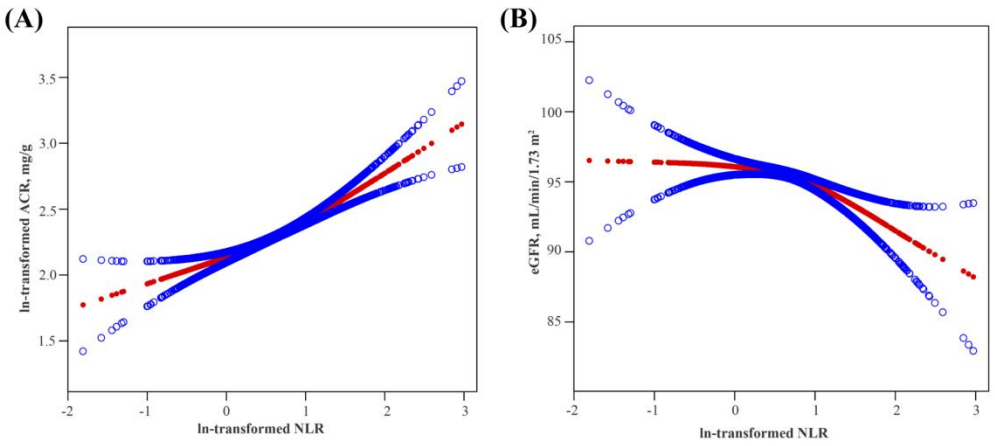
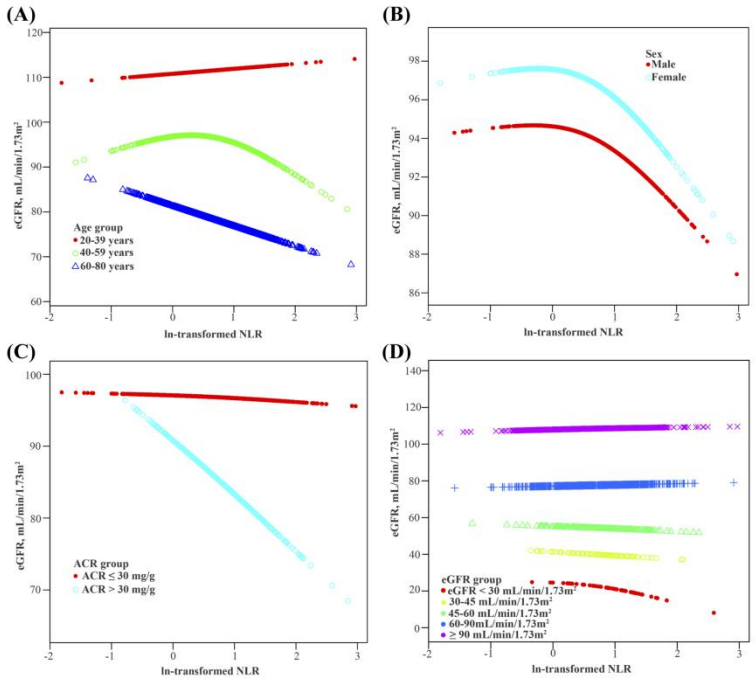
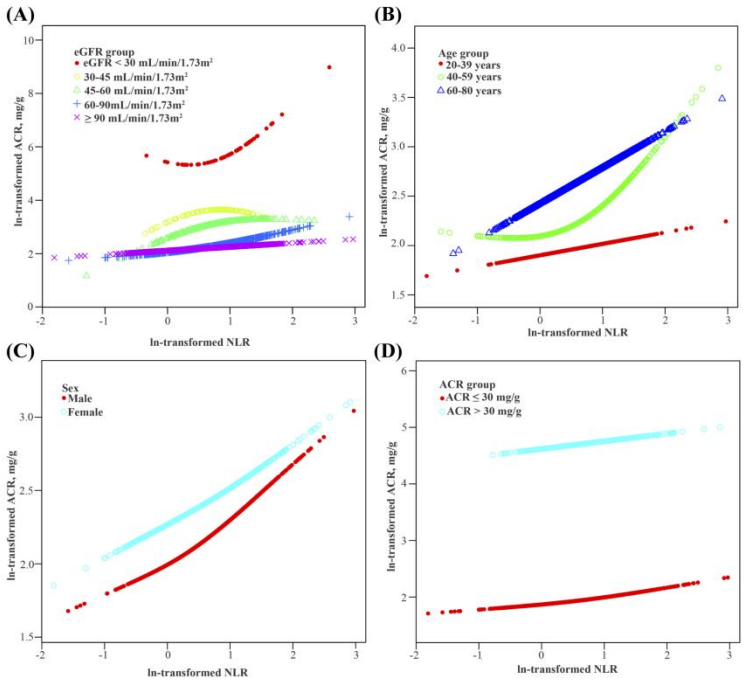


