

Table 1 Missing data and multiple imputation procedures for covariates

Covariates	Missing, <i>n</i>	Missing, %
Age	0	0
Sex	0	0
Education	0	0
Wealth	1190	27.46
Residence	0	0
Marital status	0	0
Smoking	0	0
Drinking	6	0.14
BMI	680	15.70
PM _{2.5}	0	0

Missing values in covariates were handled using multiple imputation by chained equations (MICE), with 20 imputed datasets and 20 iterations per dataset. Wealth quartile, a categorical variable with four levels, was imputed using multinomial logistic regression (polyreg), whereas BMI, a continuous variable, was imputed using predictive mean matching (pmm). Drinking had only six missing observations and was handled using complete-case analysis. Exposure variables (mDTR and mDMT) and the outcome variables (follow-up time and incident CVD) were not imputed. BMI, body mass index; CVD, cardiovascular disease; mDTR, mean diurnal temperature range; mDMT, mean daily mean temperature.

Table 2 Provincial distribution of participants and incident cardiovascular disease events in the analytic cohort

Province	Participants, <i>n</i> (%)	Incident CVD events, <i>n</i> (%)
Shanghai	13 (0.3)	2 (0.2)
Yunnan	274 (6.3)	40 (4.1)
Inner Mongolia	105 (2.4)	37 (3.8)
Beijing	28 (0.6)	6 (0.6)
Jilin	62 (1.4)	18 (1.8)
Sichuan	509 (11.7)	110 (11.2)
Tianjin	17 (0.4)	9 (0.9)
Anhui	216 (5.0)	69 (7.0)
Shandong	378 (8.7)	104 (10.6)
Shanxi	143 (3.3)	36 (3.7)
Guangdong	232 (5.4)	25 (2.5)
Guangxi	194 (4.5)	28 (2.9)
Xinjiang	22 (0.5)	7 (0.7)
Jiangsu	236 (5.4)	41 (4.2)
Jiangxi	225 (5.2)	52 (5.3)
Hebei	146 (3.4)	52 (5.3)
Henan	322 (7.4)	84 (8.6)
Zhejiang	201 (4.6)	18 (1.8)
Hubei	101 (2.3)	21 (2.1)
Hunan	215 (5.0)	51 (5.2)
Gansu	108 (2.5)	28 (2.9)
Fujian	117 (2.7)	26 (2.6)
Guizhou	63 (1.5)	8 (0.8)
Liaoning	120 (2.8)	33 (3.4)
Chongqing	88 (2.0)	10 (1.0)
Shaanxi	125 (2.9)	39 (4.0)

Qinghai	33 (0.8)	7 (0.7)
Heilongjiang	40 (0.9)	21 (2.1)

Percentages for participants were calculated using the total number of participants in the analytic cohort ($N = 4,333$) as the denominator, whereas percentages for incident CVD events were calculated using the total number of incident CVD events ($n = 982$) as the denominator. CVD, cardiovascular disease.

Table 3 Provincial distribution of baseline cardiovascular disease prevalence among Chinese adults aged ≥ 60 years

Province	<i>N</i>	CVD cases, <i>n</i>	Prevalence, %
Heilongjiang	112	52	46.43
Jilin	156	68	43.59
Inner Mongolia	263	111	42.21
Tianjin	54	22	40.74
Shanghai	28	10	35.71
Hebei	267	79	29.59
Beijing	63	17	26.98
Xinjiang	46	12	26.09
Shaanxi	235	56	23.83
Qinghai	53	12	22.64
Henan	528	117	22.16
Shandong	571	123	21.54
Liaoning	207	44	21.26
Hunan	353	66	18.7
Anhui	402	74	18.41
Gansu	180	31	17.22
Jiangxi	372	63	16.94
Shanxi	215	36	16.74
Guangxi	303	49	16.17
Hubei	222	36	16.22
Jiangsu	357	54	15.13
Sichuan	735	111	15.1
Zhejiang	300	44	14.67
Fujian	171	22	12.87
Chongqing	112	12	10.71
Guangdong	371	38	10.24

Yunnan	416	41	9.86
Guizhou	94	8	8.51
Total	7186	1408	19.59

Baseline CVD prevalence was calculated as the number of participants aged ≥ 60 years who reported physician-diagnosed heart disease or stroke at Wave 1 (2011), divided by the total number of participants with available CVD information. CVD, cardiovascular disease.

