Association between Adequate dietary protein and all-cause and cardiovascular mortality in patients with selective glomerular hypofiltration syndromes

European Journal of Nutrition

Ruming Shen; Zhongjiao Xu; Li Lin; Jiayi Shen; Wuming Hu; Lingchun Lv; Tiemin Wei

Corresponding Author: Tiemin Wei, MD, Department of Cardiology, Lishui Hospital, Zhejiang University School of Medicine, No.289, Kuocang Road, Liandu District, Lishui, China, 323000. Email: lswtm@sina.com
Co-corresponding author: Lingchun Lv
E-mail: lvlingchun@medmail.com.cn

Method 1. Laboratory Methodology for Cystatin C and creatinine

Cystatin C levels were determined using a Cystatin C immunoassay on an automated multi-channel analyzer (Siemens Dimension Vista 1500, Siemens Healthcare Diagnostics).

For the measurement of creatinine levels, an improved version of the Jaffé reaction, as modified by Popper et al and Seeling and Wuest, was utilized. Any values below 0.6 mg/dL were considered insignificant and treated as missing data. It is noteworthy that there were notable discrepancies between creatinine levels measured during NHANES 1999-2000 and the gold standard reference method [Roche coupled enzymatic assay (creatininase, creatinase, sarcosine oxidase, kits #1775677 and 1775766) performed on a Roche P Module instrument]. Consequently, Deming regression was employed to correct the creatinine results for NHANES 1999-2000, following the recommendation provided on the NHANES official website [Standard Creatinine (Y) = 1.013*NHANES Creatinine (X) + 0.147 (r = 0.984)].

Method 2. List of the twenty-eight food parameters used in the calculation of DII

Carbohydrates, protein, total fat, alcohol, fiber, cholesterol, saturated fat, monounsaturated fatty acids (MUFAs), polyunsaturated fatty acids (PUFAs), niacin, vitamin A, thiamin, riboflavin, vitamin B6, vitamin B12, vitamin C, vitamin D, vitamin E, Fe, Mg, Zinc, Selenium, folic acid, β -carotene, caffeine, energy, n-3 fatty acids, and n-6 fatty acids. [1]

Table S1 Definitions of variables

Variables	Definition
Verifying dietary interview as reliable and met the minimum standards	Less than 25% foods with missing descriptive information (e.g., caffeinated or decaffeinated, preparation methods, or brand names); and Less than 15% foods with missing amounts; and Any meal reported must have at least one known food. For example, if a respondent reported having a lunch but could not remember any foods from that lunch, the recall did not meet the criterion.
Pregnancy	Pregnancy status at the time of examination is reported for females 8-59 years of age. Persons who reported they were pregnant at the time of exam or the urine test was positive, the status was coded as pregnant.
Income levels[2]	Low income: PIR ≤ 1.3

	Median income: 3.5≥PIR>1.3 High income: PIR>3.5
Ethnicity[3]	Ethnicity was classified as Mexican American, Non-Hispanic Black, Non-Hispanic White, and other.
Educational levels	Educational levels were categorized as less than high school and equal to or above high school.
Smoking status[4]	Current smoking: smoked moth than 100 cigarettes in life and smoke some days or every day Former smoking: smoked more than 100 cigarettes in life and smoke not at all now Never smoking: smoked less than 100 cigarettes in life
Drinking status[4]	Current drinking: including current light/moderate drinker (≤1 drink per day for women or ≤2 drinks per day for men on average over the past year), or current heavier drinker (>1 drink per day for women or >2 drinks per day for men on average over the past year); Former drinking: had ≥12 drinks in 1 year and did not drink last year, or did not drink last year but drank ≥12 drinks in lifetime; Never drinking: had <12 drinks in lifetime;
Hyperlipidemia	A total triglyceride level ≥150mg/dL; or Total cholesterol level ≥200mg/dL; or Low-density lipoprotein level ≥130mg/dL; or High-density lipoprotein (HDL) level <40mg/dL for males and <50mg/dL for females; or Using lipid-lowering medications at baseline.
Hypertension	Being previously diagnosed with hypertension by a healthcare professional; or Having a blood pressure (BP) reading ≥140/90mmHg on at least three out of four measurements; or Using anti-hypertensive medications at baseline.
Diabetes	Being previously diagnosed with diabetes by a healthcare professional; or Having a glycohemoglobin level >6.5%, fasting glucose level ≥7.0 mmol/L random blood glucose level ≥11.1 mmol/L, two-hour oral glucose tolerance test (OGTT) blood glucose level ≥11.1 mmol/L; or Using diabetes medications or insulin at baseline.
Cardiovascular disease	Being previously diagnosed with coronary heart disease (CHD), congestive heart failure (HF), heart attack, stroke, or angina

	by a healthcare professional
Medication Usage	Taking angiotensin-converting enzyme inhibitors (ACEIs), angiotensin-II receptor blockers (ARBs), β blockers, or spironolactone at baseline were considered as taking medication

PIR, family income to poverty

Table S2 Definition of red meat and other protein food [5, 6]

