Supplementary Figures and Tables

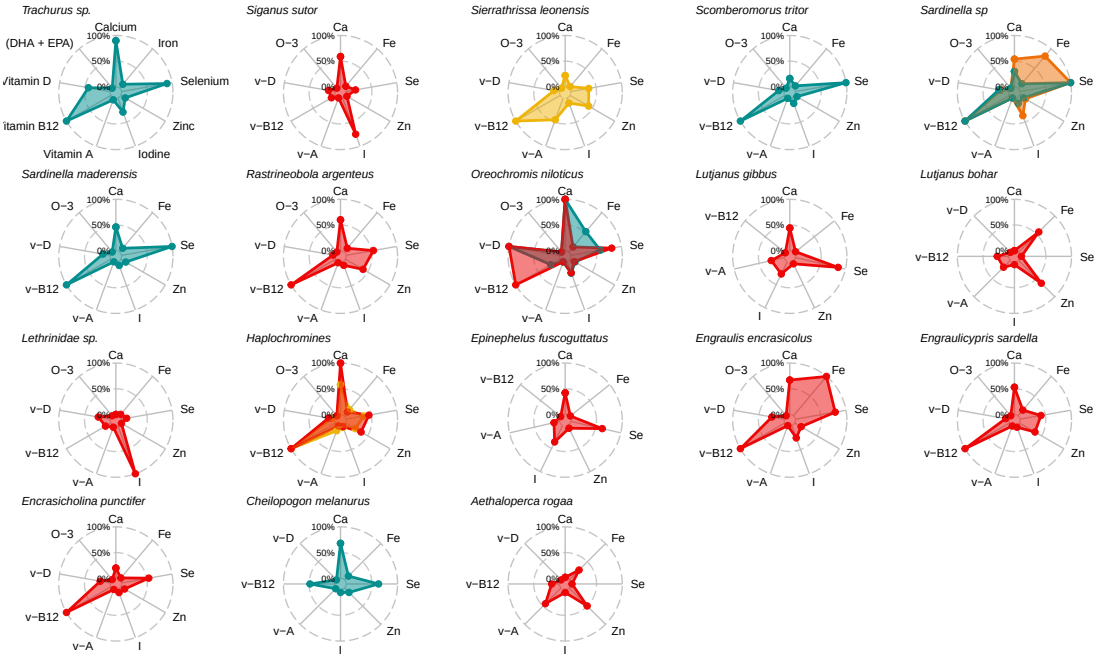

Fig. S1. Nutrient content of processed fish species. Radars show contribution of 9 g portion to recommend intakes of each nutrient, for each sampled species. Plots coloured by processing type.

