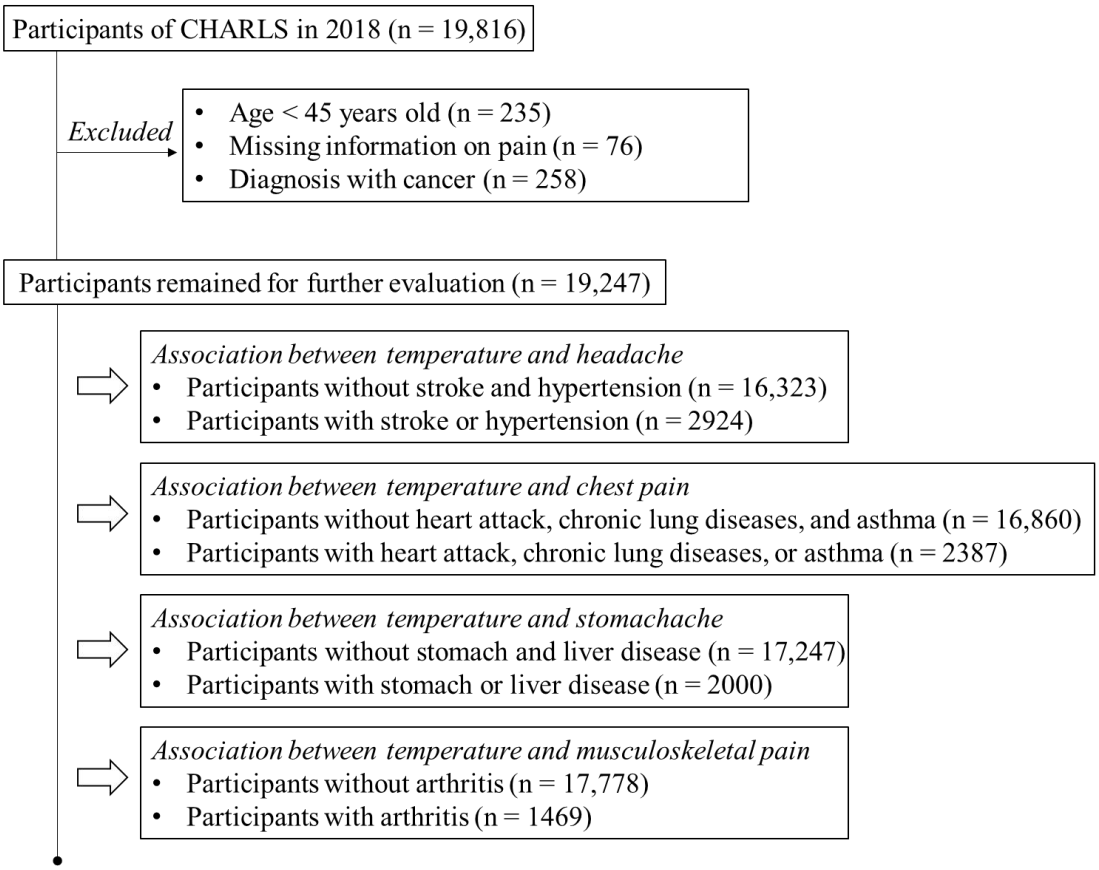
