Supplementary Information

Impact of population aging on future temperature-related mortality at different global warming levels

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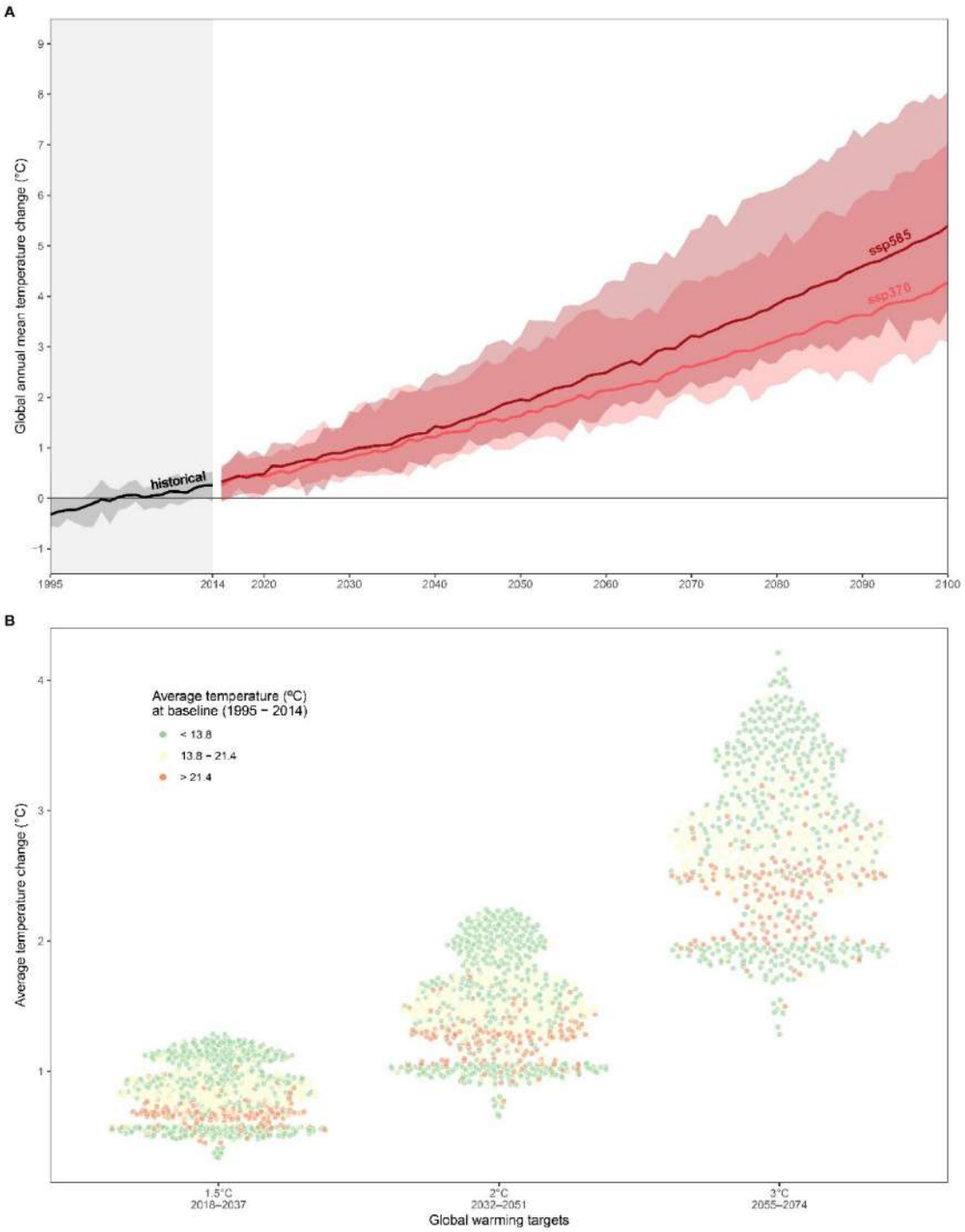
Supplementary Methods

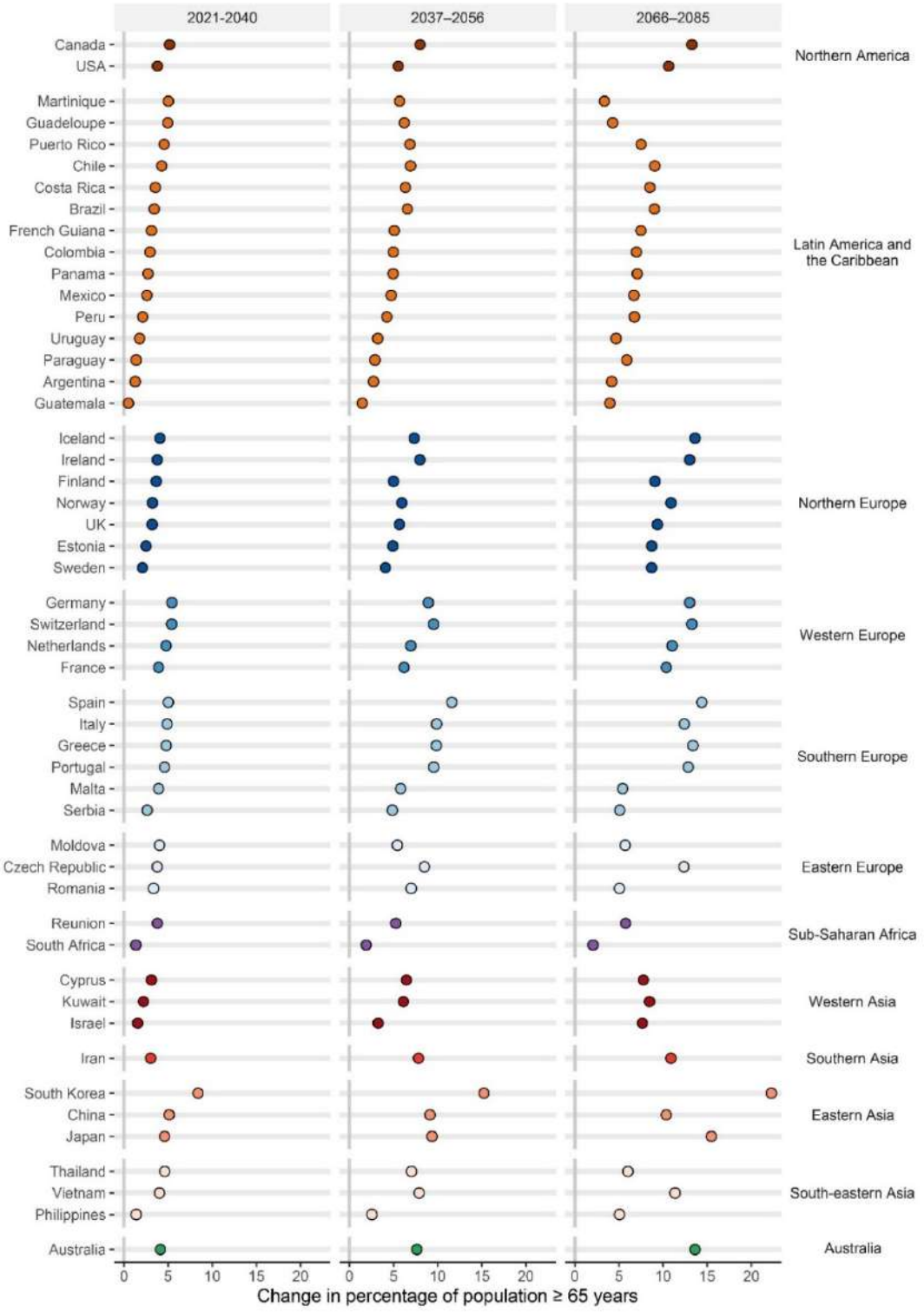
Age group-specific temperature-mortality relationships

To obtain the age group-specific relationships, we first quantified the location-specific relationship between daily mean temperature and mortality using observed data and a state-of-the-art two-stage approach coupled with distributed lag nonlinear models [1] and multivariate dose-response meta-regression [2,3]. We then applied age-specific exposure-response function (ERF) predicted from a meta-analytical model derived by Dr. Noah Scovronick. In detail, it was not possible to derive pooled ERF for specific age categories from the time series analysis (1st stage) as MCC mortality data by age are not available for all locations for the same age bands. Thus, Scovronick et al. applied a novel methodology consistent with a multivariate dose-response meta-analysis that allows for continuously modelling age as an effect modifier of the temperature-mortality association. Using the derived meta-regression model, we predicted the ERF at 50, 70, and 83.5 years old, corresponding to the average age at death for each interval, which represented the temperature-mortality association at the 0-64, 65-74, and ≥75 years age groups, respectively. Using the youngest age group (0-64 years) as the reference, we then calculated a set of ERF conversion factors for two older groups through dividing the ERFs at age 70 and 83.5 years by the ERF at age 50 years, respectively. To keep the non-linear shape of the overall ERF and to take into account the larger temperature range for cold than for heat (Figure S3), here we used the 10^{th} percentile of temperature for cold and the 99^{th} percentile of temperature for heat when calculating the ERF convention factors for cold and heat, respectively. These age group-specific ERF conversion factors were then applied to estimate the location-specific age-specific temperature-mortality associations based on the overall ERF derived from the two-stage analysis. Although this approach allows for the use of continuous risk estimates across the full temperature range, it relies on the strong assumption that difference in mortality risk between age categories remains the same across locations.

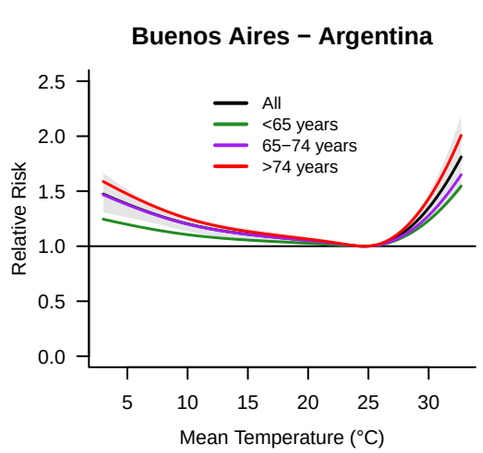
Compared with the 0-64 age group, the 65-74 and ≥75 years age groups have 1.2 and 1.8 times of heat-related mortality risks and 1.9 and 2.4 times of cold-related mortality risks. Applying these conversion factors to the location-specific total ERF, we obtained the age group-specific ERFs in each MCC location. Figure S3 reports the total and age group-specific exposure-response curves in 800 studied locations.

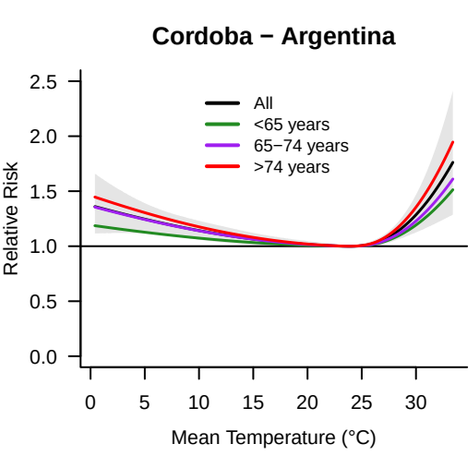


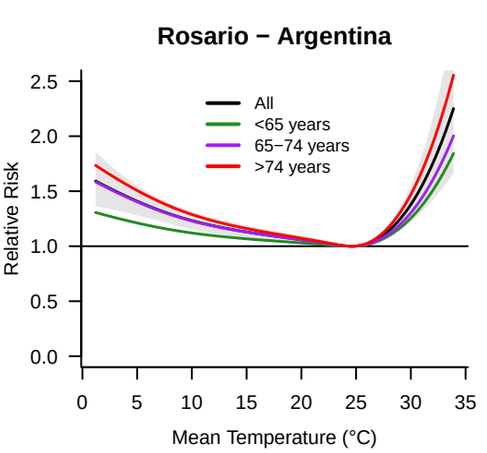
Supplementary Figure 1. Projections of average daily mean temperature changes under global warming levels. (A) Global annual average temperature changes relative to 1995-2014 (historical period, gray shaded area) under SSP5-8.5 and SSP3-7.0. Solid colored lines represent the multi-model ensemble average, and colored shades show the range of simulations from 18 global circulation models (GCMs). (**B**) **Location-specific average temperature changes** at different levels of global warming stratified by local average temperature at historical period (1995-2014).



Supplementary Figure 2. Population aging at periods corresponding to different levels (1.5 °C, 2 °C, and 3 °C – SSP3-7.5) of global warming by country/area. Country-specific age-group population projections are derived from the SSP3 scenario in the first 20-year periods reaching 1.5 °C (2021-2040), 2 °C (2037–2056), and 3 °C (2066–2085) of warming, respectively.


Buenos Aires − Argentina
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Cordoba − Argentina
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Rosario − Argentina
All
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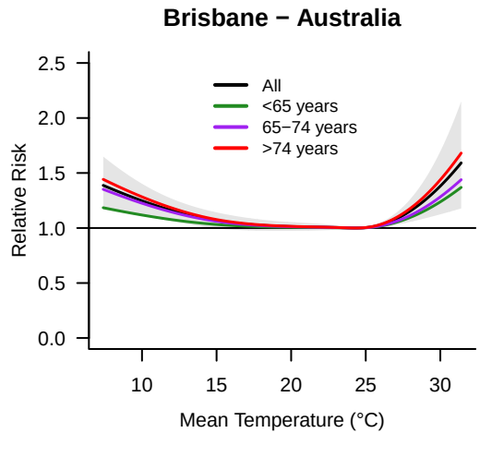
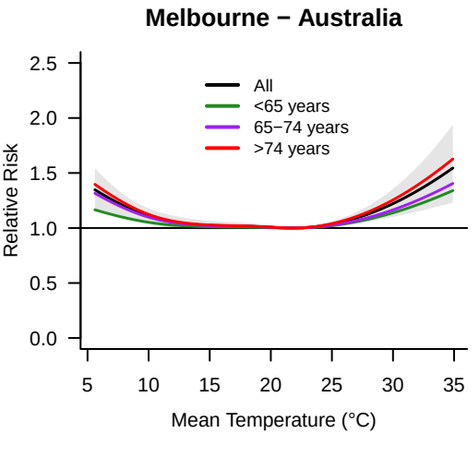
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Brisbane − Australia
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Melbourne − Australia
All
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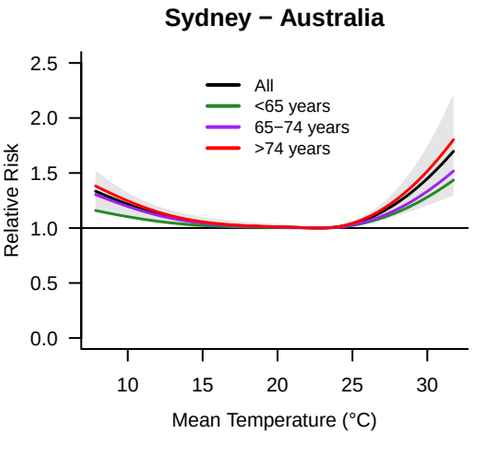
>74 years
Relative Risk
Mean Temperature (°C)


Sydney − Australia
All
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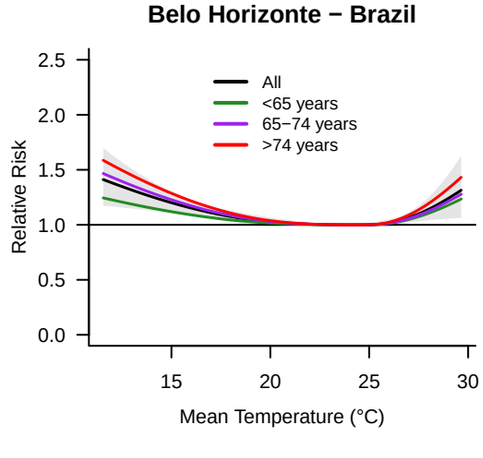
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Belo Horizonte − Brazil
All
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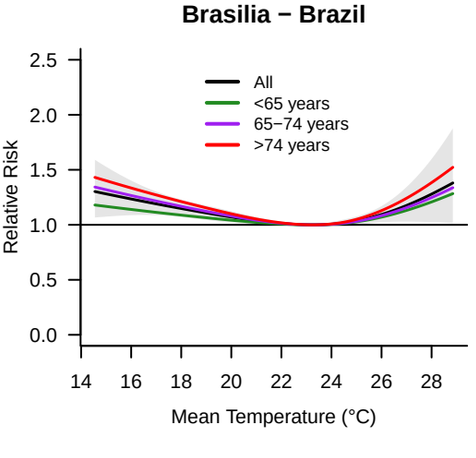
>74 years
Relative Risk
Mean Temperature (°C)


Brasilia − Brazil
All
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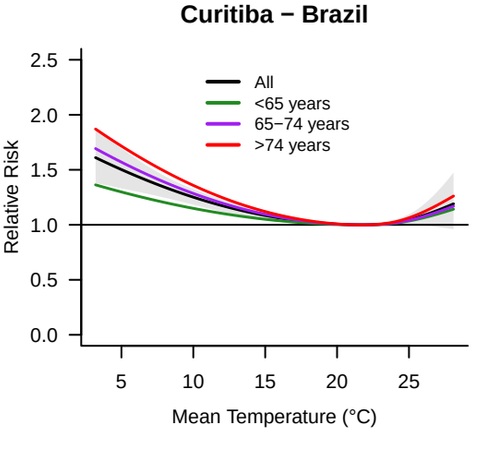
Relative Risk
Mean Temperature (°C)