Table 4 Provincial distribution of mean diurnal temperature range among Chinese adults aged ≥ 60 years

Province	N	Mean mDTR	SD mDTR
Xinjiang	40	26.74	0
Inner Mongolia	212	23.02	2.08
Hebei	251	19.41	2.4
Qinghai	44	18.97	0
Beijing	49	18.56	0
Gansu	156	17.66	1.59
Shanxi	196	17.44	1.92
Yunnan	352	17.36	1.59
Shaanxi	199	15.37	1.55
Heilongjiang	94	15.24	1.92
Jilin	133	14.8	0.96
Chongqing	101	14.61	0
Sichuan	664	14.54	6.51
Liaoning	178	14.34	1.64
Guizhou	81	13.75	0.66
Tianjin	43	13.48	0
Shandong	526	12.77	1.54
Jiangxi	310	12.65	1.93
Henan	479	12.52	0.97
Hubei	141	12.48	1.63
Fujian	153	11.96	0.81
Anhui	290	11.87	0.56
Zhejiang	252	11.52	1.01
Guangxi	269	10.99	1.6
Jiangsu	310	10.95	0.67
Hunan	305	10.95	0.57

Guangdong	311	9.51	1.18
Shanghai	24	9.02	0

mDTR was calculated as the average of the corresponding temperature estimates for 2011 and 2013. N represents the number of participants with available mDTR data. mDTR, mean diurnal temperature range; SD, standard deviation.

Table 5 Provincial distribution of mean daily mean temperature among Chinese adults aged ≥ 60 years

Province	N	Mean mDMT	SD mDMT
Guangdong	311	22.74	0.62
Guangxi	269	21.61	1.52
Fujian	153	19.33	1.29
Jiangxi	310	18.32	1.19
Zhejiang	252	18.1	0.78
Guizhou	81	17.93	0.17
Chongqing	101	17.81	0
Hunan	305	17.64	0.51
Yunnan	352	17.62	1.99
Shanghai	24	17.21	0
Hubei	141	16.86	0.78
Sichuan	664	15.69	3.22
Anhui	290	15.66	0.34
Jiangsu	310	15.39	0.94
Henan	479	15	0.97
Shandong	526	12.86	0.73
Shaanxi	199	12.44	2.13
Tianjin	43	11.91	0
Shanxi	196	10.57	1.95
Beijing	49	9.56	0
Hebei	251	9.3	1.61
Liaoning	178	8.5	0.65
Gansu	156	7.96	1.36
Xinjiang	40	7.3	0
Qinghai	44	5.16	0
Jilin	133	5.14	0.75

Heilongjiang	94	3.11	0.68
Inner Mongolia	212	1.64	3.43

mDMT was calculated as the average of the corresponding temperature estimates for 2011 and 2013. N represents the number of participants with available mDMT data; mDMT, mean daily mean temperature; SD, standard deviation.

Table 6 Distribution of incident cardiovascular disease events and person-years according to quartiles of temperature exposure

Exposure	Quartile	Range	<i>N</i>	Person-years	Incident CVD, <i>n</i>
mDTR	Q1	7.95–11.03	111 6	7198.29	180
	Q2	11.03– 12.66	107 6	6920.79	255
	Q3	12.66– 15.69	110 6	7018.36	289
	Q4	15.69– 31.24	103 5	6424.15	258
mDMT	Q1	-1.77–12.71	109 5	6762.21	336
	Q2	12.71– 15.96	111 4	7132.02	274
	Q3	15.96– 18.06	106 6	6785.88	209
	Q4	18.06– 23.29	105 8	6881.47	163

Person-years were calculated from baseline to the first occurrence of incident CVD or censoring, whichever occurred first. Quartile cut-points were determined from the original exposure distribution. *N*, number of participants; CVD, cardiovascular disease; mDTR, mean diurnal temperature range; mDMT, mean daily mean temperature.

