# Supplementary Information

## Optimal heat stress metric for modelling heat-related mortality varies from country to country

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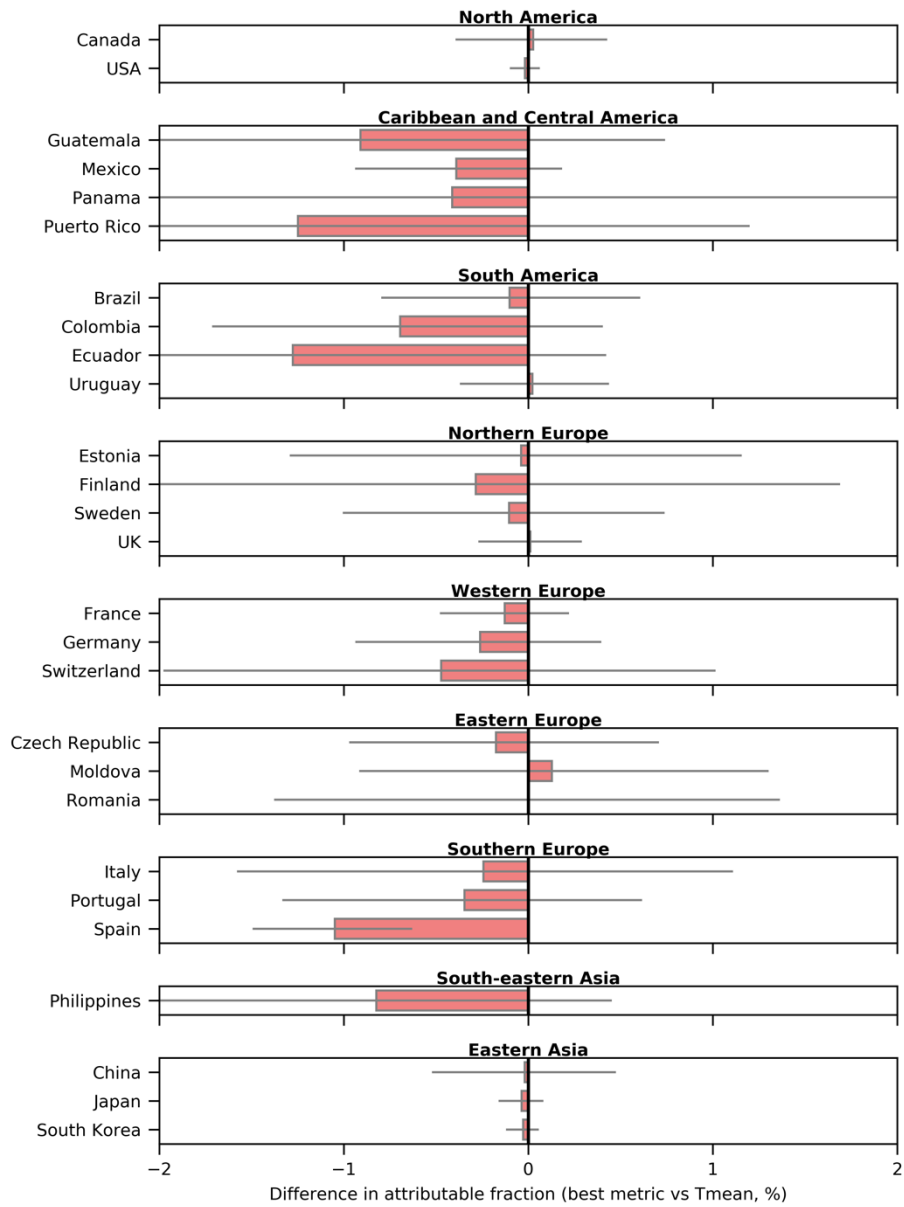
**This file includes:**