Curitiba − Brazil
All
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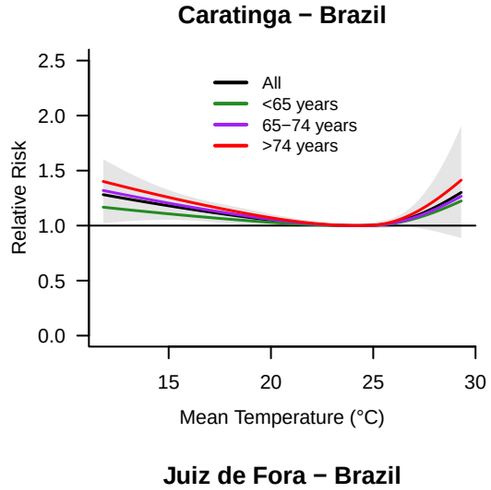
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Caratinga − Brazil
All
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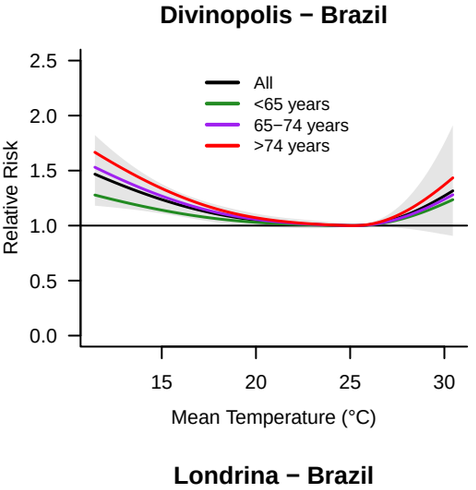
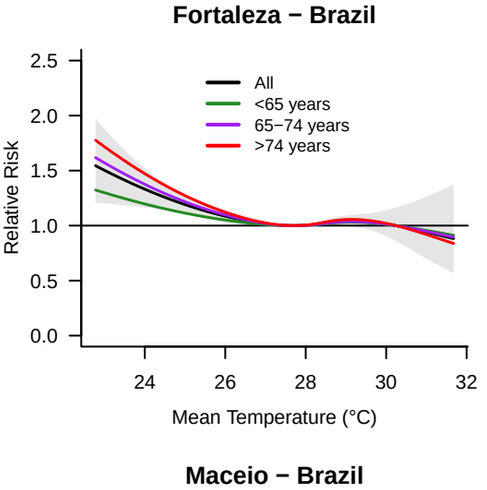
>74 years
Relative Risk
Mean Temperature (°C)


Divinopolis − Brazil
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Fortaleza − Brazil
All
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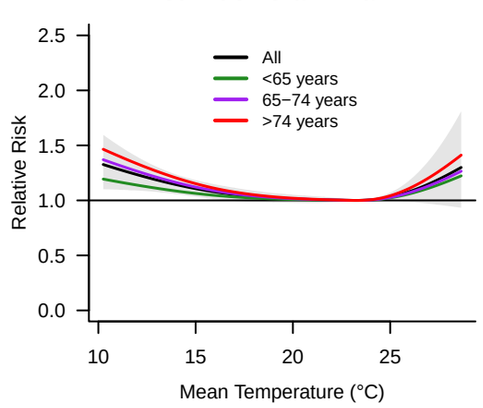
Relative Risk
Mean Temperature (°C)


Juiz de Fora − Brazil
All
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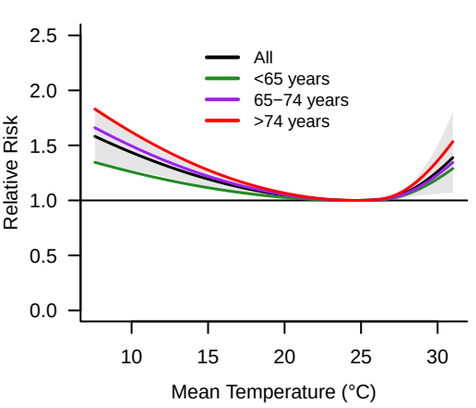
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Londrina − Brazil
All
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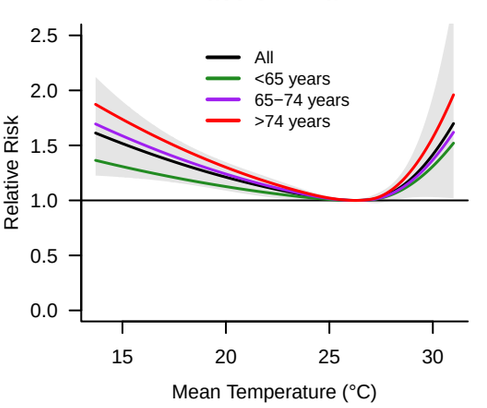
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Maceio − Brazil
All
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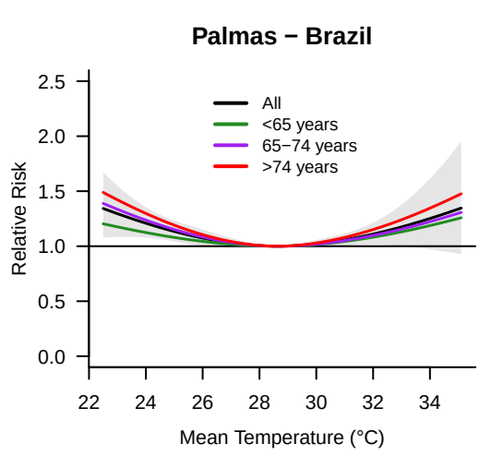
>74 years
Relative Risk
Mean Temperature (°C)


Palmas − Brazil
All
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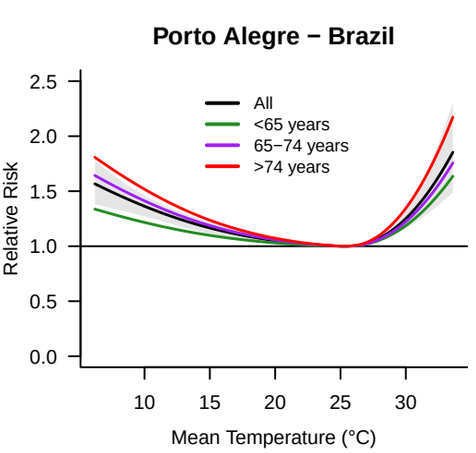
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Porto Alegre − Brazil
All
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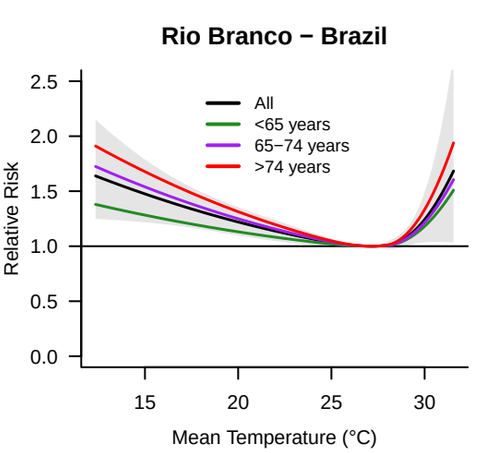
Relative Risk
Mean Temperature (°C)


Rio Branco − Brazil
All
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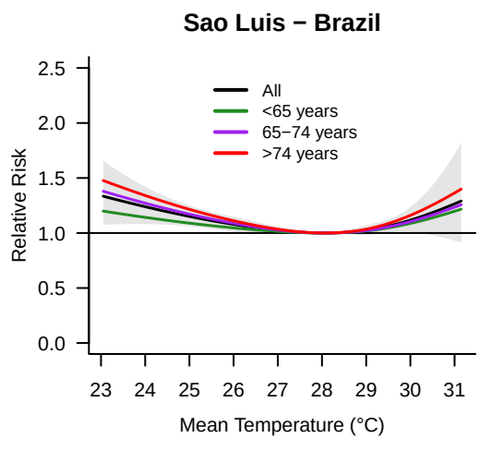
>74 years
Relative Risk
Mean Temperature (°C)