Food component	Foods
Red Meat	
Meat	Beef, veal, pork, lamb, and game meat; excludes organ meat and cured meat
Cured Meat	Frankfurters, sausages, corned beef, cured ham and luncheon meat that are made from beef, pork, or poultry
Organ Meat	Organ meat from beef, veal, pork, lamb, game, and poultry
Other Protein Food	
Poultry	Chicken, turkey, Cornish hens, duck, goose, quail, and pheasant (game birds),; excludes organ meat and cured meat
Seafood	Finfish, shellfish, and other seafood
Eggs	Eggs (chicken, duck, goose, quail) and egg substitutes
Soy Products	Soy products, excluding calcium fortified soy milk and products made with raw (green) soybean
Nuts and Seeds	Peanuts, tree nuts, and seeds; excludes coconut
Bean, Peas, and Lentils	Bean, peas, and lentils (legumes)

Table S3 The impact of dietary protein intake on all-cause mortality of patients with selective glomerular hypofiltration syndromes across different subgroups.

		Quintile of Dietary Protein Intake (g/d)					
Subgroups	**Death/n**	**Q1**	**Q2**	**Q3**	**Q4**	**P-Values for Trend**	**P-Values for Interaction**
Median (g/d)		38.51	59.59	76.13	104.86		
Age≥65y	309/501	Ref	0.67 [0.45, 0.99]	1.17 [0.77, 1.78]	0.93 [0.58, 1.49]	0.958	<0.001
P-Value			0.047	0.450	0.771		
Median (g/d)		46.92	74.17	96.83	139.49		
Age<65y	140/1667	Ref	0.56 [0.35, 0.92]	0.38 [0.21, 0.70]	0.42 [0.21, 0.82]	0.011	
P-Value			0.021	0.002	0.011		
Median (g/d)		54.12	79.14	104.20	145.65		
Male	279/1359	Ref	0.61 [0.45, 0.84]	0.51 [0.33, 0.78]	0.55 [0.33, 0.92]	0.007	<0.001
P-Value			0.003	0.002	0.024		
Median (g/d)		35.46	56.19	73.70	99.74		
Female	170/809	Ref	1.03 [0.63, 1.70]	2.62 [1.49, 4.62]	2.74 [1.44, 5.20]	0.001	
P-Value			0.893	0.001	0.002		
Median (g/d)		36.41	59.05	80.91	123.76		
Low Income	101/386	Ref	0.76 [0.34, 1.65]	2.10 [0.86, 5.17]	1.49 [0.49, 4.56]	0.349	0.005
P-Value			0.482	0.105	0.481		
Median (g/d)		43.62	65.14	84.62	133.23		
Median Income	188/712	Ref	0.43 [0.27, 0.70]	0.55 [0.32, 0.94]	0.26 [0.12, 0.55]	0.004	
P-Value			0.001	0.029	<0.001		
Median (g/d)		48.95	76.64	97.97	137.19		
High Income	160/1070	Ref	0.78 [0.47, 1.28]	0.89 [0.47, 1.65]	0.44 [0.20, 0.95]	0.041	
P-Value			0.328	0.702	0.037		

Median (g/d)		46.89	74.60	95.90	137.12		
Higher Educated	282/1706	Ref	1.01 [0.69, 1.47]	1.19 [0.78, 1.83]	0.86 [0.49, 1.52]	0.689	0.071
P-Value			0.970	0.414	0.606		
Median (g/d)		34.40	57.46	74.17	108.10		
Lower Educated	167/462	Ref	0.65 [0.37, 1.14]	0.67 [0.35, 1.29]	0.35 [0.15, 0.83]	0.023	
P-Value			0.134	0.233	0.017		
Median (g/d)		39.87	66.42	92.88	133.07		
Current Smoking	60/270	Ref	1.53 [0.89, 2.63]	0.77 [0.36, 1.64]	0.30 [0.15, 0.60]	0.071	0.054
P-Value			0.124	0.500	0.001		
Median (g/d)		43.62	70.57	88.98	130.97		
Former Smoking	198/698	Ref	0.61 [0.37, 1.00]	0.87 [0.53, 1.44]	0.31 [0.15, 0.67]	0.009	
P-Value			0.048	0.595	0.003		
Median (g/d)		44.94	69.43	93.76	136.75		
Never Smoking	191/1200	Ref	1.30 [0.83, 2.06]	0.82 [0.46, 1.45]	1.11 [0.58, 2.15]	0.899	
P-Value			0.253	0.491	0.748		
Median (g/d)		45.11	74.38	95.33	136.41		
Current Drinking	255/1609	Ref	0.89 [0.60, 1.33]	1.29 [0.82, 2.02]	0.77 [0.42, 1.41]	0.635	0.056
P-Value			0.577	0.275	0.404		
Median (g/d)		42.66	59.79	80.86	130.45		
Former Drinking	155/373	Ref	0.20 [0.11, 0.39]	0.45 [0.25, 0.81]	0.16 [0.06, 0.40]	0.005	
P-Value			<0.001	0.008	<0.001		
Median (g/d)		35.46	61.37	74.13	115.04		
Never Drinking	39/186	Ref	NA	NA	NA	<0.001	
P-Value			NA	NA	NA		
Median (g/d)		46.92	72.24	95.06	136.39		
BMI≥28	178/839	Ref	0.57 [0.36, 0.91]	0.40 [0.22, 0.72]	0.41 [0.20, 0.82]	0.014	0.758