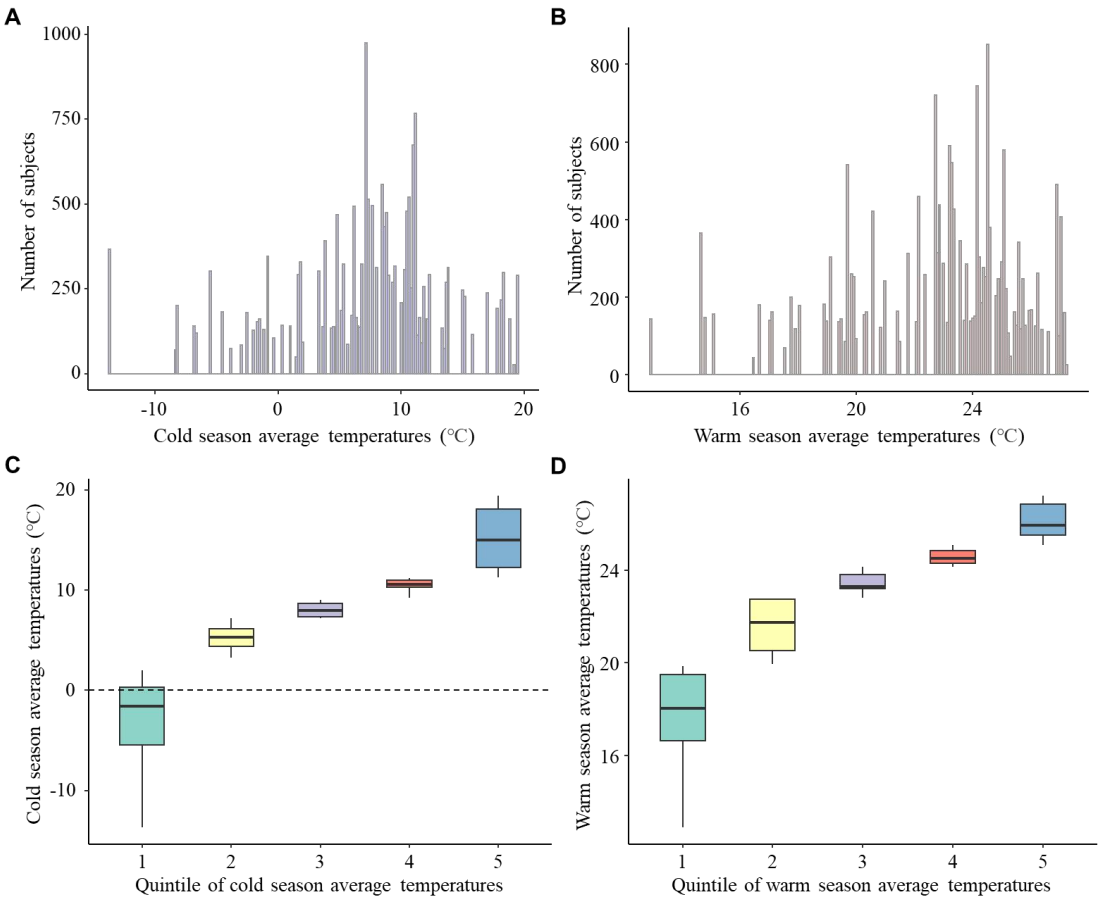