Sao Luis − Brazil
All
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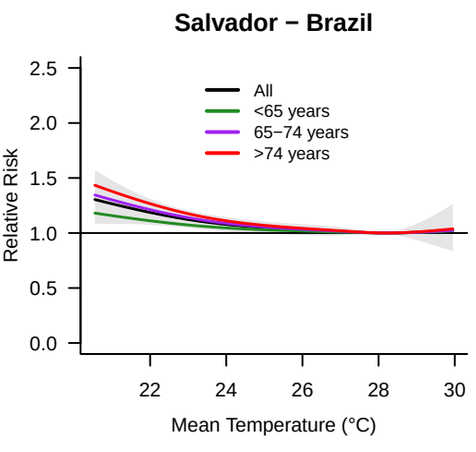
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Salvador − Brazil
All
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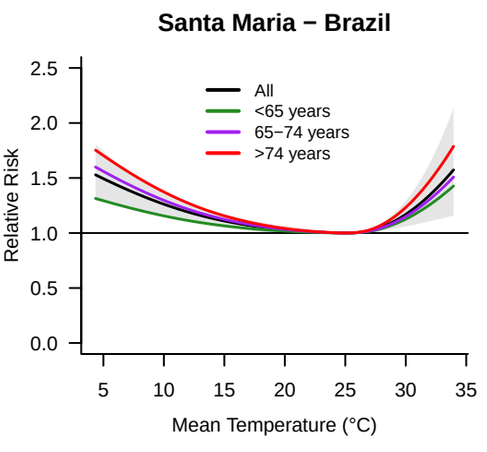
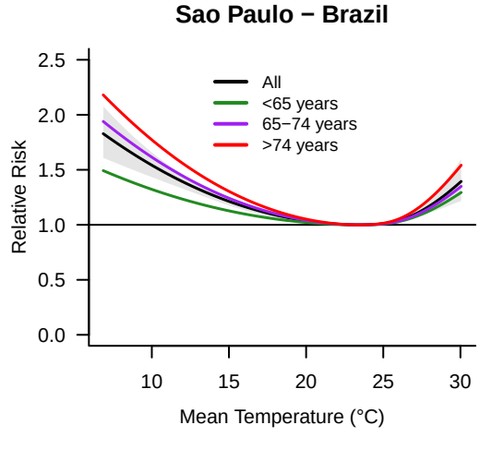
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Santa Maria − Brazil
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Sao Paulo − Brazil
All
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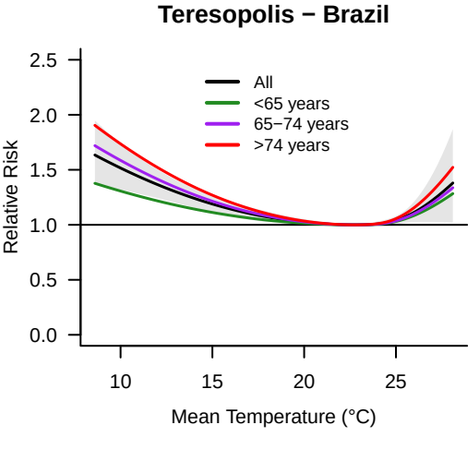
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Teresopolis − Brazil
All
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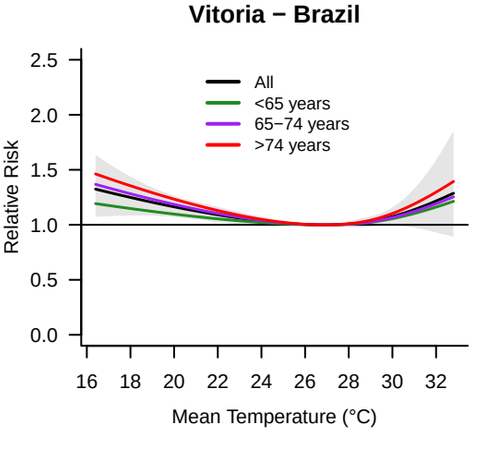
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Vitoria − Brazil
All
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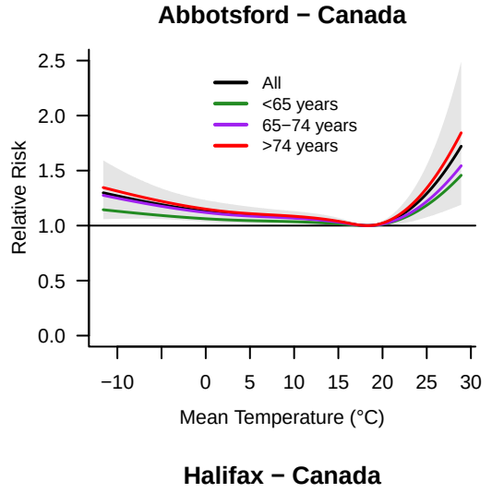
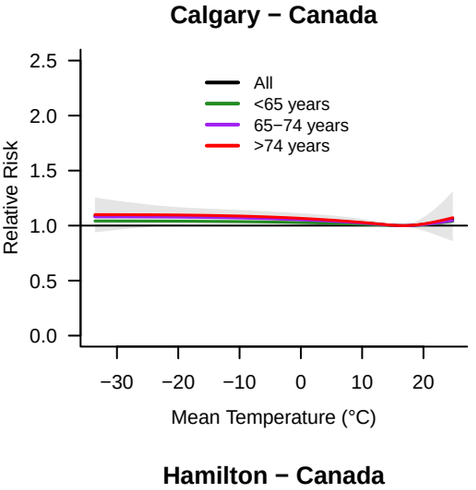
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Abbotsford − Canada
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Calgary − Canada
All
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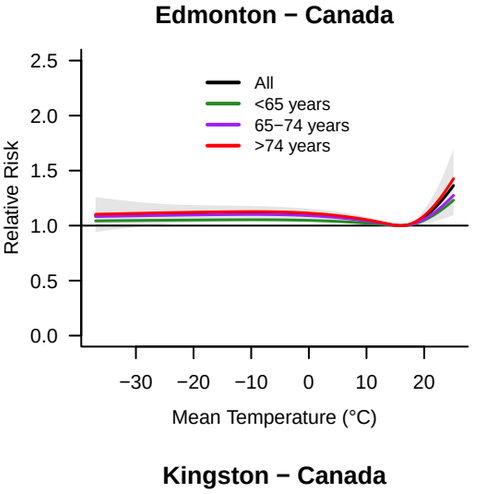
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Edmonton − Canada
All
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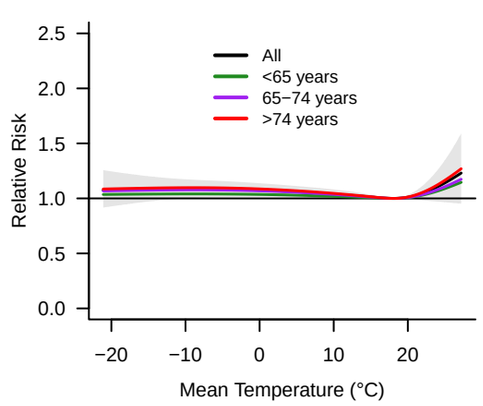
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Halifax − Canada
All
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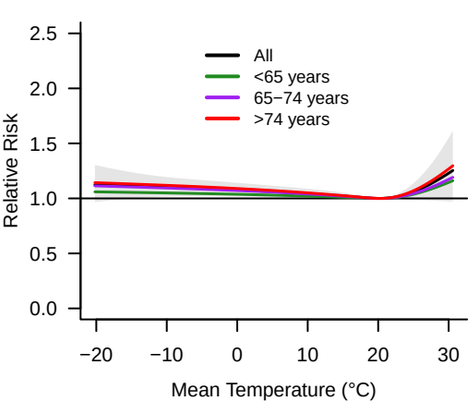
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Hamilton − Canada
All
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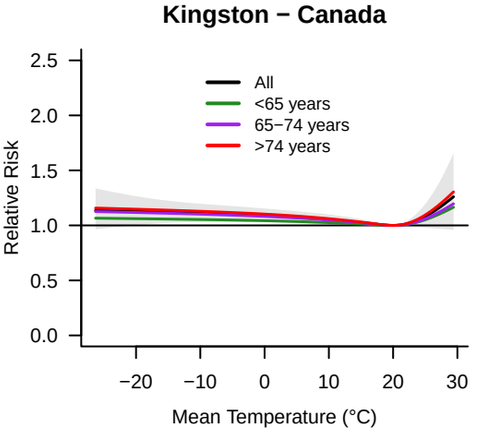
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Kingston − Canada
All
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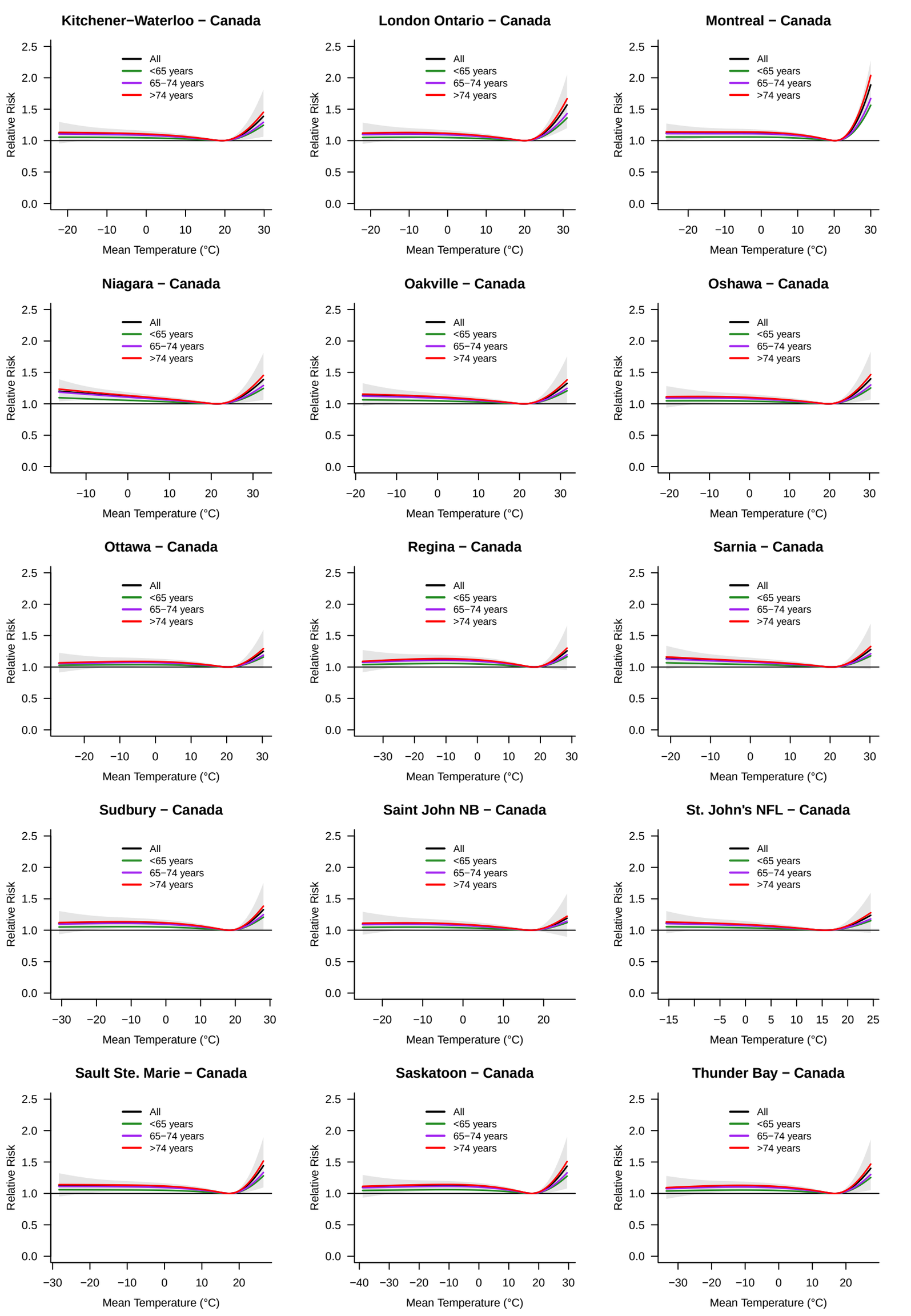
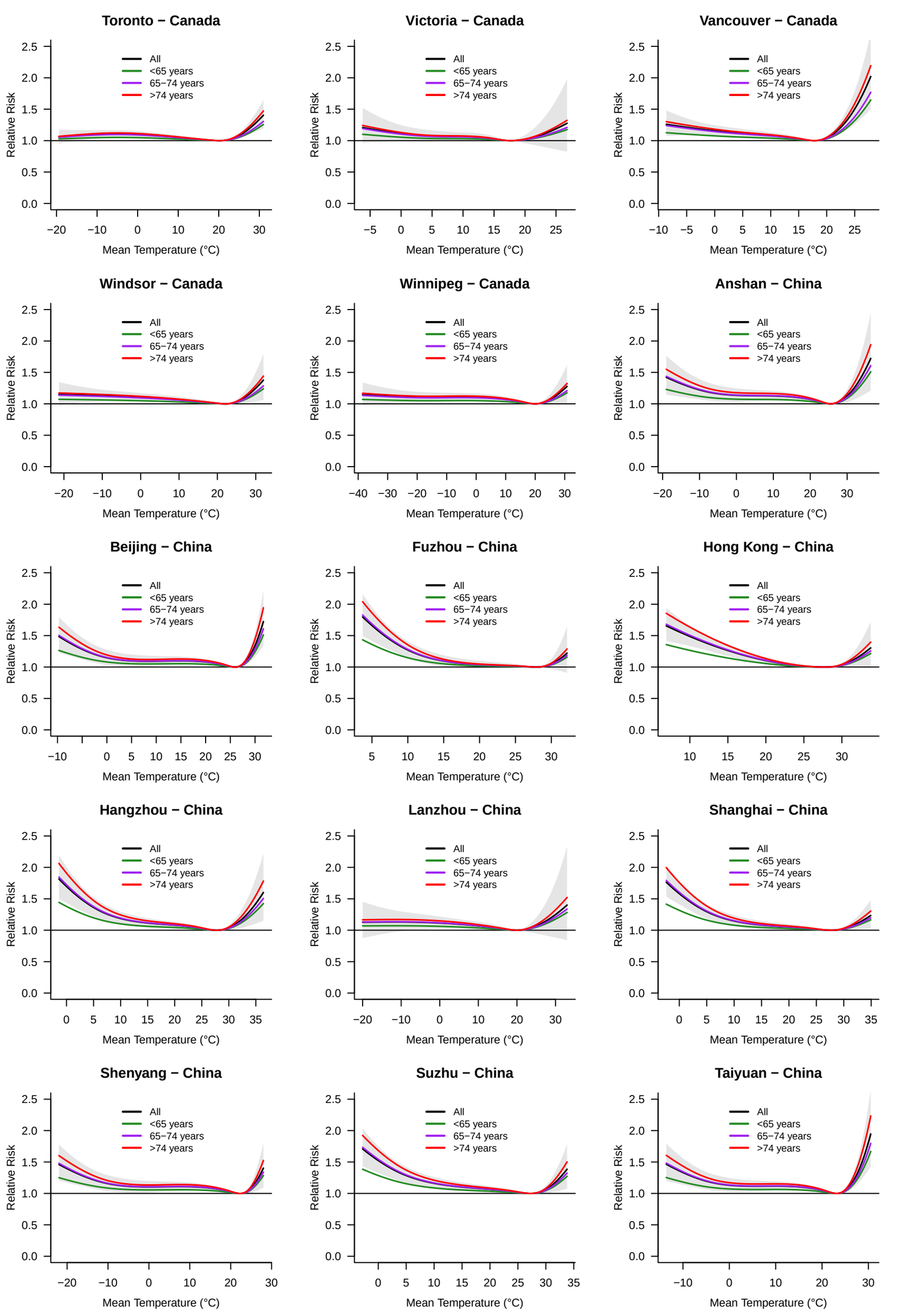
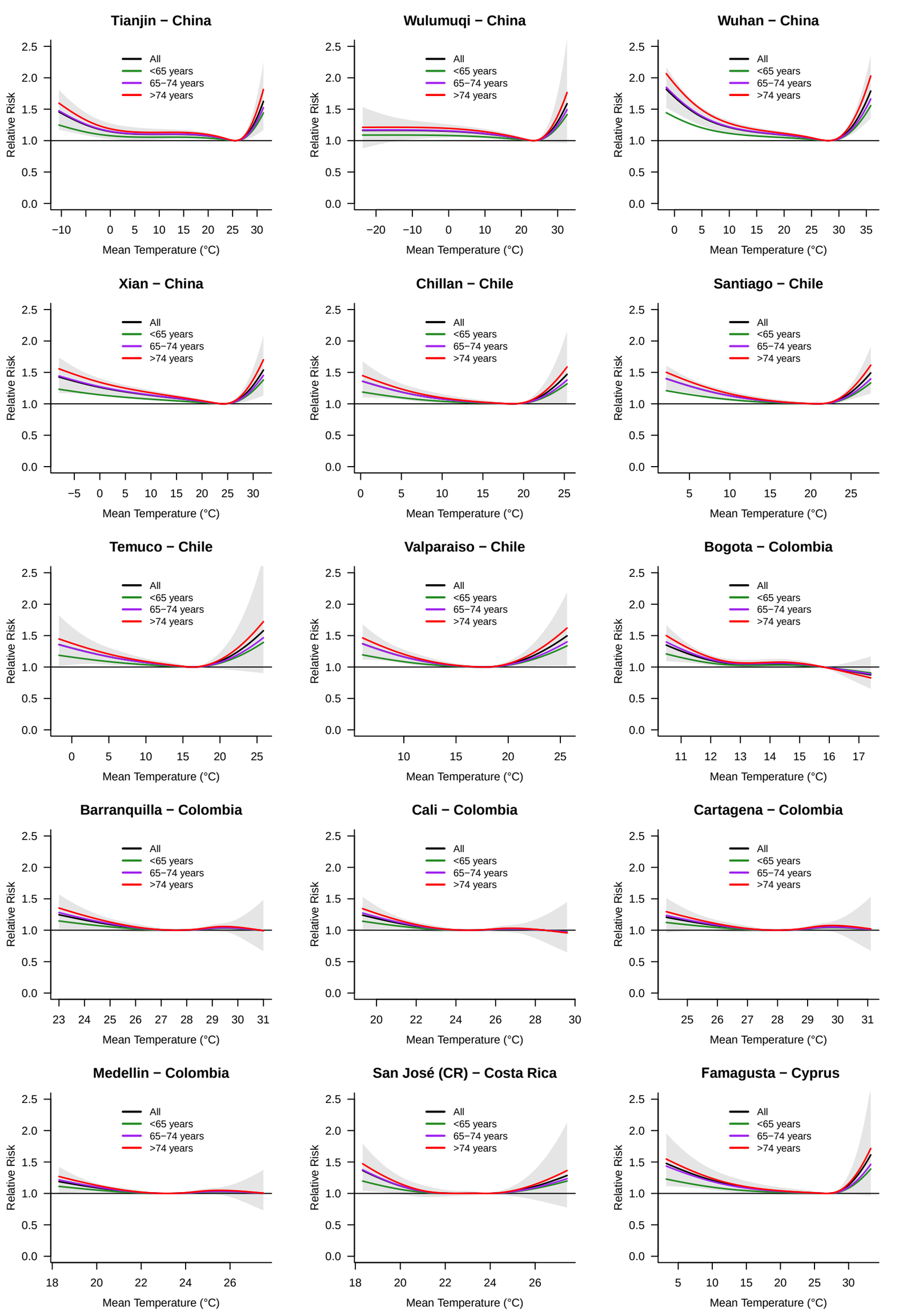
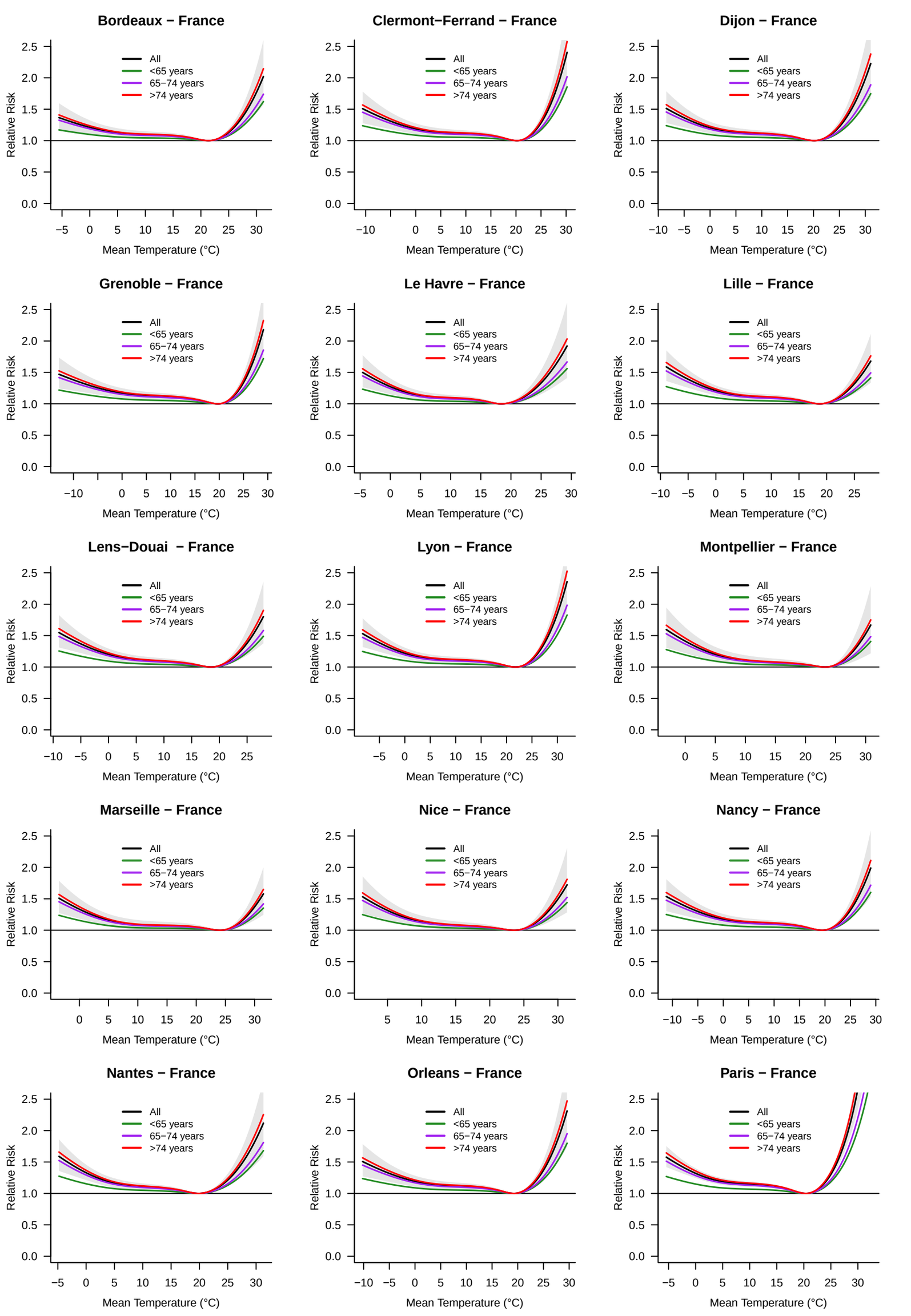
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

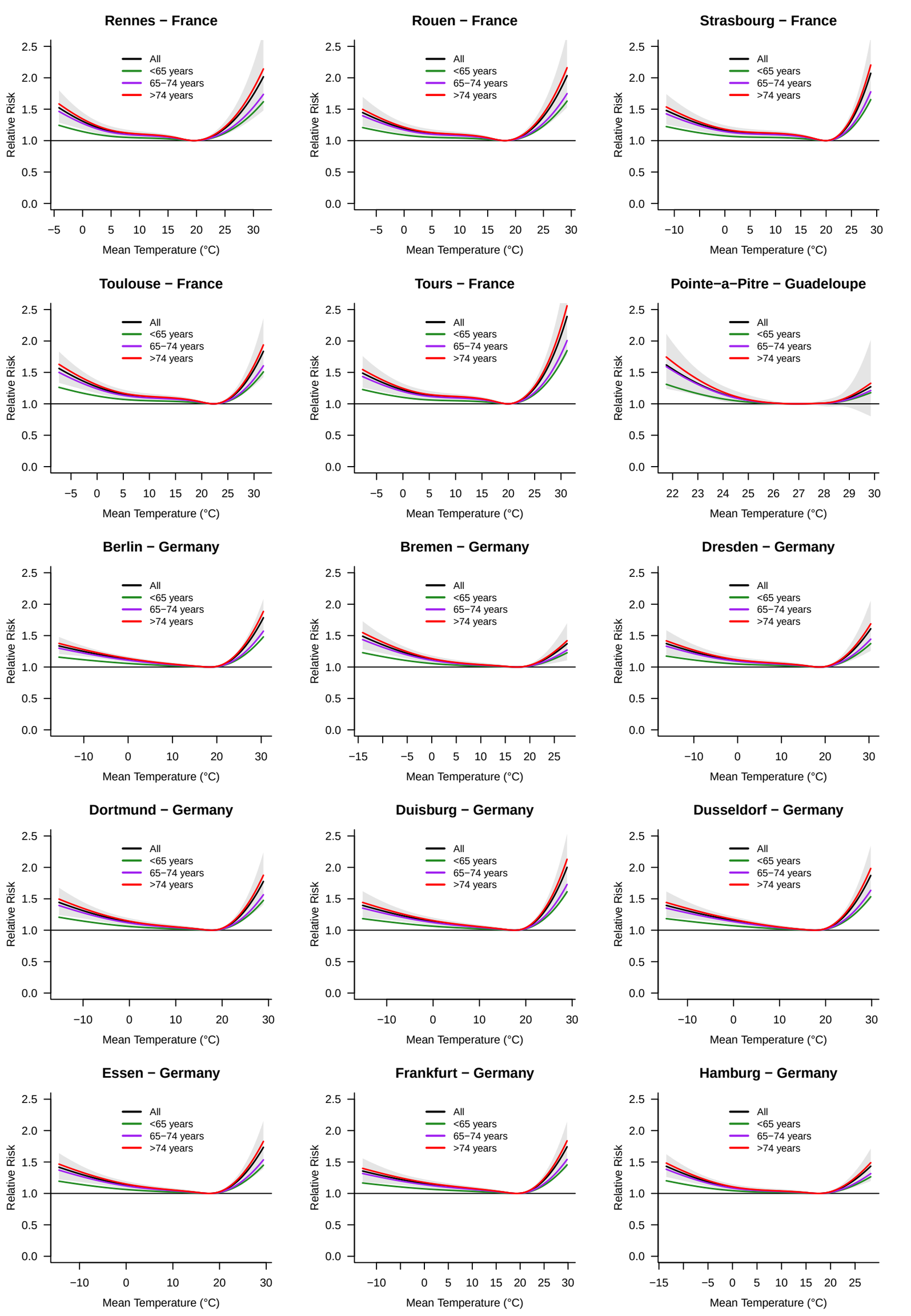

Kitchener−Waterloo − Canada
London Ontario − Canada
Montreal − Canada
Niagara − Canada
Oakville − Canada
Oshawa − Canada
Ottawa − Canada
Regina − Canada
Sarnia − Canada
Sudbury − Canada
Saint John NB − Canada
St. John's NFL − Canada
Sault Ste. Marie − Canada
Saskatoon − Canada
Thunder Bay − Canada
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