P-Value			0.019	0.002	0.012		
Median (g/d)		42.08	68.19	89.97	133.07		
BMI<28	271/1329	Ref	1.02 [0.71, 1.48]	1.15 [0.76, 1.73]	0.69 [0.38, 1.27]	0.384	
P-Value			0.908	0.512	0.233		
Median (g/d)		45.72	73.86	94.47	137.19		
Higher HEI	248/1082	Ref	0.63 [0.42, 0.94]	0.60 [0.37, 0.97]	0.32 [0.17, 0.61]	0.001	<0.001
P-Value			0.022	0.036	0.001		
Median (g/d)		40.32	66.03	87.86	128.89		
Lower HEI	201/1086	Ref	0.96 [0.60, 1.52]	1.20 [0.72, 2.00]	1.48 [0.77, 2.85]	0.162	
P-Value			0.853	0.489	0.238		
Median (g/d)		35.36	55.23	73.34	98.30		
Higher DII	240/1085	Ref	0.71 [0.48, 1.04]	0.89 [0.59, 1.34]	1.37 [0.89, 2.12]	0.217	0.028
P-Value			0.079	0.561	0.154		
Median (g/d)		65.14	88.29	110.22	157.28		
Lower DII	209/1083	Ref	1.30 [0.88, 1.93]	0.54 [0.35, 0.84]	0.78 [0.45, 1.36]	0.045	
P-Value			0.185	0.006	0.380		
Median (g/d)		40.32	63.69	83.33	112.63		
Hypertension	281/783	Ref	1.02 [0.70, 1.49]	0.87 [0.55, 1.36]	0.66 [0.37, 1.18]	0.155	0.915
P-Value			0.920	0.529	0.158		
Median (g/d)		45.30	74.30	96.83	137.75		
No Hypertension	168/1385	Ref	0.55 [0.32, 0.94]	0.65 [0.36, 1.19]	0.50 [0.24, 1.05]	0.149	
P-Value			0.029	0.164	0.067		
Median (g/d)		41.89	67.65	89.22	128.02		
Hyperlipidemia	357/1556	Ref	0.81 [0.59, 1.10]	0.88 [0.63, 1.24]	0.44 [0.26, 0.72]	0.005	0.160
P-Value			0.180	0.477	0.001		
Median (g/d)		46.89	76.64	98.23	149.15		

No Hyperlipidemia	92/612	Ref	0.36 [0.13, 0.97]	0.76 [0.28, 2.07]	1.53 [0.47, 4.94]	0.284	
P-Value			0.043	0.592	0.480		
Median (g/d)		47.32	63.63	78.48	109.66		
Diabetes	99/201	Ref	0.85 [0.35, 2.08]	1.41 [0.54, 3.70]	0.84 [0.29, 2.38]	0.661	0.572
P-Value			0.729	0.479	0.738		
Median (g/d)		42.66	71.59	93.41	135.83		
No Diabetes	350/1967	Ref	0.76 [0.55, 1.06]	0.79 [0.54, 1.17]	0.74 [0.44, 1.25]	0.317	
P-Value			0.105	0.243	0.260		
Median (g/d)		39.73	62.46	82.54	128.89		
Higher ACR	310/1078	Ref	0.69 [0.49, 0.97]	0.68 [0.46, 1.01]	0.66 [0.39, 1.09]	0.130	0.130
P-Value			0.031	0.059	0.105		
Median (g/d)		52.13	76.64	97.87	143.59		
Lower ACR	139/1090	Ref	0.85 [0.52, 1.38]	0.64 [0.34, 1.17]	0.36 [0.16, 0.80]	0.007	
P-Value			0.500	0.146	0.012		
Median (g/d)		35.17	51.13	65.16	88.94		
CKD	110/130	Ref	13.42[4.19,42.95]	3.64[1.16, 11.43]	0.23[0.08, 0.68]	<0.001	0.614
P-Value			<0.001	0.027	0.008		
Median (g/d)		44.77	72.74	94.60	135.61		
No CKD	339/2038	Ref	0.63 [0.45, 0.88]	0.75 [0.51, 1.10]	0.50 [0.30, 0.81]	0.020	
P-Value			0.006	0.144	0.005		

HRs and 95%CIs were calculated with the use of Cox proportional hazards regression models. P-values for trend were obtained based on the median value for each quintile. P-values for interaction were calculated differently depending on the type of variable: for binary variables (age, gender, educational level, BMI, HEI, DII, hypertension, hyperlipidemia, diabetes, hypertension, ACR, and CKD), the interaction term was added directly to the model and its p-value was obtained; for multiple-category variables (income level, smoking status, and drinking status), p-values were calculated by likelihood ratio test, comparing the model with interaction to the model without interaction. BMI, body mass index, kg/m2; HEI, healthy eating index; DII, dietary inflammation index; ACR, urine albumin-to-creatinine ratio, mg/g; CKD, chronic kidney disease.