Supplementary Figure S1. Study population selection process.



Supplementary Figure S2. Distribution of participants by average temperatures. Number of participants exposed to different average temperatures in cold season (A) and warm season (B). Distribution of the average temperatures categorized by quintiles in cold season (C) and warm season (D).

Supplementary Table S1. Baseline characteristics of participants by quintiles of average temperature in the cold season

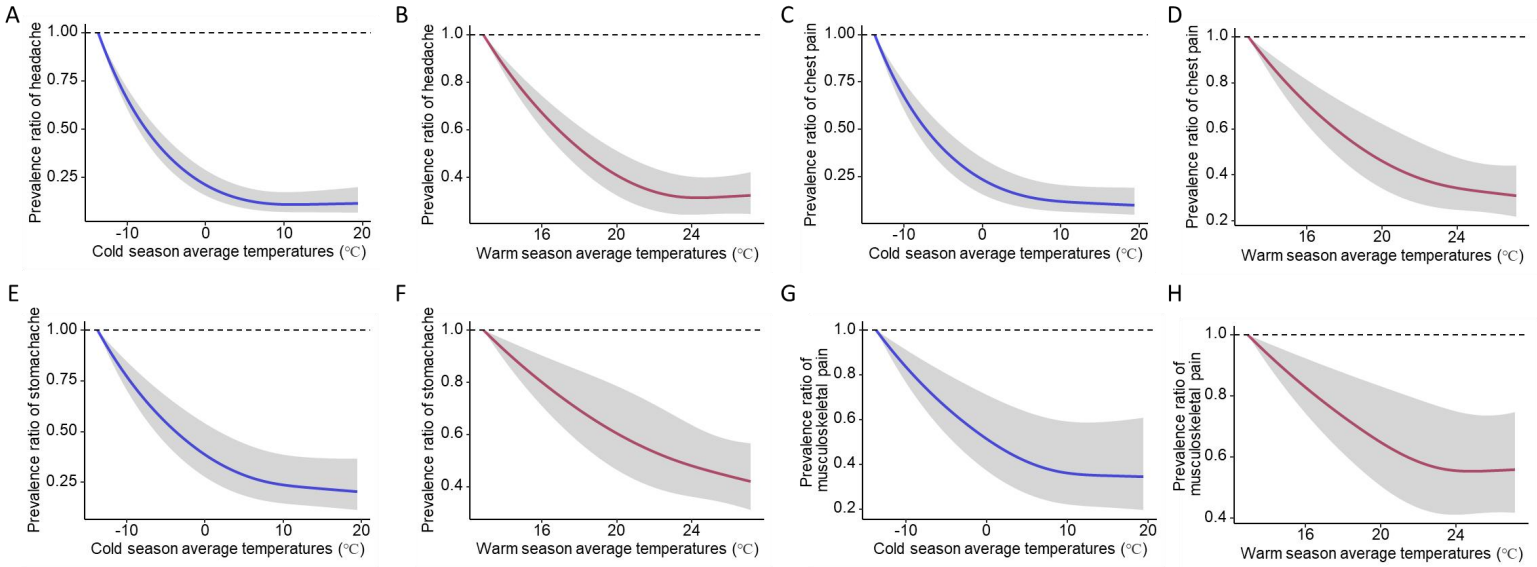
Variable	Quintile 1 (*n* = 3,789)	Quintile 2 (*n* = 3,719)	Quintile 3 (*n* = 3,937)	Quintile 4 (*n* = 3,924)	Quintile 5 (*n* = 3,878)
Age (years), mean ± SD	61.0 ± 9.6	61.8 ± 9.9	61.6 ± 10.2	63.1 ± 10.5	62.6 ± 10.5
Women, *n* (%)	1,971 (52.0)	1,956 (52.6)	2,053 (52.1)	2,030 (51.7)	2,063 (53.2)
High school or higher, *n* (%)	589 (15.5)	587 (15.8)	438 (11.1)	493 (12.6)	326 (8.4)
Current smoking, *n* (%)	1,153 (30.4)	929 (25.0)	983 (25.0)	1,096 (27.9)	1,049 (27.1)
Current drinking, *n* (%)	958 (25.3)	984 (26.5)	1,097 (27.9)	1,130 (28.8)	907 (23.4)
Nighttime sleep duration, mean ± SD	6.3 ± 1.9	6.4 ± 1.9	6.2 ± 2.1	6.0 ± 2.1	6.2 ± 2.0
Location of residential address, *n* (%)					
Central of City/Town	796 (21.0)	666 (17.9)	624 (15.8)	866 (22.1)	449 (11.6)
Urban-Rural Integration Zone	246 (6.5)	353 (9.5)	303 (7.7)	325 (8.3)	137 (3.5)
Rural	2,683 (70.8)	2,662 (71.6)	2,892 (73.5)	2,655 (67.7)	3,231 (83.3)
Special Zone	9 (0.2)	4 (0.1)	36 (0.9)	20 (0.5)	9 (0.2)
Missing	55 (1.5)	34 (0.9)	82 (2.1)	58 (1.5)	52 (1.3)
Marital status, *n* (%)					
Married	3,063 (80.8)	2,928 (78.7)	3,070 (78.0)	3,066 (78.1)	2,954 (76.2)
Insurance type, *n* (%)					
Basic medical insurance	3,457 (91.2)	3,395 (91.3)	3,684 (93.6)	3,567 (90.9)	3,564 (91.9)
Private medical insurance	143 (3.8)	196 (5.3)	104 (2.6)	143 (3.6)	97 (2.5)
Other insurance	34 (0.9)	50 (1.3)	52 (1.3)	98 (2.5)	78 (2.0)
No insurance	152 (4.0)	77 (2.1)	94 (2.4)	114 (2.9)	136 (3.5)
Missing	3 (0.1)	1 (0.0)	3 (0.1)	2 (0.1)	3 (0.1)
Diagnosed with diabetes, *n* (%)	208 (5.5)	204 (5.5)	233 (5.9)	200 (5.1)	173 (4.5)
Diagnosed with dyslipidemia, *n* (%)	428 (11.3)	398 (10.7)	414 (10.5)	337 (8.6)	282 (7.3)

Note. Values are presented as means ± standard deviation or number (percentages).

