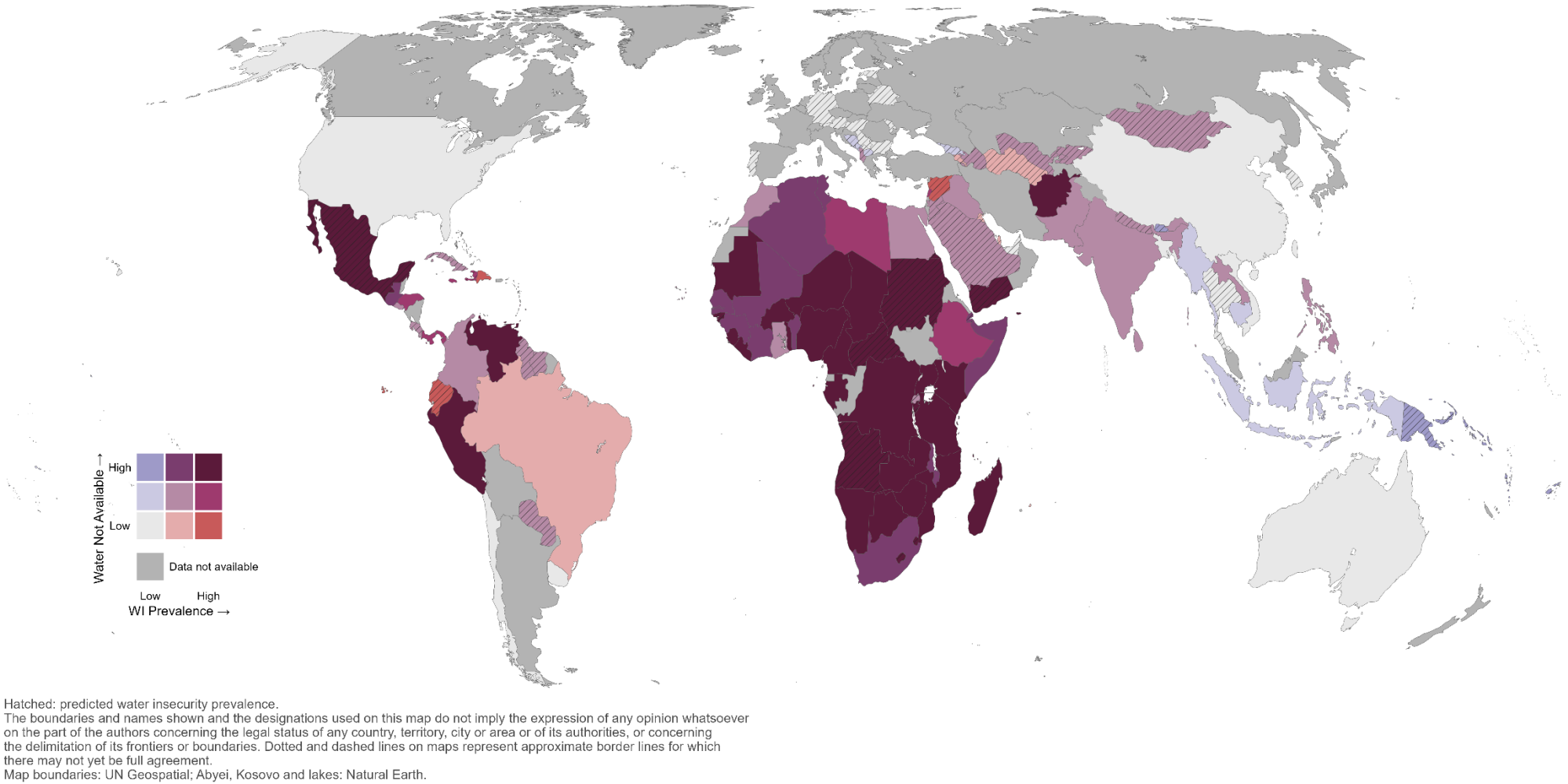


Fig S7: Bivariate map* showing the overlap between Water Insecurity Prevalence with Water Availability When Needed



**Note countries shaded in dark grey indicates no data available*

Table S2: National-level Indicators and Data Sources

	Indicator	Source	Most recent Year	Countries with missing data for 193 UN countries + Palestine	Range of most recent year	Range of values (raw un-log transformed for all)
Water	(Log) Level of water stress: freshwater withdrawal as a proportion of available freshwater resources	WB/ FAO AQUASTAT [1]	2022	19 for 2022; 17 for all years	2022 for all except Israel and Palestine 2021	0.0274 to 3850.5
Water	% with at least basic drinking water services	WHO/UNICEF [2]	2024	11 for 2024; 1 for all years (Nicaragua)	2016 to 2024	35.68 to 100
Health	Life expectancy at birth, total (years)	WB/ UN stats [3]	2024	0	2024	54.635 to 86.497
Health / Water	Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (per 100,000 population)	WB/WHO [4]	2019	11	2019 only available year	0.4 to 108.1
Health	Mortality rate, under-5 (per 1,000 live births)	WB/ WHO/UNICEF [5]	2024	1 (Liechtenstein)	2024	1.3 to 115.6
Climate & Environment	Average precipitation in depth (mm per year)	WB/ FAO FAOSTAT [6]	2022	15 for 2022, 13 for all years	2022 for all except Israel and Palestine 2021	18.1 to 3240
Governance	Corruption Index	TI [7]	2025	15	2025	9 to 89
Geographic	(Log) Population density (people per sq. km of land area)	WB/FAO [8]	2024	0	2024 to 2023	2.26 to 18536.95
Climate & Environment	Climate Vulnerability Index (ND-GAIN)	ND-GAIN [9]	2024	4	2024	26.415 to 71.849
Health	Fertility rate, total (births per woman)	WB/ UN stats [10]	2024	0	2024	0.748 to 6.028
Economic	(Log) GNI per capita, PPP (constant 2021 international $)	WB [11]	2025	94 for 2025; 8 for less than 2015	2021 to 2025	1024.15 to 116633.38
Sociodemographic	Primary school completion rate %	WB/UNESCO [12]	2025	183 for 2025; 21 for less than 2015	2025 to 2015	32.64 to 135

Health	Prevalence of moderate or severe food insecurity in the population (%)	WB/FAO [13]	2024	59 for 2024; 37 for all	2017 to 2024	1 to 88.8
Water	% with safely managed drinking water services	WHO/UNICEF JMP [2]	2024	59	2024	6.22 to 100
Water	SMDWS component: % with water available when needed	WHO/UNICEF JMP [2]	2024	59	2024	16.65 to 100
Water	SMDWS component: % with water on premises	WHO/UNICEF JMP [2]	2024	12	2024	6.12 to 100
Water	SMDWS component: % with water free from contamination	WHO/UNICEF JMP [2]	2024	59	2024	8.72 to 100

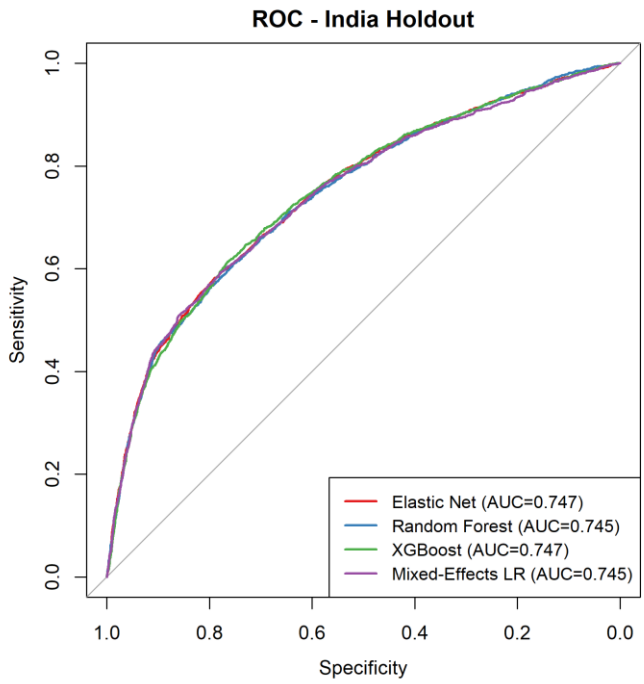
Table S3: Individual-level Indicators

Variable	Variable Type	Observed, 76 countries (n = 89,740), % missing	Predicted individual-level, 85 countries (n = 82,805), % missing	All, 161 countries (n = 172,545), % missing
Age	Continuous (years)	0.44	0.27	0.36
Income quintile	Ordinal categorical (1–5)	1.12	3.02	2.03
Inadequate income	Binary	1.57	3	2.26
Education	Categorical (3 levels)	0.62	0.53	0.57
Dissatisfied with water	Binary	0.56	2.39	1.44
Marital status	Categorical (3 levels)	0.18	0.37	0.27
Urbanicity	Categorical (3 levels)	0.01	0.18	0.09
Employment	Categorical (4 levels)	0	1.81	0.87
Household size	Continuous (count)	0	3.02	1.45

Table S4: Model Predictors

Model Type	Data Type	Predictors
Individual-level ML Models	Individual Data from GWP	1) age 2)hh size 3) gender 4)income quintile 5) subjective adequacy of income 6) education 7) marital status 8)employment, 9) satisfaction with water quality 10) urbanicity
Individual-level ML Models	Data flags created based on Individual Data from GWP	1) Source of urbanicity data ; 2) variable flagging if income missing; 3) variable flagging if urbanicity missing
Individual-level ML Models + Country-level ML Models	National Statistics (see data source in Table S1)	1) log GNI; 2)log_water_stress; 3)log_Pop_density; 4) Drinking_basic; 5) Life Expectancy; 6) Fertility Rate; 7)Corruption; 8) Mortality U5; 9)Mortality rate due to WASH; 10) Average rainfall; 11) Climate Vulnerability Index
Individual-level ML Models + Country-level ML Models	Country grouping into 9 regions: 1) East & South-East Asia; 2) Southern Asia; 3) Eastern Africa; 4) Middle Africa; 5) Southern Africa; 6) Western Africa; 7) MENA; 8) Latin America; 9) North America, Europe & Australia	Region (Categorical Variable with 9 regions)

Fig S8: ROC for individual Country hold-outs



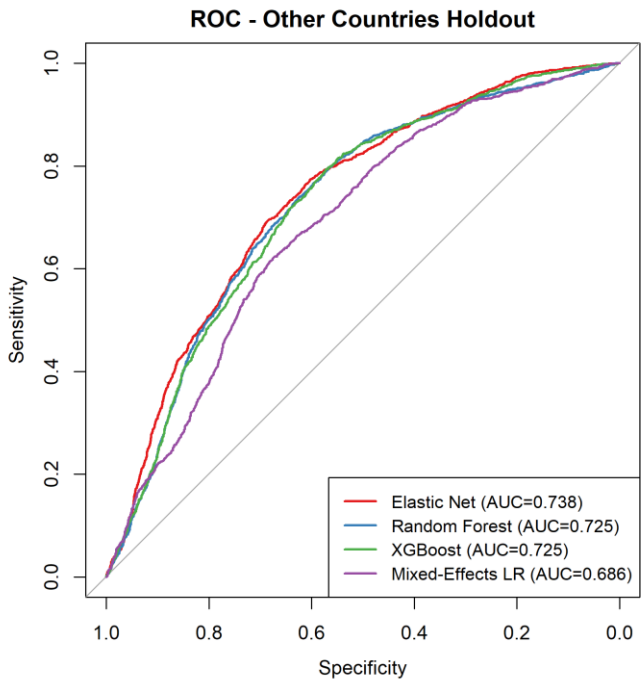


Fig S9: Predicted vs Observed from Out-of-sample predictions (LCO CV + hold-outs) for individual ENET and XGBoost (by M49 regions)

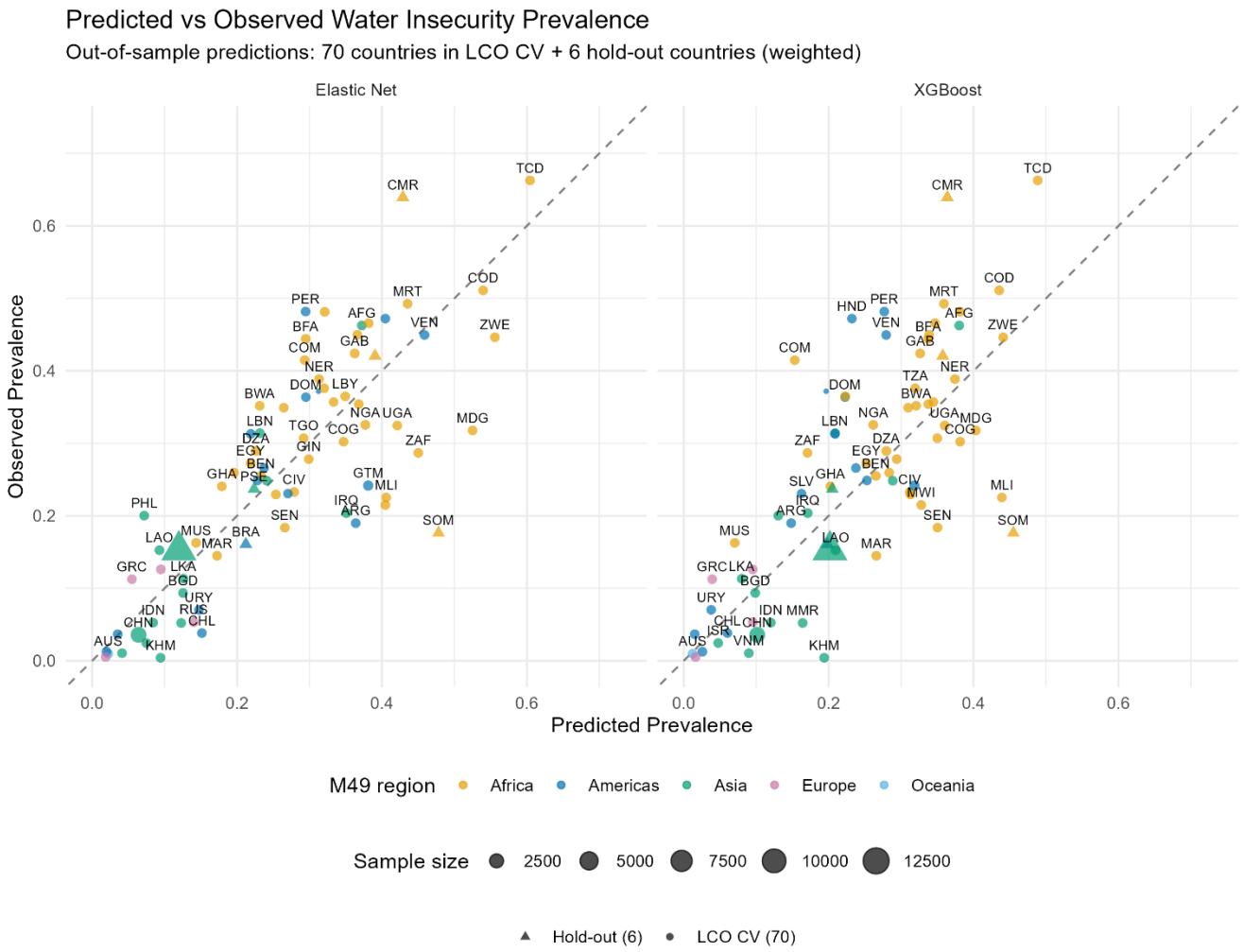


Fig S10: Out of Sample Prevalences- predicted vs observed all individual level models