Table S4 The impact of dietary protein intake on cardiovascular mortality of patients with selective glomerular hypofiltration syndromes across different competing risk models.

	Quintile of Dietary Protein Intake (g/d)				
Models	**Q1, <57.93**	**Q2, 57.93-79.81**	**Q3, 79.82-107.12**	**Q4, ≥107.13**	**P-Values for Trend**
Median (g/d)	43.62	69.53	92.88	134.09	
Model1	Ref	0.77[0.51,1.14]	0.21[0.11,0.4]	0.16[0.08,0.32]	<0.001
P-Value		0.190	<0.001	<0.001	
Model2	Ref	0.67[0.4,1.12]	0.2[0.09,0.47]	0.41[0.18,0.92]	0.002
P-Value		0.130	<0.001	0.030	
Model3	Ref	0.51[0.29,0.89]	0.13[0.05,0.32]	0.2[0.07,0.58]	0.001
P-Value		0.018	<0.001	<0.001	
Model4	Ref	0.58[0.33,1.02]	0.15[0.06,0.38]	0.26[0.09,0.75]	0.003
P-Value		0.059	<0.001	0.012	
Model5	Ref	0.56[0.31,1.01]	0.14[0.05,0.36]	0.23[0.08,0.69]	0.002
P-Value		0.054	<0.001	0.001	

HRs and 97.5%CIs were calculated with the use of competing risk models. P-values for trend were obtained based on the median value for each quintile. Model1, unadjusted for covariates; Model2, adjusted for age, gender, ethnicity, income level, and educational level; Model3: Model2 +smoking status, drinking status, body mass index (BMI, kg/m2), healthy eating index (HEI), and dietary inflammation index (DII); Model4, Model3+hypertension, hyperlipidemia, diabetes, cardiovascular disease, and medication usage (having angiotensin converting enzyme inhibitors, angiotensin-II receptor blocker, β blocker or spironolactone use at baseline) ; Model5, Model4+ urine albumin-to-creatinine ratio(ACR, mg/g), and chronic kidney disease.

Table S5 The impact of dietary protein intake on cardiovascular mortality of patients with selective glomerular hypofiltration syndromes across different participants.

	Quintile of Dietary Protein Intake (g/d)				
Models	**Q1**	**Q2**	**Q3**	**Q4**	**P-Values for Trend**
Age≥65y, Death/n= 99/501					
Median (g/d)	38.51	59.59	76.13	104.86	
Model1	Ref	0.73 [0.42, 1.24]	0.98 [0.59, 1.60]	0.29 [0.15, 0.57]	0.001
P Value		0.245	0.922	<0.001	
Model2	Ref	0.73 [0.42, 1.26]	0.88 [0.50, 1.55]	0.28 [0.13, 0.58]	0.001
P Value		0.257	0.656	0.001	
Model3	Ref	0.60 [0.32, 1.13]	0.67 [0.34, 1.30]	0.23 [0.09, 0.58]	0.003
P Value		0.114	0.239	0.002	
Model4	Ref	0.76 [0.39, 1.51]	0.67 [0.33, 1.32]	0.23 [0.09, 0.59]	0.003
P Value		0.435	0.244	0.002	
Model5	Ref	0.69 [0.34, 1.38]	0.77 [0.38, 1.57]	0.26 [0.10, 0.69]	0.009
P Value		0.290	0.473	0.007	
Male, Death/n=69/1359					
Median (g/d)	54.12	79.14	104.20	145.65	
Model1	Ref	0.83 [0.49, 1.40]	0.24 [0.11, 0.51]	0.08 [0.02, 0.26]	<0.001
P Value		0.487	<0.001	<0.001	
Model2	Ref	0.37 [0.21, 0.65]	0.23 [0.10, 0.51]	0.13 [0.04, 0.42]	<0.001
P Value		0.001	<0.001	0.001	
Model3	Ref	0.42 [0.22, 0.78]	0.26 [0.10, 0.67]	0.12 [0.03, 0.48]	<0.001
P Value		0.006	0.005	0.003	
Model4	Ref	0.40 [0.21, 0.77]	0.21 [0.08, 0.56]	0.12 [0.03, 0.48]	<0.001
P Value		0.006	0.002	0.003	

