

Table.S1 The lower limit of detection of circulating antioxidants in NHANES 2017–2018 dataset

Variable codes	Antioxidants	Lower limit of detection
LBXALC	alpha-carotene (ug/dL)	0.7
LBXARY	alpha-cryptoxanthin (ug/dL)	0.2
LBXBEC	trans-beta-carotene (ug/dL)	0.8
LBXBSE	Blood selenium (ug/L)	24.48
LBXCBC	cis-beta-carotene (ug/dL)	0.7
LBXCRY	beta-cryptoxanthin (ug/dL)	0.9
LBXGTC	gamma-tocopherol (ug/dL)	11
LBXLCC	Total Lycopene (ug/dL)	1
LBXLUZ	Lutein and zeaxanthin (ug/dL)	2.4
LBXLYC	trans-lycopene (ug/dL)	0.8
LBXRPL	Retinyl palmitate (ug/dL)	1.3
LBXRST	Retinyl stearate (ug/dL)	0.7
LBXVIA	Retinol (ug/dL)	1
LBXVIC	Vitamin C (mg/dL)	0.03
LBXVIE	alpha-tocopherol (ug/dL)	40

Table.S2 The detection rate of circulating antioxidants in NHANES 2017–2018 dataset

Variable codes	Antioxidants	At or above the detection limit individuals	Below lower detection limit individuals	Detection rate (%)
LBXBSE	Blood selenium (ug/L)	7513	0	100
LBXGTC	gamma-tocopherol (ug/dL)	6731	0	100
LBXVIA	Retinol (ug/dL)	6812	0	100
LBXVIE	alpha-tocopherol (ug/dL)	6665	0	100
LBXLCC	Total Lycopene (ug/dL)	6388	4	99.94
LBXLUZ	Lutein and zeaxanthin (ug/dL)	6492	8	99.88
LBXLYC	trans-lycopene (ug/dL)	6454	9	99.86
LBXARY	alpha-cryptoxanthin (ug/dL)	6471	11	99.83
LBXBEC	trans-beta-carotene (ug/dL)	6568	14	99.79
LBXCRY	beta-cryptoxanthin (ug/dL)	6459	29	99.55
LBXALC	alpha-carotene (ug/dL)	5796	486	92.26
LBXVIC	Vitamin C (mg/dL)	6740	695	90.65
LBXCBC	cis-beta-carotene (ug/dL)	3063	3161	49.21
LBXRPL	Retinyl palmitate (ug/dL)	2526	3755	40.22
LBXRST	Retinyl stearate (ug/dL)	632	5491	10.32

Table.S3 The detail information of the measurement of sleeping status and sleep disorders related symptoms

Code or Value	Value Description	Binary outcome
SLQ030	How often do you snore?	
0	Never	No
1	Rarely - 1-2 nights a week	No
2	Occasionally - 3-4 nights a week	Yes
3	Frequently - 5 or more nights a week	Yes
7	Refused	Excluded
9	Don't know	Excluded
SLQ040	How often do you snort or stop breathing?	
0	Never	No
1	Rarely - 1-2 nights a week	No
2	Occasionally - 3-4 nights a week	Yes
3	Frequently - 5 or more nights a week	Yes
7	Refused	Excluded
9	Don't know	Excluded
SLQ050	Ever told doctor had trouble sleeping?	
1	Yes	Yes
2	No	No
7	Refused	Excluded
9	Don't know	Excluded
SLD012	Sleep hours - weekdays or workdays	
	Range of Values	
SLD013	Sleep hours - weekends	
	Range of Values	

Table.S3 The questionnaire selection of demographic and health-related covariates

Covariable code	Questionnaire label	Variable value
RIAGENDR	Gender	1 for male, 2 for female
RIDAGEYR	Age in years at screening	1 for 20-39, 2 for 40-59, 3 for $\geq 60$
RIDRETH1	Race/Hispanic origin	1 for Mexican American, 2 for Other Hispanic, 3 for Non-Hispanic White, 4 for Non-Hispanic Black, 5 for Other Race - Including Multi-Racial
DMDEDUC2	Education level - Adults 20+	1 for below high school, 2 for high school, 3 for above high school
DMDMARTL	Marital status	1 for Married, 2 for Widowed, 3 for Divorced, 4 for Separated, 5 for Never married, 6 for Living with partner
ALQ121	Past 12 months how often have alcohol drink?	1 for yes, 2 for no
BMXBMI	Body Mass Index (kg/m**2)	$<25$ , 25-30, $\geq 30$
BPQ020	Ever told you had high blood pressure?	1 for yes, 2 for no
DIQ010	Doctor told you have diabetes?	1 for yes, 2 for no, 3 for borderline
KIQ022	Ever told you had weak/failing kidneys?	1 for yes, 2 for no
SMQ040	Do you now smoke cigarettes?	1 for yes, 2 for no