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Recto: Lu LIU et al. Dietary Zn intake and inadequacy in China
RESEARCH ARTICLE

Time trends in dietary Zn intake and occurrence of dietary Zn inadequacy among Chinese adults: data from the China Health and Nutrition Surveys between 2004 and 2011

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Supplementary materials

Table S1 Survey regions in the China Health and Nutrition Survey 2004–2011 for nine regions (Heilongjiang, Liaoning, Shandong, Jiangsu, Henan, Hubei, Hunan, Guizhou, and Guangxi) were included for 2004, 2006, and 2009 and three cities (Beijing, Chongqing, and Shanghai) only for 2011

Region	2004	2006	2009	2011
Guangxi	√	√	√	√
Guizhou	√	√	√	√
Heilongjiang	√	√	√	√
Henan	√	√	√	√
Hubei	√	√	√	√
Hunan	√	√	√	√
Jiangsu	√	√	√	√
Liaoning	√	√	√	√
Shandong	√	√	√	√
Shanghai				√
Beijing				√
Chongqing				√

Table S2 Four-way table of sociodemographic characteristics (year, gender, income level, and living area) of China Health and Nutrition Survey in 2004–2011

Survey	Male			Female			Total
	Low	Middle	High	Low	Middle	High	
2004							
Rural	629	656	446	695	698	481	3605
Urban	191	251	427	207	271	452	1799
Total	820	907	873	902	969	933	5404
2006							
Rural	531	585	445	610	636	473	3280
Urban	139	232	400	187	260	406	1624
Total	670	817	845	797	896	879	4904
2009							
Rural	540	595	470	610	623	475	3313
Urban	167	233	351	203	260	353	1567
Total	707	828	821	813	883	828	4880
2011							
Rural	574	694	445	732	741	466	3652
Urban	219	369	530	298	418	592	2426
Total	793	1063	975	1030	1159	1058	6078

Table S3 Chinese dietary reference intakes of Zn (NHC, 2017)

Age	Zn (mg·d^{-1})		
	EAR	RNI	UL
0–0.5		2	
0.5–1	2.8	3.5	
1–4	3.2	4.0	8
4–7	4.6	5.5	12
7–11	5.9	7.0	19
11–14 (male)	8.2	10.0	28
11–14 (female)	7.6	9.0	
14–18 (male)	9.7	12.0	35
14–18 (female)	6.9	8.5	
18–50 (male)	10.4	12.5	40
18–50 (female)	6.1	7.5	
Above 50 (male)	10.4	12.5	40
Above 50 (female)	6.1	7.5	

Note: EAR, estimated average requirement; RNI, recommended nutrient intake; UL, tolerable upper intake level.

Table S4 The fixed effects from years and income on dietary Zn intake (mg·d^{-1}) as estimated using mixed-effect regression (Eq. S1)

Variables	Fixed effect on dietary Zn intake (mg·d^{-1}) with 95% CI	Standard error	*P* value
Survey year	–0.16 [0.0051, 0.0054]	0.015	< 0.001
Income in each survey year			
2004	0.000024 [0.0000028, 0.000045]	0.000011	0.026
2006	0.000017 [0.0000015, 0.000033]	0.000008	0.032
2009	0.000018 [0.00001, 0.000026]	0.000004	< 0.001
2011	0.000011 [-0.0000014, 0.000023]	0.000006	0.083

Note: nine regions (Heilongjiang, Liaoning, Shandong, Jiangsu, Henan, Hubei, Hunan, Guizhou, and Guangxi) were involved in 2004, 2006, 2009, and 2011. Community was added to the model as a random effect.

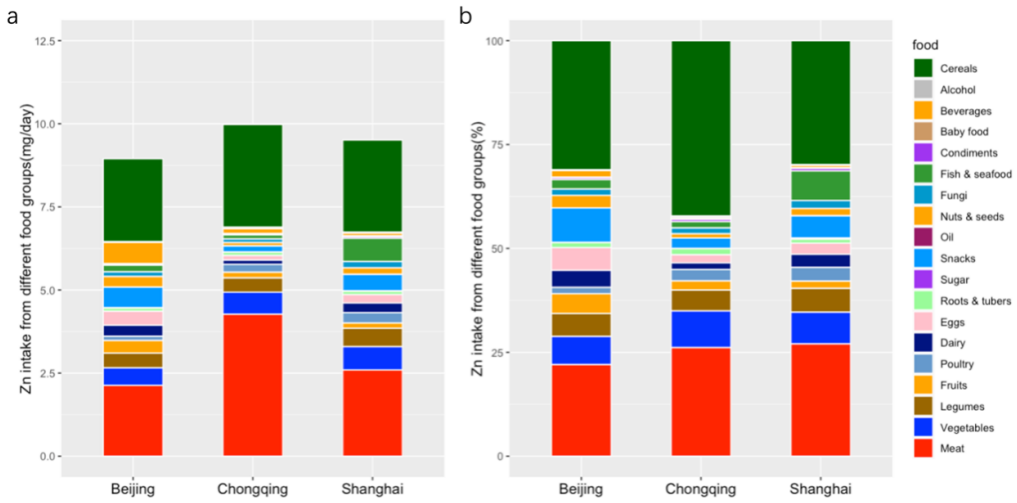

Fig. S1 Dietary Zn intake from 19 food groups for three cities surveyed in 2011 by (a) amount ($mg \cdot d^{-1}$) and (b) proportion of total daily intake (%).