**Figure S1.** Difference in attributable fraction between the best-fit metric and $T_{mean}$ for selected countries. Only countries where the best-fit metric gives a noticeably better fit to warm-season mortality than $T_{mean}$ are included. Countries are grouped by United Nations regions. Error bars show the 95% confidence intervals.
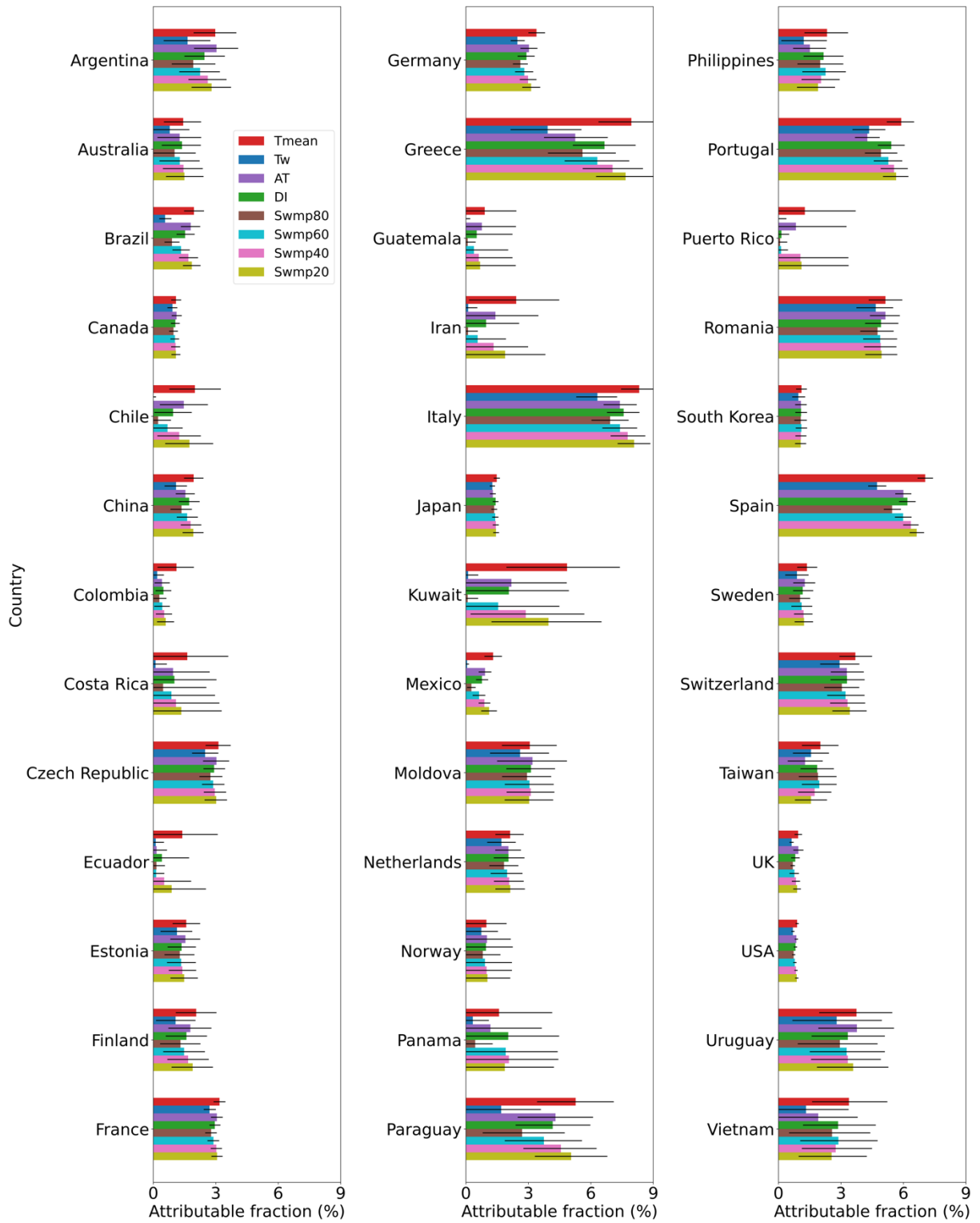
**Figure S2.** Fraction of deaths attributable to heat estimated from all studied heat stress metrics for all included MCC-defined countries. Error bars show the 95% confidence interval.

**Table S1.** Details of the included MCC-defined countries, including the number of locations in each country, and the time period used in this study.

| MCC country | No. of locations | Period |
|---|---|---|
| Argentina | 3 | 2005-2015 |
| Australia | 3 | 1988-2009 |
| Brazil | 18 | 1997-2011 |
| Canada | 26 | 1986-2015 |
| Chile | 4 | 2004-2014 |
| China | 14 | 1996-2015 |
| Colombia | 5 | 1998-2013 |
| Costa Rica | 1 | 2000-2017 |
| Czech Republic | 4 | 1994-2015 |
| Ecuador | 2 | 2014-2018 |
| Estonia | 5 | 1997-2018 |
| Finland | 1 | 1994-2014 |
| France | 18 | 2000-2014 |
| Germany | 12 | 1993-2015 |
| Greece | 1 | 2001-2010 |
| Guatemala | 1 | 2009-2016 |
| Iran | 2 | 2002-2015 |
| Italy | 11 | 1987-2010 |
| Japan | 47 | 1979-2015* |
| Kuwait | 1 | 2000-2016 |
| Mexico | 10 | 1998-2014 |
| Moldova | 4 | 2001-2010 |
| Netherlands | 5 | 1995-2016 |
| Norway | 1 | 1979-2018[#] |
| Panama | 1 | 2013-2016 |
| Paraguay | 1 | 2004-2019 |
| Philippines | 4 | 2006-2010 |
| Portugal | 5 | 1980-2018 |
| Peurto Rico | 1 | 2009-2016 |
| Romania | 8 | 1994-2016 |
| South Korea | 36 | 1997-2018 |
| Spain | 52 | 1990-2014 |
| Sweden | 3 | 1990-2016 |
| Switzerland | 8 | 1995-2013 |
| Taiwan | 3 | 1994-2014 |
| United Kingdom | 70 | 1990-2016 |
| USA | 210 | 1979-2006[&] |
| Uruguay | 1 | 2012-2016 |
| Vietnam | 2 | 2009-2013 |

*MCC data span 1972-2015; [#] MCC data span 1969-2018; [&] MCC data span 1973-2006.