Table 7 Test of the proportional hazards assumption for mean diurnal temperature range based on Schoenfeld residuals

Variable	χ^2	df	<i>P</i> value
mDTR	3.582	1	0.058
Age	2.527	1	0.112
Sex	0.062	1	0.803
Education	0.240	1	0.624
Partnered	7.828	1	0.005
Rural	1.450	1	0.229
Wealth	5.339	3	0.149
Smoke	0.719	1	0.396
Drink	0.522	1	0.470
BMI	2.168	1	0.141
PM _{2.5}	7.269	1	0.007
Global	25.411	13	0.020

The proportional hazards assumption was assessed using Schoenfeld residuals. A *P* value < 0.05 indicates evidence of a potential violation of the proportional hazards assumption. BMI, body mass index; PM_{2.5}, particulate matter with an aerodynamic diameter ≤ 2.5 μm ; mDTR, mean diurnal temperature range.

Table 8 Test of the proportional hazards assumption for mean daily mean temperature based on Schoenfeld residuals

Variable	χ^2	df	<i>P</i> value
mDMT	0.867	1	0.352
Age	2.410	1	0.121
Sex	0.067	1	0.796
Education	0.251	1	0.616
Partnered	7.310	1	0.007
Rural	2.255	1	0.133
Wealth	5.280	3	0.152
Smoke	0.735	1	0.391
Drink	0.433	1	0.510
BMI	1.790	1	0.181
PM _{2.5}	5.730	1	0.017
Global	24.054	13	0.031

The proportional hazards assumption was assessed using Schoenfeld residuals. A *P* value < 0.05 indicates evidence of a potential violation of the proportional hazards assumption. BMI, body mass index; PM_{2.5}, particulate matter with an aerodynamic diameter ≤ 2.5 μm ; mDMT, mean daily mean temperature.

Table 9 Assessment of multicollinearity among covariates for mean diurnal temperature range

Variable	Mean VIF	SD	Min VIF	Max VIF
Age	1.074	0.002	1.071	1.077
BMI	1.039	0.003	1.032	1.044
PM _{2.5}	1.055	0.002	1.052	1.059
Drinking	1.185	0.001	1.182	1.187
Education	1.050	0.002	1.047	1.052
mDTR	1.061	0.002	1.057	1.063
Marital status	1.082	0.002	1.080	1.087
Residence	1.067	0.003	1.063	1.077
Sex	1.420	0.002	1.414	1.423
Smoking	1.337	0.002	1.332	1.340
Wealth	1.022	0.001	1.020	1.025

VIFs were calculated separately for each imputed dataset for the covariates included in the primary Model 4 for mDMT. The table presents the mean, minimum, and maximum VIF values across the 20 imputed datasets. Lower VIF values indicate less multicollinearity; all observed VIFs were below 1.5, suggesting no substantial multicollinearity among the covariates included in the primary Model 4. VIF, variance inflation factor; BMI, body mass index; SD, standard deviation; mDTR, mean diurnal temperature range; PM_{2.5}, particulate matter with an aerodynamic diameter ≤ 2.5 μm .

Table 10 Assessment of multicollinearity among covariates for mean daily mean temperature

Variable	Mean VIF	SD	Min VIF	Max VIF
Age	1.072	0.002	1.070	1.076
BMI	1.045	0.003	1.038	1.050
PM _{2.5}	1.012	0.001	1.010	1.015
Drinking	1.186	0.001	1.183	1.188
Education	1.053	0.002	1.050	1.055
mDMT	1.021	0.002	1.017	1.025
Marital status	1.078	0.001	1.076	1.082
Residence	1.071	0.004	1.066	1.081
Sex	1.408	0.002	1.405	1.411
Smoking	1.320	0.002	1.316	1.323
Wealth	1.024	0.001	1.021	1.026

VIFs were calculated separately for each imputed dataset for the covariates included in the primary Model 4 for mDMT. The table presents the mean, minimum, and maximum VIF values across the 20 imputed datasets. Lower VIF values indicate less multicollinearity; all observed VIFs were below 1.5, suggesting no substantial multicollinearity among the covariates included in the primary Model 4. VIF, variance inflation factor; BMI, body mass index; SD, standard deviation; mDMT, mean daily mean temperature; PM_{2.5}, particulate matter with an aerodynamic diameter ≤ 2.5 μm .