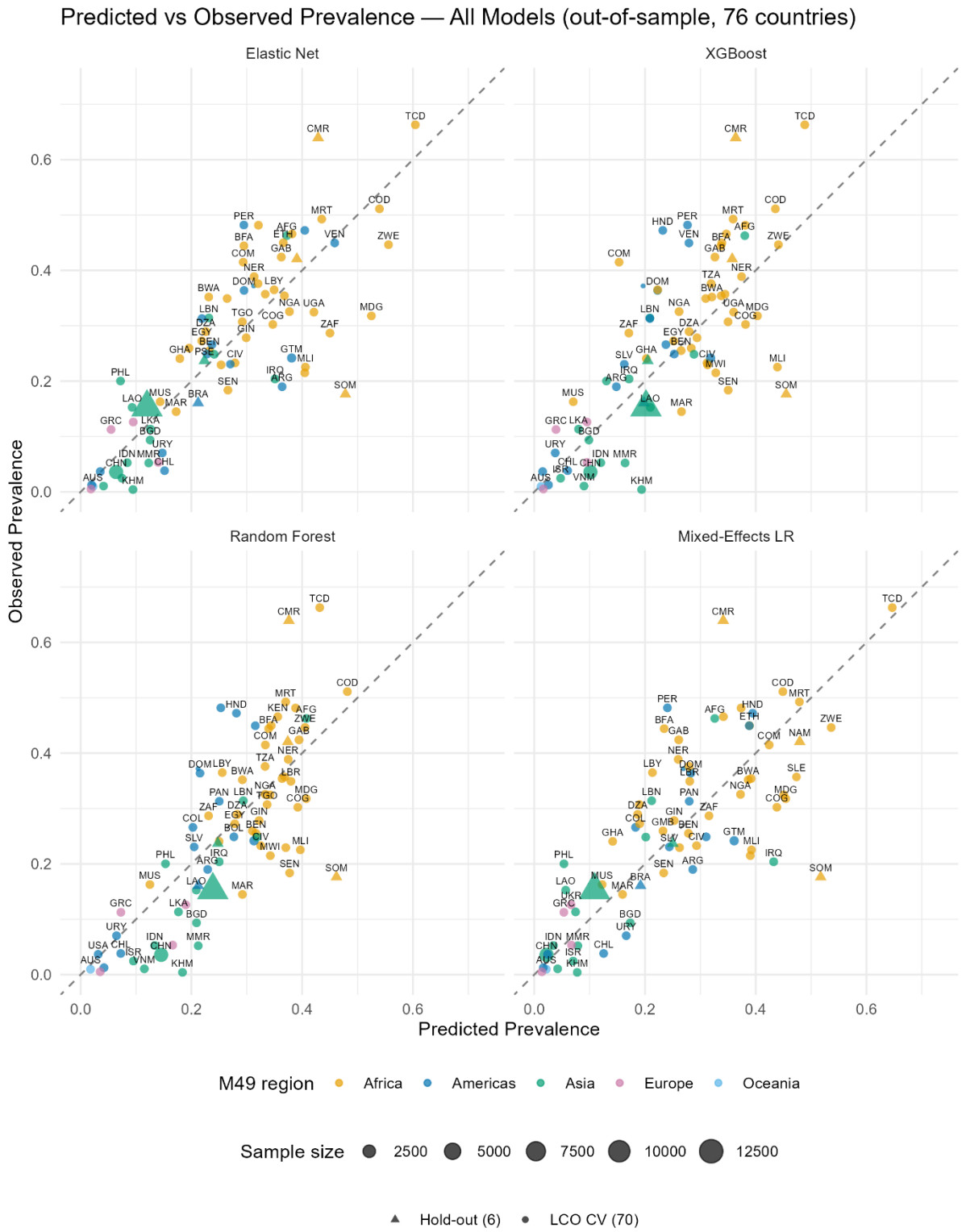


Fig S11: LCO CV Residuals by model region (individual and country level model)

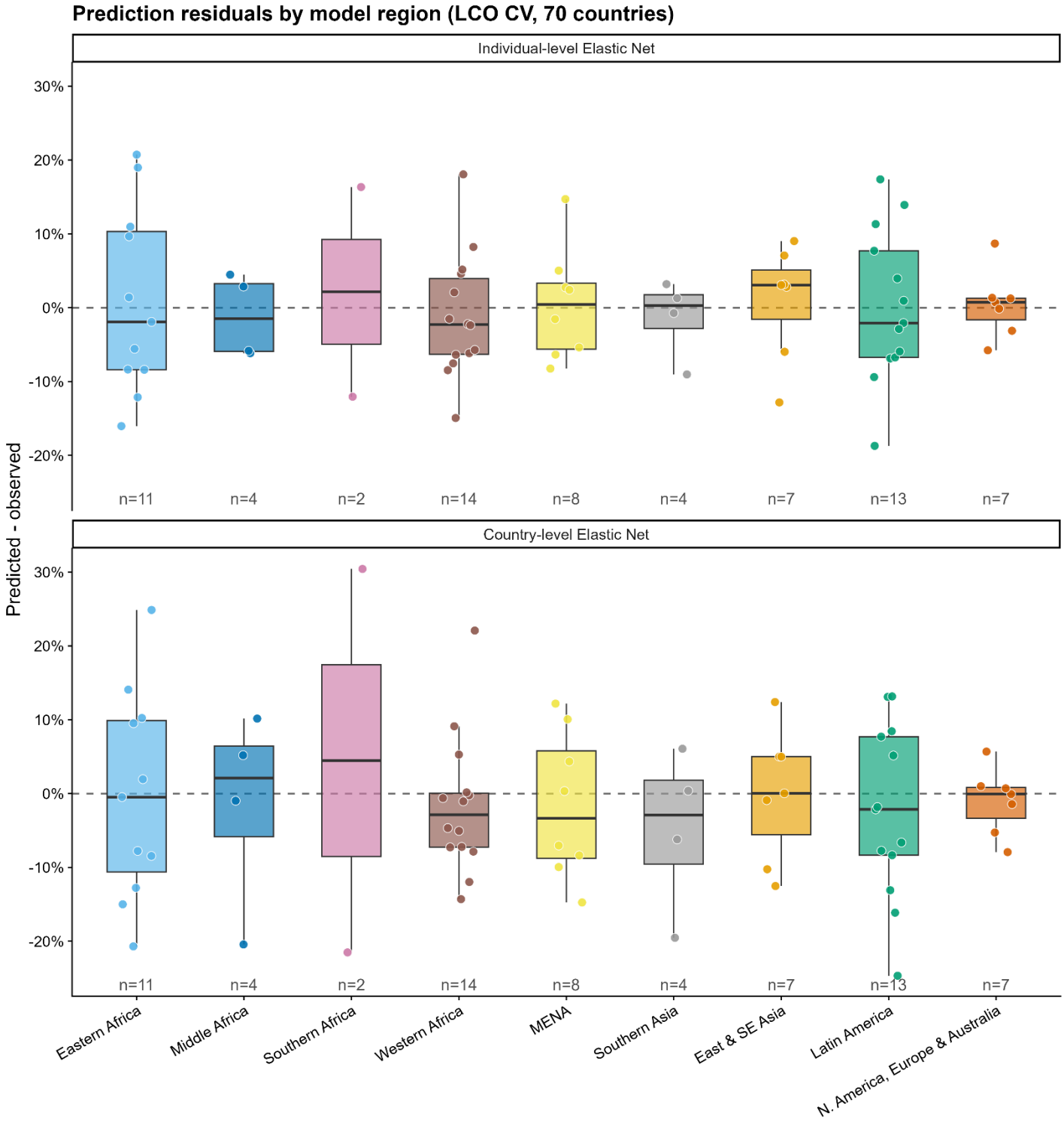


Fig S12: LCO CV Residuals by income group (individual and country level model)

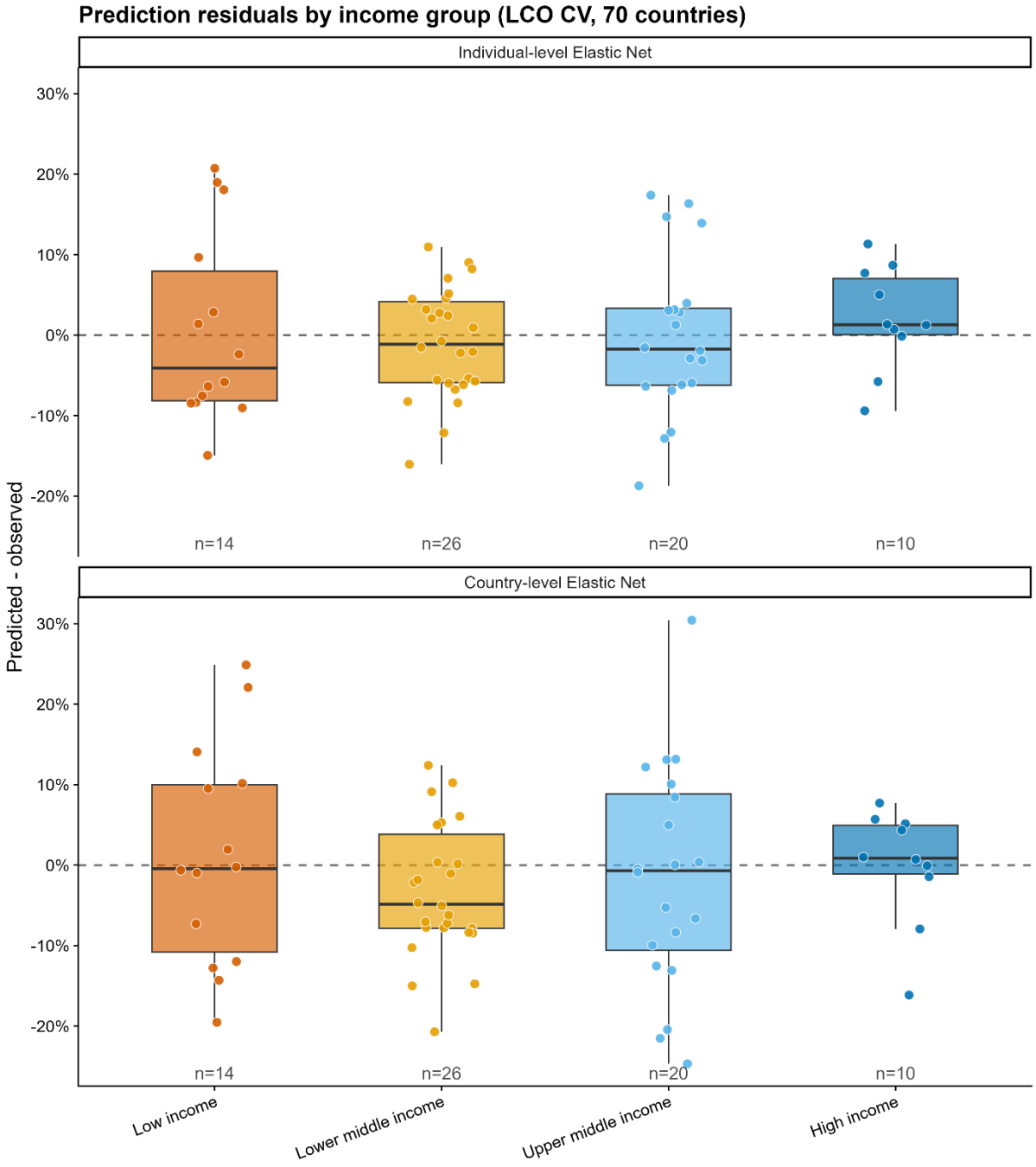


Table S5: Test dataset comparison metrics- Individual Level Model

Model	Test set	AUC ROC	AUC PR	Accuracy	Sensitivity	Specificity	F1	Brier	Threshold
Elastic Net	Focal (India)	0.747	0.369	0.761	0.582	0.791	0.410	0.109	0.128
Elastic Net	Other countries	0.738	0.522	0.689	0.693	0.687	0.590	0.188	0.324
Random Forest	Focal (India)	0.745	0.365	0.733	0.610	0.754	0.395	0.115	0.253
Random Forest	Other countries	0.726	0.499	0.662	0.740	0.625	0.586	0.191	0.302
XGBoost	Focal (India)	0.747	0.360	0.743	0.614	0.765	0.406	0.110	0.215
XGBoost	Other countries	0.725	0.499	0.644	0.793	0.573	0.590	0.193	0.254
Mixed-Effects LR	Focal (India)	0.745	0.367	0.752	0.593	0.779	0.406	0.111	0.111
Mixed-Effects LR	Other countries	0.686	0.467	0.657	0.623	0.674	0.540	0.204	0.350

Table S6: LCO CV comparison metrics- Individual Level Model

Model	AUC ROC mean	AUC ROC sd	AUC PR mean	AUC PR sd	Accuracy mean	Accuracy sd	Sensitivity mean	Sensitivity sd	Specificity mean	Specificity sd	F1 mean	F1 sd	Brier mean	Brier sd
Elastic Net	0.764	0.027	0.488	0.058	0.682	0.014	0.728	0.069	0.668	0.038	0.523	0.049	0.154	0.024
Mixed-Effects LR*	0.763	0.026	0.490	0.045	0.696	0.018	0.699	0.059	0.696	0.028	0.525	0.038	0.155	0.026
Random Forest	0.762	0.019	0.476	0.059	0.693	0.013	0.698	0.043	0.691	0.022	0.521	0.049	0.155	0.023
XGBoost	0.761	0.014	0.478	0.063	0.675	0.032	0.736	0.065	0.652	0.063	0.521	0.049	0.156	0.024

* Intraclass correlation (ICC, latent scale) from mixed-effects logistic models with a random intercept for country, fitted to all 70 training countries: 33.2% without predictors and 9.3% with predictors (reduced set of 13 and region for convergence), i.e. the predictors explained 79% of the between-country variance.

Table S7: Model Comparison Metrics LCO CV*

Model level	Model	R^2	MAE	RMSE	Calibration slope	Calibration intercept
Individual level	**Elastic Net**	**0.688**	**0.07**	**0.087**	**0.911**	**0.023**
Individual level	XGBoost	0.615	0.077	0.098	0.993	0.025
Individual level	Random Forest	0.631	0.075	0.094	1.103	-0.032
Individual level	Mixed-Effects LR	0.65	0.077	0.095	0.841	0.051
Country level	Beta Regression	0.556	0.088	0.109	0.753	0.063
Country level	Fractional Logit	0.545	0.089	0.111	0.748	0.063
Country level	**Elastic Net (logit)**	**0.559**	**0.087**	**0.11**	**0.742**	**0.078**
Country level	XGBoost	0.307	0.102	0.135	0.846	0.073
Baseline	Model-region mean^	0.435	0.093	0.117	0.869	0.034

*Leave-country-out cross-validation, 70 countries (n = 72,143 respondents).
^ Model-region mean: each country is predicted as the mean observed prevalence of the training countries in its model region, using the same cross-validation folds. It is shown as a reference for how much the models improve on a simple regional average.