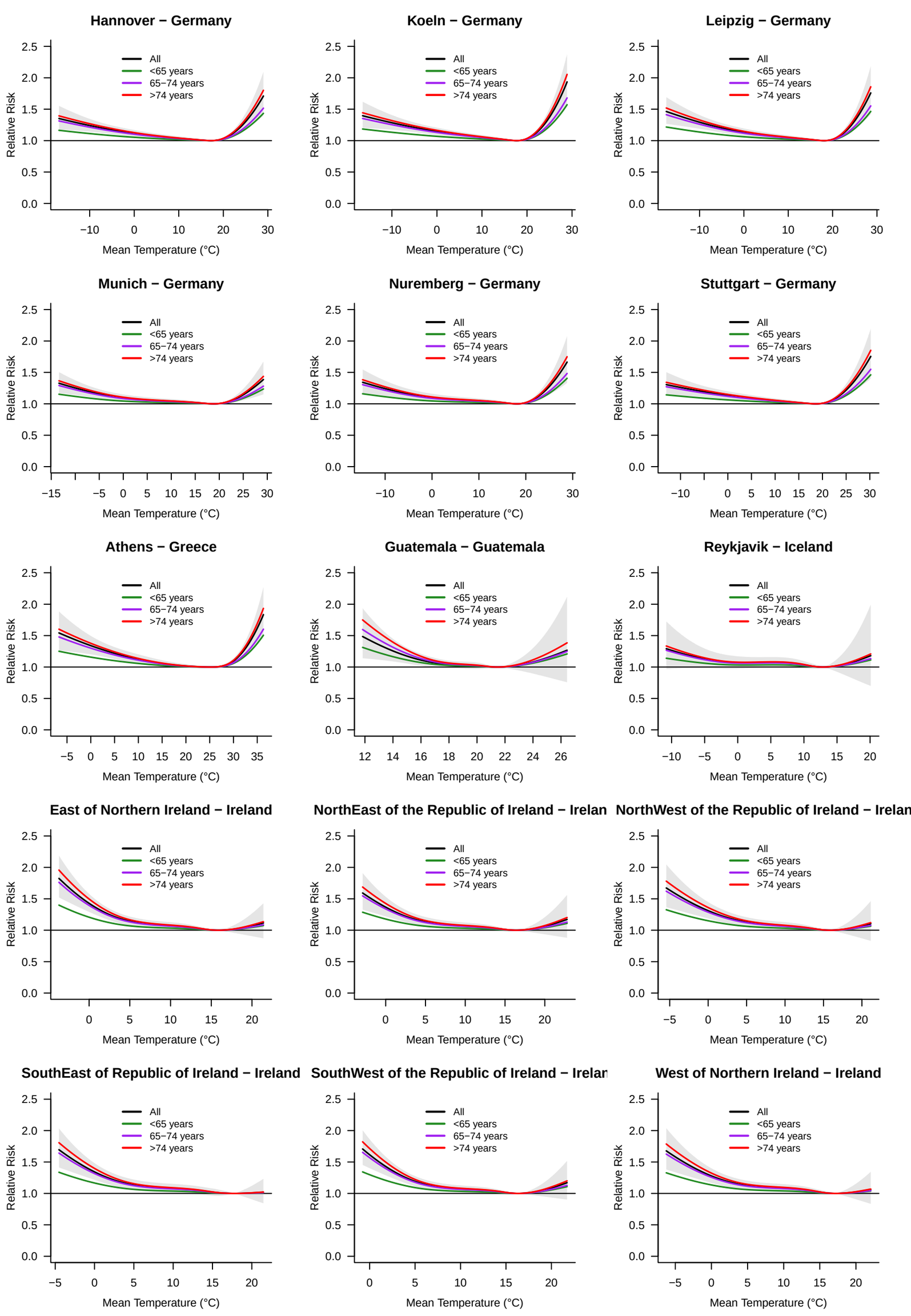

Toronto − Canada
Victoria − Canada
Vancouver − Canada
Windsor − Canada
Winnipeg − Canada
Anshan − China
Beijing − China
Fuzhou − China
Hong Kong − China
Hangzhou − China
Lanzhou − China
Shanghai − China
Shenyang − China
Suzhu − China
Taiyuan − China
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

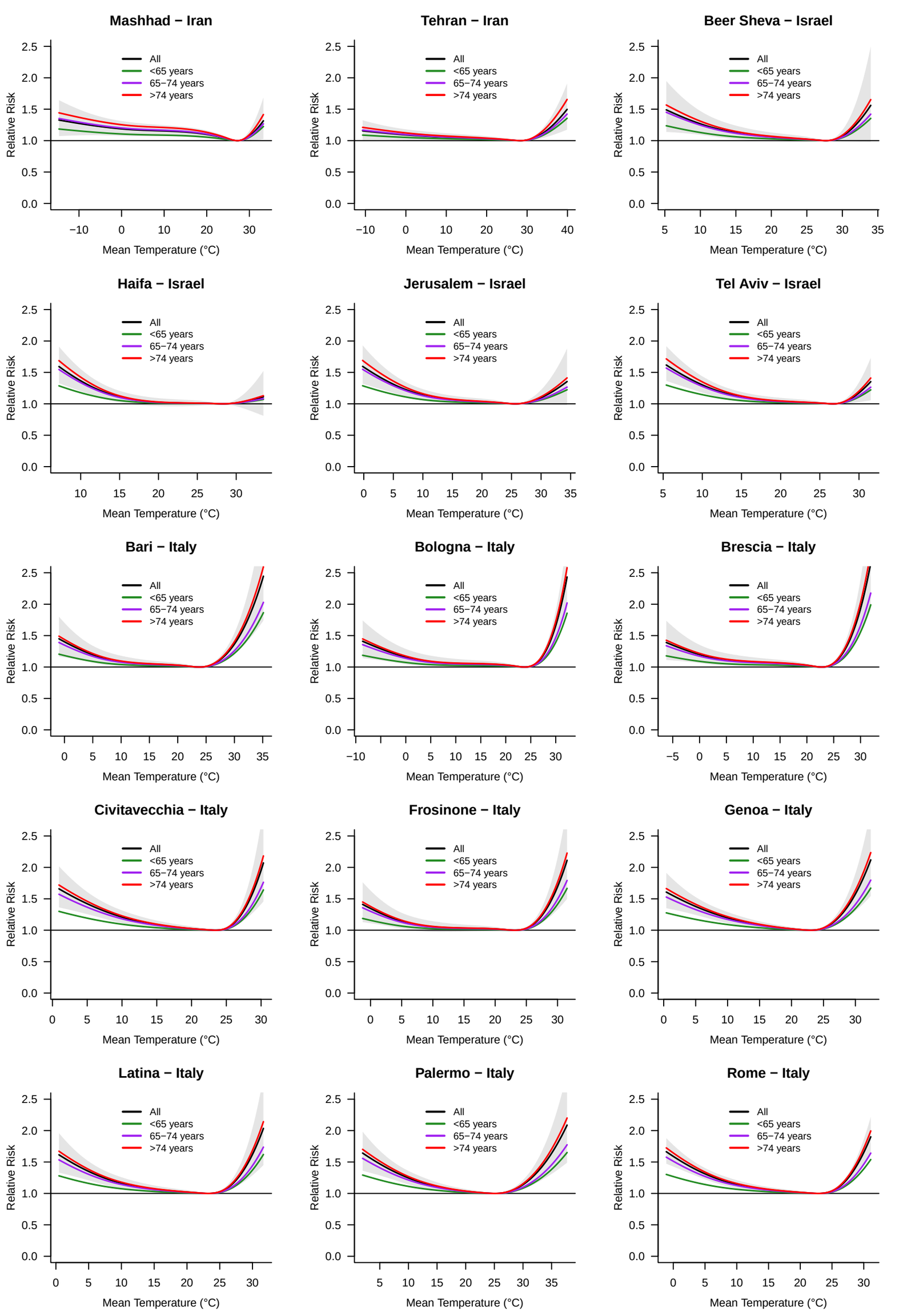

Tianjin − China
Wulumuqi − China
Wuhan − China
Xian − China
Chillan − Chile
Santiago − Chile
Temuco − Chile
Valparaiso − Chile
Bogota − Colombia
Barranquilla − Colombia
Cali − Colombia
Cartagena − Colombia
Medellin − Colombia
San José (CR) − Costa Rica
Famagusta − Cyprus
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

Larnaka − Cyprus
Limassol − Cyprus
Nicosia − Cyprus
pafos − Cyprus
Brno − Czech Republic
Ostrava − Czech Republic
Prague − Czech Republic
South Bohemia − Czech Republic
Kohtla−Jarve linn − Estonia
Narva linn − Estonia
Parnu linn − Estonia
Tallinn − Estonia
Tartu linn − Estonia
Cayenne − French Guiana
Helsinki − Finland
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Bordeaux − France
Clermont−Ferrand − France
Dijon − France
Grenoble − France
Le Havre − France
Lille − France
Lens−Douai − France
Lyon − France
Montpellier − France
Marseille − France
Nice − France
Nancy − France
Nantes − France
Orleans − France
Paris − France
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

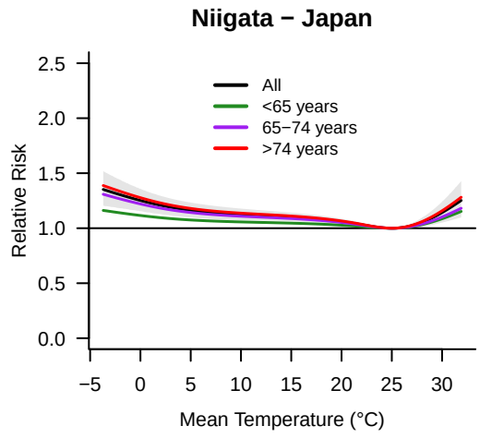

Rennes − France
Rouen − France
Strasbourg − France
Toulouse − France
Tours − France
Pointe−a−Pitre − Guadeloupe
Berlin − Germany
Bremen − Germany
Dresden − Germany
Dortmund − Germany
Duisburg − Germany
Dusseldorf − Germany
Essen − Germany
Frankfurt − Germany
Hamburg − Germany
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

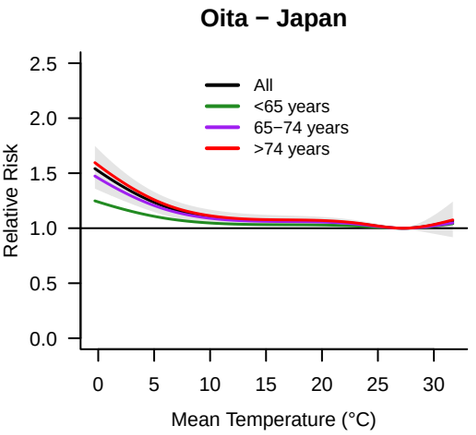

Hannover − Germany
Koeln − Germany
Leipzig − Germany
Munich − Germany
Nuremberg − Germany
Stuttgart − Germany
Athens − Greece
Guatemala − Guatemala
Reykjavik − Iceland
East of Northern Ireland − Ireland
NorthEast of the Republic of Ireland − Irelan
NorthWest of the Republic of Ireland − Irelan
SouthEast of Republic of Ireland − Ireland
SouthWest of the Republic of Ireland − Irelar
West of Northern Ireland − Ireland
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

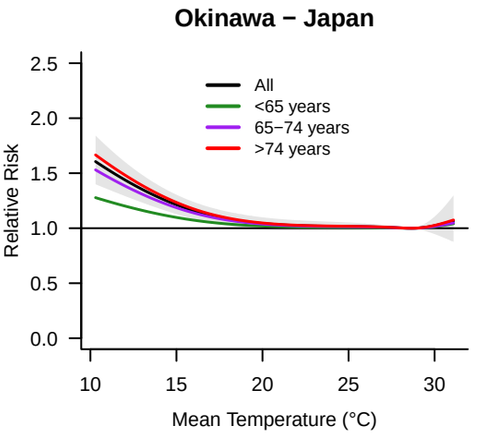

Mashhad − Iran
Tehran − Iran
Beer Sheva − Israel
Haifa − Israel
Jerusalem − Israel
Tel Aviv − Israel
Bari − Italy
Bologna − Italy
Brescia − Italy
Civitavecchia − Italy
Frosinone − Italy
Genoa − Italy
Latina − Italy
Palermo − Italy
Rome − Italy
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

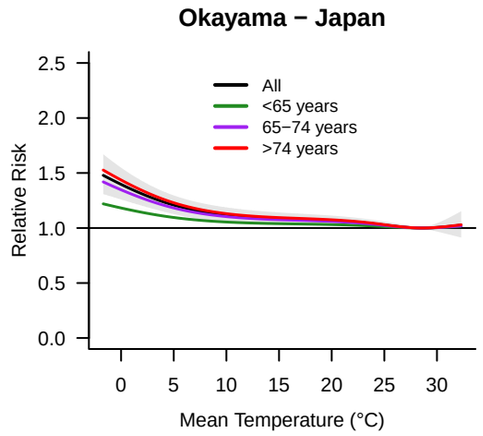
Turin − Italy
Viterbo − Italy
Aichi − Japan
Akita − Japan
Aomori − Japan
Chiba − Japan
Ehime − Japan
Fukushima − Japan
Fukuoka − Japan
Fukui − Japan
Gifu − Japan
Gunma − Japan
Hokkaido − Japan
Hiroshima − Japan
Hyogo − Japan
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

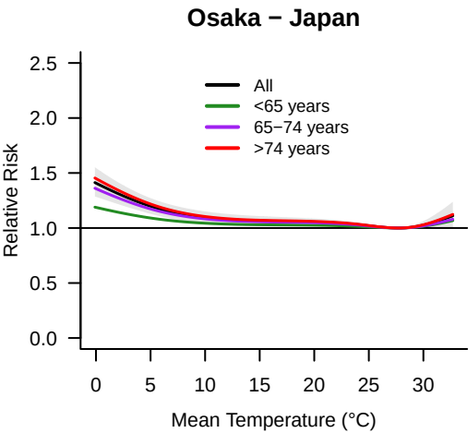
Ibaraki − Japan
Ishikawa − Japan
Iwate − Japan
Kagawa − Japan
Kagoshima − Japan
Kumamoto − Japan
Kanagawa − Japan
Kochi − Japan
Kyoto − Japan
Mie − Japan
Miyagi − Japan
Miyazaki − Japan
Nagano − Japan
Nara − Japan
Nagasaki − Japan
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