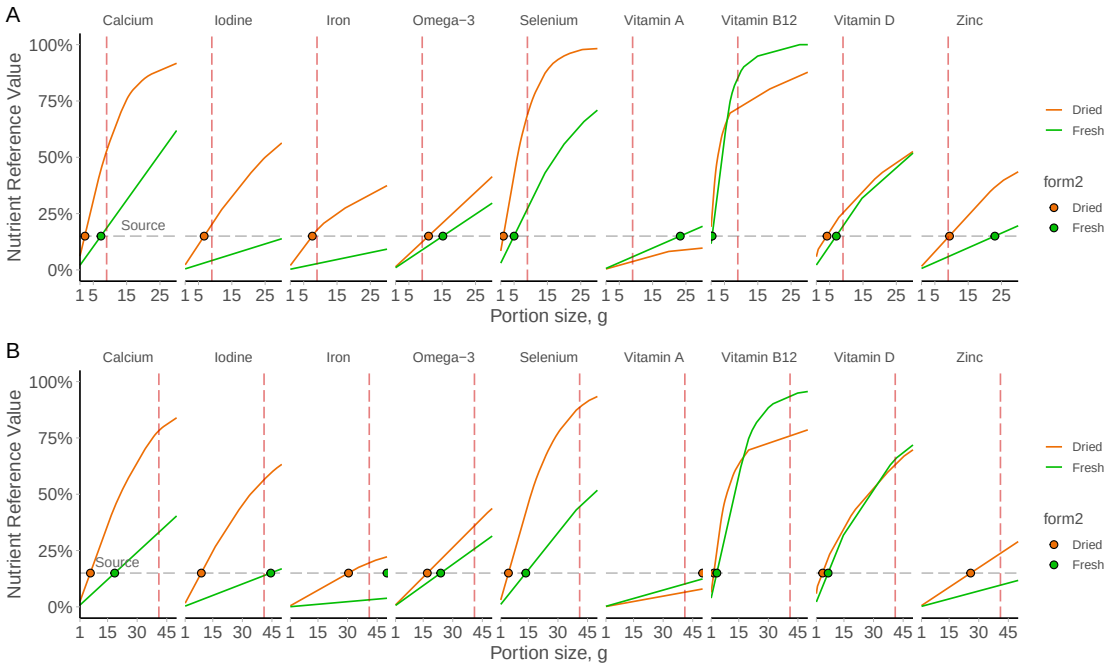

Fig. S2. Portion size of processed fish species required to reach recommended nutrient intakes. Lines show the contribution to NRV (children 0.5 - 5 years old) across range in portion sizes, for each nutrient and by processing type. We use 15% NRV as a threshold for a 'source' of a specific nutrient.

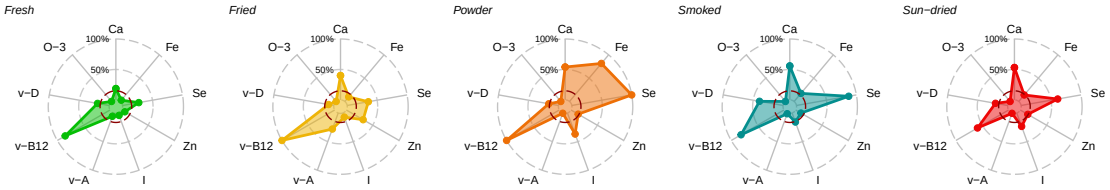

Fig. S3. Nutrient content of fish species by processing type. Radars show contribution of 9 g portion to recommend intakes of each nutrient, for processing type, averaged across species.

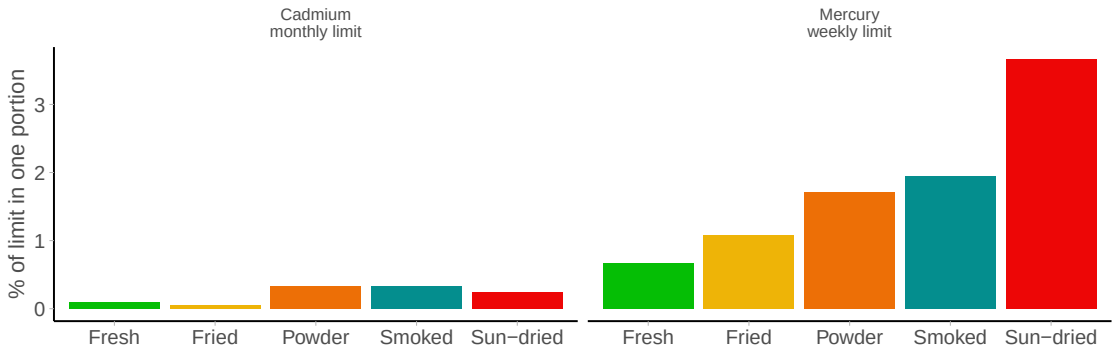

Fig. S4. Contaminant content of fish by processing type. Bars show contribution of 9 g portion to exposure limits of cadmium and mercury for each processing type, averaged across species.