Supplementary Table S2. Baseline characteristics of participants by quintiles of average temperature in the warm season

Variable	Quintile 1 (*n* = 3,696)	Quintile 2 (*n* = 3,896)	Quintile 3 (*n* = 3,911)	Quintile 4 (*n* = 3,781)	Quintile 5 (*n* = 3,963)
Age (years), mean ± SD	61.0 ± 10.0	61.4 ± 10.0	62.2 ± 10.1	62.7 ± 10.3	62.8 ± 10.4
Women, *n* (%)	1,933 (52.3)	2,028 (52.1)	2,061 (52.7)	1,955 (51.7)	2,096 (52.9)
High school or higher, *n* (%)	602 (16.3)	490 (12.6)	456 (11.7)	347 (9.2)	538 (13.6)
Current smoking, *n* (%)	1,091 (29.5)	1,099 (28.2)	987 (25.2)	967 (25.6)	1,066 (26.9)
Current drinking, *n* (%)	850 (23.0)	1,053 (27.0)	1,046 (26.7)	1,146 (30.3)	981 (24.8)
Nighttime sleep duration, mean ± SD	6.3 ± 2.0	6.3 ± 2.0	6.2 ± 2.0	6.2 ± 2.1	6.2 ± 2.0
Location of residential address, *n* (%)					
Central of City/Town	881 (23.8)	621 (15.9)	619 (15.8)	500 (13.2)	780 (19.7)
Urban-Rural Integration Zone	324 (8.8)	217 (5.6)	335 (8.6)	271 (7.2)	217 (5.5)
Rural	2,421 (65.5)	2,965 (76.1)	2,900 (74.1)	2,945 (77.9)	2,892 (73.0)
Special Zone	11 (0.3)	41 (1.1)	3 (0.1)	12 (0.3)	11 (0.3)
Missing	59 (1.6)	52 (1.3)	54 (1.4)	53 (1.4)	63 (1.6)
Marital status, *n* (%)					
Married	2,938 (79.5)	3,055 (78.4)	3,040 (77.7)	2,987 (79.0)	3,061 (77.2)
Insurance type, *n* (%)					
Basic medical insurance	3,381 (91.5)	3,547 (91.0)	3,590 (91.8)	3,543 (93.7)	3,606 (91.0)
Private medical insurance	132 (3.6)	143 (3.7)	172 (4.4)	102 (2.7)	134 (3.4)
Other insurance	49 (1.3)	86 (2.2)	42 (1.1)	54 (1.4)	81 (2.0)
No insurance	131 (3.5)	119 (3.1)	105 (2.7)	78 (2.1)	140 (3.5)
Missing	3 (0.1)	1 (0.0)	2 (0.1)	4 (0.1)	2 (0.1)
Diagnosed with diabetes, *n* (%)	184 (5.0)	201 (5.2)	228 (5.8)	208 (5.5)	197 (5.0)
Diagnosed with dyslipidemia, *n* (%)	409 (11.1)	375 (9.6)	394 (10.1)	350 (9.3)	331 (8.4)

Note. Values are presented as means ± standard deviation or number (percentages).



Supplementary Figure S3. Spline curves showing the associations of average temperature during the cold season (A, C, E, and G) and warm season (B, D, F, and H) with different pain types among participants with specific diseases. (A, B) For headache, analyses were conducted among participants with stroke or hypertension; (C, D) For chest pain, analyses were conducted among participants with heart attack, chronic lung diseases, or asthma; (E, F) For stomachache, analyses were conducted among participants with stomach or liver disease; (G, H) For musculoskeletal pain, analyses were conducted among participants with arthritis. Ambient temperature was modeled as a smooth term using a restricted cubic spline with three knots. Shading indicates 95% confidence intervals (CIs). The reference was the lowest level of ambient temperature. Models are adjusted for age, sex, urban or rural residence, educational attainment, marital status, insurance type, smoking status, drinking status, nighttime sleep duration, dyslipidemia status, diabetes status, and warm season average temperature (for cold season temperature analysis) and cold season average temperature (for warm season temperature analysis).