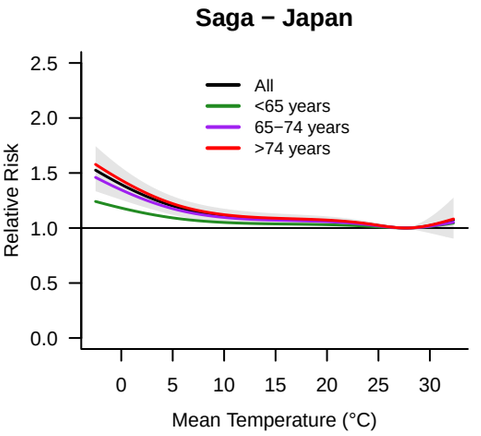

Niigata − Japan
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

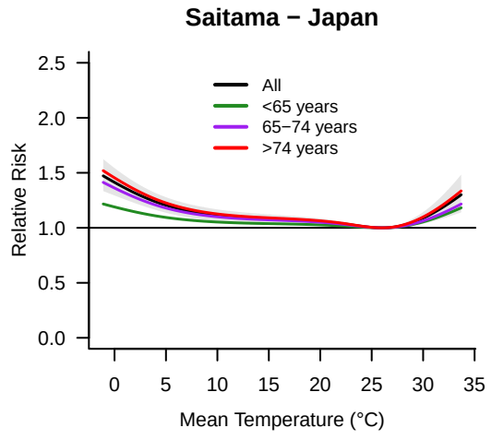

Oita − Japan
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

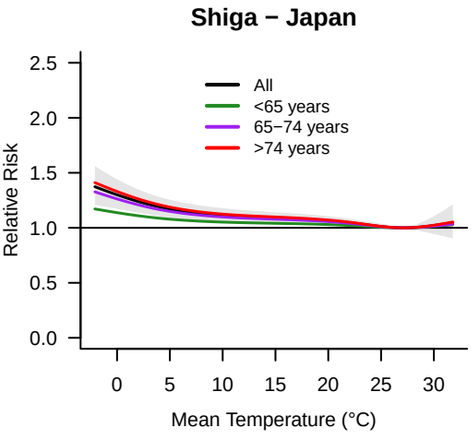

Okinawa − Japan
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

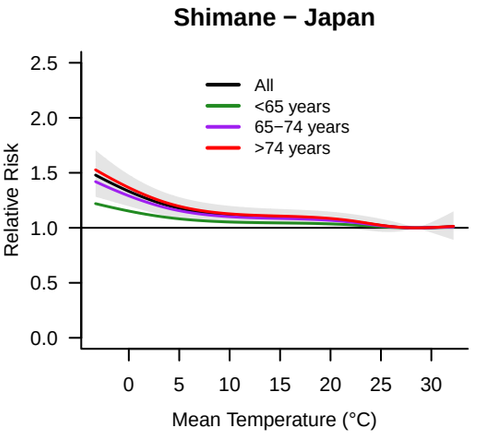

Okayama − Japan
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

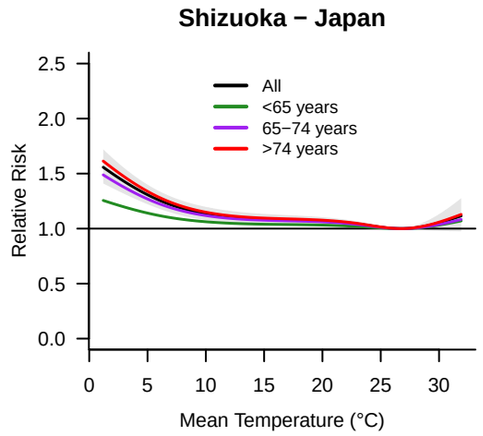

Osaka − Japan
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

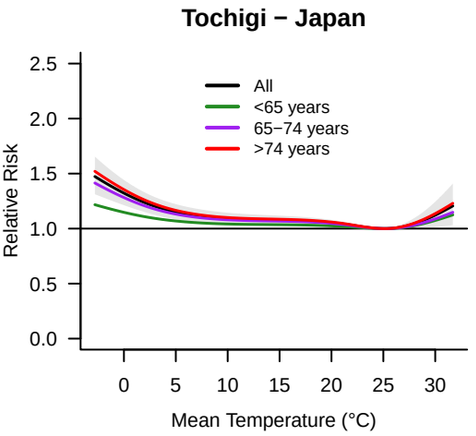

Saga − Japan
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

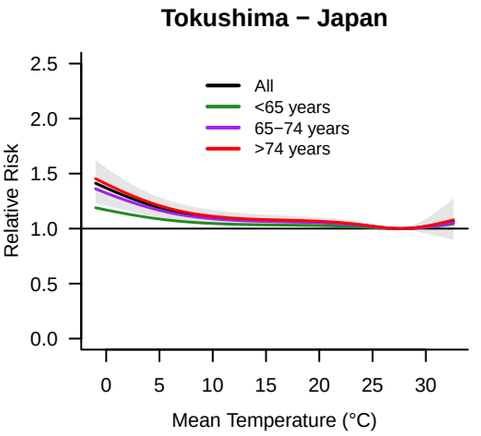

Saitama − Japan
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

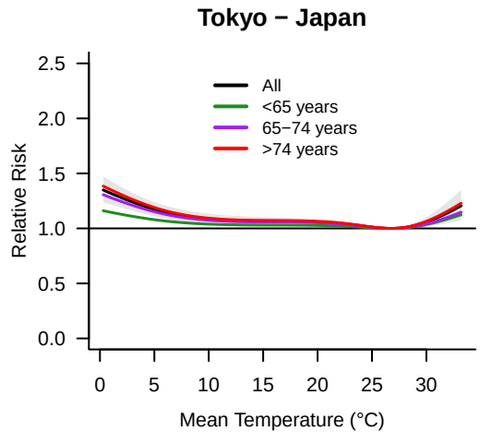

Shiga − Japan
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

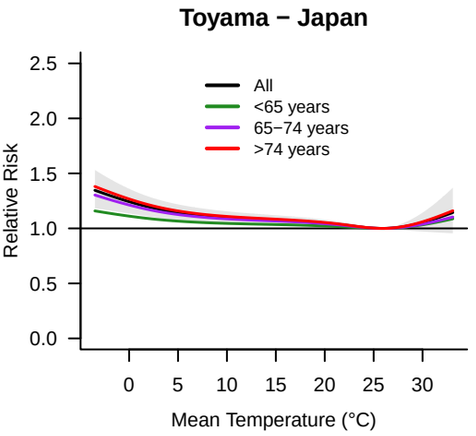

Shimane − Japan
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

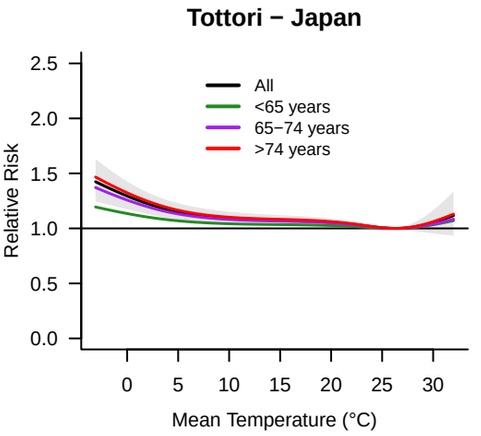

Shizuoka − Japan
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

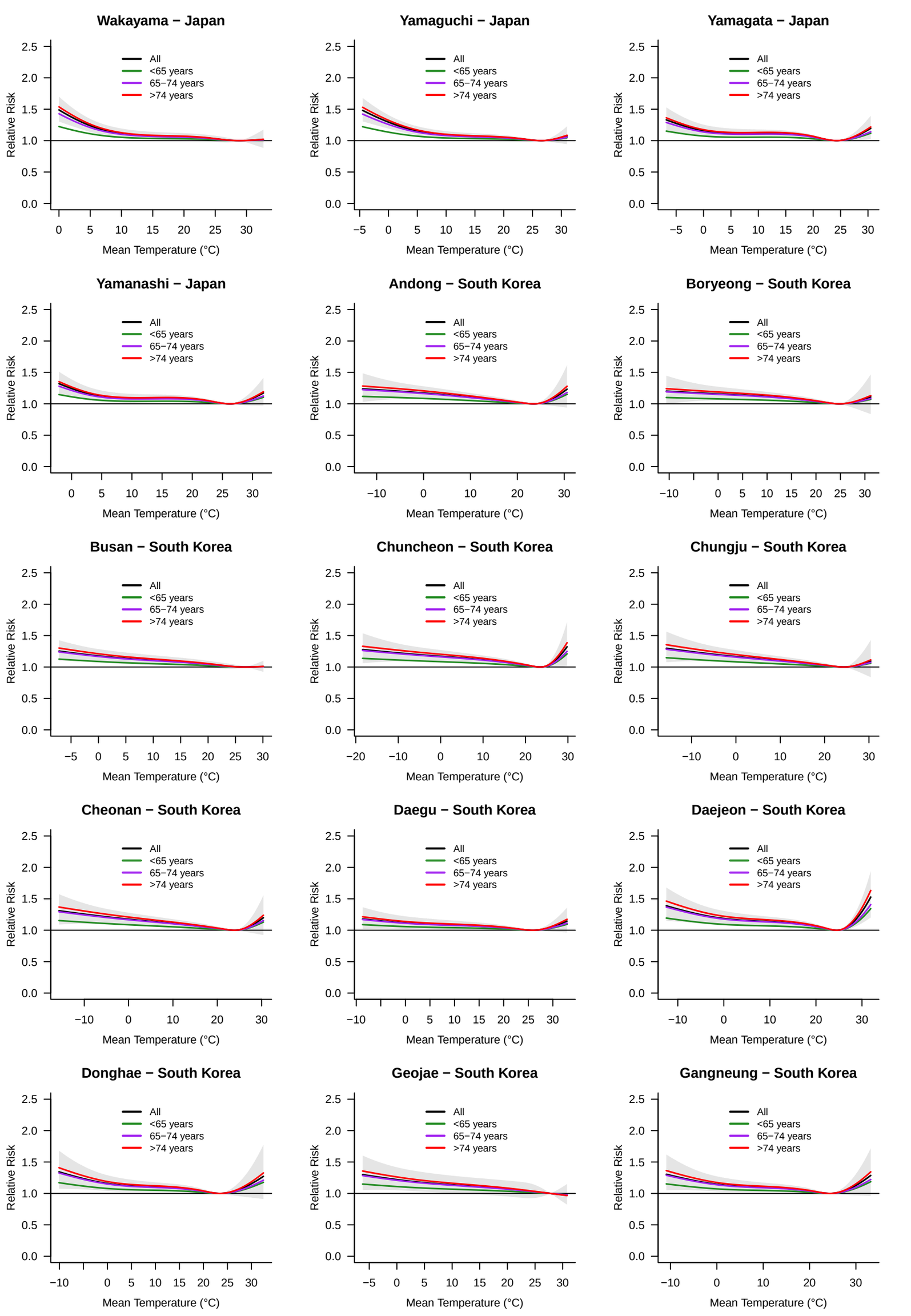

Tochigi − Japan
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

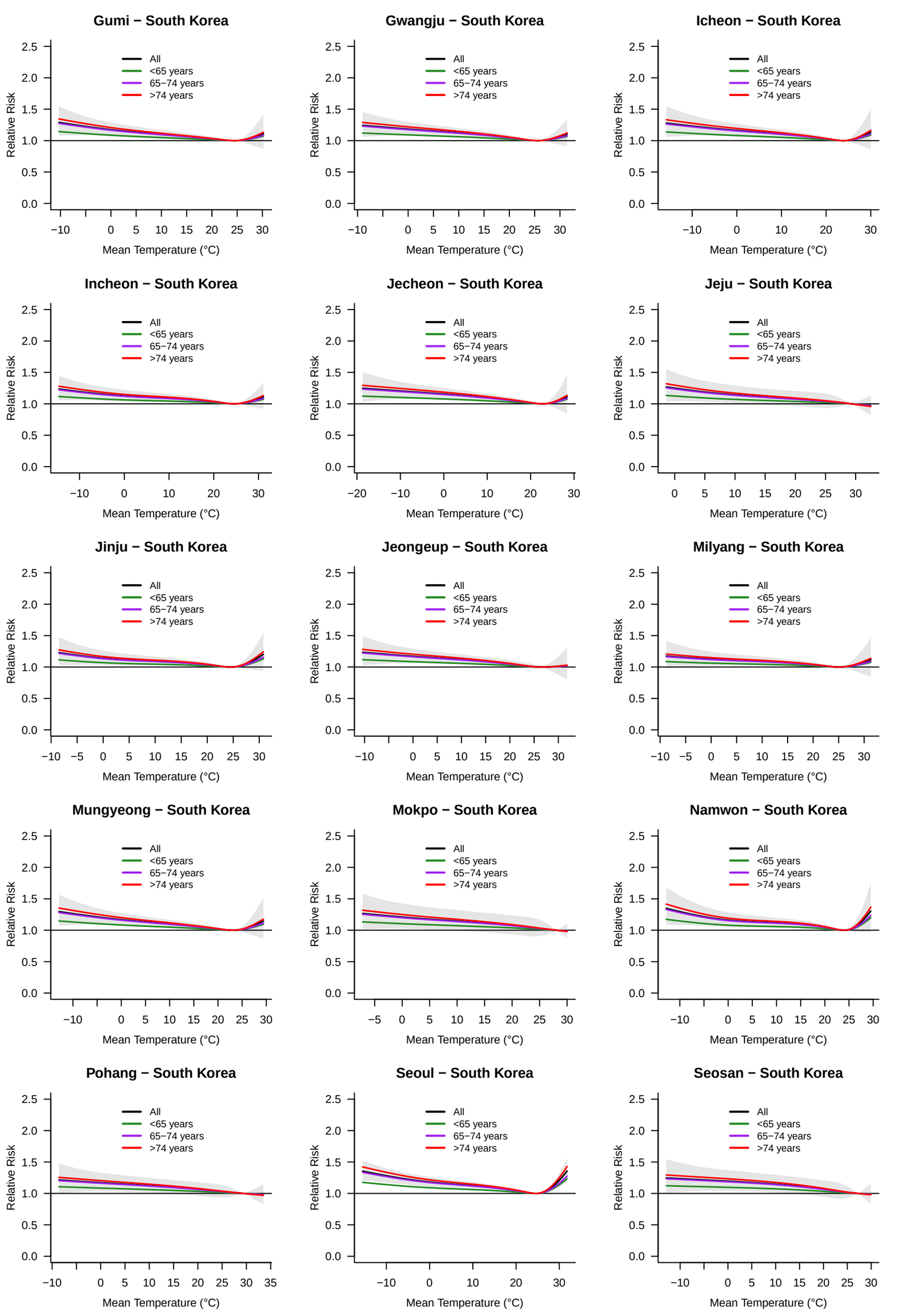

Tokushima − Japan
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

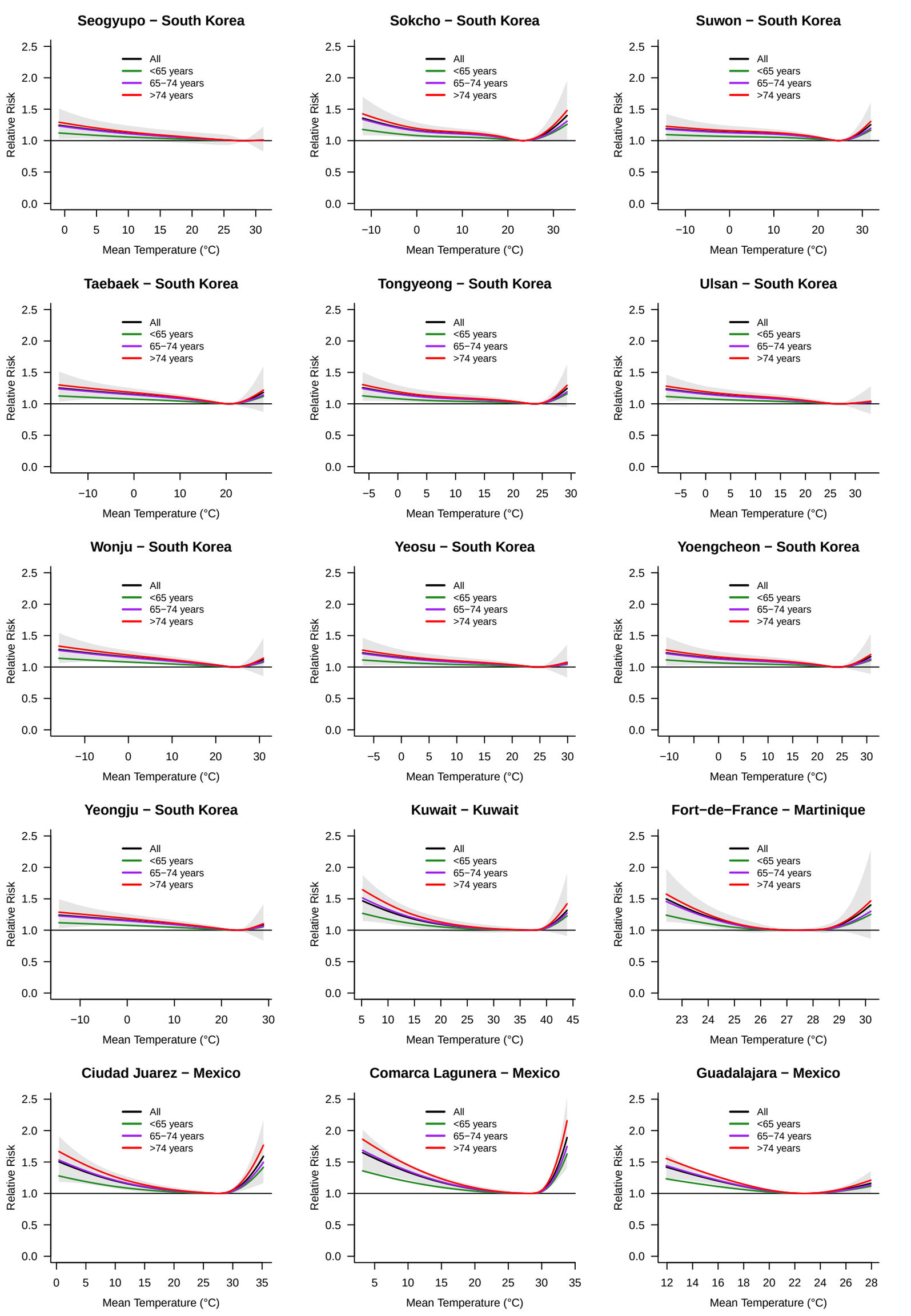

Tokyo − Japan
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

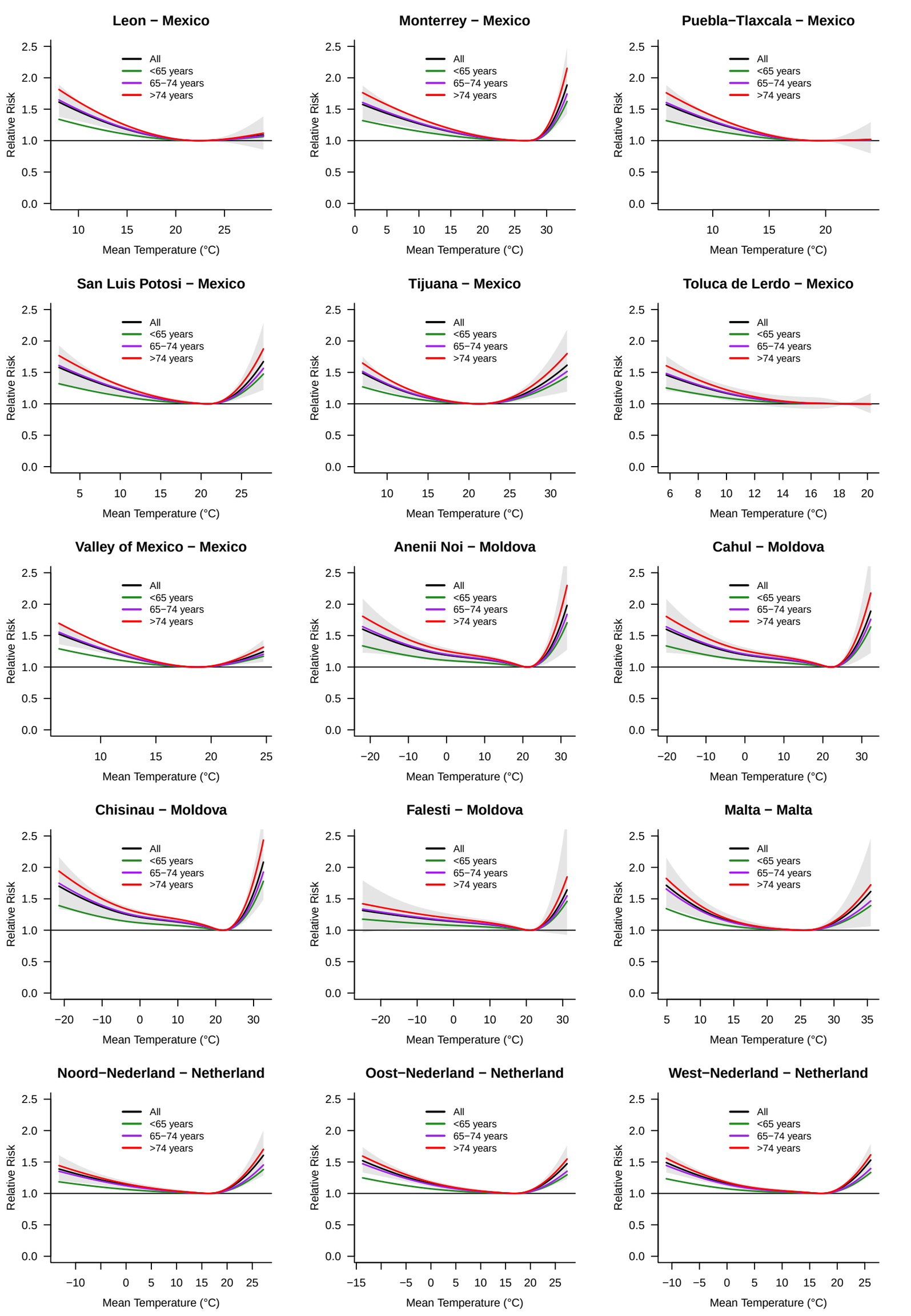

Toyama − Japan
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

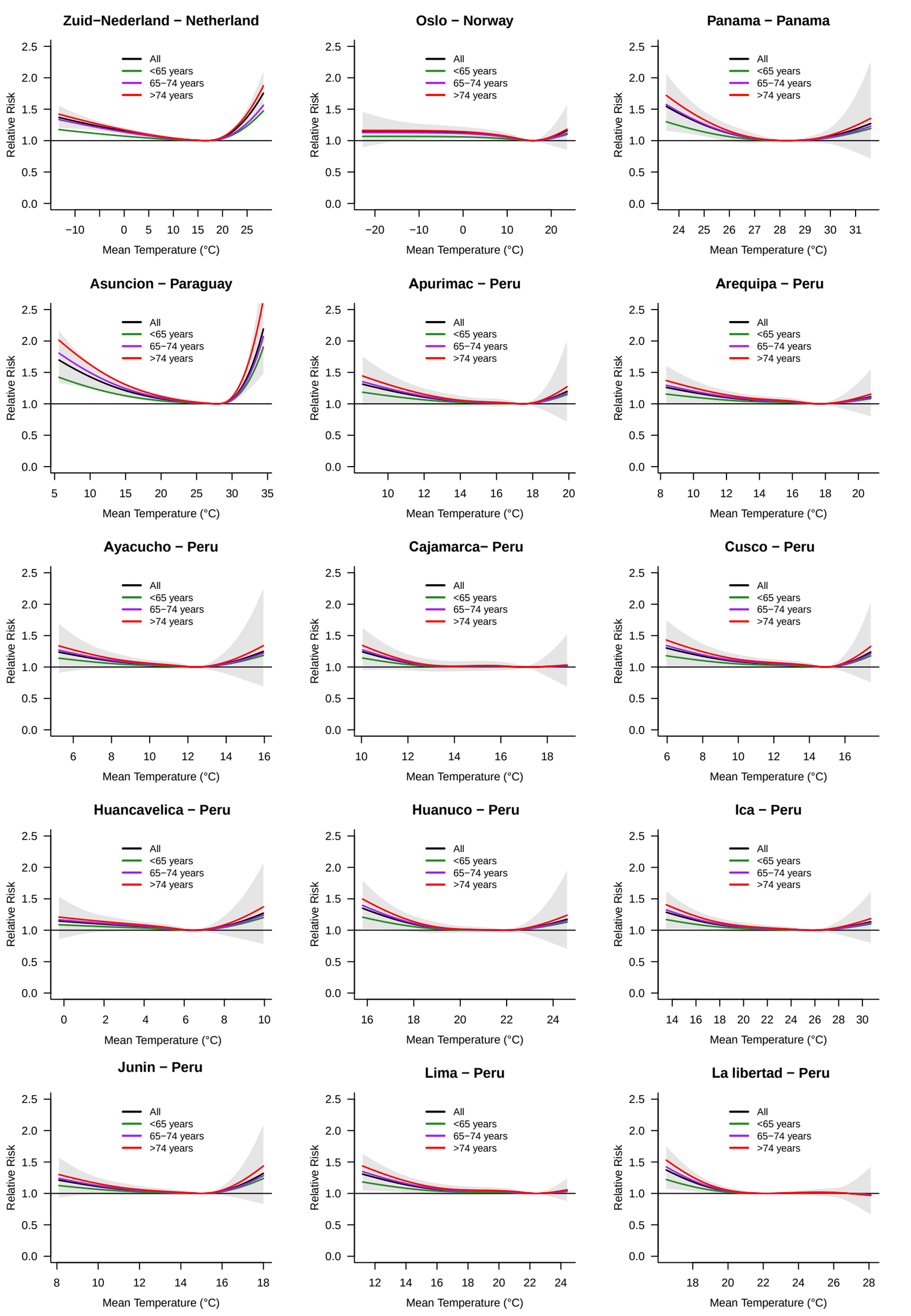

Tottori − Japan
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

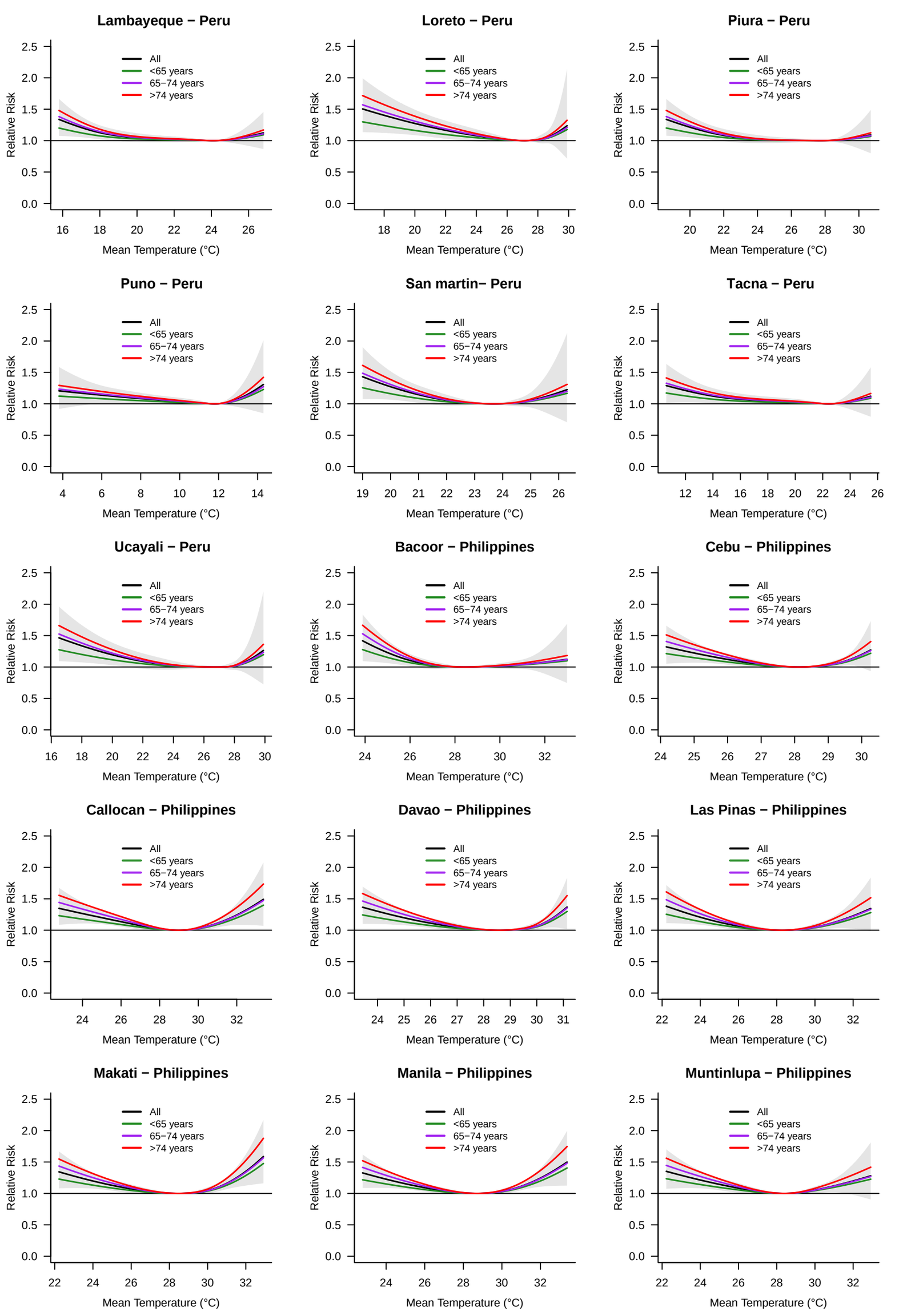

Wakayama − Japan
Yamaguchi − Japan
Yamagata − Japan
Yamanashi − Japan
Andong − South Korea
Boryeong − South Korea
Busan − South Korea
Chuncheon − South Korea
Chungju − South Korea
Cheonan − South Korea
Daegu − South Korea
Daejeon − South Korea
Donghae − South Korea
Geojae − South Korea
Gangneung − South Korea
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

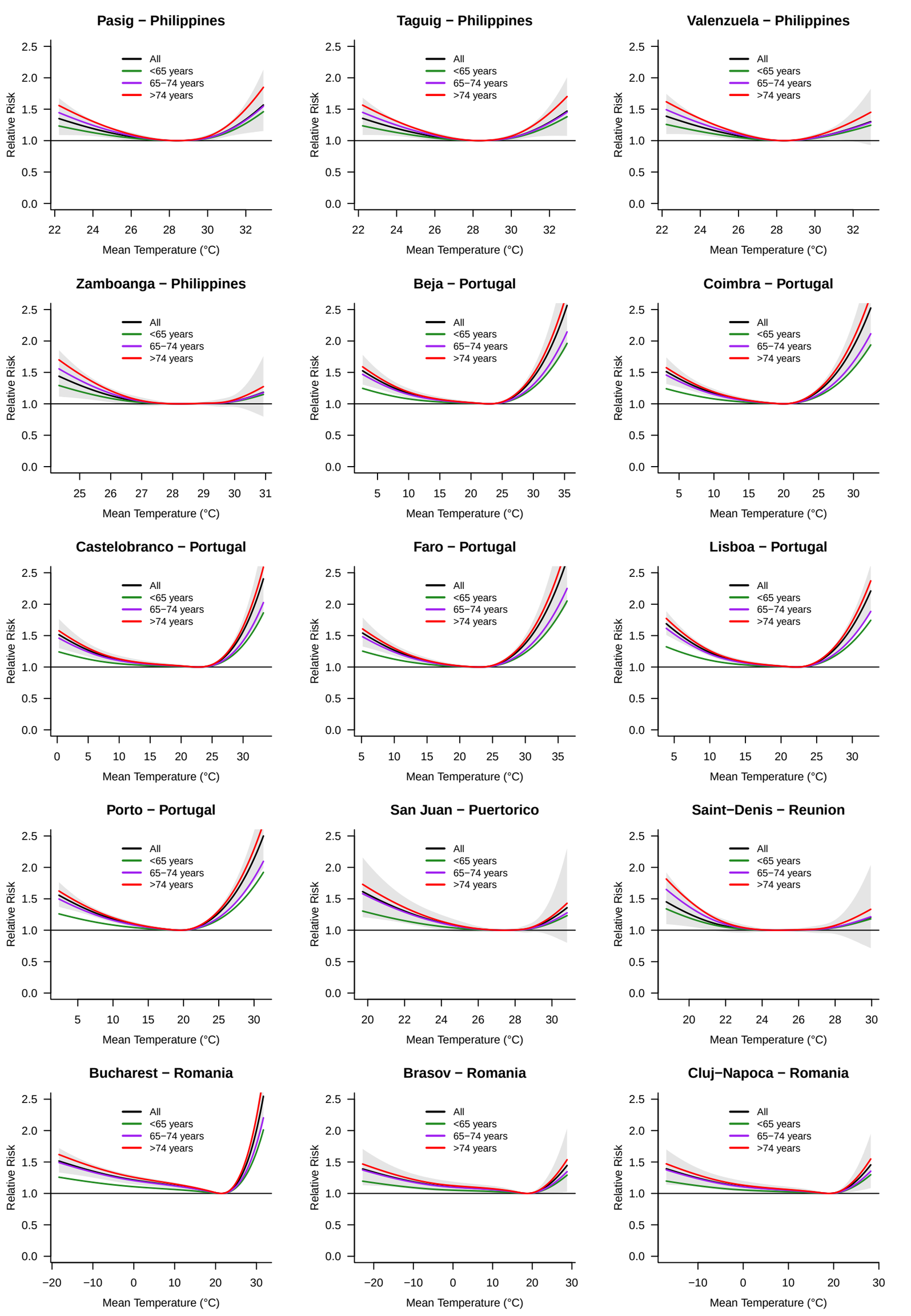

Gumi − South Korea
Gwangju − South Korea
Icheon − South Korea
Incheon − South Korea
Jecheon − South Korea