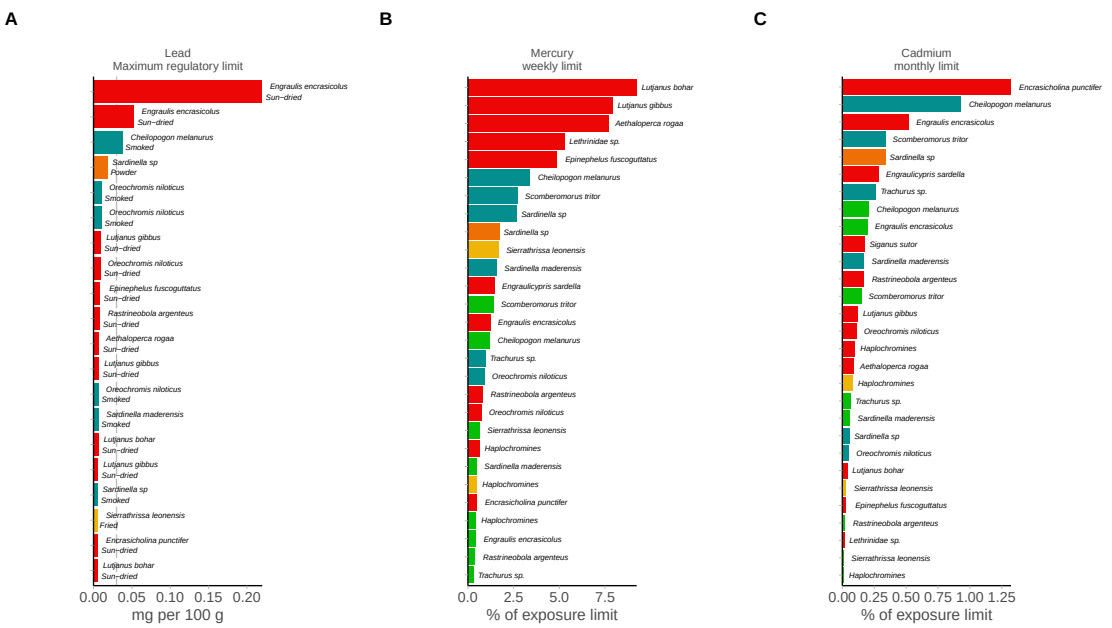

Fig. S5. Contaminant content of processed fish species. A) Bars show 20 individual samples with the highest lead content, with three samples exceeding the maximum regulatory limit (0.3 mg/kg). For B) cadmium and C) mercury, bars show the contribution of 9 g portion to exposure limits offor each sampled species, coloured by processing type.