Table S8: Country Hold-out comparison metrics*

Model level	Model	MAE	RMSE	Mean bias
Individual level	Elastic Net	0.107	0.153	0.011
Individual level	XGBoost	0.123	0.165	-0.001
Individual level	Random Forest	0.124	0.165	0.021
Individual level	Mixed-Effects LR	0.131	0.188	0.017
Country level	Beta Regression	0.139	0.19	0.014
Country level	Fractional Logit	0.142	0.197	0.022
Country level	Elastic Net (logit)	0.17	0.242	0.025
Country level	XGBoost	0.122	0.155	-0.035
Baseline	Model-region mean	0.111	0.126	0.02

*Hold-out countries: India, Namibia, Cameroon, Somalia, Palestine and Brazil, predicted by models trained on the 70 training countries. Mean bias = mean (predicted − observed); positive values indicate over-prediction. R^2 and calibration are not shown because they are unstable for only six countries.

Fig S13: Validation Graph for Country-Level Elastic Net

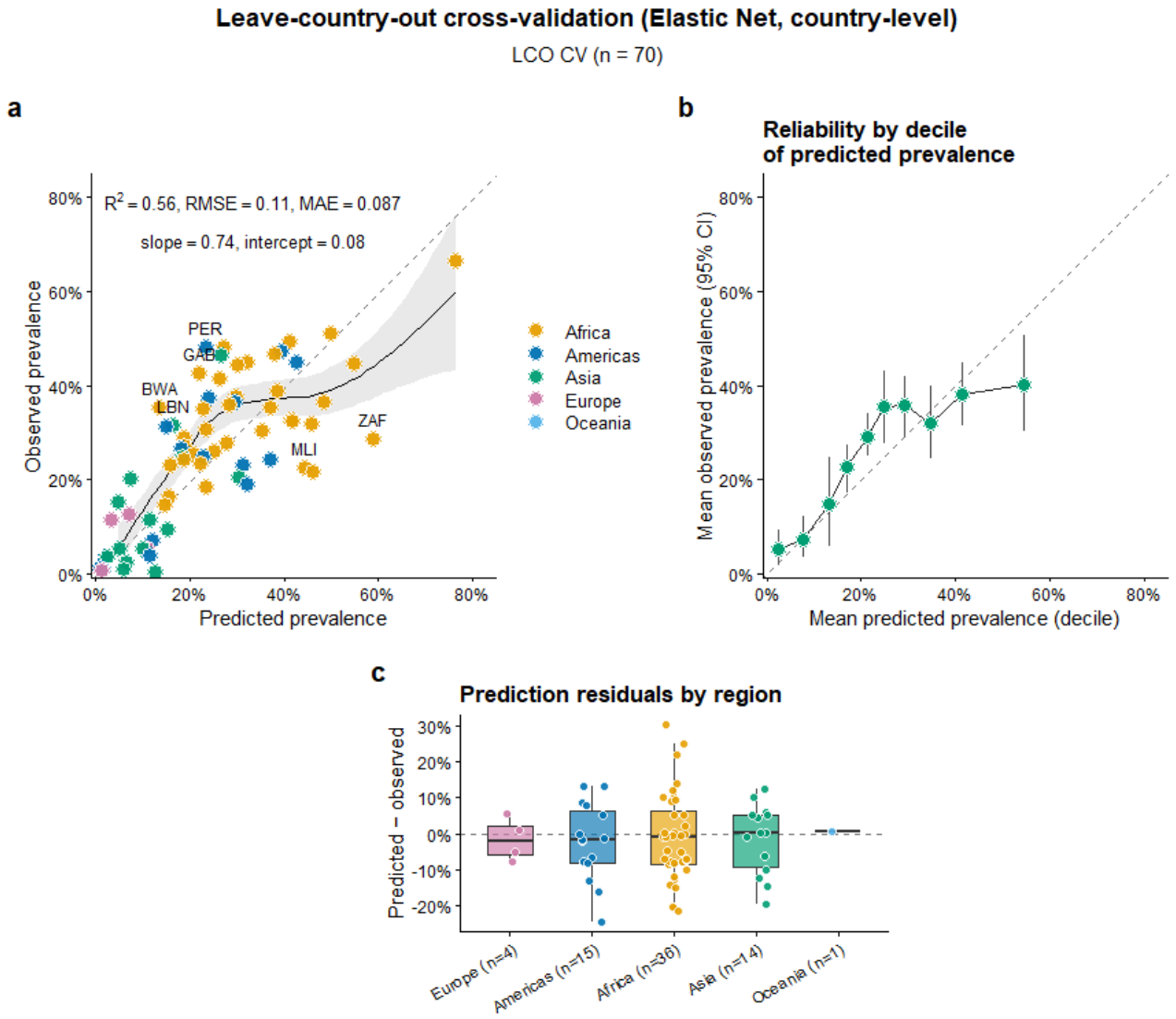


Fig S14: Out of sample Prevalences- predicted vs observed all country level models

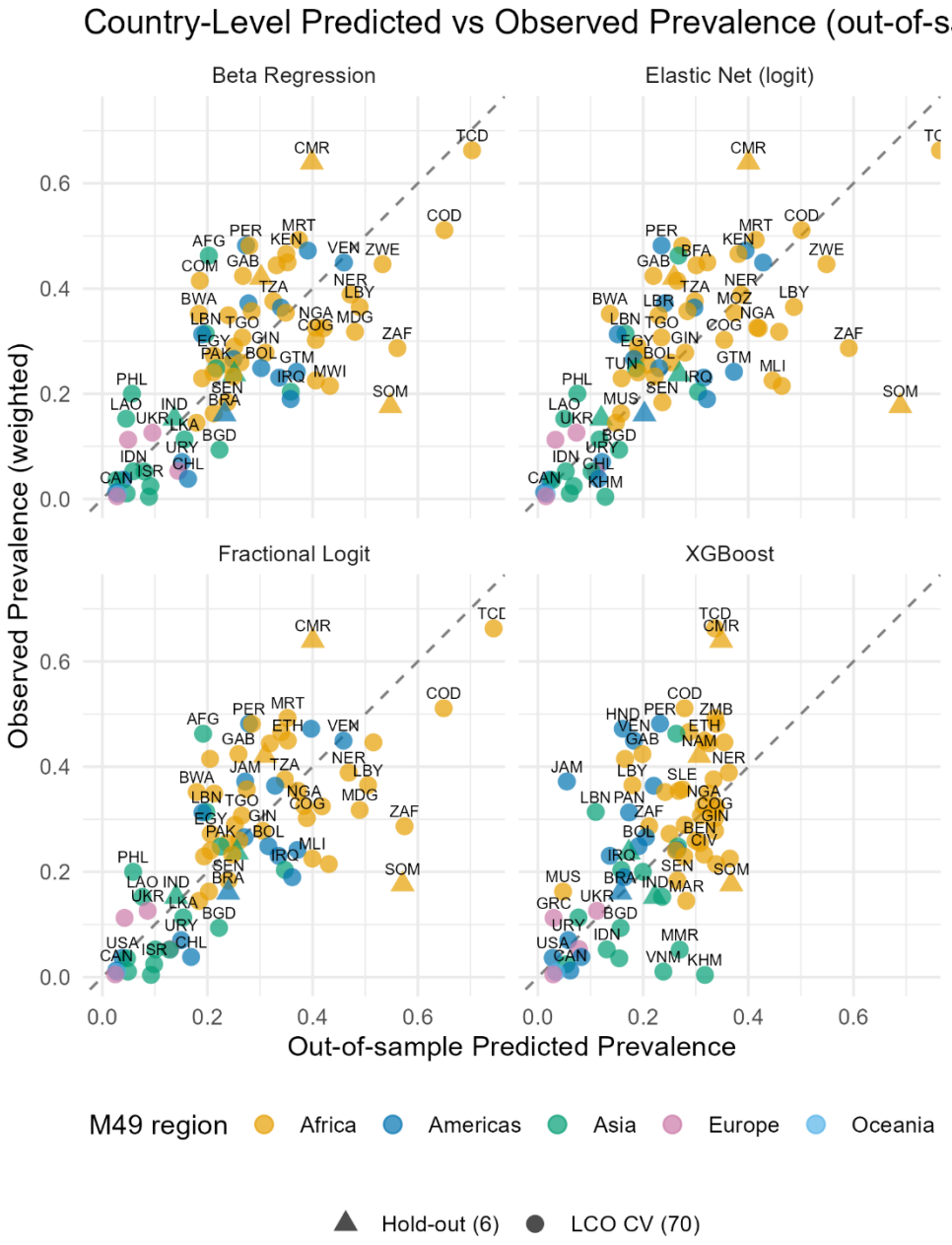


Table S9: Coefficients Individual-Level ENET model*

Feature	Coefficient (log-odds per 1 SD)	Odds Ratio (per 1 SD)
Latin America	0.605	1.832
Water dissatisfied	0.598	1.819
Eastern Africa	0.375	1.454
Western Africa	0.370	1.447
Income inadequate	0.326	1.386
ND-GAIN index (high score = low vulnerability)	-0.308	0.735
Southern Africa	0.294	1.342
Corruption index (low score = high corruption)	-0.256	0.774
MENA	0.253	1.288
Middle Africa	0.249	1.283
Basic drinking water (%)	-0.216	0.806
GNI per capita (log)	0.215	1.240
Water stress (log)	0.209	1.233
Income quintile 5 (richest)	-0.166	0.847
Income quintile 4	-0.108	0.898
Age	-0.108	0.898
Southern Asia	0.106	1.112
N. America/Europe/Australia	0.099	1.105
Income quintile 3	-0.098	0.907
Life expectancy	-0.093	0.911
Population density (log)	-0.089	0.915
Household size	0.087	1.091
Mean annual rainfall	0.068	1.071
Fertility rate	0.058	1.060
Under-5 mortality	-0.056	0.945
Income missing	-0.050	0.951
Underemployed	0.046	1.047
College education	-0.041	0.959
Out of workforce	-0.038	0.963
Married/Partnered	0.035	1.036
Income quintile 2	-0.035	0.966
Secondary education	-0.032	0.968
Separated/Widowed	0.024	1.024
Cities	-0.023	0.977
Female	0.012	1.012
Unemployed	0.012	1.012
Urbanicity missing	0.008	1.008
WASH mortality	-0.006	0.994
Urbanicity missing flag	0.001	1.001
Urbanicity self-reported	0.000	1.000
Towns/semi-dense	0.000	1.000

**Predictors were standardised, so coefficients show relative strength rather than effect of a one unit/category change.*

Fig S15: Individual-Level SHAP Feature Importance

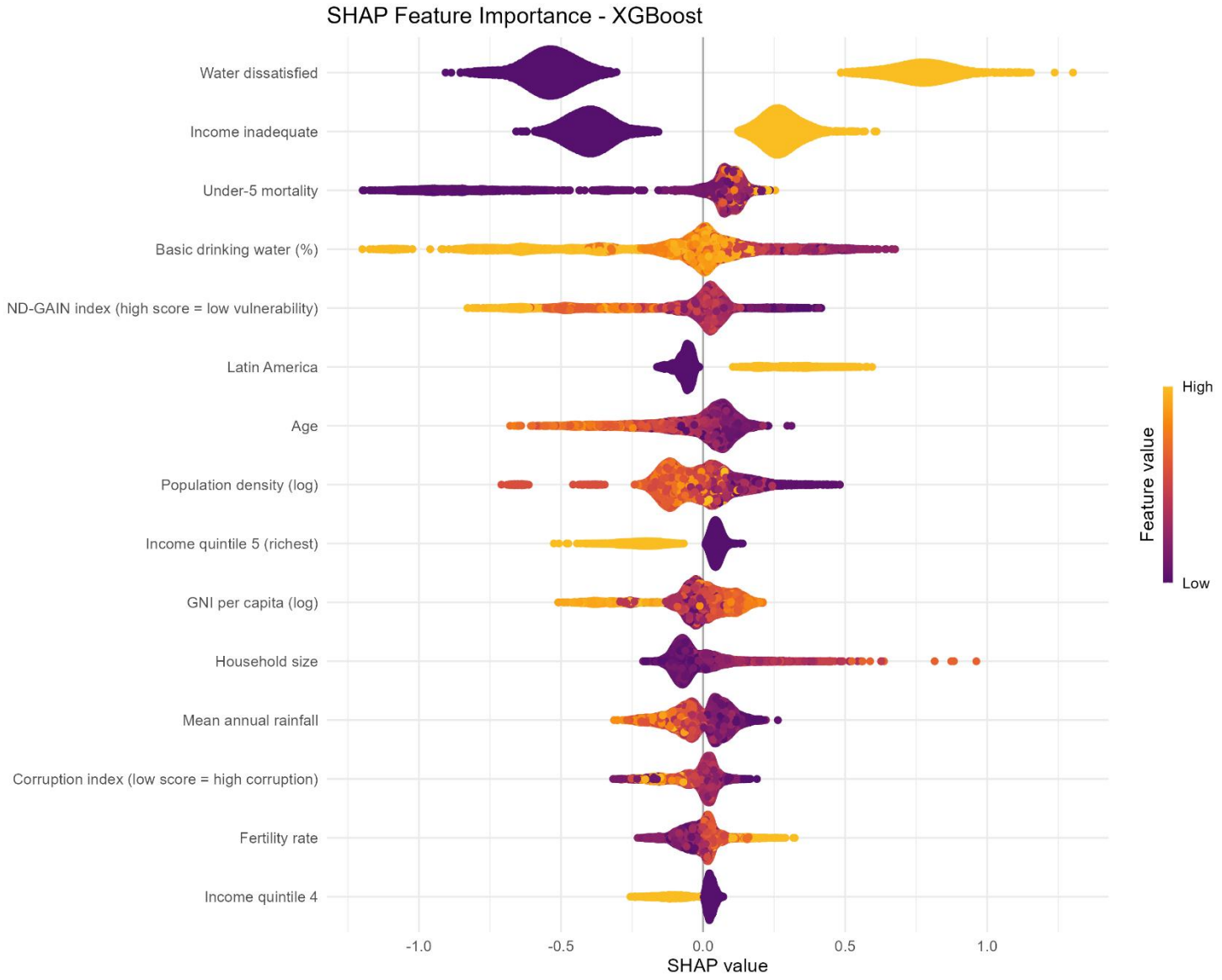
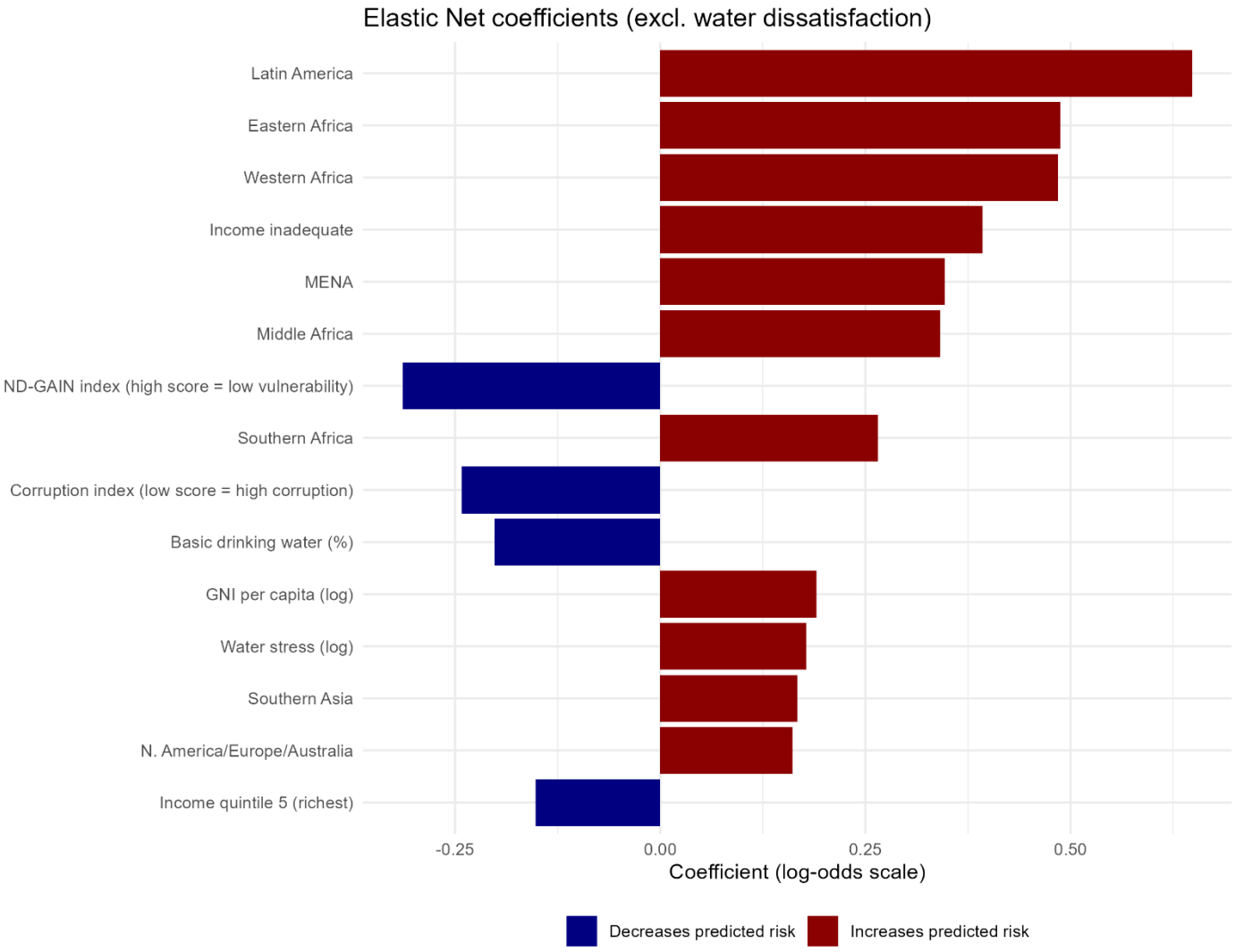