Supplementary Figure S1. Association between ln-transformed NLR and renal function indicators through smooth curve fitting. (A) Association between ln-transformed NLR and ln-transformed ACR; (B) Association between ln-transformed NLR and eGFR. Adjusted for age, sex, race, ALT, AST, BMI, HDL, PIR, total calorie intake, education level, marital status, uric acid, physical activity, total cholesterol, diabetes, tobacco exposure, hypertension, CVD, and alcohol consumption. NLR, neutrophil-to-lymphocyte ratio; eGFR, estimated glomerular filtration rate; ACR, albumin-to-creatinine ratio; ALT, alanine aminotransferase; AST, aspartate aminotransferase; BMI, body mass index; HDL, high-density lipoprotein; PIR, poverty income ratio; CVD, cardiovascular disease.



Supplementary Figure S2. The association between ln-transformed NLR and eGFR through smooth curve fitting, stratified by age, sex, ACR, and eGFR groups. (A) Stratified by age; (B) Stratified by sex; (C) Stratified by ACR group; (D) Stratified by eGFR group. Adjusted for age, sex, race, ALT, AST, BMI, HDL, PIR, total calorie intake, education level, marital status, uric acid, physical activity, total cholesterol, diabetes, tobacco exposure, hypertension, CVD, and alcohol consumption. NLR, neutrophil-to-lymphocyte ratio; eGFR, estimated glomerular filtration rate; ACR, albumin-to-creatinine ratio; ALT, alanine aminotransferase; AST, aspartate aminotransferase; BMI, body mass index; HDL, high-density lipoprotein; PIR, poverty income ratio; CVD, cardiovascular disease.



Supplementary Figure S3. The association between ln-transformed NLR and ln-transformed ACR through smooth curve fitting, stratified by age, sex, ACR, and eGFR groups. (A) Stratified by eGFR group; (B) Stratified by age; (C) Stratified by sex; (D) Stratified by ACR group. Adjusted for age, sex, race, ALT, AST, BMI, HDL, PIR, total calorie intake, education level, marital status, uric acid, physical activity, total cholesterol, diabetes, tobacco exposure, hypertension, CVD, and alcohol consumption. NLR, neutrophil-to-lymphocyte ratio; eGFR, estimated glomerular filtration rate; ACR, albumin-to-creatinine ratio; ALT, alanine aminotransferase; AST, aspartate aminotransferase; BMI, body mass index; HDL, high-density lipoprotein; PIR, poverty income ratio; CVD, cardiovascular disease.

Supplementary Table S1. Characteristics of the study population, according to the eGFR groups, weighted

eGFR, mL/min/1.73m²	**< 60**	**60-89.9**	**≥ 90**	***P* value**
No. of participants	448	2005	4414	
Age, median (Q1, Q3), years	68.73 (64.00, 79.25)	57.40 (50.00, 70.00)	40.79 (30.00, 55.00)	< 0.001
Serum creatinine, median (Q1, Q3), mg/dL	1.60 (1.18, 1.62)	0.99 (0.87, 1.12)	0.78 (0.65, 0.87)	< 0.001
BMI, median (Q1, Q3), kg/m²	30.91 (26.20, 34.80)	29.59 (25.50, 33.55)	29.82 (24.40, 33.70)	0.01
HDL, median (Q1, Q3), mg/dL	53.63 ± 16.54	55.03 ± 17.14	52.81 ± 14.94	< 0.001
ALT, median (Q1, Q3), U/L	18.29 (12.00, 20.00)	22.02 (13.00, 25.00)	23.94 (13.00, 27.00)	< 0.001
AST, median (Q1, Q3), U/L	21.67 (15.00, 23.25)	21.97 (16.00, 24.00)	22.10 (16.00, 24.00)	0.83
Uric acid, median (Q1, Q3), mg/dL	6.59 ± 1.64	5.59 ± 1.38	5.18 ± 1.37	< 0.001
Total cholesterol, median (Q1, Q3), mg/dL	179.46 ± 42.41	192.12 ± 40.73	185.25 ± 38.71	< 0.001
NLR, median (Q1, Q3)	2.60 (1.58, 3.00)	2.24 (1.38, 2.58)	2.03 (1.35, 2.36)	< 0.001
Lymphocyte count, median (Q1, Q3), 10^9 cells/L	1.96 (1.40, 2.40)	2.07 (1.60, 2.50)	2.25 (1.80, 2.70)	< 0.001
Neutrophil count, median (Q1, Q3), 10^9 cells/L	4.46 (3.00, 5.13)	4.20 (3.00, 4.90)	4.27 (3.00, 5.10)	0.02
Sex, %				0.006
Male	42.55	51.92	49.33	
Female	57.45	48.08	50.67	
Race, %				< 0.001
Non-Hispanic white	64.96	68.58	57.66	
Non-Hispanic black	20.84	13.91	9.6	
Mexican American	3.38	3.81	11.79	
Other race/ethnicity	10.82	13.71	20.95	
PIR, %				< 0.001