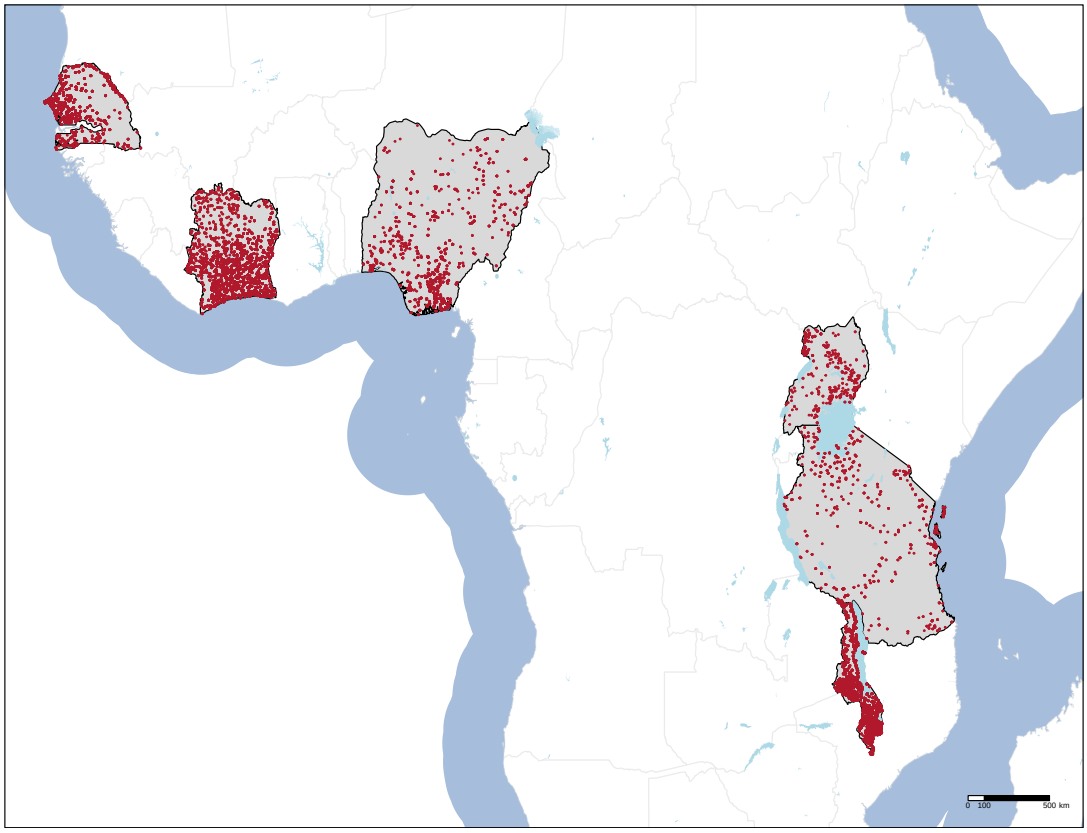

Fig. S6. Geographical location of LSMS across six countries. Red points are surveyed households.

