

Table S1 Sensitivity analysis: negative binomial regression *vs.* Poisson regression

Panel A Monthly Aggregated Model (n=12 calendar months)								
Overdispersion check: Pearson $\chi^2/df = 1.26 \rightarrow$ minimal overdispersion; Poisson is appropriate. NB did not converge (n=12 too small, expected).								
Variable	Poisson Regression (Primary)			Negative Binomial		Robustness		
	IRR per 1 °C (95% CI)	IRR per 10 °C (95% CI)	P value	IRR per 10 °C (95% CI)	P value	Δ IRR	Direction	Conclusion
D mean T	1.024 (1.014–1.034)	1.268 (1.151–1.395)	<0.0001	Not applicable*	Not applicable*	–	Consistent	Robust
d mean T	1.024 (1.014–1.034)	1.268 (1.152–1.397)	<0.0001	Not applicable*	Not applicable*	–	Consistent	Robust
D low T	1.024 (1.015–1.034)	1.269 (1.157–1.392)	<0.0001	Not applicable*	Not applicable*	–	Consistent	Robust
d low T	1.024 (1.014–1.033)	1.265 (1.153–1.388)	<0.0001	Not applicable*	Not applicable*	–	Consistent	Robust
D per T	1.022 (1.013–1.031)	1.244 (1.136–1.362)	<0.0001	Not applicable*	Not applicable*	–	Consistent	Robust
d per T	1.022 (1.013–1.032)	1.247 (1.139–1.365)	<0.0001	Not applicable*	Not applicable*	–	Consistent	Robust
Δ mean T	1.040 (0.717–1.507)	1.475 (0.036–60.4)	0.84	Not applicable*	Not applicable*	–	Consistent	Robust
Δ low T	0.893 (0.468–1.704)	0.322 (0.001–206.1)	0.73	Not applicable*	Not applicable*	–	Consistent	Robust
Δ per T	1.015 (0.668–1.542)	1.158 (0.018–76.1)	0.95	Not applicable*	Not applicable*	–	Consistent	Robust
* NB model did not converge for n=12 aggregated monthly data points (expected; n too small for dispersion parameter estimation). Poisson dispersion index = 1.26 confirms Poisson is appropriate.								
Panel B Year-Month Sensitivity Analysis [n=144 year-month strata (12 years $\times$ 12 months)]								
Overdispersion check: Pearson $\chi^2/df = 1.69 \rightarrow$ moderate overdispersion; NB sensitivity analysis performed.								
Variable	Poisson Regression		Negative Binomial		Robustness			
	IRR per 10 °C decrease (95% CI)	P value	IRR per 10 °C decrease (95% CI)	P value	Δ IRR	Direction	Conclusion	
D mean T	1.205 (1.106–1.314)	<0.001	1.209 (0.994–1.468)	0.057	-0.003	Same	Consistent	
d mean T	1.189 (1.092–1.294)	<0.001	1.195 (0.985–1.449)	0.070	-0.004	Same	Consistent	
D low T	1.211 (1.111–1.319)	<0.001	1.211 (0.998–1.468)	0.052	0.000	Same	Consistent	
d low T	1.196 (1.101–1.300)	<0.001	1.202 (0.996–1.451)	0.056	-0.004	Same	Consistent	
D per T	1.183 (1.094–1.280)	<0.001	1.189 (0.993–1.425)	0.060	-0.004	Same	Consistent	
d per T	1.172 (1.085–1.267)	<0.001	1.182 (0.989–1.412)	0.066	-0.007	Same	Consistent	
Δ mean T	1.379 (0.830–2.294)	0.214	1.582 (0.510–4.926)	0.427	-0.093	Same (NS)	Consistent	
Δ low T	1.082 (0.632–1.852)	0.774	1.091 (0.321–3.717)	0.889	-0.007	Same (NS)	Consistent	
Δ per T	1.264 (0.758–2.114)	0.369	1.344 (0.413–4.367)	0.623	-0.047	Same (NS)	Consistent	

NB, negative binomial.

Table S2 Extended temperature fluctuation analysis: multi-day rolling ΔT and climatological deviation

Variable	Definition	N (days)	IRR per 10 °C (95% CI)	P value
Multi-Day Rolling Mean Temperature (absolute level, sustained cold exposure)				
3-day rolling mean T	Mean of onset day + 2 preceding days	464	1.027 (0.943–1.116)	0.544
7-day rolling mean T	Mean of onset day + 6 preceding days	464	1.032 (0.948–1.122)	0.470
3-day rolling low T	Mean of lowest temperature (low T) on onset day + 2 preceding days	464	1.026 (0.942–1.116)	0.556
7-day rolling low T	Mean of lowest temperature (low T) on onset day + 6 preceding days	464	1.030 (0.946–1.121)	0.491
Multi-Day ΔT (abrupt temperature change over 3 and 7 days)				
Δ 3 mean T	Onset day mean T – mean T 3 days prior	455	1.056 (0.869–1.284)	0.583
Δ 7 mean T	Onset day mean T – mean T 7 days prior	451	1.023 (0.856–1.224)	0.801
Δ 3 low T	Onset day low T – low T 3 days prior	455	1.049 (0.862–1.278)	0.632
Δ 7 low T	Onset day low T – low T 7 days prior	451	1.031 (0.862–1.232)	0.738
Deviation from Monthly Climatological Mean (thermal stress relative to seasonal norm)				
Climatological deviation (mean T)	Onset day mean T – 12-year monthly mean T (positive = warmer than seasonal norm; negative = colder)	464	1.028 (0.819–1.290)	0.814

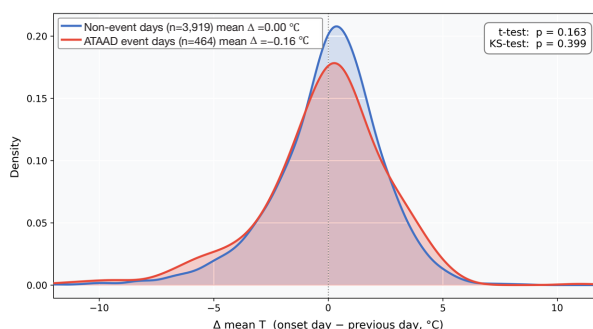


Figure S1 Kernel density plot of day-to-day temperature change (Δ mean T) on ATAAD event days ($n=464$) versus non-event days ($n=3,919$) across the full 4,383-day study period. The two distributions are virtually identical (event days: mean $\Delta = -0.16$ °C; non-event days: mean $\Delta = -0.00$ °C; $P=0.163$ by t -test; $P=0.399$ by Kolmogorov–Smirnov test), directly visualizing the null ΔT finding.