Jeju − South Korea
Jinju − South Korea
Jeongeup − South Korea
Milyang − South Korea
Mungyeong − South Korea
Mokpo − South Korea
Namwon − South Korea
Pohang − South Korea
Seoul − South Korea
Seosan − South Korea
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

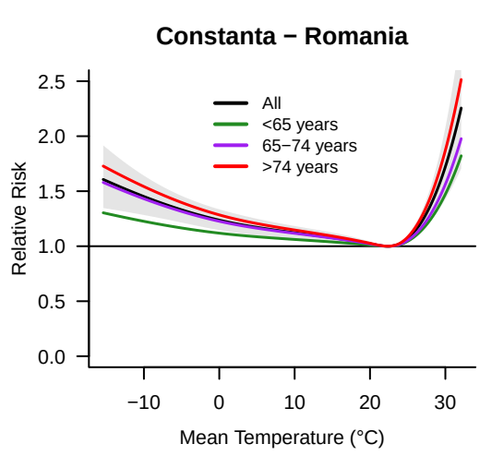

Seogyupo − South Korea
Sokcho − South Korea
Suwon − South Korea
Taebaek − South Korea
Tongyeong − South Korea
Ulsan − South Korea
Wonju − South Korea
Yeosu − South Korea
Yoengcheon − South Korea
Yeongju − South Korea
Kuwait − Kuwait
Fort−de−France − Martinique
Ciudad Juarez − Mexico
Comarca Lagunera − Mexico
Guadalajara − Mexico
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

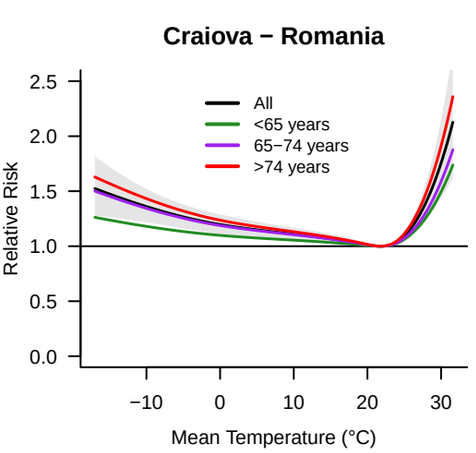

Leon − Mexico
Monterrey − Mexico
Puebla−Tlaxcala − Mexico
San Luis Potosi − Mexico
Tijuana − Mexico
Toluca de Lerdo − Mexico
Valley of Mexico − Mexico
Anenii Noi − Moldova
Cahul − Moldova
Chisinau − Moldova
Falesti − Moldova
Malta − Malta
Noord−Nederland − Netherland
Oost−Nederland − Netherland
West−Nederland − Netherland
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

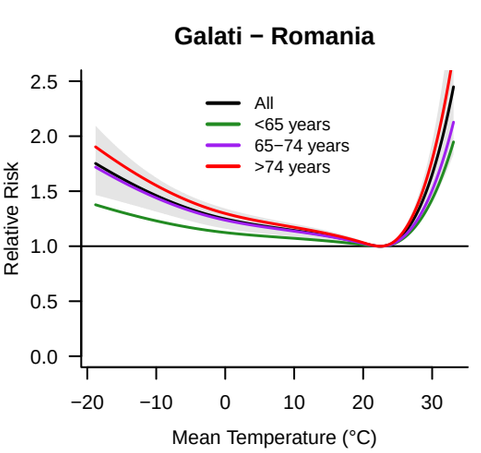

Zuid−Nederland − Netherland
Oslo − Norway
Panama − Panama
Asuncion − Paraguay
Apurimac − Peru
Arequipa − Peru
Ayacucho − Peru
Cajamarca− Peru
Cusco − Peru
Huancavelica − Peru
Huanuco − Peru
Ica − Peru
Junin − Peru
Lima − Peru
La libertad − Peru
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

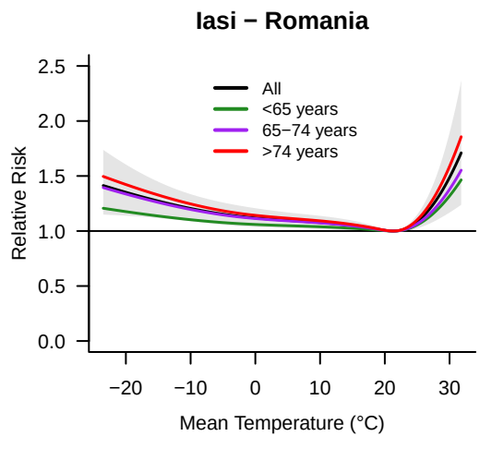

Lambayeque − Peru
Loreto − Peru
Piura − Peru
Puno − Peru
San martin− Peru
Tacna − Peru
Ucayali − Peru
Bacoor − Philippines
Cebu − Philippines
Callocan − Philippines
Davao − Philippines
Las Pinas − Philippines
Makati − Philippines
Manila − Philippines
Muntinlupa − Philippines
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

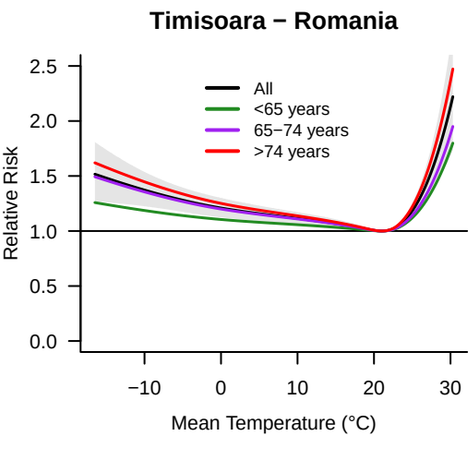

Pasig − Philippines
Taguig − Philippines
Valenzuela − Philippines
Zamboanga − Philippines
Beja − Portugal
Coimbra − Portugal
Castelobranco − Portugal
Faro − Portugal
Lisboa − Portugal
Porto − Portugal
San Juan − Puertorico
Saint−Denis − Reunion
Bucharest − Romania
Brasov − Romania
Cluj−Napoca − Romania
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