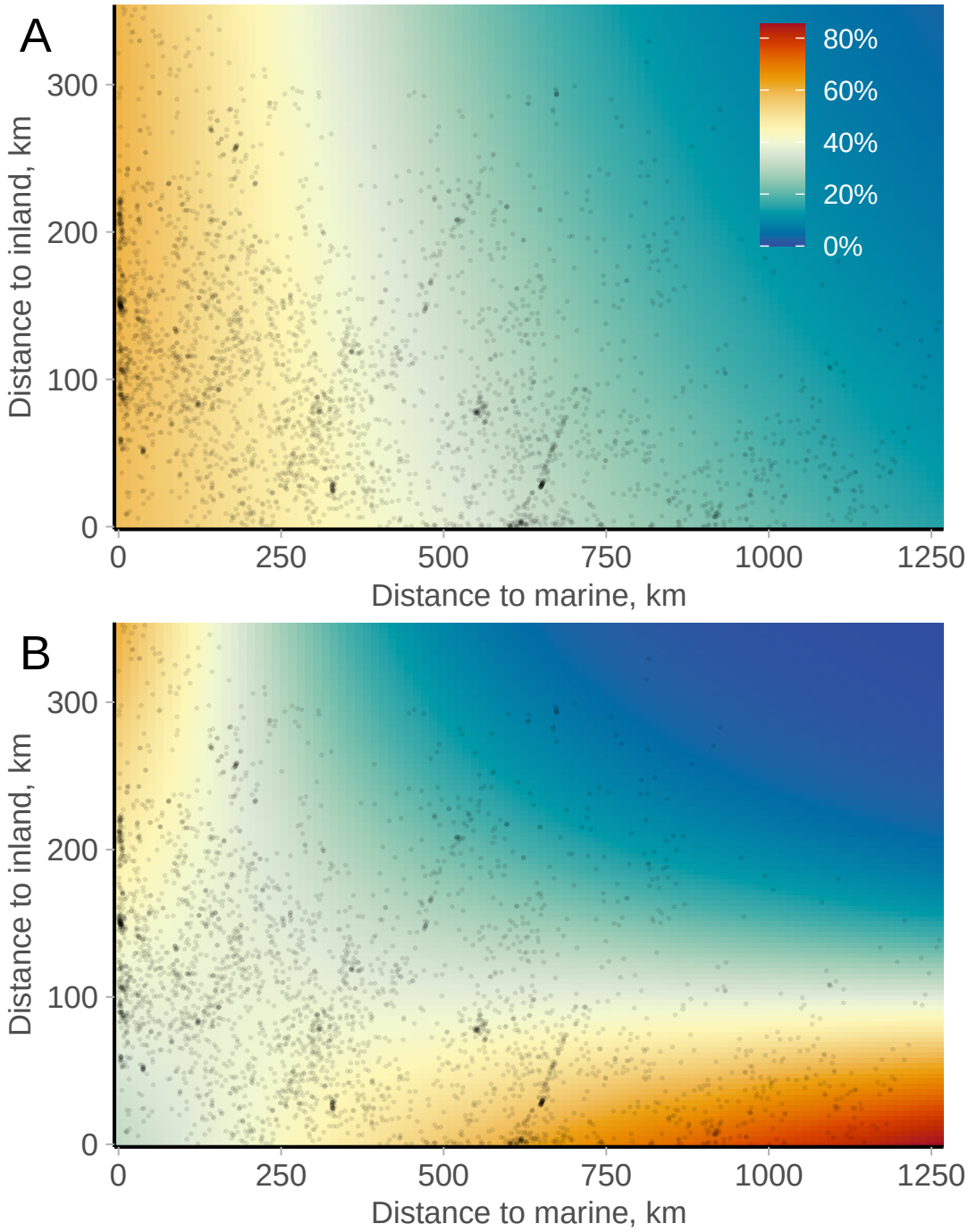

Fig. S7. Effect of distance to water on consumption of dried (A) and fresh (B) fish. Heat maps show median predicted probability of fish consumption (low = blue, high = red) along gradients in marine and inland water access. Heat maps are overlaid with the average location of all household clusters in LSMS.

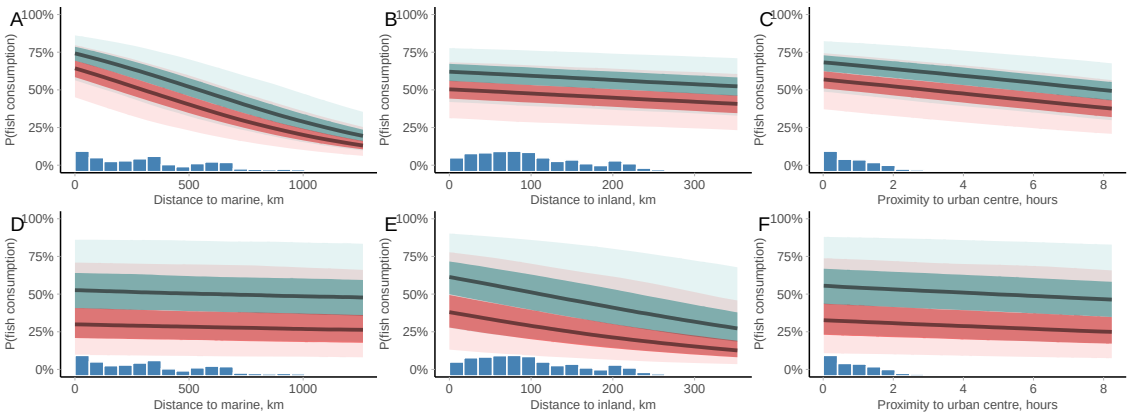

Fig. S8. Dried (top-row) and fresh (bottom-row) fish consumption for poor and rich households (10% and 90% quantiles of household wealth, respectively). Panels show distance to marine water (A, D), distance to inland water (B, E), and proximity to urban centre (C, F), where lines are the median posterior predicted probability that a poor (red) or wealthy (blue) household consumed fish (shading = 50% and 95% posterior density intervals). Each posterior prediction holds other covariates at their mean (0). Inset histograms show distribution of observed data.