Model5	Ref	0.36 [0.18, 0.70]	0.19 [0.07, 0.51]	0.11 [0.03, 0.43]	<0.001
P Value		0.003	0.001	0.002	
Higher Educated, Death/n= 82/1706					
Median (g/d)	46.89	74.60	95.90	137.12	
Model1	Ref	0.62 [0.37, 1.02]	0.30 [0.16, 0.58]	0.14 [0.06, 0.33]	<0.001
P Value		0.061	<0.001	<0.001	
Model2	Ref	0.54 [0.29, 1.03]	0.28 [0.13, 0.59]	0.21 [0.08, 0.57]	<0.001
P Value		0.063	0.001	0.002	
Model3	Ref	0.58 [0.28, 1.19]	0.25 [0.10, 0.66]	0.16 [0.05, 0.59]	0.003
P Value		0.139	0.005	0.006	
Model4	Ref	0.61 [0.30, 1.23]	0.22 [0.08, 0.61]	0.20 [0.06, 0.69]	0.005
P Value		0.170	0.003	0.011	
Model5	Ref	0.60 [0.29, 1.23]	0.23 [0.08, 0.64]	0.19 [0.05, 0.69]	0.006
P Value		0.162	0.005	0.011	
No Diabetes, Death/n= 96/1967					
Median (g/d)	42.66	71.59	93.41	135.83	
Model1	Ref	0.64 [0.41, 1.02]	0.24 [0.13, 0.46]	0.17 [0.08, 0.36]	<0.001
P Value		0.063	<0.001	<0.001	
Model2	Ref	0.42 [0.24, 0.73]	0.26 [0.13, 0.55]	0.24 [0.10, 0.56]	<0.001
P Value		0.002	<0.001	0.001	
Model3	Ref	0.34 [0.18, 0.64]	0.22 [0.09, 0.54]	0.17 [0.05, 0.51]	0.002
P Value		0.001	0.001	0.002	
Model4	Ref	0.38 [0.20, 0.70]	0.30 [0.13, 0.73]	0.28 [0.09, 0.85]	0.018
P Value		0.002	0.007	0.025	
Model5	Ref	0.36 [0.19, 0.68]	0.29 [0.12, 0.70]	0.26 [0.08, 0.80]	0.015
P Value		0.001	0.006	0.019	

No CKD, Death/n= 87/2038					
Median (g/d)	44.77	72.74	94.60	135.61	
Model1	Ref	0.83 [0.51, 1.35]	0.32 [0.17, 0.62]	0.22 [0.11, 0.47]	<0.001
P Value		0.457	0.001	<0.001	
Model2	Ref	0.40 [0.22, 0.75]	0.30 [0.14, 0.64]	0.22 [0.09, 0.53]	0.001
P Value		0.004	0.002	0.001	
Model3	Ref	0.26 [0.13, 0.52]	0.19 [0.08, 0.46]	0.10 [0.03, 0.29]	<0.001
P Value		<0.001	<0.001	<0.001	
Model4	Ref	0.33 [0.16, 0.67]	0.27 [0.11, 0.68]	0.17 [0.06, 0.54]	0.005
P Value		0.002	0.005	0.002	
Model5	Ref	0.32 [0.16, 0.65]	0.25 [0.10, 0.65]	0.16 [0.05, 0.50]	0.004
P Value		0.002	0.004	0.002	

HRs and 95%CIs were calculated with the use of Cox proportional hazards regression models. P-values for trend were obtained based on the median value for each quintile. Model1, unadjusted for covariates; Model2, adjusted for age, gender, ethnicity, income level, and educational level; Model3: Model2 +smoking status, drinking status, body mass index (BMI, kg/m2), healthy eating index (HEI), and dietary inflammation index (DII); Model4, Model3+hypertension, hyperlipidemia, diabetes, cardiovascular disease, and medication usage (having angiotensin converting enzyme inhibitors, angiotensin-II receptor blocker, β blocker or spironolactone use at baseline) ; Model5, Model4+ urine albumin-to-creatinine ratio(ACR, mg/g), and chronic kidney disease.

Table S6 The impact of red meat on all-cause and cardiovascular mortality of patients with selective glomerular hypofiltration syndromes across different models.

	Quintile of Red Meat Consumption (g/d)				
Models	**Q1, <30.50**	**Q2, 30.50-141.99**	**Q3, 142.00-319.23**	**Q4, ≥319.24**	**P-Values for Trend**
Median (g/d)	0.00	90.51	228.87	466.00	
All-Cause Mortality, Death/n= 404/1988					
Model1	Ref	1.08 [0.83, 1.39]	0.81 [0.62, 1.06]	0.61 [0.46, 0.83]	<0.001
P Value		0.569	0.126	0.001	
Model2	Ref	1.24 [0.95, 1.62]	1.00 [0.76, 1.31]	0.92 [0.68, 1.25]	0.299