**Table S2.** Best-fit metric, attributable fraction estimated with the best-fit metric, attributable fraction attributed with $T_{mean}$, and their 95% confidence intervals (in brackets) for each studied MCC-defined country.

| MCC country | Best-fit metric | Attributable fraction, Best (%) | Attributable fraction, $T_{mean}$ (%) |
|---|---|---|---|
| Argentina | $T_{mean}$ | 2.98 (1.94–3.99) | 2.98 (1.94–3.99) |
| Australia | $T_{mean}$ | 1.44 (0.51–2.29) | 1.44 (0.51–2.29) |
| Brazil | Swmp20 | 1.85 (1.42–2.27) | 1.95 (1.48–2.43) |
| Canada | AT | 1.12 (0.88–1.37) | 1.09 (0.86–1.34) |
| Chile | $T_{mean}$ | 2.00 (0.77–3.24) | 2.00 (0.77–3.24) |
| China | Swmp20 | 1.92 (1.41–2.41) | 1.94 (1.48–2.41) |
| Colombia | AT | 0.42 (0.06–0.79) | 1.11 (0.20–1.95) |
| Costa Rica | $T_w$ | 0.11 (-0.51–0.65) | 1.63 (-0.30–3.60) |
| Czech Republic | Swmp40 | 2.96 (2.43–3.50) | 3.13 (2.51–3.72) |
| Ecuador | $T_w$ | 0.12 (-0.31–0.51) | 1.39 (-0.20–3.09) |
| Estonia | AT | 1.54 (0.82–2.25) | 1.58 (0.93–2.25) |
| Finland | AT | 1.78 (0.72–2.79) | 2.06 (1.08–3.03) |
| France | AT | 3.05 (2.77–3.33) | 3.18 (2.89–3.46) |
| Germany | Swmp20 | 3.13 (2.71–3.57) | 3.39 (3.00–3.80) |
| Greece | $T_{mean}$ | 7.95 (6.37–9.43) | 7.95 (6.37–9.43) |
| Guatemala | $T_w$ | 0.00 (-0.27–0.21) | 0.91 (-0.68–2.42) |
| Iran | $T_{mean}$ | 2.42 (0.15–4.48) | 2.42 (0.15–4.48) |
| Italy | Swmp20 | 8.08 (7.28–8.86) | 8.32 (7.45–9.18) |
| Japan | Swmp20 | 1.45 (1.31–1.59) | 1.48 (1.34–1.63) |
| Kuwait | Swmp20 | 3.97 (1.23–6.51) | 4.86 (1.95–7.39) |
| Mexico | AT | 0.92 (0.61–1.22) | 1.31 (0.89–1.73) |
| Moldova | AT | 3.20 (1.50–4.85) | 3.07 (1.73–4.36) |
| Netherlands | $T_{mean}$ | 2.12 (1.42–2.78) | 2.12 (1.42–2.78) |
| Norway | $T_{mean}$ | 0.99 (-0.05–1.96) | 0.99 (-0.05–1.96) |
| Panama | AT | 1.18 (-1.60–3.64) | 1.59 (-1.01–4.15) |
| Paraguay | $T_{mean}$ | 5.27 (3.42–7.10) | 5.27 (3.42–7.10) |
| Philippines | AT | 1.51 (0.70–2.28) | 2.33 (1.25–3.34) |
| Portugal | Swmp40 | 5.55 (4.91–6.21) | 5.90 (5.20–6.51) |
| Peurto Rico | $T_w$ | 0.02 (-0.43–0.38) | 1.27 (-1.20–3.71) |
| Romania | AT | 5.14 (4.39–5.83) | 5.14 (4.33–5.95) |
| South Korea | AT | 1.08 (0.80–1.35) | 1.11 (0.85–1.36) |
| Spain | AT | 6.00 (5.61–6.38) | 7.05 (6.68–7.42) |
| Sweden | AT | 1.26 (0.71–1.76) | 1.37 (0.90–1.86) |
| Switzerland | Swmp60 | 3.22 (2.34–4.13) | 3.69 (2.92–4.49) |
| Taiwan | $T_{mean}$ | 2.01 (1.12–2.88) | 2.01 (1.12–2.88) |
| United Kingdom | AT | 0.96 (0.71–1.20) | 0.94 (0.77–1.13) |
| USA | Swmp20 | 0.88 (0.80–0.96) | 0.90 (0.82–0.97) |
| Uruguay | AT | 3.77 (1.91–5.55) | 3.75 (1.95–5.46) |
| Vietnam | Swmp40 | 2.75 (1.12–4.49) | 3.38 (1.61–5.23) |

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