Poor	12.19	8.86	12.73	
Near poor	43.94	28.61	30.73	
Non-poor	34.38	51.35	45.08	
Missing	9.49	11.18	11.46	
Hypertension, %				< 0.001
No	18.44	51.92	70.38	
Yes	81.56	48.08	29.62	
Diabetes, %				< 0.001
No	62.83	83.44	88.05	
Yes	37.17	16.56	11.95	
Tobacco exposure, %				< 0.001
Undetectable	40.14	42.9	34.65	
Involuntary	41.57	36.85	39.78	
Active	18.29	20.25	25.58	
Total calories take, Kcal per day, %				< 0.001
Low	48.56	38.55	33.85	
Adequate	36.42	37.05	40.49	
High	6.5	18.34	18.97	
Missing	8.51	6.06	6.68	
Physical activity category, %				< 0.001
Below	37.81	35.02	29.91	
Meet	11.24	16.54	16.93	
Exceed	17.02	27.74	35.62	
Missing	33.93	20.7	17.54	
Alcohol drinking, %				< 0.001
Never	8.82	6.59	6.01	
Ever	35.87	18.64	11.02	
Current	50.39	70.89	78.08	
Missing	4.92	3.88	4.89	
Education level, %				< 0.001
Less than high school	16.7	10.12	11.53	
High school	33.42	25.65	27.5	
More than high school	49.88	64.23	60.97	
Marital status, %				< 0.001
Married or living with a partner	52.17	65.47	61.46	
Widowed, divorced or separated	40.52	23.81	12.92	
Never married	7.31	10.72	25.62	
CVD, %				< 0.001
No	67.02	87.44	95.03	
Yes	32.98	12.56	4.97	

Note. Mean ± standard deviation for continuous variables. For a skewed distribution of continuous variables, the data are described as median and quartile ranges. A weighted linear regression model was used to calculate the *P*-value. (%) for categorical variables, and the *P*-value was calculated using the weighted chi-square

test. NLR, neutrophil-to-lymphocyte ratio; eGFR, estimated glomerular filtration rate; CI, confidence interval; ALT, alanine aminotransferase; AST, aspartate aminotransferase; BMI, body mass index; HDL, high-density lipoprotein; PIR, poverty income ratio; CVD, cardiovascular disease.

Supplementary Table S2. Associations between ln-transformed NLR and renal function (eGFR and ACR) stratified by age, sex, ACR, and eGFR groups

Outcomes	eGFR	ln-transformed ACR
Sex		
Male	–2.08 (–3.23, –0.93) < 0.001	0.14 (0.07, 0.22) < 0.001
Female	–0.67 (–1.79, 0.45) 0.24	0.19 (0.11, 0.27) < 0.001
P for interaction	0.78	0.62
Age, years		
20–39	–0.10 (–1.56, 1.37) 0.90	0.05 (-0.04, 0.13) 0.27
40–59	–1.73 (–3.10, –0.36) 0.01	0.29 (0.20, 0.38) < 0.001
60–80	–3.65 (–5.18, –2.12) < 0.001	0.23 (0.13, 0.34) < 0.001
P for interaction	0.002	0.005
eGFR, mL/min/1.73 m^2		
< 30	0.55 (–2.66, 3.75) 0.74	–0.12 (–1.35, 1.11) 0.85
30–45	–1.19 (–4.11, 1.72) 0.42	0.30 (–0.62, 1.23) 0.53
45–60	–1.06 (–2.13, –0.01) 0.04	0.26 (–0.06, 0.59) 0.12
60–90	–0.43 (–1.21, 0.36) 0.29	0.23 (0.14, 0.32) < 0.001
≥ 90	0.43 (–0.19, 1.05) 0.17	0.11 (0.04, 0.17) < 0.001
P for interaction	0.39	0.10
ACR, mg/g		
≤ 30	–0.63 (–1.44, 0.18) 0.13	0.11 (0.08, 0.15) < 0.001
> 30	–6.92 (–9.90, –3.94) < 0.001	0.10 (–0.07, 0.27) 0.25
P for interaction	< 0.001	0.70