P Value		0.106	0.983	0.591	
Model3	Ref	1.29 [0.98, 1.70]	1.06 [0.80, 1.41]	1.05 [0.77, 1.44]	0.874
P Value		0.073	0.683	0.748	
Model4	Ref	1.33 [1.00, 1.76]	1.04 [0.78, 1.38]	1.02 [0.74, 1.41]	0.648
P Value		0.050	0.799	0.897	
Model5	Ref	1.19 [0.90, 1.59]	1.03 [0.77, 1.38]	1.02 [0.74, 1.40]	0.837
P Value		0.227	0.818	0.903	
Cardiovascular Mortality, Death/n= 108/1988					
Model1	Ref	1.25 [0.77, 2.02]	0.68 [0.39, 1.19]	0.72 [0.41, 1.26]	0.073
P Value		0.373	0.176	0.252	
Model2	Ref	2.00 [1.18, 3.39]	1.03 [0.58, 1.84]	1.34 [0.76, 2.39]	0.773
P Value		0.010	0.921	0.311	
Model3	Ref	2.66 [1.49, 4.74]	1.18 [0.64, 2.16]	1.19 [0.65, 2.20]	0.760
P Value		0.001	0.596	0.568	
Model4	Ref	3.08 [1.68, 5.67]	1.10 [0.58, 2.10]	1.04 [0.55, 1.96]	0.326
P Value		<0.001	0.773	0.900	
Model5	Ref	3.14 [1.68, 5.84]	1.11 [0.58, 2.12]	1.04 [0.55, 1.97]	0.323
P Value		<0.001	0.754	0.902	

HRs and 95%CIs were calculated with the use of Cox proportional hazards regression models. P-values for trend were obtained based on the median value for each quintile. Model1, unadjusted for covariates; Model2, adjusted for age, gender, ethnicity, income level, and educational level; Model3: Model2 +smoking status, drinking status, body mass index (BMI, kg/m2), healthy eating index (HEI), and dietary inflammation index (DII); Model4, Model3+hypertension, hyperlipidemia, diabetes, cardiovascular disease, and medication usage (having angiotensin converting enzyme inhibitors, angiotensin-II receptor blocker, β blocker or spironolactone use at baseline) ; Model5, Model4+ urine albumin-to-creatinine ratio (ACR, mg/g), and chronic kidney disease

Table S7 The impact of other protein food on all-cause and cardiovascular mortality of patients with selective glomerular hypofiltration syndromes across different models.

		Quintile of Other Protein Food Consumption (g/d)			

Models	Q1, <128.45	Q2, 128.45-376.49	Q3, 376.50-739.31	Q4, ≥739.32	P-Values for Trend
Median (g/d)	0.00	97.89	241.50	536.50	
All-Cause Mortality, Death/n= 413/1959					
Model1	Ref	1.37 [1.07, 1.76]	0.96 [0.73, 1.26]	0.54 [0.39, 0.75]	<0.001
P Value		0.014	0.785	<0.001	
Model2	Ref	1.24 [0.96, 1.61]	1.20 [0.90, 1.59]	0.71 [0.51, 0.99]	0.018
P Value		0.101	0.207	0.043	
Model3	Ref	1.23 [0.94, 1.60]	1.10 [0.81, 1.49]	0.67 [0.48, 0.94]	0.004
P Value		0.134	0.559	0.022	
Model4	Ref	1.25 [0.96, 1.64]	1.12 [0.83, 1.52]	0.66 [0.47, 0.92]	0.003
P Value		0.097	0.460	0.016	
Model5	Ref	1.15 [0.88, 1.51]	1.17 [0.87, 1.59]	0.61 [0.43, 0.86]	0.002
P Value		0.303	0.303	0.005	
Cardiovascular Mortality, Death/n= 108/1959					
Model1	Ref	0.95 [0.61, 1.47]	0.43 [0.25, 0.75]	0.22 [0.10, 0.44]	<0.001
P Value		0.818	0.003	<0.001	
Model2	Ref	0.77 [0.48, 1.24]	0.53 [0.29, 0.96]	0.30 [0.14, 0.65]	0.001
P Value		0.286	0.035	0.002	
Model3	Ref	0.71 [0.43, 1.15]	0.34 [0.17, 0.69]	0.27 [0.13, 0.59]	<0.001
P Value		0.163	0.003	0.001	
Model4	Ref	0.67 [0.40, 1.13]	0.37 [0.19, 0.75]	0.28 [0.13, 0.62]	0.001
P Value		0.133	0.006	0.002	
Model5	Ref	0.67 [0.39, 1.15]	0.38 [0.19, 0.76]	0.28 [0.12, 0.62]	0.001
P Value		0.143	0.007	0.002	

HRs and 95%CIs were calculated with the use of Cox proportional hazards regression models. P-values for trend were obtained based on the median value for each quintile. Model1, unadjusted for covariates; Model2, adjusted for age, gender, ethnicity, income level, and educational level; Model3: Model2 +smoking status, drinking status, body mass index (BMI, kg/m2), healthy eating index

(HEI), and dietary inflammation index (DII); Model4, Model3+hypertension, hyperlipidemia, diabetes, cardiovascular disease, and medication usage (having angiotensin converting enzyme inhibitors, angiotensin-II receptor blocker, β blocker or spironolactone use at baseline) ; Model5, Model4+ urine albumin-to-creatinine ratio (ACR, mg/g), and chronic kidney disease

Table S8 The difference of chronic kidney disease (CKD) and urine albumin-to-creatinine ratio (ACR) between male and female at baseline.

