# **Supplementary Information**

## **Supplementary Materials and Methods**

#### Data collection and processing

Food allergy prevalence data were curated from the original studies<sup>1,2</sup> and were logit transformed for analysis. Nutritional compositions of food allergens were obtained from the U.S. Department of Agriculture (USDA) FoodData Central database (<a href="https://fdc.nal.usda.gov/index.html">https://fdc.nal.usda.gov/index.html</a>). Each macronutrient (protein, carbohydrate and fat) was calculated as g content per 100g of food and the remaining was grouped as other.

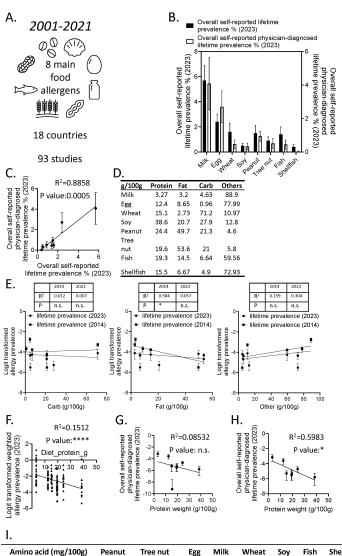
#### Modelling and analysis

Data analyses were run in RStudio (v4.1.2.) or in GraphPad PRISM.

GraphPad PRISM was also used for the correlation analyses for logit transformed food allergy prevalence and the corresponding macronutrient content and amino acid content.

*lmer()* function in *lme4* package was used for the linear mixed-effects modelling of logit transformed food allergy prevalence and the corresponding macronutrient compositions, with foods and countries that the prevalence data was based on adjusted as random effects. The macronutrient compositions and their potential interactions were used as predictors, and a null model considering only the random effects from foods and countries was included as well. Akaike information criterion (AIC) was used for model evaluation and the one with the lowest AIC was favoured.

# **Supplementary Figure**



Amino acid (mg/100g)	Peanut	Tree nut	Egg	Milk	Wheat	Soy	Fish	Shellfish
Tryptophan	332	170	163	46	191	204	270	186
Threonine	1156	620	580	164	350	874	960	886
Isoleucine	1256	440	686	204	430	1024	1070	929
Leucine	2455	810	912	341	780	1822	1790	1527
Lysine	1748	450	745	292	340	1321	1960	2031
Methionine	493	200	392	83	190	311	590	520
Cystine	316	170	292	27	290	327	240	176
Phenylalanine	1559	540	673	172	530	1033	790	778
Tyrosine	1099	310	534	169	350	703	690	634
Valine	1614	580	766	240	550	1054	1130	964
Arginine	3448	2430	686	89	540	2095	1250	1454
Histidine	788	330	232	116	280	590	550	333
Alanine	997	530	667	138	410	983	1180	1191
Aspartic acid	3248	1440	966	292	740	2458	1970	1925
Glutamic acid	6930	3340	1323	707	4320	4733	3120	2943
Glycine	1326	710	397	85	440	908	990	1385
Proline	1137	580	298	355	1310	933	650	599
Serine	1381	660	840	186	570	1104	810	819

Figure S1. A-B. Overview of allergy studies for the eight common food allergens (milk, egg, wheat, soy, peanut, tree nut, fish and shellfish, A) and the pooled estimates for overall selfreported lifetime prevalence (black) and overall self-reported physician-diagnosed lifetime prevalence (white) (B) described in Spolidoro et al. 2023. C. Correlation analysis for the pooled estimates for overall self-reported lifetime food allergy prevalence and overall self-reported physician-diagnosed food allergy prevalence for the eight common food allergens described in Spolidoro et al. 2023. **D.** Overview of the nutrient compositions (g content/100g food) of the eight common food allergens. E. Correlation analyses for the carbohydrate (carb), fat, and other contents in food allergens and their corresponding logit transformed pooled estimates for overall self-reported lifetime prevalence in 2023 and 2014. F. Correlation analysis for the protein content in food allergens and their corresponding logit transformed self-reported lifetime food allergy prevalence reported in 93 individual studies reviewed in Spolidoro et al. 2023 after adjusting by weight reported in the original meta-analysis. G-H. Correlation analyses for the protein content in food allergens and their corresponding logit transformed pooled estimates for overall selfreported physician-diagnosed lifetime prevalence including (G) and excluding shellfish (H) reported in Spolidoro et al. 2023. I. Overview of the amino acid compositions (mg content/100g food) of the eight common food allergens.

### **Supplementary Table**

**Table S1.** Akaike information criterion (AIC) results for the linear mixed-effect modelling for logit transformed food allergy prevalence (logit.pre) and the corresponding nutrient compositions (protein, carbohydrate (carb), fat, and other), with the corresponding foods and countries that the data was based on adjusted as random effects.

Models	AIC
$Imer(logit.pre \sim 1 + (1 Food) + (1 Country))$	396.3631
$Imer(logit.pre \sim 1+ (1 Food))$	407.4841
$Imer(logit.pre \sim 1 + (1 Country))$	431.8854
lmer(logit.pre ~ 1+ Protein + (1 Food) + (1 Country))	388.1100
lmer(logit.pre ~ 1+ Protein + (1 Food))	400.1929
lmer(logit.pre ~ 1+ Protein + (1 Country))	391.4684
$Imer(logit.pre \sim 1 + Fat + (1 Food) + (1 Country))$	395.4642
$Imer(logit.pre \sim 1 + Fat + (1 Food))$	406.3059
$Imer(logit.pre \sim 1 + Fat + (1 Country))$	423.2048
$Imer(logit.pre \sim 1 + Carb + (1 Food) + (1 Country))$	395.7735
$Imer(logit.pre \sim 1 + Carb + (1 Food))$	407.1841
$Imer(logit.pre \sim 1 + Carb + (1 Country))$	426.9792
$Imer(logit.pre \sim 1 + Other + (1 Food) + (1 Country))$	394.9930
$Imer(logit.pre \sim 1 + Other + (1 Food))$	406.5240
$Imer(logit.pre \sim 1 + Other + (1 Country))$	410.4373

$Imer(logit.pre \sim 0 + Protein + Fat + Carb + Other + (1 Food) + (1 Country))$	388.8317
$Imer(logit.pre \sim 0 + Protein + Fat + Carb + Other + (1 Food))$	400.7301
$Imer(logit.pre \sim 0 + Protein + Fat + Carb + Other + (1 Country))$	394.1248
$Imer(logit.pre \sim 1 + Protein + Fat + Carb + (1 Food) + (1 Country))$	388.8317
$Imer(logit.pre \sim 1 + Protein + Fat + Other + (1 Food) + (1 Country))$	388.8317
$Imer(logit.pre \sim 1 + Protein + Carb + Other + (1 Food) + (1 Country))$	388.8317
$Imer(logit.pre \sim 1 + Fat + Carb + Other + (1 Food) + (1 Country))$	388.8317

### References

- 1. Spolidoro GCI, Ali MM, Amera YT, et al. Prevalence estimates of eight big food allergies in Europe: Updated systematic review and meta-analysis. *Allergy.* 2023;78(9):2361-2417.
- 2. Nwaru BI, Hickstein L, Panesar SS, et al. Prevalence of common food allergies in Europe: a systematic review and meta-analysis. *Allergy.* 2014;69(8):992-1007.