Supplementary Table S3. Prevalence ratios and 95% confidence intervals for the prevalence of pain associated with per-quintile average temperature among participants with specific diseases

Outcome	Model 1	Model 2	Model 3
Headache			
Cold season average temperature	0.99 (0.94–1.03)	0.98 (0.93–1.01)	0.81 (0.76 – 0.87)
Warm season average temperature	0.91 (0.87–0.95)	0.90 (0.86–0.95)	0.86 (0.82 – 0.91)
Chest pain			
Cold season average temperature	0.98 (0.94–1.05)	0.98 (0.94 – 1.03)	0.85 (0.77 – 0.93)
Warm season average temperature	0.90 (0.85–0.96)	0.89 (0.84–0.95)	0.86 (0.80 – 0.91)
Stomachache			
Cold season average temperature	0.93 (0.88–0.98)	0.91 (0.87–0.96)	0.86 (0.79 – 0.92)
Warm season average temperature	0.89 (0.84–0.94)	0.88 (0.84–0.93)	0.88 (0.83 – 0.93)
Musculoskeletal pain			
Cold season average temperature	0.96 (0.92–1.00)	0.96 (0.92–0.99)	0.90 (0.84 – 0.97)
Warm season average temperature	0.95 (0.91–0.98)	0.95 (0.91–0.99)	0.94 (0.90 – 0.99)

Note. For analyses with headache as outcome (dependent variable), participants with stroke or hypertension were included; for analyses with chest pain, participants with heart attack, chronic lung diseases, or asthma were included; for analyses with stomachache, participants with stomach or liver disease were included; for analyses with musculoskeletal pain, participants with arthritis were included. Model 1 was adjusted for age and sex. Model 2: as for model 1, additionally adjusted for location of residential address, educational attainment, marriage status, and insurance. Model 3: as for model 2, additionally adjusted for smoking status, drinking status, nighttime sleep duration, dyslipidemia, diabetes status, and warm season average temperature (for cold season temperature analysis) and cold season average temperature (for warm season temperature analysis).

Supplementary Table S4. Prevalence ratios and 95% confidence intervals for the prevalence of pain associated with average temperature categories among participants with specific diseases

Outcome	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Headache					
Cold season average temperature	1.00 (Reference)	0.42 (0.34–0.51)	0.48 (0.39–0.59)	0.44 (0.34–0.57)	0.43 (0.32–0.56)
Warm season average temperature	1.00 (Reference)	0.72 (0.60–0.87)	0.53 (0.43–0.64)	0.55 (0.44–0.67)	0.62 (0.50–0.77)
Chest pain					
Cold season average temperature	1.00 (Reference)	0.54 (0.41–0.72)	0.62 (0.48–0.82)	0.54 (0.39–0.76)	0.51 (0.35–0.73)
Warm season average temperature	1.00 (Reference)	0.68 (0.54–0.87)	0.61 (0.47–0.79)	0.66 (0.51–0.84)	0.49 (0.37–0.65)
Stomachache					
Cold season average temperature	1.00 (Reference)	0.61 (0.48–0.78)	0.56 (0.44–0.71)	0.47 (0.35–0.63)	0.57 (0.42–0.77)
Warm season average temperature	1.00 (Reference)	0.91 (0.74–1.13)	0.70 (0.55–0.88)	0.65 (0.52–0.82)	0.64 (0.50–0.82)
Musculoskeletal pain					
Cold season average temperature	1.00 (Reference)	0.67 (0.54–0.82)	0.75 (0.60–0.93)	0.62 (0.48–0.82)	0.64 (0.48–0.85)
Warm season average temperature	1.00 (Reference)	0.82 (0.68–0.99)	0.75 (0.61–0.90)	0.79 (0.63–0.98)	0.76 (0.62–0.93)

Note. For analyses with headache as outcome (dependent variable), participants with stroke and hypertension were included; for analyses with chest pain, participants with heart attack, chronic lung diseases, or asthma were included; for analyses with stomachache, participants with stomach and liver disease were included; for analyses with musculoskeletal pain, participants with arthritis were included. Model was adjusted for age, sex, urban or rural, educational attainment, marriage status, insurance, smoking status, drinking status, nighttime sleep duration, dyslipidemia, diabetes status, and warm season average temperature (for cold season temperature analysis) and cold season average temperature (for warm season temperature analysis).