

Supplementary Table S1. Basic characteristics of the study participants

Variables	Male (n = 190)	Female (n = 342)	Z/ χ^2	P
Age (years), n (%)				
< 50	22 (11.6)	58 (17.0)	5.221	0.074
50–69	125 (65.8)	229 (67.0)		
≥ 70	43 (22.6)	55 (16.0)		
Educational level, n (%)				
Primary school and below	72 (37.9)	145 (42.4)	2.073	0.557
Junior high school	58 (30.5)	102 (29.8)		
Senior high school	50 (26.3)	84 (24.6)		
Bachelor's degree and above	10 (5.3)	11 (3.2)		
Income (yuan), n (%) ^a				
< 1,000	80 (42.1)	147 (43.0)	8.223	0.042
1,000–2,999	74 (38.9)	137 (40.1)		
3,000–4,999	23 (12.2)	51 (14.9)		
≥ 5,000	13 (6.8)	7 (2.0)		
BMI, n (%)				
< 24	64 (33.9)	118 (34.5)	0.138	0.933
24–27.9	76 (40.2)	133 (38.9)		
≥ 28	49 (25.9)	91 (26.6)		
Smoker, n (%)				
No	65 (34.2)	318 (93.0)	209.241	< 0.001
Yes	125 (65.8)	24 (7.0)		
Alcohol consumption, n (%)				
No	112 (58.9)	326 (95.3)	111.091	< 0.001
Yes	78 (41.1)	16 (4.7)		
TC/HDL, M (IQR)	3.86 (3.27–4.64)	3.93 (3.14–4.77)	–0.321	0.749
UCd (μg/gCr), M (IQR)	0.89 (0.47–1.71)	0.84 (0.45–1.61)	–0.793	0.428
UPb (μg/gCr), M (IQR)	2.63 (0.91–5.53)	2.87 (0.97–5.98)	–0.982	0.326
eGFR mL/min/1.73 m ² , M (IQR)	70.74 (60.62–89.71)	75.26 (48.73–93.67)	–1.634	0.102
UNAG U/gCr, M (IQR)	16.28 (11.15–25.08)	16.28 (11.03–23.71)	–5.77	0.564

Note. ^aMonthly household income per capita. BMI, body mass index; HDL, high-density lipoprotein cholesterol; TC, total cholesterol; IQR, interquartile range; UCd, urinary cadmium; UPb, urinary lead; M, median.

Supplementary Table S2. Univariable analysis of factors associated with low eGFR

Variables	eGFR control group (N = 342)	Low eGFR ^a group (N = 190)	Z/ χ^2	P
Age (years), M (IQR)	60 (51–65)	64 (61–70)	-6.919	< 0.001
Sex, n (%)			20.296	< 0.001
Male	146 (42.7)	44 (23.2)		
Female	196 (57.3)	146 (76.8)		
Educational level, n (%)			81.578	< 0.001
Junior high school and below	197 (57.6)	180 (94.7)		
High school and above	145 (42.4)	10 (5.3)		
Income (yuan), n (%) ^b			39.736	< 0.001
< 3,000	255 (74.6)	183 (93.6)		
≥ 3,000	87 (25.4)	7 (3.4)		
Smoker, n (%)			3.447	0.063
No	237 (69.3)	146 (76.8)		
Yes	105 (30.7)	44 (23.2)		
Alcohol consumption, n (%)			4.135	0.042
No	273 (79.8)	165 (86.8)		
Yes	69 (20.2)	25 (13.2)		
BMI (kg/m ²), $\bar{x} \pm s_x$	25.49 ± 3.50	25.62 ± 3.69	-1.228	0.219
TC/HDLC, M (IQR)	3.65 (3.03–4.30)	4.38 (3.70–5.12)	-7.542	< 0.001
UCd (μg/gCr), M (IQR)	0.76 (0.42–1.26)	1.11 (0.59–2.78)	-4.821	< 0.001
UPb (μg/gCr), M (IQR)	1.72 (0.68–4.00)	4.67 (2.43–7.88)	-7.506	< 0.001

Note. ^aeGFR < 60 mL/min/1.73 m²; ^bMonthly household income per capita. BMI, body mass index; M, median; IQR, interquartile range; s_x , standard deviation; TC, total cholesterol; HDLC, high-density lipoprotein cholesterol; UCd, urinary cadmium level; UPb, urinary lead level.