Country	Date	Location	Source	Population	Processing type	Primary species	Source	Avg. portion, g	Study portion relative to our analysis
Kenya	2014	Mfangano Island	Fiorella et al. 2018	WRA	Dried dagaa and cichlids, and fresh or fried tilapia and Nile perch	*Rastrineobola argentea, Cichlidae*	FW	85	207%
Kenya	2014	Mfangano Island	Fiorella et al. 2018	Child (<24 months)	Dried dagaa and cichlids, and fresh or fried tilapia and Nile perch	*Rastrineobola argentea, Cichlidae*	FW	-	-
Malawi	2018-2019	Mangochi District	Werner et al, 2024	Child (6-15 months)	Small fish (not identified)	*Engraulicypris sardella*	FW	3.35	37%
Uganda	2018	Eastern Uganda	Lydia O'Meara	WRA (NPNL)	Sun-dried fish	*Rastrineobola argentea*	FW	12.75	31%
Uganda	2018	Eastern Uganda	Lydia O'Meara	Child (12-23 mo)	Sun-dried fish	*Rastrineobola argentea*	FW	2	22%
Uganda	2018	Eastern Uganda	Kimere et al, 2022	Child (12-23 months)	Small fish with bones	*Rastrineobola argentea*	FW	2	22%
Uganda & Tanzania	-	Northwestern Tanzania and Central Uganda	Ekesa et al 2019	Child (12-59 months)	Dried or fried	*Rastrineobola argentea*	FW	15	167%
Zambia	-	Lusaka	Marinda et al. 2018	Household	Fresh, dried, smoked, salted fish.	*Claris theodorae, Rastrineobola argentea, Limnothrissa miodan, Stolothrissa miodon*	FW	-	-
Ghana	2022	Four coastal regions	Jananda et al. 2023	Child (18-59 months)	40 small fish species, primarily fried (43%) or smoked (38%)	*Sardinella aurita, Engraulis encrasicolus, Scomber colias*	M	29.5	328%
Ghana	-	National	Hasselberg et al, 2022	Child (6-23 months)	-	-	M	17	189%
Senegal	-	Dakar	Anderson et al. 2010	Adult Men (20-62 years)	No processing indicated.	*Epinephelus aeneus, Sardinella sp.*	M	33.17	81%
Tanzania	2015	Central Tanzania	Raymond et al. 2017	Child (6-23 months)	Whole fish, dried or smoked	Sardine and tilapia	-	-	-
Tanzania	2008-09	Rufiji river floodplain	Moreau & Garaway 2018	Household	Fresh and sundried	*Oreochromis urolepsis, Citharinus congicus, Synodontis rukwaensis, Rastrineobola argentea, Hilsa kelee*	FW & M	86.3	-
Kenya	2021	Southern Kenyan coast	Odoli et al. 2021	-	Dried sardine (Sardinella gibbosa)	*Sardinella gibbosa*	M	-	-
Ghana	2023	Greater Accra, Volta, Central, and Western regions	Agyei-Mensah et al. 2023	Household	Dried, smoked, or fried	*Sardinella, Engraulis encrasicolus*	M	-	-

Table S1 | Species composition and portion size of dried fish consumption from studies conducted across East and West Africa. WRA = women of reproductive age. Table is ordered by the 'Source' column, indicating fish sourced from freshwater (FW, green) or marine (M, blue) ecosystems

							% households consuming fish			
Country	**Survey Name**	**Total population**	**Population year**	**N households**	**Avg. household size**	**Dried fish categories**	**Fish**	**Processed fish**	**Smoked**	**Dried**
Cote D'Ivoire	Enquête Harmonisée sur le Conditions de Vie des Ménages 2018-2019	28,873,034	2023	12,774	2.6	Poisson fumé mangni, Autres Poissons fumés	87%	59%	100%	-
Malawi	Fourth Integrated Household Survey 2016-2017	20,931,751	2023	12,447	3.7	Dried fish (small, medium, large), Smoked fish (small, medium, large)	73%	63%	32%	82%
Nigeria	General Household Survey Wave 4 2018-2019	223,804,632	2023	4,976	5.2	Fish - smoked, Fish - dried	71%	42%	41%	67%
Senegal	Enquête Harmonisée sur le Conditions de Vie des Ménages 2018-2019	17,763,163	2023	7,101	9.3	Poisson fumé Kethiakh (sardinelle), Autre Poisson fumé (Con fumé, yaboye ou obo fumé, …), Poisson séché	91%	67%	69%	73%
Tanzania	National Panel Survey 2014-2015, Wave 4	67,438,106	2023	3,352	5.3	Dried/salted fish and seafood	75%	29%	-	-
Uganda	National Panel Survey 2010-2011	48,582,334	2023	2,657	7.1	Dry/Smoked fish	36%	24%	-	-
		407,393,020		***43,307***						