Table 11 Sensitivity analyses for the association of mean diurnal temperature range and mean daily mean temperature with incident cardiovascular disease risk

Sensitivity analysis	N	CVD events	mDTR, effect estimate (95% CI)	P value	mDMT, effect estimate (95% CI)	P value
Mutual adjustment	4,333	982	HR 1.02 (1.00, 1.04)	0.069	HR 0.95 (0.94, 0.97)	<0.001
Logistic regression	4,333	982	OR 1.06 (1.04, 1.08)	<0.001	OR 0.94 (0.93, 0.95)	<0.001
Complete-case analysis	2,708	625	HR 1.06 (1.04, 1.08)	<0.001	HR 0.95 (0.93, 0.96)	<0.001
Lag analysis	3,619	681	HR 1.05 (1.03, 1.07)	<0.001	HR 0.95 (0.93, 0.96)	<0.001
Winsorization (1st-99th percentiles)	4,333	982	HR 1.06 (1.05, 1.08)	<0.001	HR 0.94 (0.93, 0.95)	<0.001
Province-adjusted	4,333	982	HR 1.06 (1.03, 1.09)	<0.001	HR 0.92 (0.88, 0.96)	<0.001

Continuous exposures were modeled per 1-SD increase. Logistic regression, complete-case analysis, lag analysis (excluding CVD events within the first 2 years), and winsorization (1st-99th percentiles) were based on the primary model (Model 4), which was adjusted for age, sex, education, wealth, residence, marital status, smoking, drinking, BMI, and PM_{2.5}. Mutual-adjustment models additionally adjusted for the other temperature exposure (mDTR or mDMT), while the province-adjusted models additionally adjusted for province. SD, standard deviation; BMI, body mass index; CVD, cardiovascular disease; mDTR, mean diurnal temperature range; mDMT, mean daily mean temperature; HR, hazard ratio; OR, odds ratio; CI, confidence interval; PM_{2.5}, fine

particulate matter with an aerodynamic diameter $\leq 2.5 \mu\text{m}$.

Table 12 Assessment of multicollinearity in the mutual-adjustment model

Variable	VIF
mDMT	1.032
mDTR	2.239
Age	1.069
Sex	1.384
Education	1.033
Marital status	1.068
Residence	1.061
Wealth	1.025
Smoking	1.317
Drinking	1.154
BMI	1.066
PM _{2.5}	1.029

VIFs were calculated separately for each imputed dataset for the variables included in the mutual-adjustment model. VIF, variance inflation factor; BMI, body mass index; mDMT, mean daily mean temperature; PM_{2.5}, particulate matter with an aerodynamic diameter ≤ 2.5 μm .