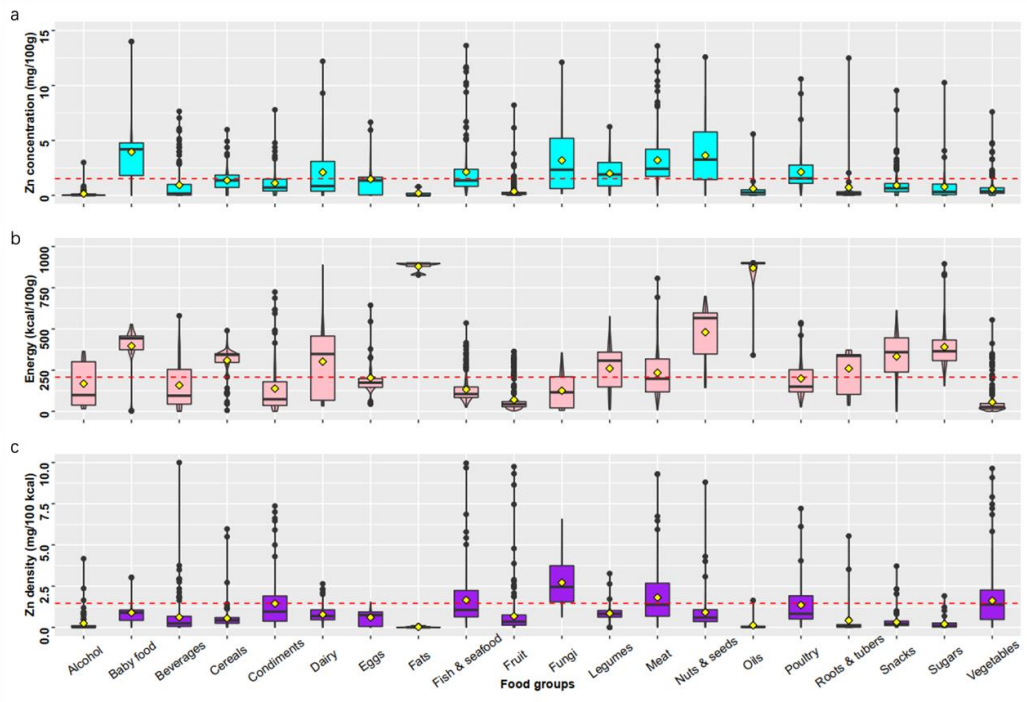

Fig. S2 Concentration of (a) Zn (mg per 100 g), (b) energy (kcal per 100 g), and (c) Zn density (mg per 100 kcal) in 19 food groups[29,42]. Yellow dots represent the mean of one group. The red dash lines represents the mean over all food groups. The range of Zn density was shown among 0–15 mg per 100 kcal.

The fixed effects on dietary Zn intake ($mg \cdot d^{-1}$) and explanatory variables (i.e., survey year (as numerical variable) and income level (as numerical variable)) was explored using the following linear mixed effects model:

$$\text{Zn intake} = \beta_0 + \beta_1 \times \text{Year}_{ij} + \beta_2 \times \text{Income}_{ij} + a_i + \varepsilon_{ij} \quad \text{(S1)}$$

In which the indices i and j represent community ID and individual ID, where community is a government-designated administrative district. In all mixed effects models, β_0 is the intercept, β_1 and β_2 are the slope of each explanatory variables. a_i is a random community effect, and ε_{ij} is a residual random error, both assumed to be independent and normally distributed with constant variance.