Table S2 | The number of households surveyed in LSMS, with dried fish categories and % household consuming each type, by country. Total population estimates from data.worldbank.org. Some households consumed both smoked and dried, meaning combined processed proportions may exceed 100%.

Covariate	Definition	Link with fish consumption	Data source
Proximity to inland waterbody	Distance from household to nearest large inland waterbody, km	Households nearer to inland fish production sources are likely to have greater physical access to fish and at lower prices, thus associated with higher fish consumption	Lehner & Doll (2004), South (2017)
Proximity to marine coastline	Distance from household to nearest marine coastline, km	Households nearer to marine fish production sources are likely to have greater physical access to fish and at lower prices, thus associated with higher fish consumption	Lehner & Doll (2004), South (2017)
Proximity to urban centres	Travel time from household to nearest urban centre via surface transport (based on 2015 data)	Urban centres likely to have greater availability of fish products, through trade routes, and lower fish prices, thus associated with higher fish consumption	Weiss et al. (2018)
Wealth	Total expenditure on items in the past 3 months (square root and scaled to Purchasing Power Parity)	Dried fish are more affordable than fresh fish and so may be consumed more by poorer households	LSMS, World Bank (2024)
Household size	Number of people in household	Larger households consume more foods and thus may be more likely to have consumed fish in the past 7 days	LSMS
Household cluster	Nested intercept of household cluster (defined by country survey)	Non-independence of diet surveys from neighbouring households	LSMS
Household country	Country intercept	Country-level prevalence of fish consumption	LSMS

Table S3 | Explanatory covariates used in LSMS models of dried and fresh fish consumption.

	Calcium, mg	Iron, mg	Zinc, mg	Selenium, µg	Iodine, µg	Vitamin B12, µg	Vitamin A, µg	Vitamin D, µg	Omega-3 (EPA + DHA), g	Cadmium, µg	Lead, mg/kg	Mercury, µg
Children 0.5-5 years	450	7.5	4.1	20	110	0.8	250	5	0.7	0.32	0.05	0.02
Women 15-49 years	1150	30.1	11.4	55	150	2.4	650	5	1.1	1.625	0.05	0.104
Guideline	RNI	RNI	PRI	RDA	RDA	RNI	PRI	RNI	AI	PTMI	Maximum regulatory limit	TWI
Source	WHO & FAO (2004)	WHO & FAO (2004)	EFSA (2017)	IOM (2000)	IOM (2001)	WHO & FAO (2004)	EFSA (2017)	WHO & FAO (2004)	FAO & WHO (2010)	JECFA (2010)	EC (2014)	JECFA (2006)

Table S4 | Nutrient reference values and contaminant limits. Values are the per capita recommended intakes per day (for nutrients), or healthy limits per day, week, or month (for contaminants), for young children and non-pregnant, adult women. Iron requirements assume 10% bioavailability (i.e. diets with moderate phytate concentrations and some meat/fish). Zinc requirements assume an estimated phytate intake level of 900 mg/day (i.e. a semi-unrefined diet). Cadmium and mercury tolerable intakes were estimated for a child of 12.8 kg and adult woman of 65 kg. RNI = Recommended Nutrient Intake, PRI = Population Reference Intake, RDA = Recommended Dietary Allowance, AI = Adequate Intake, PTMI = Provisional Tolerable Monthly Intake, TWI = Tolerable Weekly Intake.

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