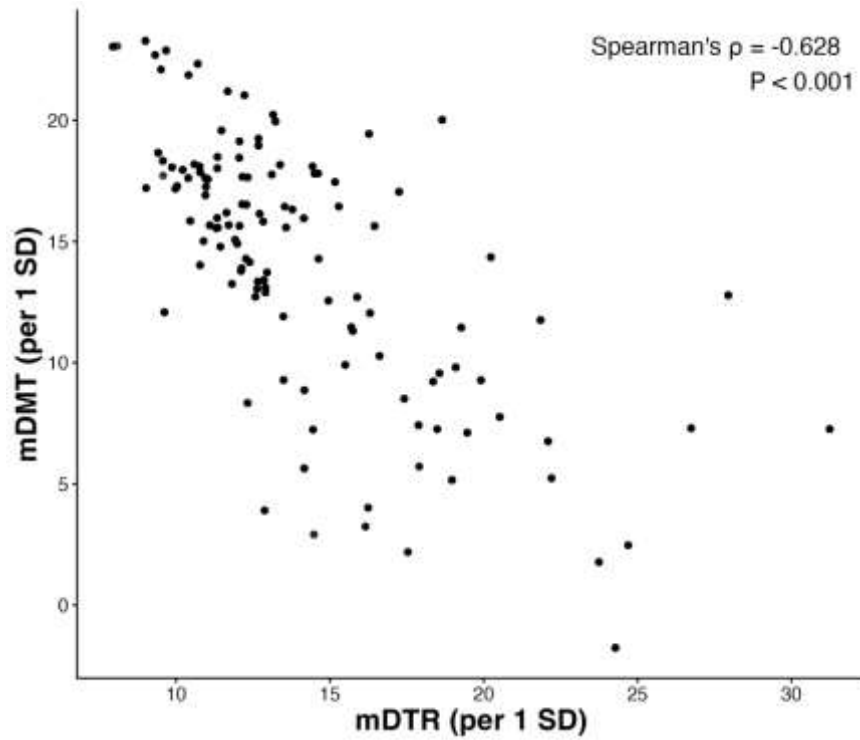


Figure 1 Spearman correlation between mDTR and mDMT. The Spearman correlation coefficient was calculated to assess the monotonic association between the two temperature exposure metrics. mDTR, mean diurnal temperature range; mDMT, mean daily mean temperature.

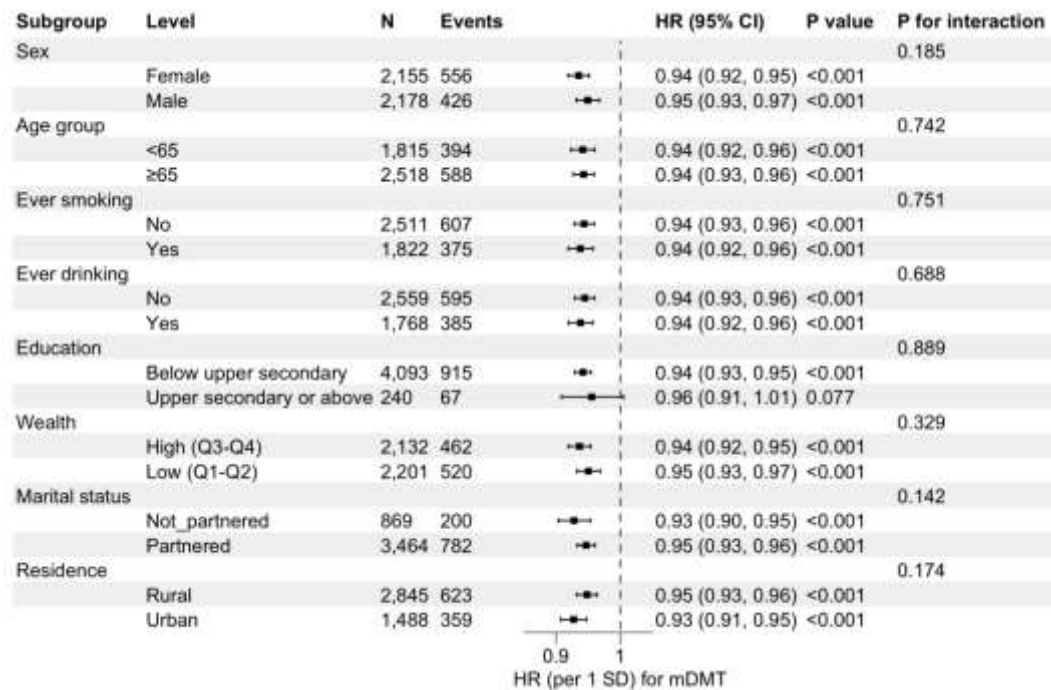


Figure 2 Forest plot of subgroup analyses for the association between mDMT and incident CVD risk. Hazard ratios (HRs) and 95% confidence intervals (CIs) are shown for each subgroup. *P* values for interaction are indicated on the right. Models were adjusted for age, sex, education, wealth, residence, marital status, smoking, drinking, BMI, and PM_{2.5}. CVD, cardiovascular disease; BMI, body mass index; mDMT, mean daily mean temperature; HR, hazard ratio; PM_{2.5}, fine particulate matter with an aerodynamic diameter ≤2.5 μm.