Supplementary Table S3. Univariable analysis of factors associated with high UNAG

Variables	UNAG control group (N = 266)	High UNAG ^a group (N = 266)	Z/ χ^2	P
Age (years), M (IQR)	60 (51–65)	64 (60–70)	-6.072	< 0.001
Sex, n (%)				
Male	95 (35.7)	95 (35.7)	0.000	> 0.999
Female	171 (64.3)	171 (64.3)		
Educational level, n (%)				
Junior high school and below	169 (63.5)	208 (78.2)	13.847	< 0.001
High school and above	97 (36.5)	58 (21.8)		
Income (yuan), n (%) ^b				
< 3,000	214 (80.5)	224 (84.2)	1.292	0.256
≥ 3,000	52 (19.5)	42 (15.8)		
Smoker, n (%)				
No	194 (72.9)	189 (71.1)	0.233	0.629
Yes	72 (27.1)	77 (28.9)		
Alcohol consumption, n (%)				
No	222 (83.5)	216 (81.2)	0.465	0.495
Yes	44 (16.5)	50 (18.8)		
BMI (kg/m ²), $\bar{x} \pm s_x$	25.47 ± 3.33	25.83 ± 3.82	-1.124	0.261
TC/HDLC, M (IQR)	3.83 (3.12–4.67)	3.98 (3.27–4.79)	-1.940	0.052
UCd (μg/gCr), M (IQR)	0.74 (0.42–1.28)	0.99 (0.54–2.12)	-3.764	< 0.001
UPb (μg/gCr), M (IQR)	2.40 (0.73–5.41)	3.09 (1.08–6.50)	-2.373	0.018

Note. ^aUNAG ≥ 16.28 U/gCr; ^bMonthly household income per capita. BMI, body mass index; M, median; IQR, interquartile range; s_x , standard deviation; TC, total cholesterol; HDLC, high-density lipoprotein cholesterol; UCd, urinary cadmium level; UPb, urinary lead level.

Supplementary Table S4. Results of multicollinearity testing for estimated glomerular filtration rate (eGFR)

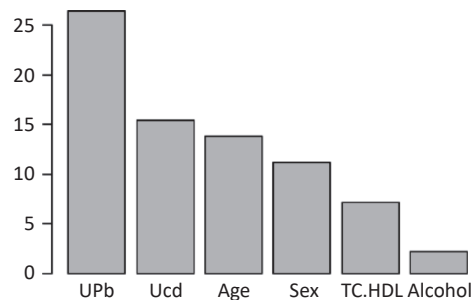
Variables	Non-standardized coefficient		Standard coefficient	t-Value	Sig.	Collinearity statistics	
	Beta	Standard error	Beta			Tolerance	VIF
(constant)	-0.470	0.159		-2.948	0.003		
Age	0.008	0.002	0.196	4.974	0.000	0.826	1.210
Sex	-0.203	0.040	-0.203	5.009	0.000	0.783	1.278
Educational level	-0.196	0.046	-0.186	-4.280	0.000	0.677	1.478
Income	0.132	0.051	-0.105	-2.590	0.010	0.782	1.278
Alcohol consumption	0.000	0.051	0.000	-0.004	0.997	0.780	1.282
TC/HDL	0.093	0.014	0.240	6.505	0.000	0.945	1.058
UPb	0.007	0.002	0.108	2.929	0.004	0.952	1.065
UCd	0.010	0.004	0.101	2.745	0.006	0.939	1.050

Note. HDLC, high-density lipoprotein cholesterol; TC, total cholesterol; UCd, urinary cadmium; UPb, urinary lead; VIF, variance inflation factor.