Note. Adjusted for age, sex, race, ALT, AST, BMI, HDL, PIR, total calorie intake, education level, marital status, uric acid, physical activity, total cholesterol, diabetes, tobacco exposure, hypertension, and alcohol consumption. NLR, neutrophil-to-lymphocyte ratio; eGFR, estimated glomerular filtration rate; ACR, albumin-to-creatinine ratio; *CI*, confidence interval; ALT, alanine aminotransferase; AST, aspartate aminotransferase; BMI, body mass index; HDL, high-density lipoprotein; PIR, poverty income ratio; CVD, cardiovascular disease.

Supplementary Table S3. Threshold effect analysis of ln-transformed NLR on eGFR

Inflection point	Adjusted β (95% *CI*) *P* value
Male	
Inflection point	0.55
ln-transformed NLR < 0.55	1.19 (–1.28, 3.65) 0.35
ln-transformed NLR ≥ 0.55	–4.19 (–6.01, –2.38) < 0.001
log likelihood ratio	0.003
40–59 years	
Inflection point	0.87
ln-transformed NLR < 0.87	2.11 (0.05, 4.16) 0.04
ln-transformed NLR ≥0.87	–9.57 (–12.99, –6.15) < 0.001
log likelihood ratio	< 0.001
ACR ≤ 30 mg/g	
Inflection point	0.76
ln-transformed NLR < 0.76	0.45 (–0.87, 1.76) 0.51
ln-transformed NLR ≥ 0.76	–2.15 (–3.83, –0.47) 0.01
log likelihood ratio	0.04

Note. Adjusted for age, sex, race, ALT, AST, BMI, HDL, PIR, total calorie intake, education level, marital status, uric acid, physical activity, total cholesterol, diabetes, tobacco exposure, hypertension, CVD, and alcohol consumption. The log-likelihood ratio was used to compare one-line and piecewise linear regression models. A *P* value < 0.05 suggests that the piecewise linear regression models fit the data better than the one-line linear regression model. NLR, neutrophil-to-lymphocyte ratio; eGFR, estimated glomerular filtration rate; ACR, albumin-to-creatinine ratio; *CI*, confidence interval; ALT, alanine aminotransferase; AST, aspartate aminotransferase; BMI, body mass index; HDL, high-density lipoprotein; PIR, poverty income ratio; CVD, cardiovascular disease.

Supplementary Table S4. Threshold effect analysis of ln-transformed NLR on ln-transformed ACR

Inflection point	Adjusted β (95% *CI*) *P* value
45 ≤ eGFR< 60 mL/min/1.73 m^2	
Inflection point	0.67
ln-transformed NLR < 0.67	1.41 (0.74, 2.07) < 0.001
ln-transformed NLR ≥ 0.67	–0.47 (–0.97, 0.02) 0.06
log likelihood ratio	< 0.001
eGFR ≥ 90 mL/min/1.73 m^2	
Inflection point	1.11
ln-transformed NLR < 1.11	0.05 (–0.03, 0.12) 0.21
ln-transformed NLR ≥ 1.11	0.45 (0.20, 0.71) < 0.001
log likelihood ratio	0.006
40–59 years	
Inflection point	1.29
ln-transformed NLR < 1.29	0.21 (0.10, 0.31) < 0.001
ln-transformed NLR ≥ 1.29	1.10 (0.62, 1.57) < 0.001
log likelihood ratio	< 0.001
60–80 years	
Inflection point	1.39
ln-transformed NLR < 1.39	0.31 (0.19, 0.43) < 0.001
ln-transformed NLR ≥ 1.39	–0.31 (–0.72, 0.11) 0.15
log likelihood ratio	0.007

Note. Adjusted for age, sex, race, ALT, AST, BMI, HDL, PIR, total calorie intake, education level, marital status, uric acid, physical activity, total cholesterol, diabetes, tobacco exposure, hypertension, CVD, and alcohol consumption. The log-likelihood ratio was used to compare one-line and piecewise linear regression models. A *P* value < 0.05 suggests that the piecewise linear regression models fit the data better than the one-line linear regression model. NLR, neutrophil-to-lymphocyte ratio; eGFR, estimated glomerular filtration rate; ACR, albumin-to-creatinine ratio; *CI*, confidence interval; ALT, alanine aminotransferase; AST, aspartate aminotransferase; BMI, body mass index; HDL, high-density lipoprotein; PIR, poverty income ratio; CVD, cardiovascular disease.