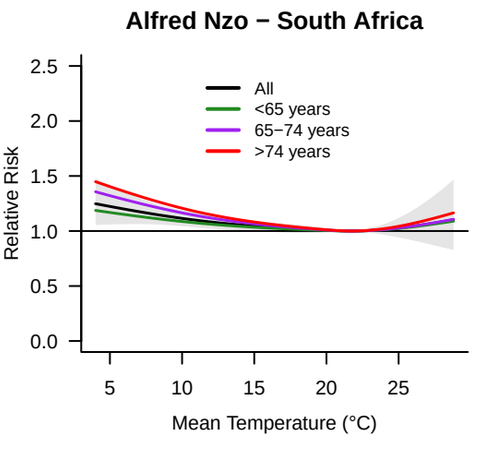

Constanta − Romania
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

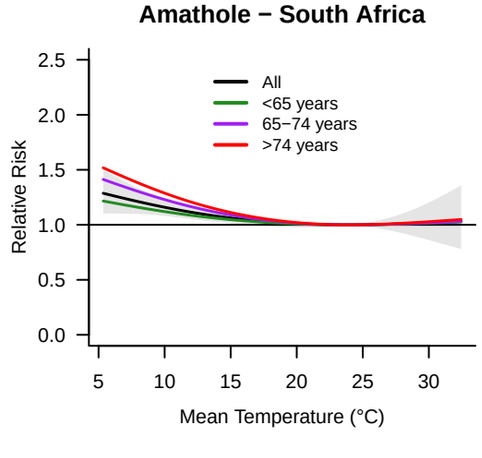

Craiova − Romania
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

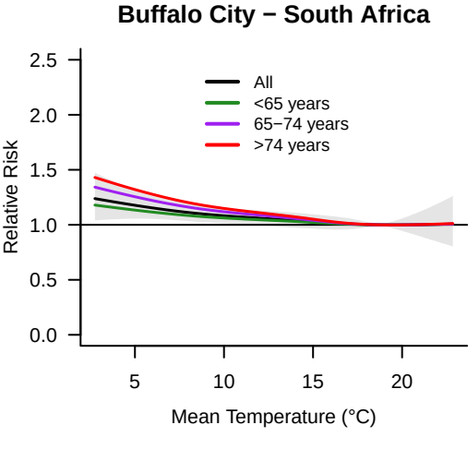

Galati − Romania
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

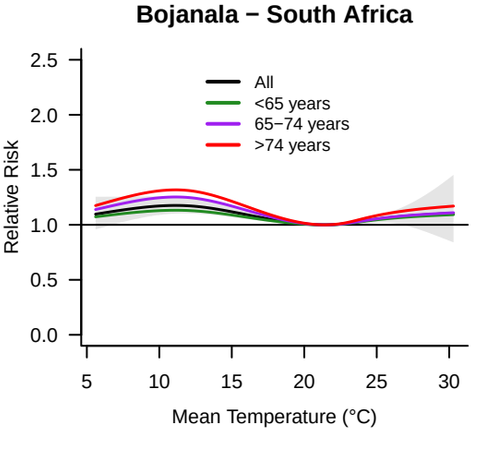

Iasi − Romania
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

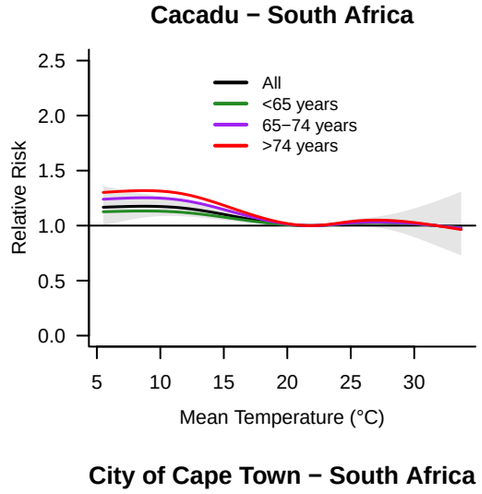

Timisoara − Romania
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

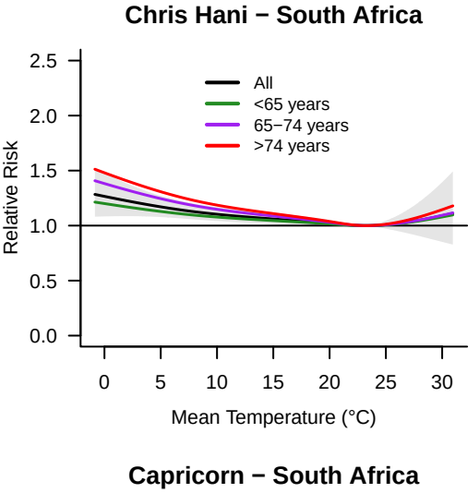

Alfred Nzo − South Africa
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

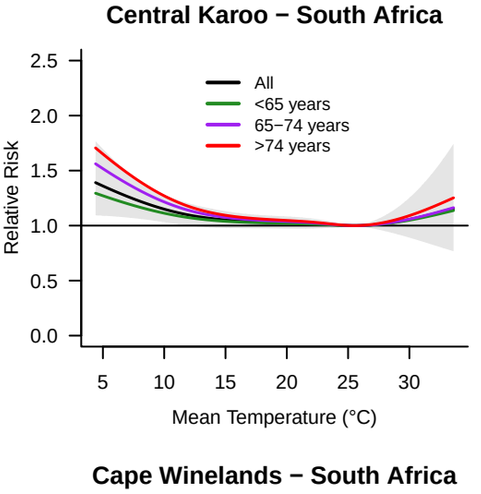

Amathole − South Africa
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

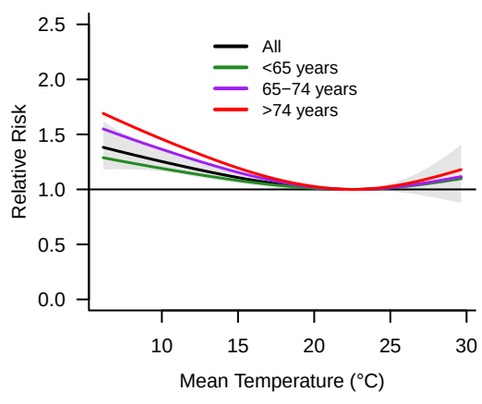

Buffalo City − South Africa
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

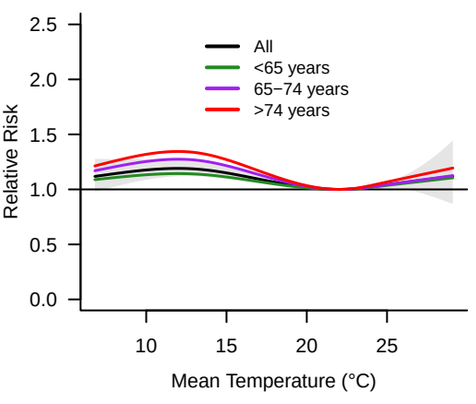

Bojanala − South Africa
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

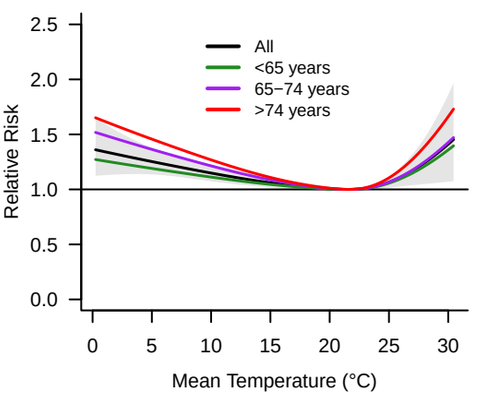

Cacadu − South Africa
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Chris Hani − South Africa
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

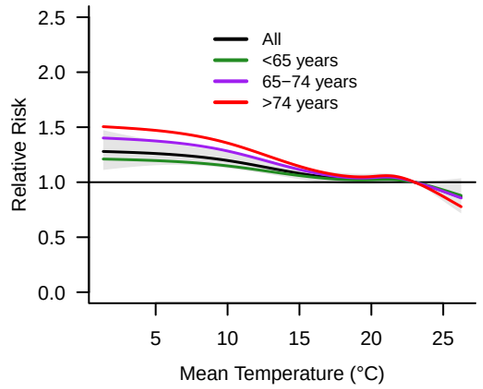

Central Karoo − South Africa
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


City of Cape Town − South Africa
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

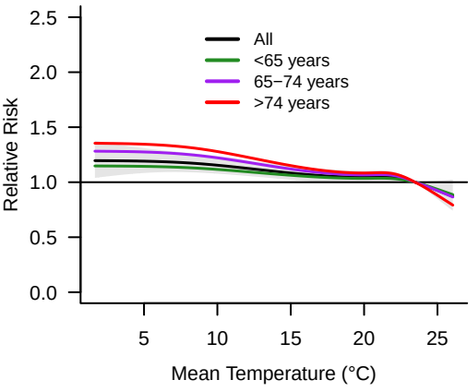

Capricorn − South Africa
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Cape Winelands − South Africa
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

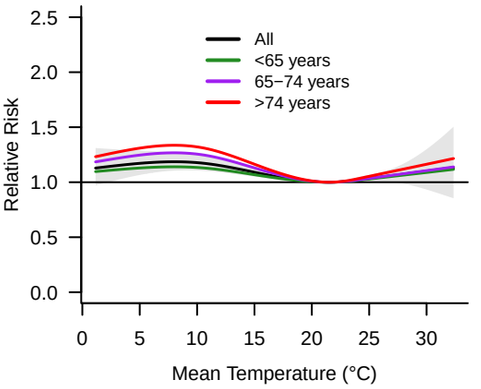
City of Johannesburg − South Africa



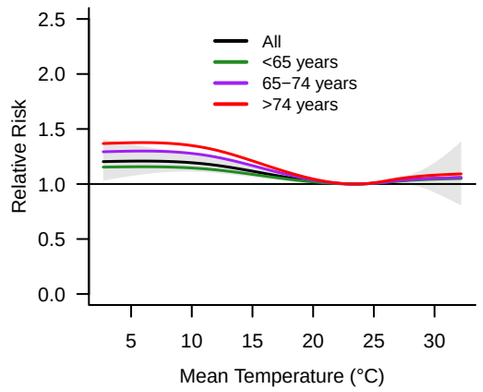
City of Tshwane − South Africa



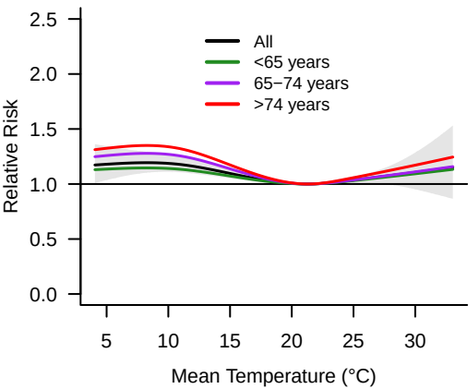
Dr Kenneth Kaunda − South Africa



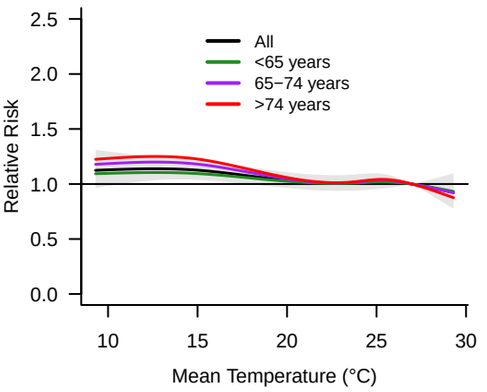
Dr Ruth Segomotsi Mompati − South Africa