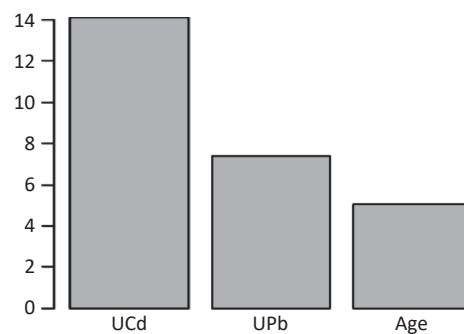
Supplementary Table S5. Results of multicollinearity testing for urinary N-acetyl- β - δ -glucosaminidase (UNAG)

Variables	Non-standardized coefficient		Standard coefficient	t-value	Sig.	Collinearity statistics	
	Beta	Standard error	Beta			Tolerance	VIF
(constant)	-0.050	0.149		-0.337	0.736		
Age	0.009	0.002	0.229	5.117	0.000	0.858	1.166
Educational level	-0.054	0.050	-0.049	-1.084	0.279	0.842	1.187
UPb	0.006	0.003	0.091	2.149	0.032	0.958	1.044
UCd	0.010	0.005	0.093	2.170	0.030	0.945	1.058

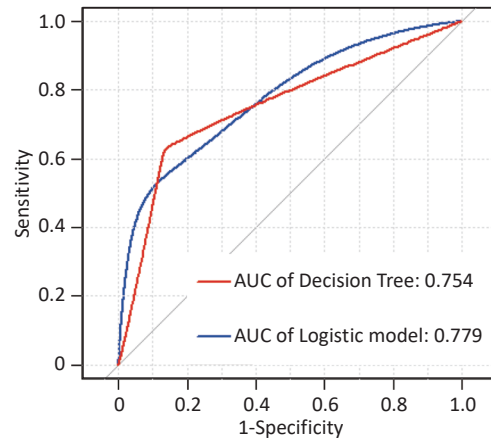
Note. UCd, urinary cadmium; UPb, urinary lead; VIF, variance inflation factor.



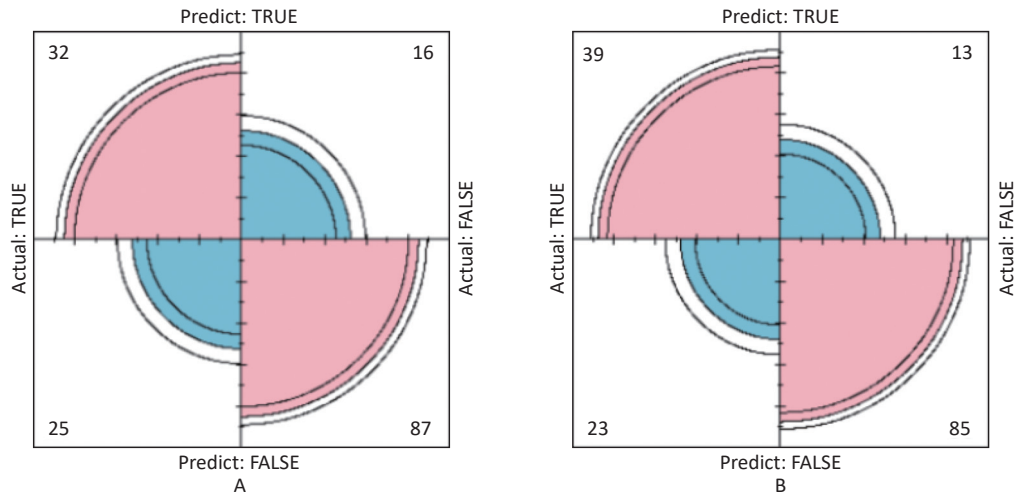
Supplementary Figure S1. Ranking of the Importance of Risk Factors for estimated glomerular filtration rate (eGFR). Using eGFR as a renal function indicator, UPb and UCd levels are more important predictive variables. eGFR, estimated glomerular filtration rate; HDLC, high-density lipoprotein cholesterol; TC, total cholesterol; UCd, urinary cadmium; UPb, urinary lead.