Fig S16: Individual-Level ENET Coefficients (without water dissatisfaction)*



**Note R^2= 0.62; MAE=0.080*

Fig S17: Individual-Level SHAP Feature Importance (without water dissatisfaction)

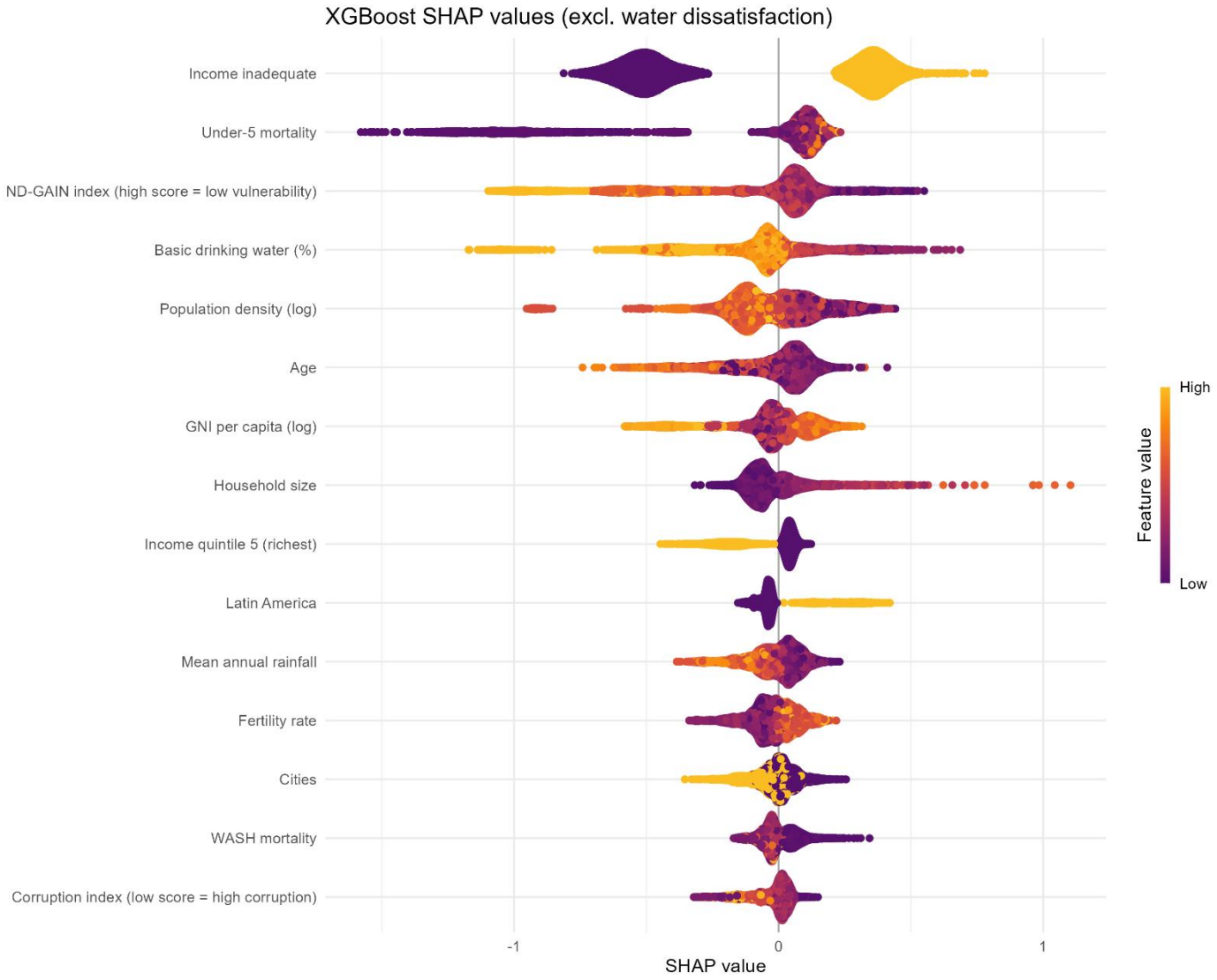


Fig S18: Feature Importance- Country Level

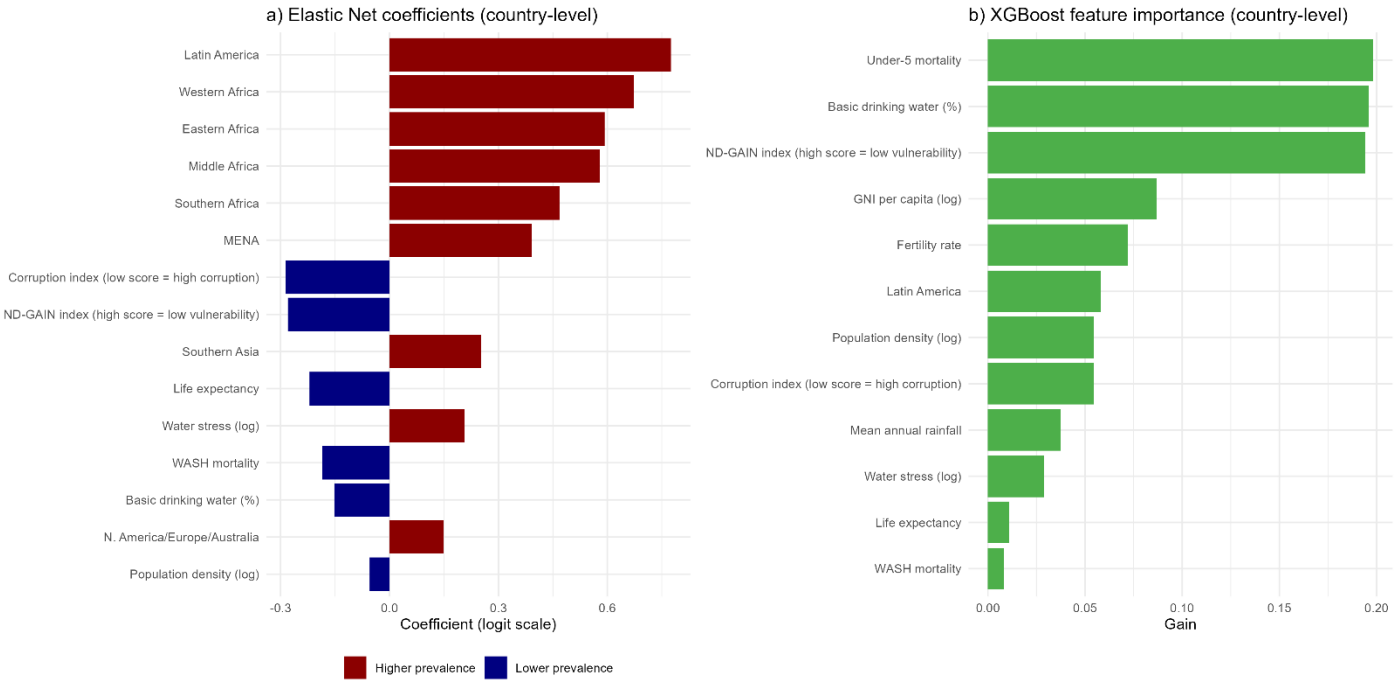


Table S10: Coefficients Country-Level ENET model*

Feature	Coefficient (change in logit prev per 1 SD)	Odds Ratio (per 1 SD)
Latin America	0.78	2.17
Western Africa	0.67	1.96
Eastern Africa	0.59	1.81
Middle Africa	0.58	1.78
Southern Africa	0.47	1.60
MENA	0.39	1.48
Corruption index (low score = high corruption)	-0.29	0.75
ND-GAIN index (high score = low vulnerability)	-0.28	0.76
Southern Asia	0.25	1.29
Life expectancy	-0.22	0.80
Water stress (log)	0.21	1.23
WASH mortality	-0.19	0.83
Basic drinking water (%)	-0.15	0.86
N. America/Europe/Australia	0.15	1.16
Population density (log)	-0.05	0.95

**Predictors were standardised, so coefficients show relative strength rather than effect of a one unit/category change. Predictors not selected by the model (coefficient=0) are not shown.*

Fig S19: SHAP Features Country-Level XGBoost

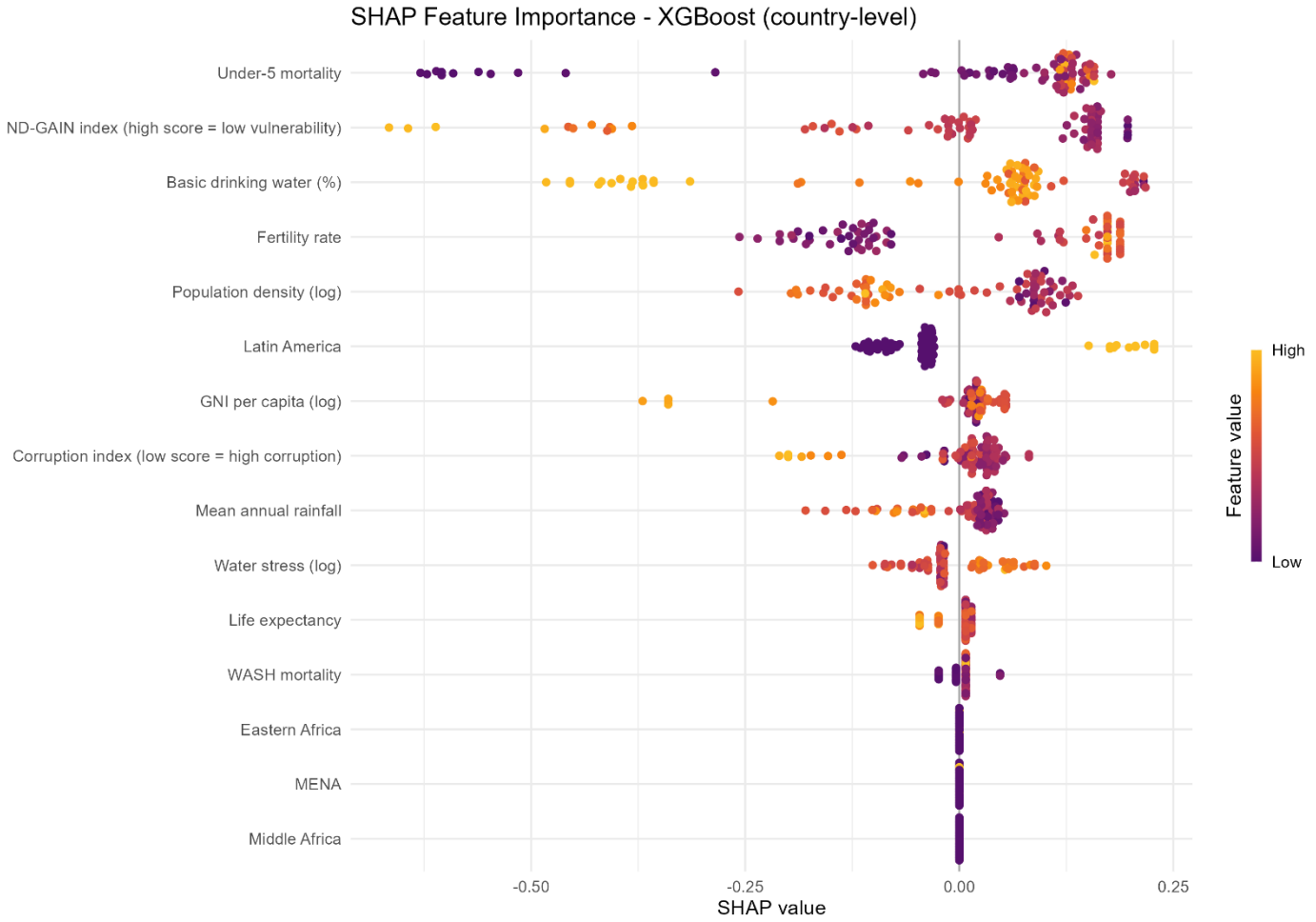


Table S11: Countries flagged with higher potential estimation uncertainty*

Reason	Country	Values
Gallup World Poll data from before 2015	Cuba; Guyana; Djibouti; Suriname; Angola; Qatar; Sudan	CUB-2006; GUY-2007; DJI-2011; SUR-2012; AGO-2014; QAT-2014; SDN-2014
Higher CPI (lower perceived corruption) than training data (individual-level model)	Denmark (DNK); Finland (FIN); Singapore (SGP)	Training data max 76; DNK 89; FIN 88; SGP 84
Higher GNI per capita (log) than training data (individual-level model)	Singapore (SGP)^; Qatar (QAT)^	Training data max 11.23; SGP 11.67; QAT 11.65
Higher Water stress (log) than training data (individual-level model)	Kuwait (KWT)	Training data max 6.71; KWT 8.26
Higher Life expectancy than training data (country-level model)	Monaco (MCO)	Training data max 83.2; MCO 86.5
Higher Population density (log) than training data (individual-level model)	Singapore (SGP)^	Training data max 7.2; SGP 9.03
Higher Population density (log) than training data (country-level model)	Monaco (MCO)	Training data max 7.2; MCO 9.83
Top 15 greatest model disagreement (country-level model: ENET vs XGBoost)	Solomon Islands (SLB); Papua New Guinea (PNG); Vanuatu (VUT); Kiribati (KIR); Equatorial Guinea (GNQ); Micronesia (Federated States of) (FSM); Fiji (FJI); Marshall Islands (MHL); Samoa (WSM); Timor-Leste (TLS); Tuvalu (TUV); Nauru (NRU)	SLB 27.6 pp; PNG 26.3 pp; VUT 25.1 pp; KIR 22 pp; GNQ 20.2 pp; FSM 18.4 pp; FJI 18.3 pp; MHL 17.2 pp; WSM 16.4 pp; TLS 15.4 pp; TUV 12.3 pp; NRU 11.9 pp
Top 15 greatest model disagreement (individual-level model: ENET vs XGBoost, or individual vs country-level)	Eswatini (SWZ); Haiti (HTI); Mongolia (MNG)	SWZ 23.7 pp; HTI 18.3 pp; MNG 12.3 pp