Characteristic	Overall, N = 2,168*	Male, N = 1,359*	Female, N = 809*	p-value#
CKD				<0.001
Yes	130 (6.00%)	60 (4.42%)	70 (8.65%)	
No	2,038 (94.00%)	1,299 (95.58%)	739 (91.35%)	
ACR (mg/g)	4.66 (3.33~7.21)	4.12 (3.10~6.67)	5.57 (3.86~8.70)	<0.001

*Median (IQR); frequency (%). # Kruskal-Wallis rank sum test for continuous variables; Pearson's Chi-squared test for categorical variables. CKD, chronic kidney disease; ACR, urine albumin-to-creatinine ratio

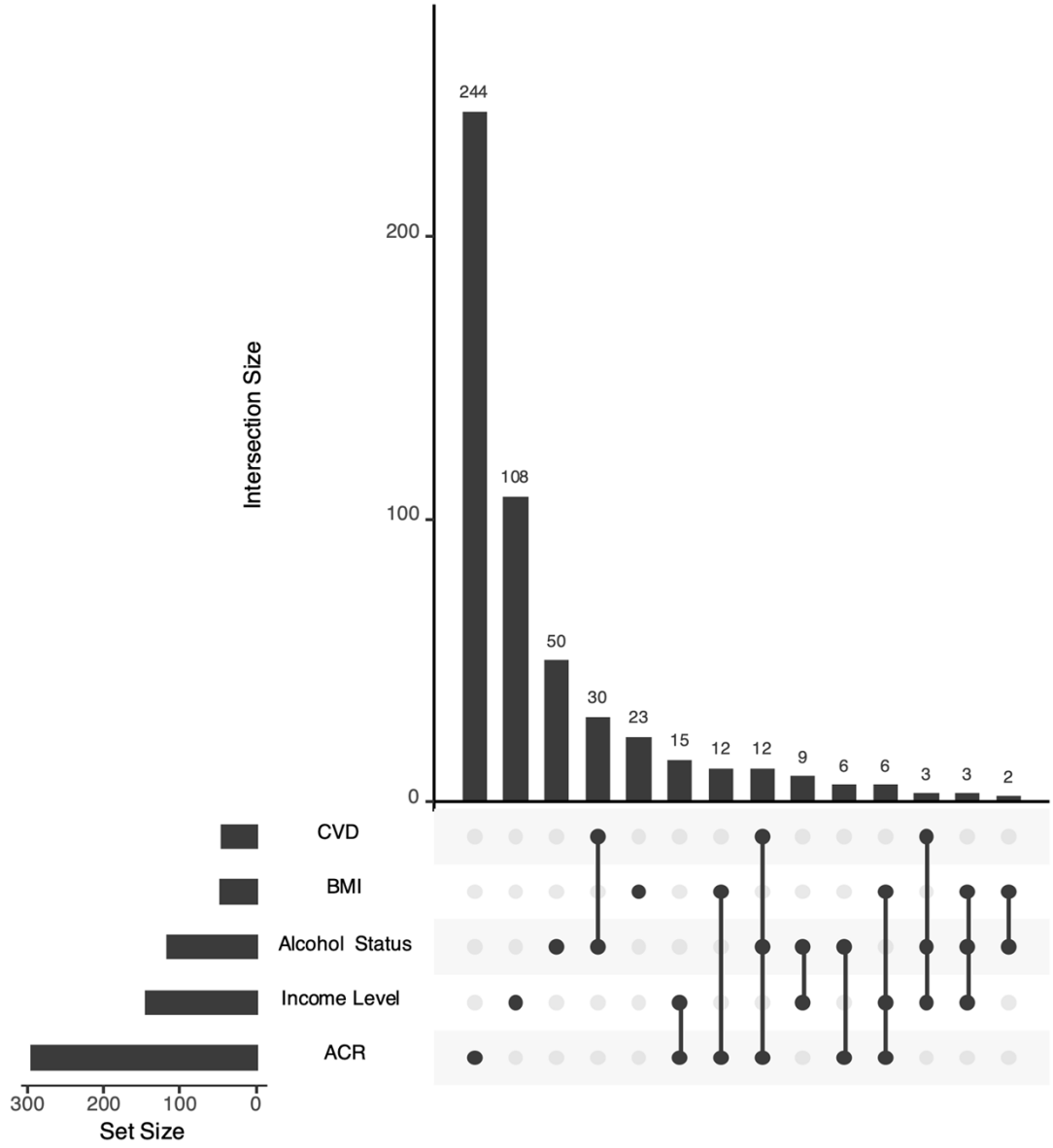

Fig. S1 Missing data. CVD, cardiovascular disease; BMI, body mass index, kg/m^2; ACR, urine albumin-to-creatinine ratio, mg/g.