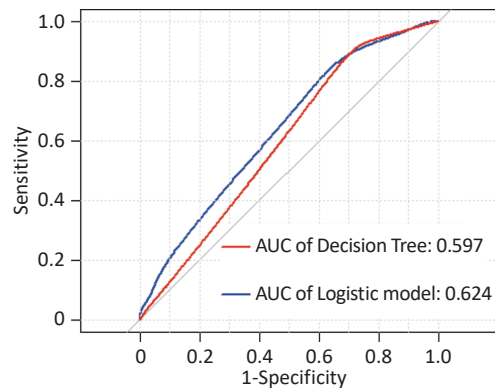
Supplementary Figure S2. Ranking of the Importance of Risk Factors for urinary N-acetyl- β - δ -glucosaminidase (UNAG). Using UNAG as a renal function indicator, UCd and UPb levels are more important predictive variables. UCd, urinary cadmium; UPb, urinary lead.



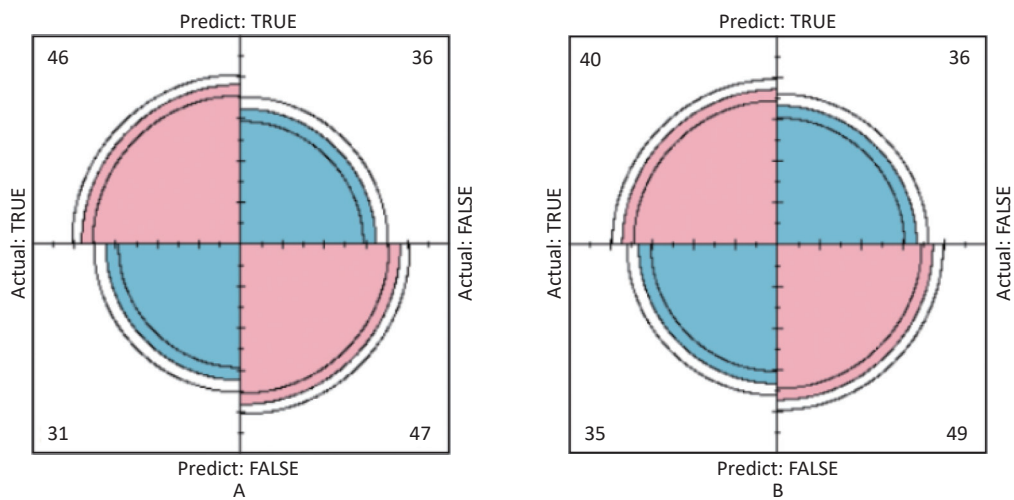
Supplementary Figure S3. Receiver operating characteristic (ROC) curve of the eGFR prediction model. The AUCs were all greater than 0.5, indicating that the model evaluation was effective. AUC, area under the curve; ROC, receiver operating characteristic; eGFR, estimated glomerular filtration rate.



Supplementary Figure S4. The prediction model confusion matrix of eGFR. (A) Confusion matrix for eGFR logistic regression; (B) Confusion matrix for eGFR classification decision tree. The pink part in the figure represents the correct prediction and the blue part represents the incorrect prediction. With eGFR as an indicator of renal function, classification decision tree models have higher sensitivity, specificity, precision and accuracy than logistic regression (True positive is shown by the number in the upper left corner, false positive is shown by the number in the upper right corner, false negative is shown by the number in the lower left corner, and true negative is shown by the number in the lower right corner). eGFR, estimated glomerular filtration rate.



Supplementary Figure S5. Receiver operating characteristic (ROC) curve of the UNAG prediction model. The AUCs were all greater than 0.5, indicating that the model evaluation was effective. AUC, area under the curve; ROC, receiver operating characteristic; UNAG, urinary N-acetyl- β - δ -glucosaminidase



Supplementary Figure S6. Confusion matrix of UNAG prediction model. (A) Confusion matrix for UNAG logistic regression; (B) Confusion matrix for UNAG classification decision tree. The pink part in the figure represents the correct prediction and the blue part represents the incorrect prediction. With UNAG as the indicator of renal function, the sensitivity and specificity of the classification decision tree model are higher than those of the logistic regression (True positive is shown by the number in the upper left corner, false positive is shown by the number in the upper right corner, false negative is shown by the number in the lower left corner, and true negative is shown by the number in the lower right corner). UNAG, urinary N-acetyl- β - δ -glucosaminidase