*≥10% out of the training range
^Note these are covered in other flags and coded accordingly)

Note the following countries had were reliant on imputed data:
Individual-level predictors with no observed values in the country (entirely imputed)- Cuba (CUB); Djibouti (DJI); Guyana (GUY); Qatar (QAT)
National predictors imputed with the model-region median (not observed)- Liechtenstein (LIE); Monaco (MCO); San Marino (SMR); Andorra (AND); Marshall Islands (MHL); Nauru (NRU); Palau (PLW); Tuvalu (TUV); Micronesia (Federated States of) (FSM); Kiribati (KIR); Tonga (TON); Montenegro (MNE); Samoa (WSM); Bahamas (BHS); Nicaragua (NIC); Solomon Islands (SLB); Serbia (SRB); Seychelles (SYC); Vanuatu (VUT)

Table S12: All country prevalences observed and predicted (Highlights related to concerns flagged in Table S11)

Country Code	Country Name	Region model	M49 region	M49 sub-region	Income Group	Tier	Prev observed	Prev enet indiv	Prev xgb indiv	Prev enet ctry	Prev xgb ctry	Prev best	L-UI	U-UI	Pop 15plus	Pop affected
AGO	Angola	Middle Africa	Africa	Sub-Saharan Africa	Lower middle income	Predicted (individual)	NA	53.1%	47.9%	45.5%	37.2%	53.1%	17.4%	74.0%	21,823,974	11,590,116
BDI	Burundi	Eastern Africa	Africa	Sub-Saharan Africa	Low income	Predicted (individual)	NA	42.7%	38.5%	41.2%	33.1%	42.7%	13.1%	66.9%	8,061,099	3,439,800
BEN	Benin	Western Africa	Africa	Sub-Saharan Africa	Lower middle income	Observed	25.5%	23.3%	26.5%	20.8%	30.8%	25.5%	21.7%	29.8%	8,702,082	2,219,827
BFA	Burkina Faso	Western Africa	Africa	Sub-Saharan Africa	Low income	Observed	44.4%	29.5%	33.7%	30.1%	32.5%	44.4%	39.0%	50.0%	14,163,092	6,291,283
BWA	Botswana	Southern Africa	Africa	Sub-Saharan Africa	Upper middle income	Observed	35.2%	23.1%	32.1%	13.7%	24.2%	35.2%	29.9%	40.8%	1,743,353	613,434
CAF	Central African Republic	Middle Africa	Africa	Sub-Saharan Africa	Low income	Predicted (individual)	NA	61.4%	58.1%	56.9%	38.0%	61.4%	16.1%	83.5%	2,829,271	1,736,210
CIV	Cote d'Ivoire	Western Africa	Africa	Sub-Saharan Africa	Lower middle income	Observed	23.3%	27.9%	31.2%	22.2%	31.6%	23.3%	19.7%	27.3%	19,477,960	4,535,592
CMR	Cameroon	Middle Africa	Africa	Sub-Saharan Africa	Lower middle income	Observed	63.9%	42.9%	36.4%	40.0%	34.8%	63.9%	58.7%	68.9%	17,593,731	11,250,271
COD	Democratic Republic of the Congo	Middle Africa	Africa	Sub-Saharan Africa	Low income	Observed	51.1%	54.0%	43.5%	50.1%	27.9%	51.1%	43.8%	58.4%	60,986,188	31,167,377
COG	Republic of Congo	Middle Africa	Africa	Sub-Saharan Africa	Lower middle income	Observed	30.2%	34.7%	38.2%	35.4%	33.7%	30.2%	26.3%	34.5%	3,894,355	1,177,260
COM	Comoros	Eastern Africa	Africa	Sub-Saharan Africa	Lower middle income	Observed	41.5%	29.3%	15.3%	26.5%	16.6%	41.5%	36.6%	46.6%	557,343	231,176
CPV	Cabo Verde	Western Africa	Africa	Sub-Saharan Africa	Upper middle income	Predicted (country-level)	NA	NA	NA	16.4%	15.3%	16.4%	2.4%	49.0%	397,103	65,065

DJI	Djibouti	Eastern Africa	Africa	Sub-Saharan Africa	Lower middle income	Predicted (individual)	NA	24.7%	30.6%	30.5%	23.9%	24.7%	6.2%	51.2%	843,025	208,425
DZA	Algeria	MENA	Africa	Northern Africa	Upper middle income	Observed	28.9%	22.6%	28.0%	19.0%	27.9%	28.9%	25.1%	33.1%	33,240,058	9,620,089
EGY	Egypt	MENA	Africa	Northern Africa	Lower middle income	Observed	27.2%	21.9%	25.2%	18.9%	25.0%	27.2%	23.3%	31.6%	81,014,112	22,075,790
ERI	Eritrea	Eastern Africa	Africa	Sub-Saharan Africa	Low income	Predicted (country-level)	NA	NA	NA	46.6%	38.0%	46.6%	9.6%	82.1%	2,251,111	1,048,937
ETH	Ethiopia	Eastern Africa	Africa	Sub-Saharan Africa	Low income	Observed	45.0%	36.6%	33.9%	32.2%	31.7%	45.0%	39.7%	50.3%	82,936,359	37,296,135
GAB	Gabon	Middle Africa	Africa	Sub-Saharan Africa	Upper middle income	Observed	42.4%	36.2%	32.6%	22.0%	19.9%	42.4%	37.6%	47.3%	1,653,306	701,008
GHA	Ghana	Western Africa	Africa	Sub-Saharan Africa	Lower middle income	Observed	24.1%	17.9%	20.2%	19.0%	26.2%	24.1%	20.4%	28.2%	22,641,114	5,448,491
GIN	Guinea	Western Africa	Africa	Sub-Saharan Africa	Lower middle income	Observed	27.8%	29.9%	29.4%	28.0%	33.7%	27.8%	23.4%	32.7%	8,977,034	2,497,565
GMB	Gambia	Western Africa	Africa	Sub-Saharan Africa	Low income	Observed	26.0%	19.6%	28.4%	25.3%	30.0%	26.0%	21.7%	30.7%	1,701,066	441,479
GNB	Guinea-Bissau	Western Africa	Africa	Sub-Saharan Africa	Low income	Predicted (country-level)	NA	NA	NA	39.4%	37.6%	39.4%	6.0%	69.5%	1,387,385	547,049
GNQ	Equatorial Guinea	Middle Africa	Africa	Sub-Saharan Africa	Upper middle income	Predicted (country-level)	NA	NA	NA	52.6%	32.4%	52.6%	14.1%	82.4%	1,219,534	641,149
KEN	Kenya	Eastern Africa	Africa	Sub-Saharan Africa	Lower middle income	Observed	46.6%	38.2%	34.7%	38.1%	28.7%	46.6%	42.3%	50.9%	36,672,481	17,081,608
LBR	Liberia	Western Africa	Africa	Sub-Saharan Africa	Low income	Observed	34.9%	26.4%	31.0%	22.9%	32.4%	34.9%	31.0%	39.1%	3,491,430	1,218,987
LBY	Libya	MENA	Africa	Northern Africa	Upper middle income	Observed	36.5%	34.9%	22.3%	48.7%	18.0%	36.5%	33.4%	39.7%	5,456,141	1,990,934

LSO	Lesotho	Southern Africa	Africa	Sub-Saharan Africa	Lower middle income	Predicted (individual)	NA	40.6%	32.3%	34.9%	23.6%	40.6%	7.5%	74.8%	1,557,382	632,475
MAR	Morocco	MENA	Africa	Northern Africa	Lower middle income	Observed	14.5%	17.2%	26.6%	14.8%	28.2%	14.5%	12.0%	17.4%	28,746,418	4,164,248
MDG	Madagascar	Eastern Africa	Africa	Sub-Saharan Africa	Low income	Observed	31.8%	52.5%	40.3%	45.9%	33.7%	31.8%	26.8%	37.2%	19,992,224	6,353,436
MLI	Mali	Western Africa	Africa	Sub-Saharan Africa	Low income	Observed	22.5%	40.6%	43.9%	44.6%	36.5%	22.5%	18.0%	27.9%	13,659,297	3,077,286
MOZ	Mozambique	Eastern Africa	Africa	Sub-Saharan Africa	Low income	Observed	35.4%	36.8%	33.8%	37.4%	26.8%	35.4%	30.6%	40.5%	19,893,677	7,043,518
MRT	Mauritania	Western Africa	Africa	Sub-Saharan Africa	Lower middle income	Observed	49.3%	43.5%	35.9%	41.4%	33.7%	49.3%	41.6%	56.9%	3,062,297	1,508,376
MUS	Mauritius	Eastern Africa	Africa	Sub-Saharan Africa	Upper middle income	Observed	16.3%	14.3%	7.0%	15.8%	4.8%	16.3%	13.1%	20.1%	1,062,937	172,951
MWI	Malawi	Eastern Africa	Africa	Sub-Saharan Africa	Low income	Observed	21.5%	40.5%	32.8%	46.4%	33.9%	21.5%	17.8%	25.7%	13,301,574	2,858,929
NAM	Namibia	Southern Africa	Africa	Sub-Saharan Africa	Lower middle income	Observed	42.1%	39.0%	35.7%	25.9%	30.7%	42.1%	38.0%	46.3%	1,959,279	824,226
NER	Niger	Western Africa	Africa	Sub-Saharan Africa	Low income	Observed	38.9%	31.3%	37.4%	38.6%	36.3%	38.9%	32.1%	46.1%	15,012,433	5,835,373
NGA	Nigeria	Western Africa	Africa	Sub-Saharan Africa	Lower middle income	Observed	32.6%	37.7%	26.2%	41.7%	31.5%	32.6%	28.7%	36.7%	141,282,182	45,990,204
RWA	Rwanda	Eastern Africa	Africa	Sub-Saharan Africa	Low income	Predicted (individual)	NA	23.7%	26.1%	22.7%	33.6%	23.7%	6.2%	46.7%	9,175,852	2,174,575
SDN	Sudan	MENA	Africa	Northern Africa	Low income	Predicted (individual)	NA	48.8%	48.8%	50.6%	38.0%	48.8%	13.7%	75.9%	30,887,073	15,068,978
SEN	Senegal	Western Africa	Africa	Sub-Saharan Africa	Lower middle income	Observed	18.4%	26.6%	35.0%	23.7%	26.5%	18.4%	13.3%	24.8%	11,786,511	2,164,956
SLE	Sierra Leone	Western Africa	Africa	Sub-Saharan Africa	Low income	Observed	35.7%	33.3%	34.5%	28.4%	27.5%	35.7%	31.4%	40.2%	5,499,078	1,963,440
SOM	Somalia	Eastern Africa	Africa	Sub-Saharan Africa	Low income	Observed	17.6%	47.8%	45.5%	68.9%	36.8%	17.6%	14.0%	21.9%	10,504,696	1,853,137
SSD	South Sudan	Eastern Africa	Africa	Sub-Saharan Africa	Low income	Predicted (individual)	NA	67.2%	65.8%	57.1%	38.0%	67.2%	22.1%	86.5%	7,558,716	5,078,102

STP	Sao Tome and Principe	Middle Africa	Africa	Sub-Saharan Africa	Lower middle income	Predicted (country-level)	NA	NA	NA	33.3%	23.7%	33.3%	5.8%	67.6%	150,266	50,097
SWZ	Eswatini	Southern Africa	Africa	Sub-Saharan Africa	Lower middle income	Predicted (individual)	NA	58.9%	35.2%	55.6%	33.2%	58.9%	18.5%	84.2%	841,688	496,093
SYC	Seychelles	Eastern Africa	Africa	Sub-Saharan Africa	High income	Predicted (country-level)	NA	NA	NA	9.8%	9.9%	9.8%	1.5%	31.8%	98,471	9,692
TCD	Chad	Middle Africa	Africa	Sub-Saharan Africa	Low income	Observed	66.3%	60.4%	48.9%	76.4%	33.7%	66.3%	58.4%	73.3%	11,350,062	7,522,854
TGO	Togo	Western Africa	Africa	Sub-Saharan Africa	Lower middle income	Observed	30.7%	29.2%	35.0%	23.5%	31.0%	30.7%	26.5%	35.3%	5,118,431	1,571,914
TUN	Tunisia	MENA	Africa	Northern Africa	Lower middle income	Observed	22.9%	25.4%	31.3%	15.9%	27.8%	22.9%	19.3%	27.0%	9,439,142	2,165,146
TZA	United Republic of Tanzania	Eastern Africa	Africa	Sub-Saharan Africa	Lower middle income	Observed	37.6%	32.0%	31.9%	29.8%	33.4%	37.6%	33.0%	42.5%	40,676,399	15,293,667
UGA	Uganda	Eastern Africa	Africa	Sub-Saharan Africa	Low income	Observed	32.5%	42.1%	36.0%	42.0%	33.9%	32.5%	27.9%	37.3%	29,232,269	9,487,604
ZAF	South Africa	Southern Africa	Africa	Sub-Saharan Africa	Upper middle income	Observed	28.7%	45.0%	17.1%	59.1%	21.2%	28.7%	24.7%	33.0%	48,092,117	13,792,220
ZMB	Zambia	Eastern Africa	Africa	Sub-Saharan Africa	Lower middle income	Observed	48.1%	32.1%	38.1%	27.4%	33.9%	48.1%	44.1%	52.2%	12,935,536	6,227,789
ZWE	Zimbabwe	Eastern Africa	Africa	Sub-Saharan Africa	Lower middle income	Observed	44.6%	55.6%	44.1%	54.9%	35.4%	44.6%	40.5%	48.8%	10,122,407	4,517,659
ARG	Argentina	Latin America	Americas	Latin America and the Caribbean	Upper middle income	Observed	19.0%	36.4%	14.8%	32.1%	16.4%	19.0%	15.7%	22.7%	36,215,384	6,877,004
ATG	Antigua and Barbuda	Latin America	Americas	Latin America and the Caribbean	High income	Predicted (country-level)	NA	NA	NA	23.0%	13.9%	23.0%	3.0%	53.2%	77,751	17,881