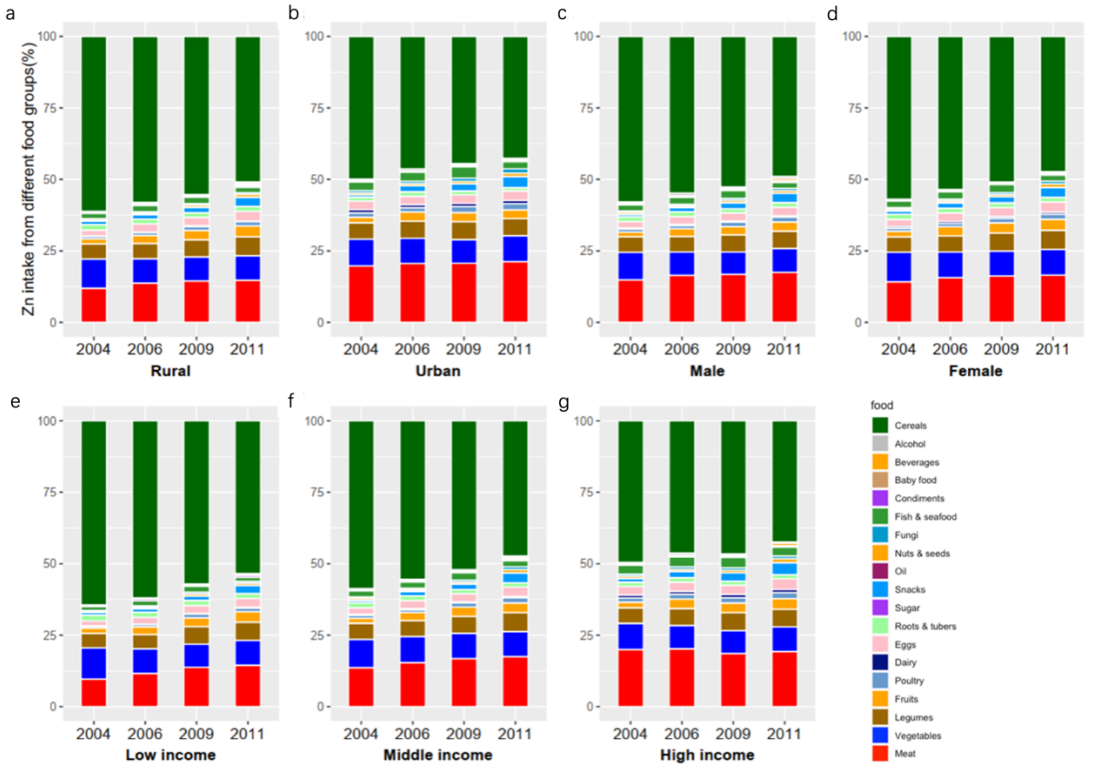

Fig. S3 Time trend of dietary Zn intake by proportion (%) from 19 food groups for adults living in (a) rural areas and (b) urban areas for (c) males, (d) females, (e–g) the income groups (e, low; f, middle; and g, high).

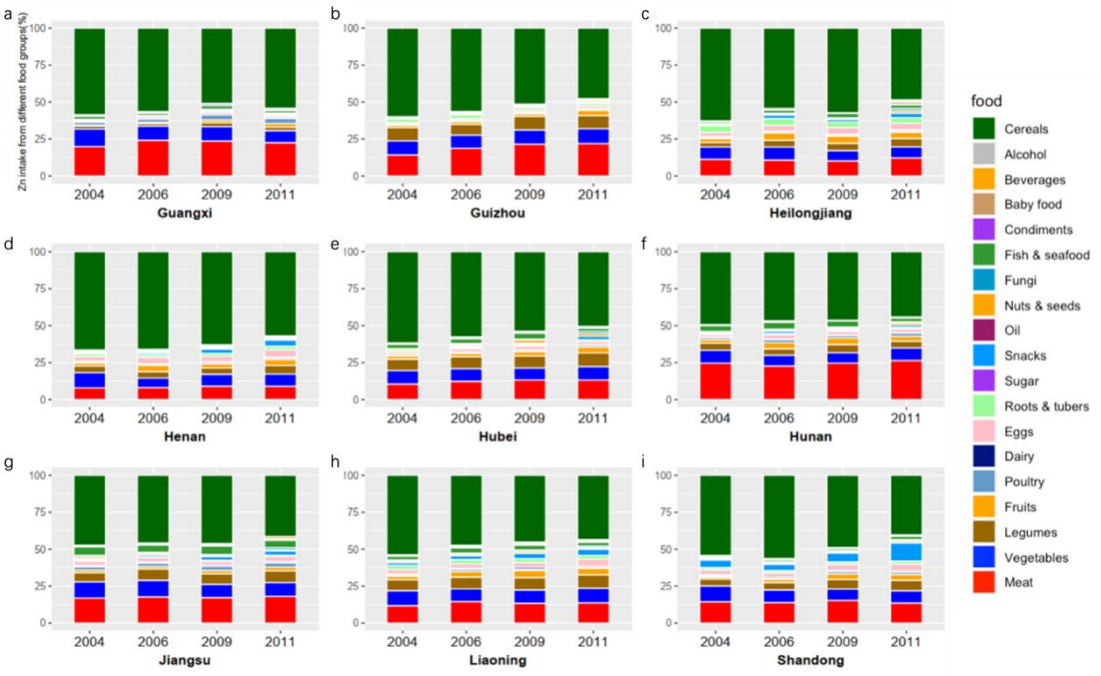

Fig. S4 Time trend of dietary Zn intake from 19 food groups for nine regions by proportion (%) of total daily intake.