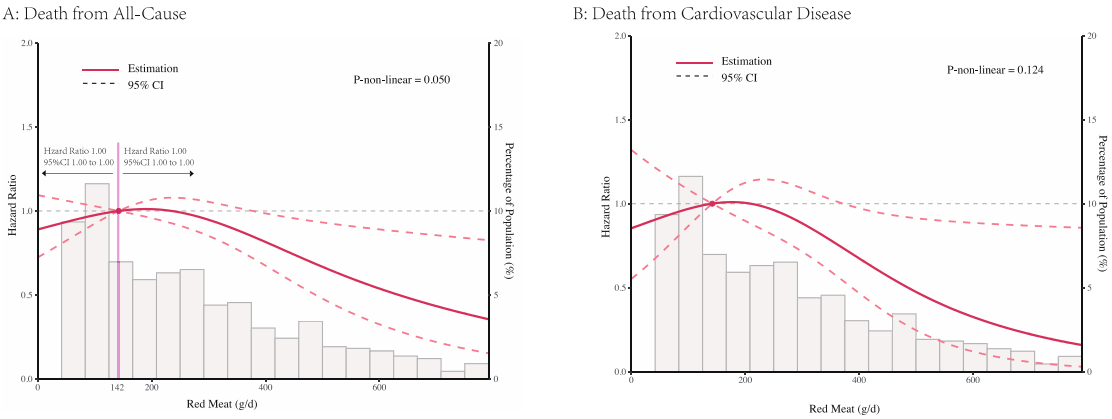

Fig. S2 Adjusted hazard ratio for the association between red meat intake and all-cause and cardiovascular mortality. A: all-cause mortality; B: cardiovascular mortality. Data were fitted using Cox proportional hazard models with restricted cubic spline (RCS) with 3 knots (the 10th, 50th, and 90th percentiles) for red meat intake, adjusted for potential covariates. Reference is the 50th percentile of dietary protein intake (142.00 g/d).

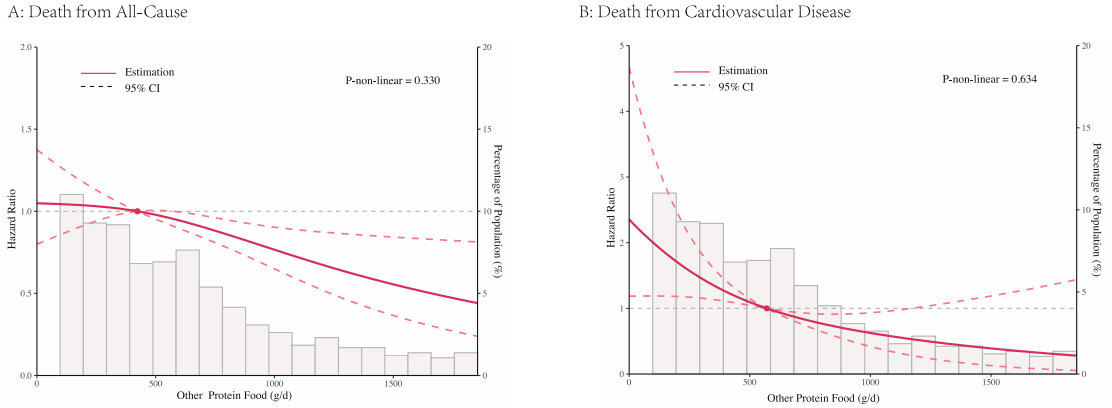

Fig. S3 Adjusted hazard ratio for the association between other protein food intake and all-cause and cardiovascular mortality. A: all-cause mortality; B: cardiovascular mortality. Data were fitted using Cox proportional hazard models with restricted cubic spline (RCS) with 3 knots (the 10th, 50th, and 90th percentiles) for other protein food, adjusted for potential covariates. Reference is the 50th percentile of dietary protein intake (376.50 g/d).

References:

1. Yuan S, Song C, Zhang R, He J, Dou K. Dietary Inflammation Index and Its Association with Long-Term All-Cause and Cardiovascular Mortality in the General US Population by Baseline Glycemic Status. *Nutrients*. Jun 21 2022;14(13)doi:10.3390/nu14132556

2. Johnson CL, Paulose-Ram R, Ogden CL, et al. National health and nutrition examination survey: analytic guidelines, 1999-2010. *Vital Health Stat 2*. Sep 2013;(161):1-24.

3. Park SK, Sack C, Sirén MJ, Hu H. Environmental Cadmium and Mortality from Influenza and Pneumonia in U.S. Adults. *Environ Health Perspect*. Dec 2020;128(12):127004. doi:10.1289/ehp7598

4. Hicks CW, Wang D, Matsushita K, Windham BG, Selvin E. Peripheral Neuropathy and All-Cause and Cardiovascular Mortality in U.S. Adults : A Prospective Cohort Study. *Ann Intern Med*. Feb 2021;174(2):167-174. doi:10.7326/M20-1340

5. Wolk A. Potential health hazards of eating red meat. *J Intern Med*. Feb 2017;281(2):106-122. doi:10.1111/joim.12543

6. Friday JE, Bowman, S.A. MyPyramid Equivalents Database for USDA Survey Food Codes, 1994-2002 Version 1.0. [Online]. Beltsville, MD: USDA, Agricultural Research Service, Beltsville Human Nutrition Research Center, Community Nutrition Research Group. Available at: http://www.barc.usda.gov/bhnrc/cnrg.