BHS	Bahamas	Latin America	Americas	Latin America and the Caribbean	High income	Predicted (country-level)	NA	NA	NA	16.2%	13.1%	16.2%	2.0%	46.8%	332,307	53,729
BLZ	Belize	Latin America	Americas	Latin America and the Caribbean	Upper middle income	Predicted (individual)	NA	22.2%	28.0%	25.6%	30.6%	22.2%	5.5%	40.5%	311,822	69,305
BOL	Bolivia (Plurinational State of)	Latin America	Americas	Latin America and the Caribbean	Lower middle income	Observed	24.9%	22.8%	25.3%	23.1%	19.1%	24.9%	20.9%	29.3%	8,877,708	2,209,351
BRA	Brazil	Latin America	Americas	Latin America and the Caribbean	Upper middle income	Observed	16.1%	21.2%	19.8%	20.2%	15.6%	16.1%	13.1%	19.6%	171,555,270	27,575,979
BRB	Barbados	Latin America	Americas	Latin America and the Caribbean	High income	Predicted (country-level)	NA	NA	NA	12.3%	12.1%	12.3%	1.4%	43.7%	234,397	28,910
CAN	Canada	N. America, Europe & Australia	Americas	Northern America	High income	Observed	1.3%	2.0%	2.6%	1.2%	6.1%	1.3%	0.7%	2.3%	35,412,107	443,923
CHL	Chile	Latin America	Americas	Latin America and the Caribbean	High income	Observed	3.8%	15.2%	6.0%	11.5%	8.2%	3.8%	2.6%	5.6%	16,573,700	634,348
COL	Colombia	Latin America	Americas	Latin America and the Caribbean	Upper middle income	Observed	26.6%	23.7%	23.8%	18.2%	20.5%	26.6%	22.3%	31.4%	42,744,290	11,369,993
CRI	Costa Rica	Latin America	Americas	Latin America and the Caribbean	High income	Predicted (individual)	NA	11.6%	8.2%	12.5%	8.8%	11.6%	2.7%	26.1%	4,209,518	488,328

CUB	Cuba	Latin America	Americas	Latin America and the Caribbean	Upper middle income	Predicted (individual)	NA	23.5%	20.2%	25.9%	21.5%	23.5%	4.9%	51.6%	9,294,023	2,187,178
DMA	Dominica	Latin America	Americas	Latin America and the Caribbean	Upper middle income	Predicted (country-level)	NA	NA	NA	13.6%	18.5%	13.6%	1.6%	41.5%	54,270	7,394
DOM	Dominican Republic	Latin America	Americas	Latin America and the Caribbean	Upper middle income	Observed	36.4%	29.5%	22.3%	29.7%	22.0%	36.4%	32.4%	40.5%	8,502,224	3,092,474
ECU	Ecuador	Latin America	Americas	Latin America and the Caribbean	Upper middle income	Predicted (individual)	NA	31.9%	30.5%	27.8%	28.4%	31.9%	8.8%	54.6%	13,918,798	4,433,294
GRD	Grenada	Latin America	Americas	Latin America and the Caribbean	Upper middle income	Predicted (country-level)	NA	NA	NA	14.2%	16.3%	14.2%	2.2%	40.6%	95,003	13,463
GTM	Guatemala	Latin America	Americas	Latin America and the Caribbean	Upper middle income	Observed	24.2%	38.1%	31.8%	37.3%	26.5%	24.2%	20.9%	27.8%	12,889,786	3,116,101
GUY	Guyana	Latin America	Americas	Latin America and the Caribbean	High income	Predicted (individual)	NA	26.2%	37.7%	27.7%	29.3%	26.2%	6.3%	55.9%	594,107	155,426
HND	Honduras	Latin America	Americas	Latin America and the Caribbean	Lower middle income	Observed	47.2%	40.5%	23.2%	39.5%	16.1%	47.2%	43.0%	51.4%	7,675,188	3,623,760
HTI	Haiti	Latin America	Americas	Latin America and the Caribbean	Lower middle income	Predicted (individual)	NA	58.4%	40.2%	53.4%	24.6%	58.4%	20.8%	81.8%	8,240,559	4,813,722
JAM	Jamaica	Latin America	Americas	Latin America and the Caribbean	Upper middle income	Observed	37.2%	31.3%	19.7%	24.1%	5.5%	37.2%	31.1%	43.7%	2,318,318	862,041

KNA	Saint Kitts and Nevis	Latin America	Americas	Latin America and the Caribbean	High income	Predicted (country-level)	NA	NA	NA	18.7%	13.0%	18.7%	2.1%	49.7%	38,318	7,159
LCA	Saint Lucia	Latin America	Americas	Latin America and the Caribbean	Upper middle income	Predicted (country-level)	NA	NA	NA	15.9%	15.4%	15.9%	2.7%	44.6%	149,082	23,759
MEX	Mexico	Latin America	Americas	Latin America and the Caribbean	Upper middle income	Predicted (individual)	NA	30.9%	19.3%	32.5%	20.5%	30.9%	8.7%	52.6%	100,159,492	30,947,062
NIC	Nicaragua	Latin America	Americas	Latin America and the Caribbean	Lower middle income	Predicted (individual)	NA	31.5%	26.6%	33.8%	25.6%	31.5%	9.4%	53.9%	5,023,492	1,584,270
PAN	Panama	Latin America	Americas	Latin America and the Caribbean	High income	Observed	31.3%	21.9%	20.9%	15.2%	17.3%	31.3%	26.2%	37.0%	3,450,052	1,079,976
PER	Peru	Latin America	Americas	Latin America and the Caribbean	Upper middle income	Observed	48.2%	29.5%	27.7%	23.5%	23.2%	48.2%	43.4%	53.0%	26,411,708	12,725,629
PRY	Paraguay	Latin America	Americas	Latin America and the Caribbean	Upper middle income	Predicted (individual)	NA	23.0%	14.9%	27.8%	18.9%	23.0%	5.5%	42.8%	5,023,383	1,154,181
SLV	El Salvador	Latin America	Americas	Latin America and the Caribbean	Upper middle income	Observed	23.1%	27.0%	16.3%	31.5%	13.7%	23.1%	18.8%	27.9%	4,813,320	1,110,243
SUR	Suriname	Latin America	Americas	Latin America and the Caribbean	Upper middle income	Predicted (individual)	NA	29.2%	34.4%	26.1%	29.3%	29.2%	8.0%	52.9%	477,729	139,663
TTO	Trinidad and Tobago	Latin America	Americas	Latin America and the Caribbean	High income	Predicted (individual)	NA	30.7%	22.4%	25.7%	14.8%	30.7%	9.0%	54.1%	1,128,511	346,737

URY	Uruguay	Latin America	Americas	Latin America and the Caribbean	High income	Observed	7.0%	14.7%	3.8%	12.2%	5.8%	7.0%	5.2%	9.4%	2,778,929	195,424
USA	United States of America	N. America, Europe & Australia	Americas	Northern America	High income	Observed	3.7%	3.5%	1.5%	2.2%	2.8%	3.7%	2.2%	6.0%	283,342,922	10,387,369
VCT	Saint Vincent and the Grenadines	Latin America	Americas	Latin America and the Caribbean	Upper middle income	Predicted (country-level)	NA	NA	NA	15.2%	17.6%	15.2%	2.2%	45.0%	79,069	11,987
VEN	Venezuela (Bolivarian Republic of)	Latin America	Americas	Latin America and the Caribbean	Lower middle income	Observed	44.9%	45.9%	27.9%	42.8%	18.3%	44.9%	40.7%	49.3%	21,411,628	9,623,897
AFG	Afghanistan	Southern Asia	Asia	Southern Asia	Low income	Observed	46.3%	37.2%	38.0%	26.7%	26.3%	46.3%	39.5%	53.2%	25,183,652	11,650,281
ARE	United Arab Emirates	MENA	Asia	Western Asia	High income	Predicted (individual)	NA	9.8%	2.2%	8.3%	3.5%	9.8%	2.0%	23.8%	9,673,647	947,068
ARM	Armenia	MENA	Asia	Western Asia	Upper middle income	Predicted (individual)	NA	10.2%	8.3%	10.3%	8.4%	10.2%	2.4%	22.3%	2,500,611	256,067
AZE	Azerbaijan	MENA	Asia	Western Asia	Upper middle income	Predicted (individual)	NA	19.6%	20.5%	16.7%	15.1%	19.6%	4.5%	38.1%	8,074,584	1,585,056
BGD	Bangladesh	Southern Asia	Asia	Southern Asia	Lower middle income	Observed	9.4%	12.5%	9.9%	15.4%	15.7%	9.4%	6.8%	12.8%	127,116,950	11,895,946
BHR	Bahrain	MENA	Asia	Western Asia	High income	Predicted (individual)	NA	9.5%	3.8%	10.1%	8.6%	9.5%	1.8%	25.1%	1,305,572	124,312
BRN	Brunei Darussalam	East & SE Asia	Asia	South-eastern Asia	High income	Predicted (country-level)	NA	NA	NA	2.2%	5.4%	2.2%	0.2%	11.0%	370,145	8,157

BTN	Bhutan	Southern Asia	Asia	Southern Asia	Lower middle income	Predicted (individual)	NA	4.8%	7.4%	5.4%	10.8%	4.8%	0.6%	15.0%	634,469	30,567
CHN	China	East & SE Asia	Asia	Eastern Asia	Upper middle income	Observed	3.6%	6.4%	10.1%	2.7%	15.5%	3.6%	2.8%	4.6%	1,189,868,357	42,600,058
CYP	Cyprus	MENA	Asia	Western Asia	High income	Predicted (individual)	NA	8.9%	2.8%	6.6%	3.6%	8.9%	1.7%	20.7%	1,150,324	102,262
GEO	Georgia	MENA	Asia	Western Asia	Upper middle income	Predicted (individual)	NA	8.4%	9.0%	8.1%	14.1%	8.4%	1.7%	21.1%	3,129,403	261,753
IDN	Indonesia	East & SE Asia	Asia	South-eastern Asia	Upper middle income	Observed	5.3%	8.4%	12.0%	5.3%	13.1%	5.3%	4.1%	6.7%	216,441,692	11,388,006
IND	India	Southern Asia	Asia	Southern Asia	Lower middle income	Observed	15.3%	12.0%	20.2%	12.0%	22.2%	15.3%	13.8%	16.9%	1,109,679,356	169,420,899
IRN	Iran (Islamic Republic of)	Southern Asia	Asia	Southern Asia	Upper middle income	Predicted (individual)	NA	19.0%	28.7%	16.6%	22.0%	19.0%	3.8%	41.5%	72,065,703	13,704,882
IRQ	Iraq	MENA	Asia	Western Asia	Upper middle income	Observed	20.4%	35.1%	17.1%	30.4%	15.9%	20.4%	16.3%	25.2%	30,080,600	6,132,389
ISR	Israel	MENA	Asia	Western Asia	High income	Observed	2.5%	7.5%	4.8%	6.8%	5.4%	2.5%	1.8%	3.3%	7,373,049	180,946
JOR	Jordan	MENA	Asia	Western Asia	Upper middle income	Predicted (individual)	NA	13.3%	12.5%	11.5%	11.0%	13.3%	2.9%	27.8%	8,041,875	1,068,369
JPN	Japan	East & SE Asia	Asia	Eastern Asia	High income	Predicted (individual)	NA	1.6%	1.7%	1.0%	3.9%	1.6%	0.2%	5.2%	109,502,289	1,711,161
KAZ	Kazakhstan	MENA	Asia	Central Asia	Upper middle income	Predicted (individual)	NA	14.2%	12.5%	13.0%	18.8%	14.2%	3.2%	32.9%	14,770,427	2,098,249
KGZ	Kyrgyzstan	MENA	Asia	Central Asia	Lower middle income	Predicted (individual)	NA	14.5%	14.4%	19.4%	18.8%	14.5%	3.4%	32.4%	5,000,024	725,426
KHM	Cambodia	East & SE Asia	Asia	South-eastern Asia	Lower middle income	Observed	0.4%	9.4%	19.4%	12.8%	31.7%	0.4%	0.1%	1.2%	12,583,309	52,010

KOR	Republic of Korea	East & SE Asia	Asia	Eastern Asia	High income	Predicted (individual)	NA	2.0%	1.7%	1.3%	3.1%	2.0%	0.2%	7.4%	46,410,430	936,116
KWT	Kuwait	MENA	Asia	Western Asia	High income	Predicted (individual)	NA	14.3%	3.7%	14.5%	7.4%	14.3%	2.7%	31.4%	3,990,855	568,941
LAO	Lao People's Democratic Republic	East & SE Asia	Asia	South-eastern Asia	Lower middle income	Observed	15.3%	9.3%	21.0%	5.0%	23.6%	15.3%	12.1%	19.1%	5,523,755	842,890
LBN	Lebanon	MENA	Asia	Western Asia	Lower middle income	Observed	31.4%	23.2%	20.9%	16.7%	11.0%	31.4%	26.9%	36.3%	4,352,690	1,366,787
LKA	Sri Lanka	Southern Asia	Asia	Southern Asia	Upper middle income	Observed	11.3%	12.6%	8.0%	11.7%	7.7%	11.3%	9.0%	14.2%	17,034,771	1,929,249
MDV	Maldives	Southern Asia	Asia	Southern Asia	Upper middle income	Predicted (individual)	NA	11.8%	8.5%	9.5%	4.4%	11.8%	2.6%	26.1%	428,844	50,453
MMR	Myanmar	East & SE Asia	Asia	South-eastern Asia	Lower middle income	Observed	5.2%	12.3%	16.4%	10.2%	27.0%	5.2%	3.6%	7.6%	41,643,360	2,171,488
MNG	Mongolia	East & SE Asia	Asia	Eastern Asia	Upper middle income	Predicted (individual)	NA	10.1%	22.4%	5.8%	14.5%	10.1%	1.6%	26.8%	2,442,601	246,724
MYS	Malaysia	East & SE Asia	Asia	South-eastern Asia	Upper middle income	Predicted (individual)	NA	3.9%	8.3%	2.0%	9.6%	3.9%	0.5%	10.9%	28,311,261	1,108,290
NPL	Nepal	Southern Asia	Asia	Southern Asia	Lower middle income	Predicted (individual)	NA	11.3%	13.6%	14.4%	19.5%	11.3%	2.4%	25.0%	21,309,652	2,404,293
OMN	Oman	MENA	Asia	Western Asia	High income	Predicted (individual)	NA	13.2%	17.3%	12.2%	19.0%	13.2%	3.3%	28.6%	4,158,364	550,778
PAK	Pakistan	Southern Asia	Asia	Southern Asia	Lower middle income	Observed	24.8%	24.1%	28.8%	18.6%	26.6%	24.8%	19.9%	30.6%	162,717,520	40,418,616
PHL	Philippines	East & SE Asia	Asia	South-eastern Asia	Upper middle income	Observed	20.0%	7.2%	13.0%	7.5%	20.0%	20.0%	16.7%	23.9%	85,092,311	17,034,939
PRK	Democratic People's Republic of Korea	East & SE Asia	Asia	Eastern Asia	Low income	Predicted (country-level)	NA	NA	NA	8.7%	15.6%	8.7%	1.1%	35.4%	21,541,599	1,880,605

PSE	State of Palestine	MENA	Asia	Western Asia	Lower middle income	Observed	23.7%	22.4%	20.5%	26.9%	17.3%	23.7%	20.7%	27.0%	3,378,577	800,471
QAT	Qatar	MENA	Asia	Western Asia	High income	Predicted (individual)	NA	14.5%	4.1%	9.3%	5.0%	14.5%	2.7%	33.6%	2,526,374	365,779
SAU	Saudi Arabia	MENA	Asia	Western Asia	High income	Predicted (individual)	NA	11.3%	2.1%	12.8%	6.3%	11.3%	2.1%	25.6%	28,240,002	3,203,565
SGP	Singapore	East & SE Asia	Asia	South-eastern Asia	High income	Predicted (individual)	NA	1.0%	1.3%	0.7%	3.2%	1.0%	0.1%	3.8%	5,396,830	55,454
SYR	Syrian Arab Republic	MENA	Asia	Western Asia	Low income	Predicted (individual)	NA	41.9%	34.6%	31.1%	20.0%	41.9%	12.8%	65.5%	18,333,789	7,675,016
THA	Thailand	East & SE Asia	Asia	South-eastern Asia	Upper middle income	Predicted (individual)	NA	7.2%	9.4%	4.8%	11.8%	7.2%	1.0%	18.9%	61,296,441	4,424,840
TJK	Tajikistan	MENA	Asia	Central Asia	Lower middle income	Predicted (individual)	NA	22.8%	18.1%	24.3%	29.1%	22.8%	5.5%	43.4%	6,917,846	1,577,044
TKM	Turkmenistan	MENA	Asia	Central Asia	Upper middle income	Predicted (individual)	NA	26.5%	17.3%	32.4%	19.5%	26.5%	7.5%	49.1%	5,240,355	1,389,544
TLS	Timor-Leste	East & SE Asia	Asia	South-eastern Asia	Lower middle income	Predicted (country-level)	NA	NA	NA	7.1%	22.6%	7.1%	0.8%	29.2%	948,774	67,741
TUR	Turkiye	MENA	Asia	Western Asia	Upper middle income	Predicted (individual)	NA	18.8%	13.6%	13.9%	12.7%	18.8%	4.5%	37.5%	67,824,390	12,733,368
UZB	Uzbekistan	MENA	Asia	Central Asia	Lower middle income	Predicted (individual)	NA	16.1%	17.6%	17.9%	21.8%	16.1%	3.4%	37.0%	25,459,237	4,095,314
VNM	Viet Nam	East & SE Asia	Asia	South-eastern Asia	Upper middle income	Observed	1.1%	4.1%	9.0%	6.0%	23.8%	1.1%	0.5%	2.3%	78,377,150	824,365
YEM	Yemen	MENA	Asia	Western Asia	Low income	Predicted (individual)	NA	48.7%	37.2%	43.8%	33.5%	48.7%	15.4%	74.7%	24,638,066	11,999,704
ALB	Albania	N. America, Europe &	Europe	Southern Europe	Upper middle income	Predicted (individual)	NA	10.3%	12.8%	4.9%	14.0%	10.3%	2.0%	23.5%	1,959,404	202,510

		Australia														
AND	Andorra	N. America, Europe & Australia	Europe	Southern Europe	High income	Predicted (country-level)	NA	NA	NA	2.1%	2.6%	2.1%	0.3%	9.0%	73,272	1,543
AUT	Austria	N. America, Europe & Australia	Europe	Western Europe	High income	Predicted (individual)	NA	1.9%	1.3%	1.7%	2.3%	1.9%	0.3%	5.0%	7,905,461	147,667
BEL	Belgium	N. America, Europe & Australia	Europe	Western Europe	High income	Predicted (individual)	NA	3.5%	3.2%	2.2%	3.9%	3.5%	0.5%	8.8%	10,066,462	353,712
BGR	Bulgaria	N. America, Europe & Australia	Europe	Eastern Europe	High income	Predicted (individual)	NA	8.4%	6.1%	6.0%	6.0%	8.4%	1.5%	20.4%	5,506,924	460,656
BIH	Bosnia and Herzegovina	N. America, Europe & Australia	Europe	Southern Europe	Upper middle income	Predicted (individual)	NA	7.2%	8.6%	5.7%	11.1%	7.2%	1.3%	18.0%	2,736,639	197,193
BLR	Belarus	N. America, Europe &	Europe	Eastern Europe	Upper middle income	Predicted (individual)	NA	7.9%	5.0%	6.4%	5.5%	7.9%	1.5%	20.6%	7,642,334	605,828

		Australia														
CHE	Switzerland	N. America, Europe & Australia	Europe	Western Europe	High income	Predicted (individual)	NA	1.6%	1.0%	1.1%	1.8%	1.6%	0.3%	4.2%	7,739,168	123,139
CZE	Czechia	N. America, Europe & Australia	Europe	Eastern Europe	High income	Predicted (individual)	NA	3.0%	3.1%	2.6%	4.2%	3.0%	0.5%	7.7%	9,244,517	273,286
DEU	Germany	N. America, Europe & Australia	Europe	Western Europe	High income	Predicted (individual)	NA	1.7%	1.2%	1.6%	2.6%	1.7%	0.3%	4.8%	71,897,736	1,254,903
DNK	Denmark	N. America, Europe & Australia	Europe	Northern Europe	High income	Predicted (individual)	NA	1.6%	1.4%	1.2%	2.6%	1.6%	0.2%	4.6%	5,074,023	78,930
ESP	Spain	N. America, Europe & Australia	Europe	Southern Europe	High income	Predicted (individual)	NA	4.4%	2.5%	2.9%	4.2%	4.4%	0.8%	11.0%	43,126,952	1,917,071
EST	Estonia	N. America, Europe &	Europe	Northern Europe	High income	Predicted (individual)	NA	2.5%	3.2%	2.0%	3.1%	2.5%	0.4%	6.5%	1,158,036	29,503

		Australia														
FIN	Finland	N. America, Europe & Australia	Europe	Northern Europe	High income	Predicted (individual)	NA	1.1%	0.8%	1.1%	2.2%	1.1%	0.2%	3.1%	4,837,295	54,114
FRA	France	N. America, Europe & Australia	Europe	Western Europe	High income	Predicted (individual)	NA	3.0%	2.5%	2.0%	3.1%	3.0%	0.6%	7.7%	57,570,548	1,751,186
GBR	United Kingdom of Great Britain and Northern Ireland	N. America, Europe & Australia	Europe	Northern Europe	High income	Observed	0.5%	1.9%	1.6%	1.5%	2.9%	0.5%	0.2%	1.3%	57,698,688	300,049
GRC	Greece	N. America, Europe & Australia	Europe	Southern Europe	High income	Observed	11.3%	5.5%	3.9%	3.3%	3.0%	11.3%	8.8%	14.3%	9,075,616	1,021,919
HRV	Croatia	N. America, Europe & Australia	Europe	Southern Europe	High income	Predicted (individual)	NA	4.4%	3.6%	3.2%	3.7%	4.4%	0.8%	11.5%	3,345,066	146,590
HUN	Hungary	N. America, Europe &	Europe	Eastern Europe	High income	Predicted (individual)	NA	6.3%	4.4%	4.7%	3.0%	6.3%	1.1%	15.7%	8,148,723	510,689

		Australia														
IRL	Ireland	N. America, Europe & Australia	Europe	Northern Europe	High income	Predicted (individual)	NA	2.8%	3.3%	1.6%	4.4%	2.8%	0.4%	7.3%	4,491,920	125,426
ISL	Iceland	N. America, Europe & Australia	Europe	Northern Europe	High income	Predicted (individual)	NA	1.6%	1.4%	1.2%	2.5%	1.6%	0.2%	5.0%	323,663	5,120
ITA	Italy	N. America, Europe & Australia	Europe	Southern Europe	High income	Predicted (individual)	NA	4.1%	2.3%	2.8%	3.6%	4.1%	0.6%	10.8%	52,047,760	2,120,694
LIE	Liechtenstein	N. America, Europe & Australia	Europe	Western Europe	High income	Predicted (country-level)	NA	NA	NA	2.1%	2.6%	2.1%	0.2%	9.6%	35,188	744
LTU	Lithuania	N. America, Europe & Australia	Europe	Northern Europe	High income	Predicted (individual)	NA	2.5%	2.7%	2.3%	3.2%	2.5%	0.3%	6.7%	2,469,751	60,950
LUX	Luxembourg	N. America, Europe &	Europe	Western Europe	High income	Predicted (individual)	NA	1.8%	1.9%	1.3%	2.2%	1.8%	0.3%	4.8%	578,800	10,306

		Australia														
LVA	Latvia	N. America, Europe & Australia	Europe	Northern Europe	High income	Predicted (individual)	NA	2.9%	3.1%	2.5%	4.5%	2.9%	0.5%	7.3%	1,567,157	44,935
MCO	Monaco	N. America, Europe & Australia	Europe	Western Europe	High income	Predicted (country-level)	NA	NA	NA	1.5%	2.8%	1.5%	0.1%	9.2%	33,061	489
MDA	Republic of Moldova	N. America, Europe & Australia	Europe	Eastern Europe	Upper middle income	Predicted (individual)	NA	8.6%	14.9%	7.0%	15.4%	8.6%	1.6%	20.3%	1,899,414	163,285
MKD	North Macedonia	N. America, Europe & Australia	Europe	Southern Europe	Upper middle income	Predicted (individual)	NA	10.0%	8.3%	6.9%	10.3%	10.0%	1.8%	24.9%	1,519,917	151,578
MLT	Malta	N. America, Europe & Australia	Europe	Southern Europe	High income	Predicted (individual)	NA	5.2%	3.0%	3.7%	4.3%	5.2%	0.7%	13.4%	504,927	26,309
MNE	Montenegro	N. America, Europe &	Europe	Southern Europe	Upper middle income	Predicted (individual)	NA	6.6%	6.1%	4.9%	5.5%	6.6%	1.1%	16.8%	511,711	33,944

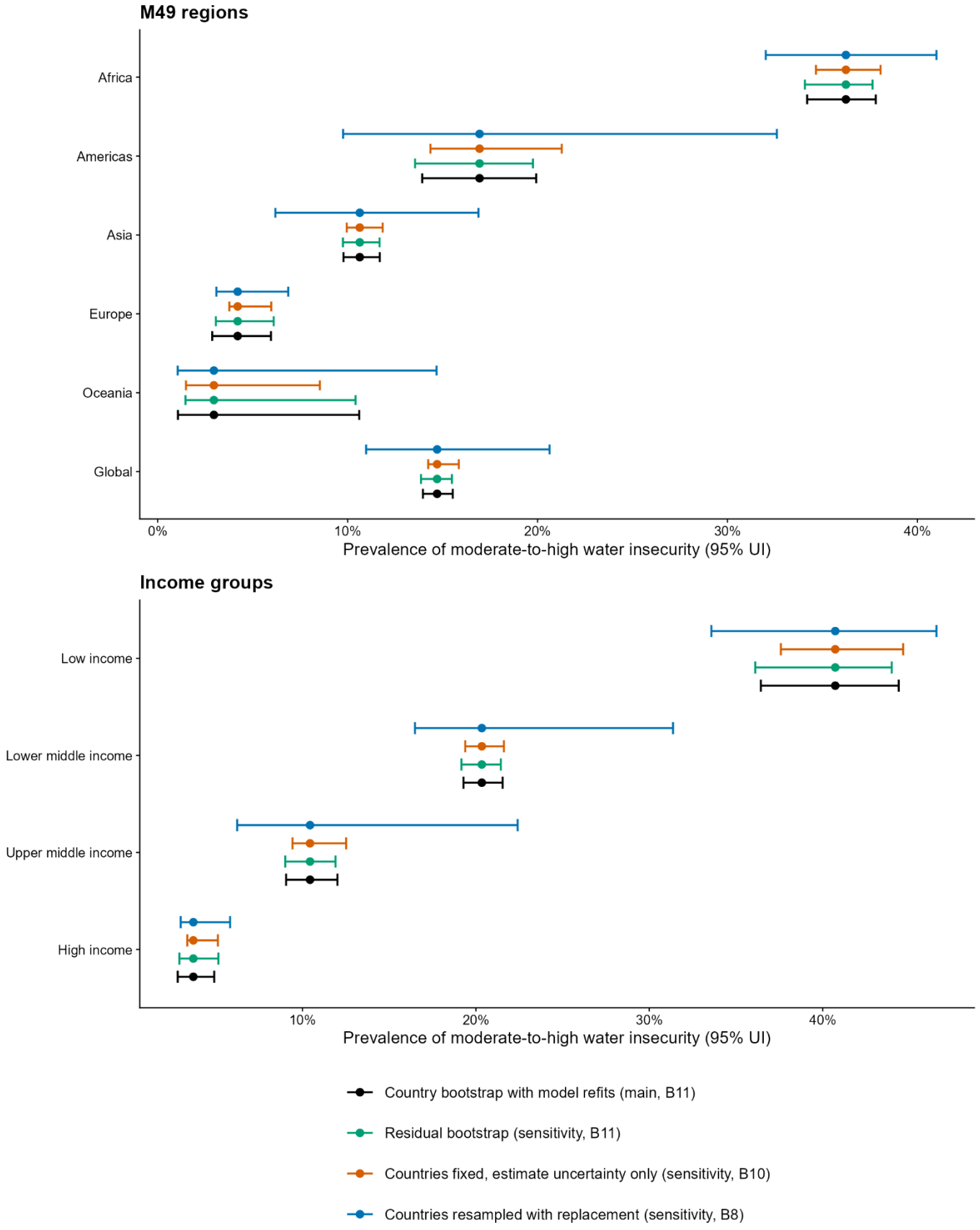
		Australia														
NLD	Netherlands (Kingdom of the)	N. America, Europe & Australia	Europe	Western Europe	High income	Predicted (individual)	NA	2.1%	2.2%	1.5%	2.7%	2.1%	0.3%	5.9%	15,386,415	315,469
NOR	Norway	N. America, Europe & Australia	Europe	Northern Europe	High income	Predicted (individual)	NA	1.3%	1.0%	1.0%	2.1%	1.3%	0.2%	3.7%	4,717,400	62,487
POL	Poland	N. America, Europe & Australia	Europe	Eastern Europe	High income	Predicted (individual)	NA	3.9%	4.2%	3.7%	5.8%	3.9%	0.5%	10.3%	31,167,096	1,223,040
PRT	Portugal	N. America, Europe & Australia	Europe	Southern Europe	High income	Predicted (individual)	NA	3.4%	3.1%	2.6%	3.0%	3.4%	0.6%	8.6%	9,431,141	324,465
ROU	Romania	N. America, Europe & Australia	Europe	Eastern Europe	High income	Predicted (individual)	NA	6.5%	6.9%	4.3%	4.6%	6.5%	1.2%	15.2%	16,061,614	1,044,041
RUS	Russian Federation	N. America, Europe &	Europe	Eastern Europe	High income	Observed	5.3%	14.0%	9.5%	11.0%	7.8%	5.3%	3.9%	7.3%	119,076,618	6,343,492

		Australia														
SMR	San Marino	N. America, Europe & Australia	Europe	Southern Europe	High income	Predicted (country-level)	NA	NA	NA	1.9%	2.9%	1.9%	0.2%	9.1%	30,067	585
SRB	Serbia	N. America, Europe & Australia	Europe	Southern Europe	Upper middle income	Predicted (individual)	NA	9.3%	9.9%	6.7%	9.5%	9.3%	2.0%	22.4%	5,615,373	523,220
SVK	Slovakia	N. America, Europe & Australia	Europe	Eastern Europe	High income	Predicted (individual)	NA	3.6%	4.2%	3.2%	3.9%	3.6%	0.7%	9.8%	4,570,878	163,276
SVN	Slovenia	N. America, Europe & Australia	Europe	Southern Europe	High income	Predicted (individual)	NA	2.3%	1.2%	2.3%	2.5%	2.3%	0.4%	5.9%	1,822,371	41,637
SWE	Sweden	N. America, Europe & Australia	Europe	Northern Europe	High income	Predicted (individual)	NA	1.3%	1.2%	1.2%	2.6%	1.3%	0.2%	3.7%	8,826,297	116,106
UKR	Ukraine	N. America, Europe &	Europe	Eastern Europe	Upper middle income	Observed	12.6%	9.5%	9.5%	7.3%	11.2%	12.6%	10.4%	15.2%	33,642,253	4,242,228

		Australia														
AUS	Australia	N. America, Europe & Australia	Oceania	Australia and New Zealand	High income	Observed	1.0%	2.2%	1.2%	1.7%	3.4%	1.0%	0.4%	2.4%	22,732,292	221,273
FJI	Fiji	East & SE Asia	Oceania	Melanesia	Upper middle income	Predicted (country-level)	NA	NA	NA	2.7%	21.0%	2.7%	0.2%	13.8%	682,803	18,348
FSM	Micronesia (Federated States of)	East & SE Asia	Oceania	Micronesia	Upper middle income	Predicted (country-level)	NA	NA	NA	7.3%	25.8%	7.3%	0.9%	31.2%	77,880	5,693
KIR	Kiribati	East & SE Asia	Oceania	Micronesia	Lower middle income	Predicted (country-level)	NA	NA	NA	6.0%	27.9%	6.0%	0.7%	25.6%	89,585	5,354
MHL	Marshall Islands	East & SE Asia	Oceania	Micronesia	Upper middle income	Predicted (country-level)	NA	NA	NA	5.8%	23.0%	5.8%	0.6%	24.3%	23,984	1,399
NRU	Nauru	East & SE Asia	Oceania	Micronesia	High income	Predicted (country-level)	NA	NA	NA	4.7%	16.6%	4.7%	0.3%	21.8%	7,557	359
NZL	New Zealand	N. America, Europe & Australia	Oceania	Australia and New Zealand	High income	Predicted (individual)	NA	2.2%	2.9%	1.5%	2.9%	2.2%	0.3%	6.9%	4,372,774	97,007
PLW	Palau	East & SE Asia	Oceania	Micronesia	High income	Predicted (country-level)	NA	NA	NA	4.0%	12.4%	4.0%	0.4%	17.5%	14,495	574
PNG	Papua New Guinea	East & SE Asia	Oceania	Melanesia	Lower middle income	Predicted (country-level)	NA	NA	NA	9.2%	35.4%	9.2%	0.7%	46.0%	7,195,416	659,302

SLB	Solomon Islands	East & SE Asia	Oceania	Melanesia	Lower middle income	Predicted (country-level)	NA	NA	NA	6.8%	34.5%	6.8%	0.7%	27.9%	532,057	36,292
TON	Tonga	East & SE Asia	Oceania	Polynesia	Upper middle income	Predicted (country-level)	NA	NA	NA	5.8%	16.9%	5.8%	0.6%	25.1%	67,516	3,921
TUV	Tuvalu	East & SE Asia	Oceania	Polynesia	Upper middle income	Predicted (country-level)	NA	NA	NA	5.4%	17.7%	5.4%	0.8%	23.3%	6,357	345
VUT	Vanuatu	East & SE Asia	Oceania	Melanesia	Lower middle income	Predicted (country-level)	NA	NA	NA	5.8%	30.9%	5.8%	0.5%	24.6%	207,933	12,045
WSM	Samoa	East & SE Asia	Oceania	Polynesia	Upper middle income	Predicted (country-level)	NA	NA	NA	5.7%	22.1%	5.7%	0.7%	23.4%	135,836	7,763

Fig S20: Uncertainty Estimate Sensitivity Analysis*



*Country bootstrap with model refits (main; black): training countries resampled within model regions (with psus resampled within countries for the individual-level model) and both Elastic Net models refitted, plus a resampled out-of-sample residual for each predicted country; observed countries drawn from their survey sampling distributions.

Residual bootstrap (green): same as the main approach, but new outcome data were generated before refitting the models. For the country-level model, resampled out-of-sample residuals were added to the fitted prevalences (logit scale). For the individual-level model, each country's fitted probabilities were shifted by a resampled country residual (logit scale) and new binary outcomes simulated from them.

Countries fixed, estimate uncertainty only (orange): each country's prevalence drawn independently from a normal distribution based on its estimate and standard error (survey sampling error for observed countries; sampling and prediction error combined for predicted countries, with no resampling of countries or model refits. Errors are therefore not shared between countries predicted by the same model.

Countries resampled with replacement (blue): same as the country fixed approach, but countries are also resampled with replacement within each group. This treats each group's countries as a sample of a wider population, and gives the widest intervals.

Regional, income-group and global prevalences are population-weighted (aged 15 and over, 2025) means of country prevalences in each repetition. UIs are the 2.5th and 97.5th percentiles across repetitions.

Table S13: Region Sensitivity Analysis

Country code	Original region	New region	n	Original Prevalence	Sensitivity Prevalence	Diff pp
JPN	East & SE Asia	N. America, Europe & Australia	1007	1.6%	2.2%	0.6%
KOR	East & SE Asia	N. America, Europe & Australia	1022	2.0%	2.8%	0.8%
SDN	MENA	Eastern Africa	1000	48.8%	53.9%	5.1%
SGP	East & SE Asia	N. America, Europe & Australia	1003	1.0%	1.4%	0.4%
YEM	MENA	Eastern Africa	1000	48.7%	54.0%	5.3%

Table S14: Imputation Sensitivity Analysis

Method	Elastic Net: India	Elastic Net: Other	XGBoost: India	XGBoost: Other
Median/mode (baseline)[1]	0.747	0.734	0.746	0.72
Model-based income[2]	0.746	0.734	0.748	0.727
MICE, pooled[3]	0.748	0.738	0.75	0.723
MICE, range across 5 imputations[4]	0.748–0.749	0.735–0.739	0.747–0.750	0.717–0.729
Maximum difference of MICE imputation from baseline	0.002	0.005	0.004	0.009

[1]Median/mode (baseline): missing values imputed using the country median (continuous variables) or mode (categorical variables) or using the model-region when country data was not available; national-level variables were replaced with the model-region median.

[2]Model-based income: same as baseline, except income quintile, which was imputed from an ordinal logistic model (inadequate income, education, urbanicity, country); for countries with no income data, the model was fitted on the eight countries with the closest GNI per capita.

[3]MICE: multiple imputation by chained equations (5 imputations, 10 iterations). Models were refitted on each imputed dataset, and "pooled" uses hold-out predictions averaged across the five fits.

[4]"Range" gives the minimum and maximum across the five imputations.

Supplementary Text S1: Sensitivity analysis of estimates based on national-level predictor imputation

Missing national-level data on corruption perception index, WASH mortality, Climate Vulnerability Index and GNI were imputed using MICE, where other national-level variables were used as predictors. Four of these predictors had some countries with missing data: water stress (n=17), rainfall (n=13), basic drinking water (n=1), U5 mortality (n=1). These gaps were filled in the main analysis using the median value from the region (model region), and for countries missing these variables other missing data was also filled using median values from the country's region (model region).

In a sensitivity analysis, all incomplete national-level variables were jointly imputed using MICE. Each variable was imputed from all other national level variables and model region using predictive mean matching. In this procedure each missing value was replaced by the observed value from one of 5 countries whose model-predicted values were the closest. This was run for 10 iterations and repeated 5 times with different random draws and the average of the 5 values was used (same procedure as main analysis). Individual-level imputation remained the same. The individual-level and country-level models were then refitted and estimates recalculated.

This imputation method made little difference to the estimates: regional, global and income group estimates changed by less than 0.1 percentage points (Table S15). Changes were confined to countries missing national level data: all of these countries had <3 percentage point change in their estimates, and all those with more than a 1 percentage point change were within the range of the uncertainty intervals (Table S16).

Table S15: Sensitivity analysis by group to imputation of national level predictors

	Group	Prev Main	Prev Sens	Difference percentage point*
	Africa	36.2%	36.2%	-0.015
	Americas	16.9%	17.0%	0.006
	Asia	10.6%	10.6%	-0.005
	Europe	4.2%	4.2%	-0.002
	Oceania	3.0%	2.9%	-0.037
M49 Region	Global	14.7%	14.7%	-0.005
	High income	3.7%	3.7%	-0.002
	Low income	40.7%	40.7%	-0.070
	Lower middle income	20.3%	20.3%	0.003
	Upper middle income	10.4%	10.4%	-0.001
Income Group	Global	14.7%	14.7%	-0.005

*Differences calculated before rounding

Table S16: Sensitivity analysis by country to imputation of national level predictors*

Country	Country Code	Tier	Main analysis (95% UI)	Sensitivity	Difference (percentage points)	Within main 95% UI
Antigua and Barbuda	ATG	Predicted (country-level)	23.0% (3.0%–53.2%)	20.3%	-2.7	Yes
Solomon Islands	SLB	Predicted (country-level)	6.8% (0.7%–27.9%)	4.3%	-2.5	Yes
South Sudan	SSD	Predicted (individual)	67.2% (22.1%–86.5%)	65.5%	-1.7	Yes
Micronesia (Federated States of)	FSM	Predicted (country-level)	7.3% (0.9%–31.2%)	9.0%	1.7	Yes
Nicaragua	NIC	Predicted (individual)	31.5% (9.4%–53.9%)	33.0%	1.5	Yes
Bahamas	BHS	Predicted (country-level)	16.2% (2.0%–46.8%)	17.5%	1.4	Yes

Palau	PLW	Predicted (country-level)	4.0% (0.4%–17.5%)	2.7%	-1.3	Yes
Vanuatu	VUT	Predicted (country-level)	5.8% (0.5%–24.6%)	4.6%	-1.2	Yes

*Only countries whose estimates changed by >1 percentage point displayed

Supplementary Text S2: Sensitivity of the estimates to individual-level imputation

In the main analysis, the individual level models used the first of the five MICE imputations. Sensitivity analysis was conducted to assess how using the other four imputations would affect the results. The predictions for the individual-level model were recalculated by applying the Elastic-Net model on each of the imputed sets to see how this affected the predictions (prediction side), and by also refitting the model on each of the imputed training datasets and predicting from the first imputation (training side). Four countries that had entirely missing data for some individual-level variables were expected to be most affected by this approach (Cuba, Djibouti, Guyana and Qatar).

Across all 85 Tier 2 countries (using the individual-level model), the range of the five estimates had a median of 0.05 percentage points on the prediction side (max 0.52 Guyana) and 0.03 on training side (max 0.42 Guyana), see Table S17. No estimates changed by more than 1 percentage point and these estimates remained within the uncertainty intervals calculated in the main analysis.

Table S17: Sensitivity analysis of Tier 2 estimates to individual-level predictor imputation

Country	**Variables with no observed values (imputed by MICE from other countries)**	**Main estimate (95% UI)**	**Prediction side: estimate across 5 imputations**	Prediction side: range (pp)	Training side: estimate across 5 imputations	Training side: range (pp)	Within main 95% UI
Guyana (GUY)	income quintile, employment, household size	26.2% (6.3%–55.9%)	26.2%–26.7%	0.52	26.1%–26.5%	0.42	Yes
Qatar (QAT)	water dissatisfaction	14.5% (2.7%–33.6%)	14.2%–14.6%	0.36	14.5%–14.6%	0.10	Yes
Cuba (CUB)	income quintile, income adequacy, employment, household size	23.5% (4.9%–51.6%)	23.4%–23.5%	0.17	23.4%–23.8%	0.35	Yes
Djibouti (DJI)	income quintile, household size	24.7% (6.2%–51.2%)	24.6%–24.8%	0.16	24.7%–25.0%	0.29	Yes
All other Tier 2 countries (n = 81)	none			median 0.04; max 0.37 (SDN)		median 0.03; max 0.31 (LSO)	81 of 81

Supplementary Text S3: Comparison with collected national data

When comparing predicted estimates from the machine learning model to other data collected nationally using household or abbreviated versions of the water insecurity experience scales, some variation was found but the estimates fall broadly within what we may expect given methodological differences. In Mexico our model estimates individual water insecurity prevalence over a 12-month period to be 30.9% in 2025, whereas household water insecurity prevalence was observed to be 15.9%, as measured using a 4-week recall in ENSANUT in 2024 [14]. A higher prevalence of water insecurity is expected to be captured when looking at individual water over the course of 12 months compared to household water insecurity over 4 weeks. Similar differences were found when comparing data from Mozambique, where observed data captured in the 2025 Gallup World Poll found that 35.4% of individuals were water insecure over a 12- month period compared to 22.9% of households were found to be water insecure over a 4-week period during the 2022-2023 Demographic and Health Survey [15]. However, there is some inherent uncertainty in the model, so some level of overestimation cannot be ruled out.

For Saudi Arabia our model predicted prevalence of water insecurity to be 11.3% using the individual-level model, which is similar to the observed individual prevalence of 8% among Saudi nationals, as measured using IWISE-4 (a validated abbreviated version of the IWISE-12 [16]) over a 12-month recall collected by the King Khalid Foundation [17]. Notably this country has a slightly higher level of water stress than the countries in the observed training data range, though less than 10%.

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