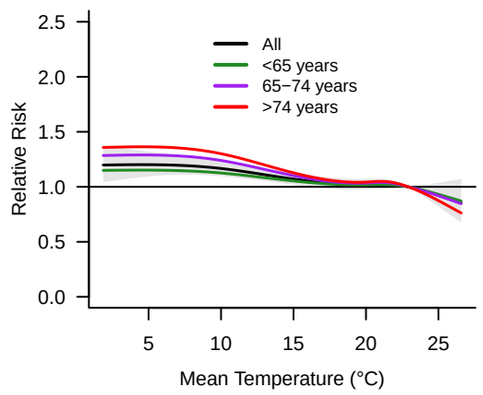
Eden − South Africa



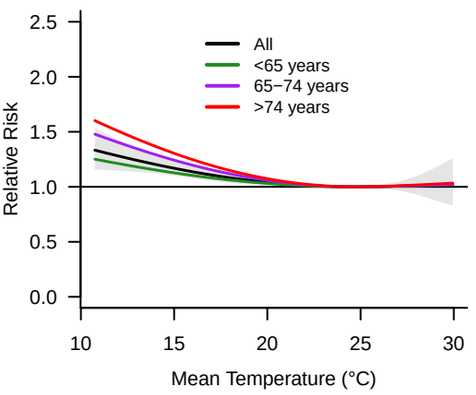
Ehlanzeni − South Africa



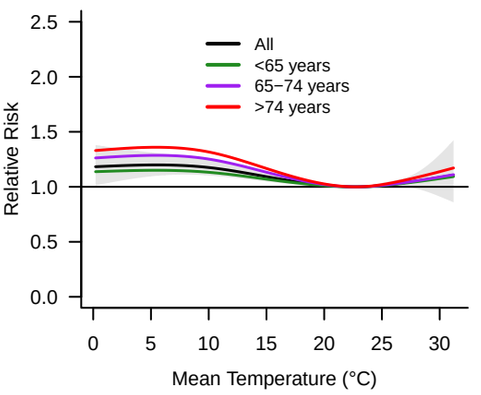
Ekurhuleni − South Africa



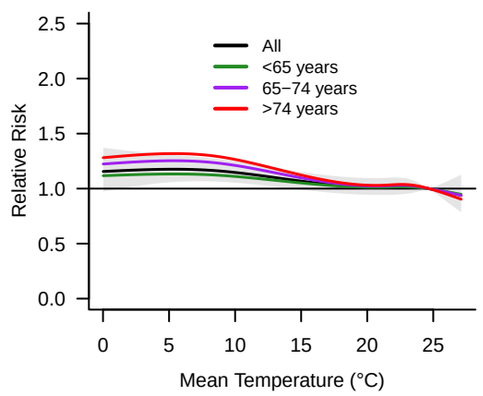
eThekwini − South Africa



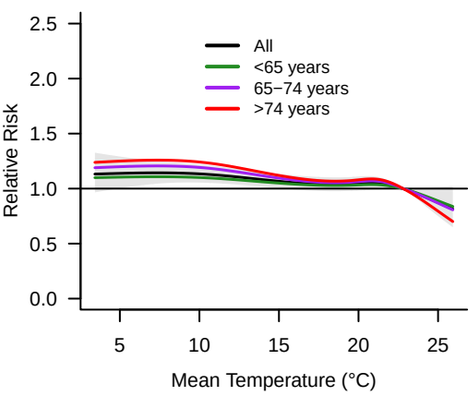
Frances Baard − South Africa



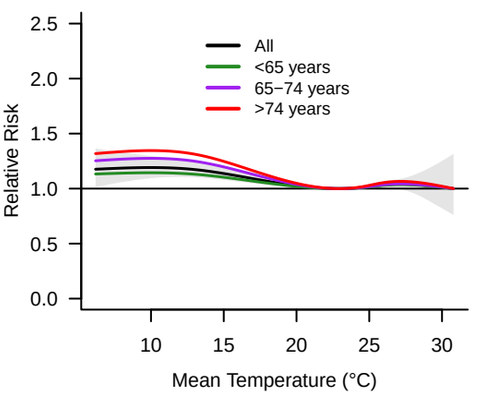
Fezile Dabi − South Africa



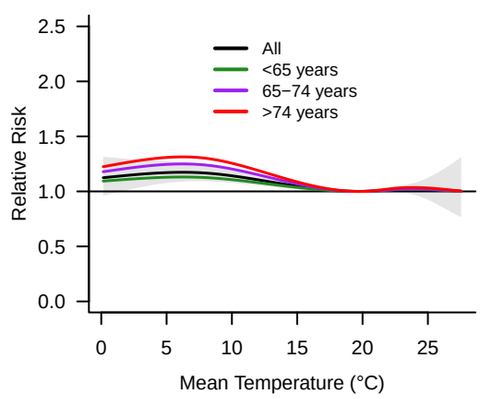
Gert Sibande − South Africa



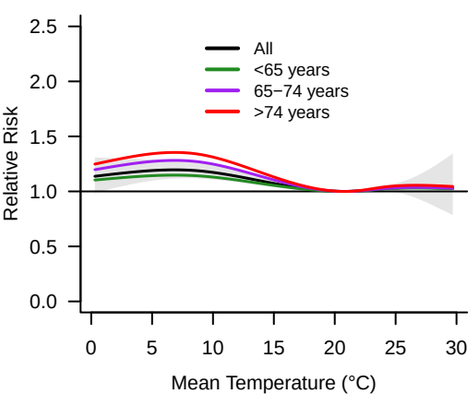
Greater Sekhukhune − South Africa



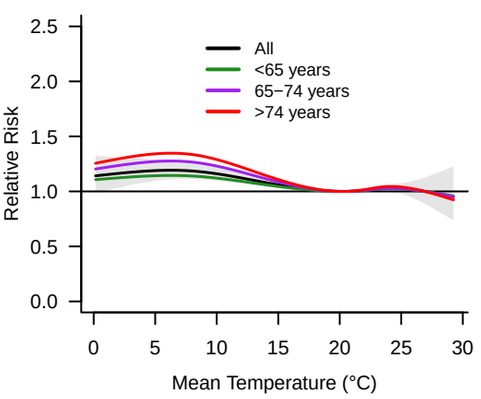
Joe Gqabi − South Africa

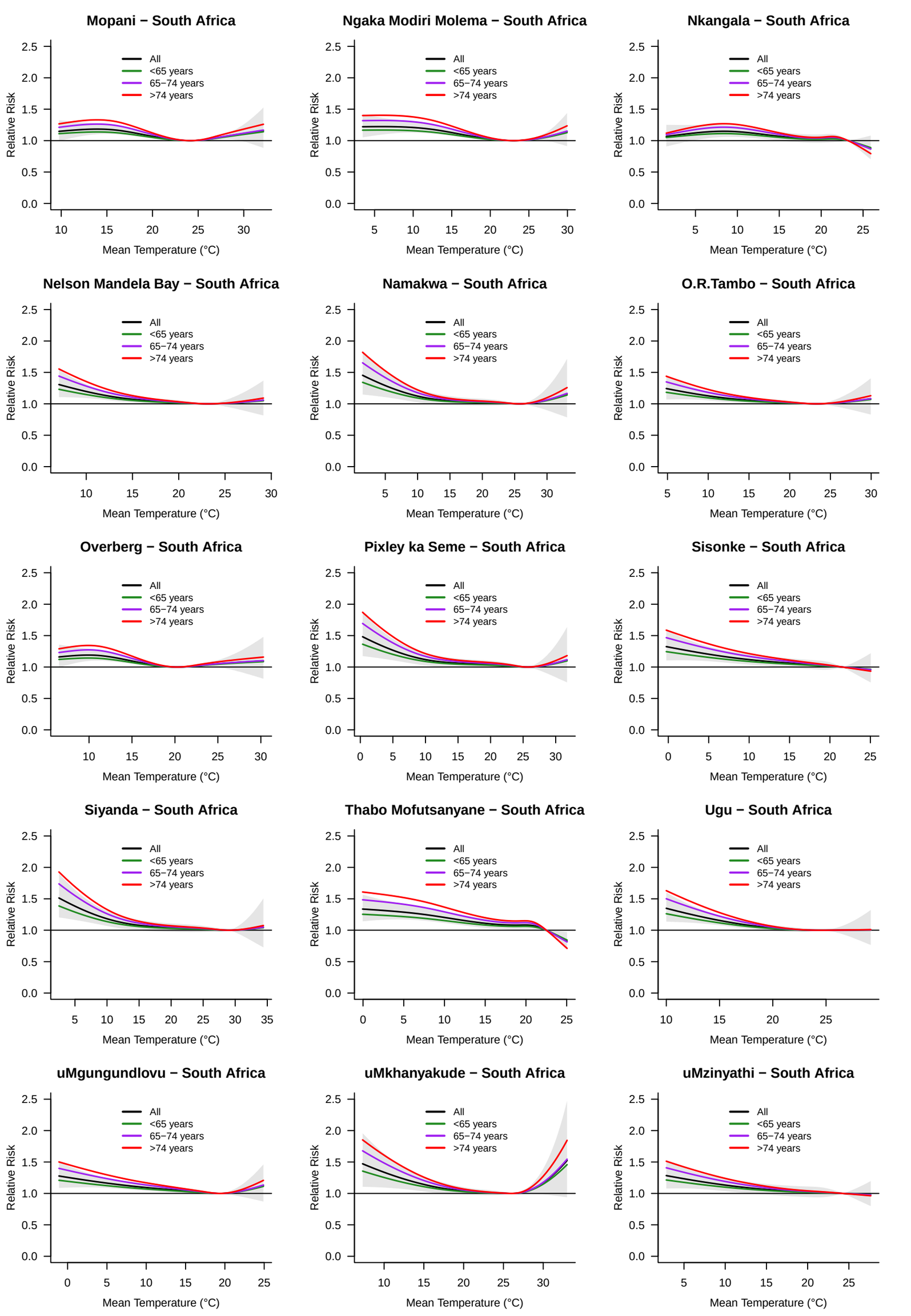


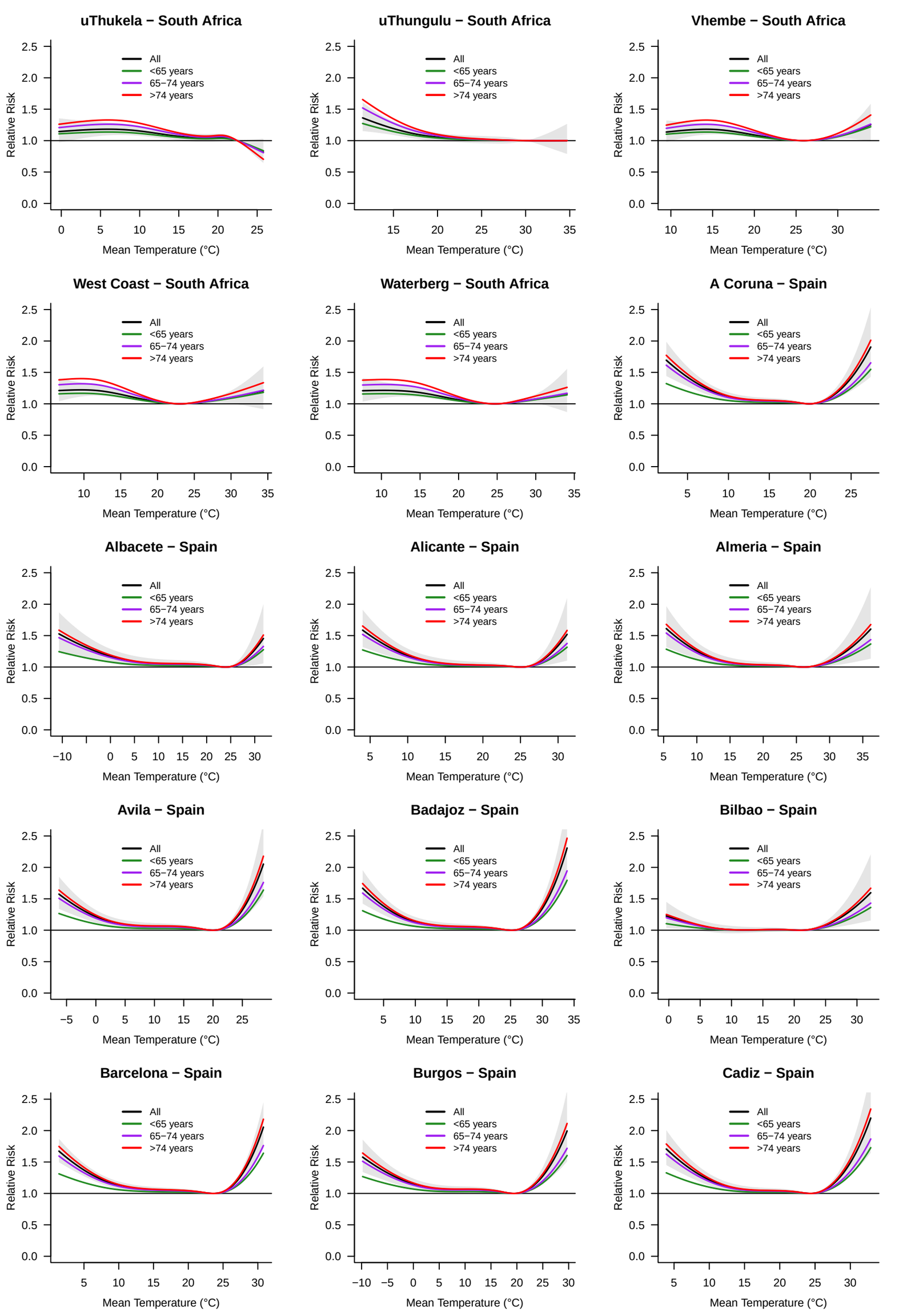
Lejweleputswa − South Africa

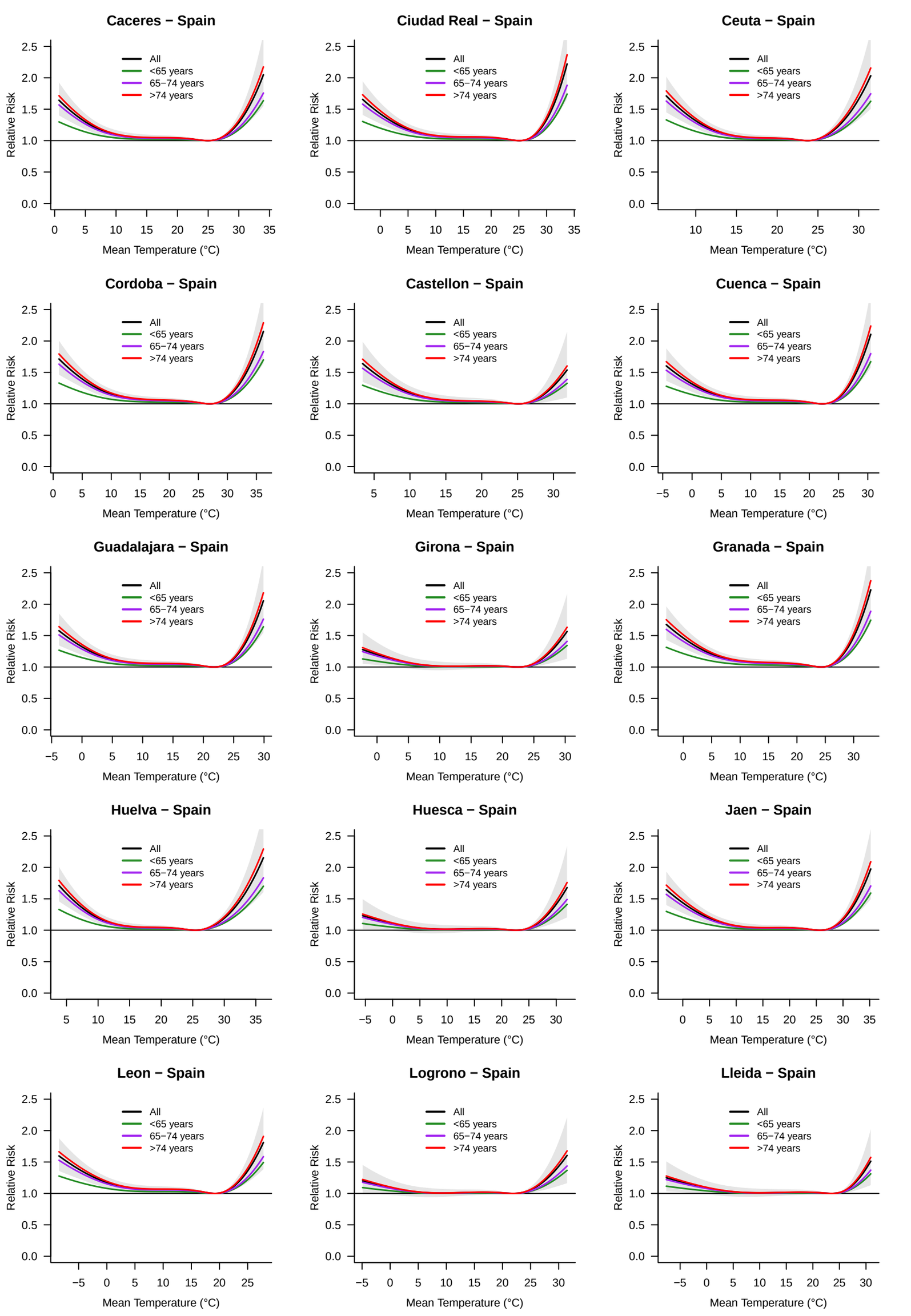


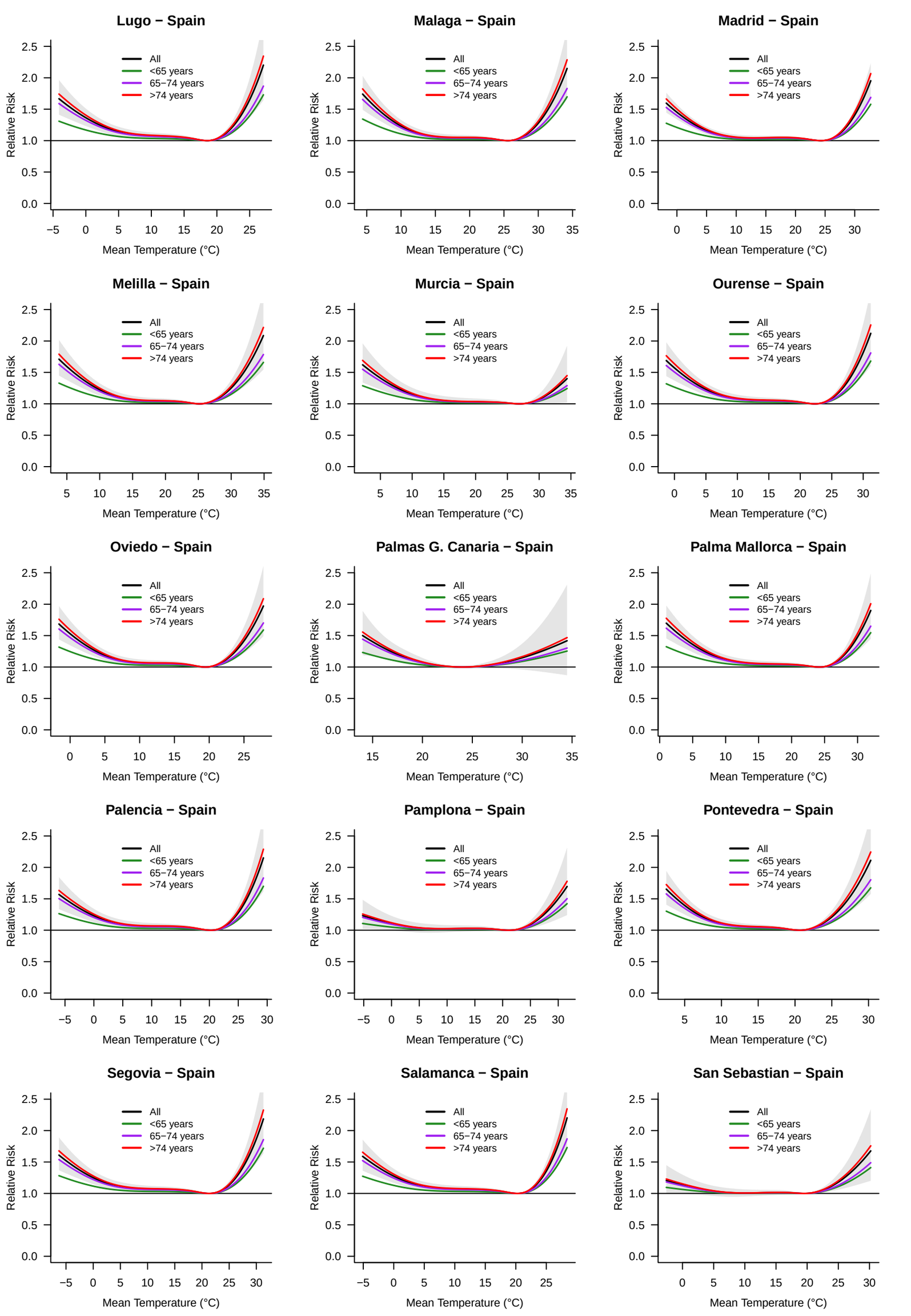
Mangaung − South Africa

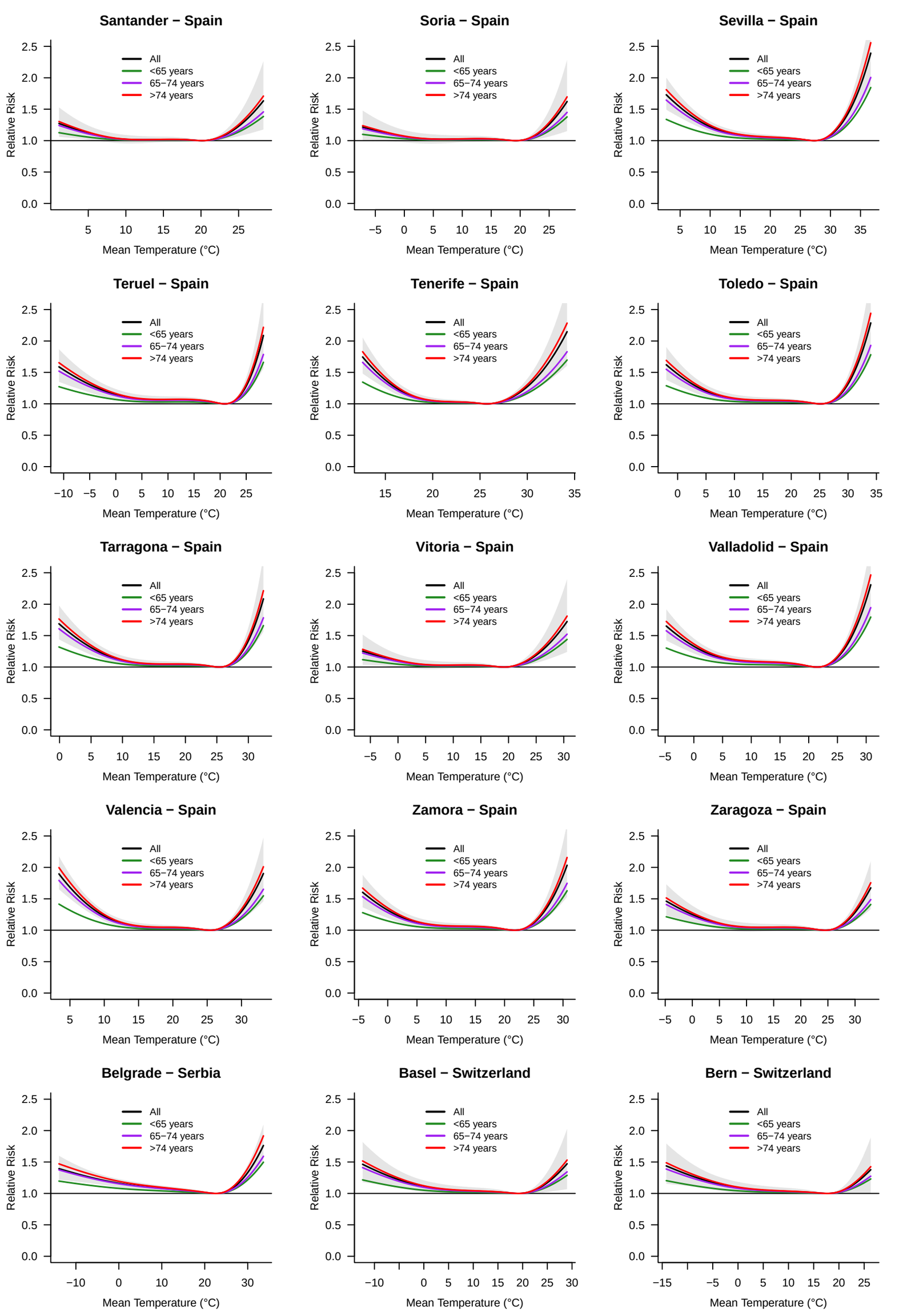


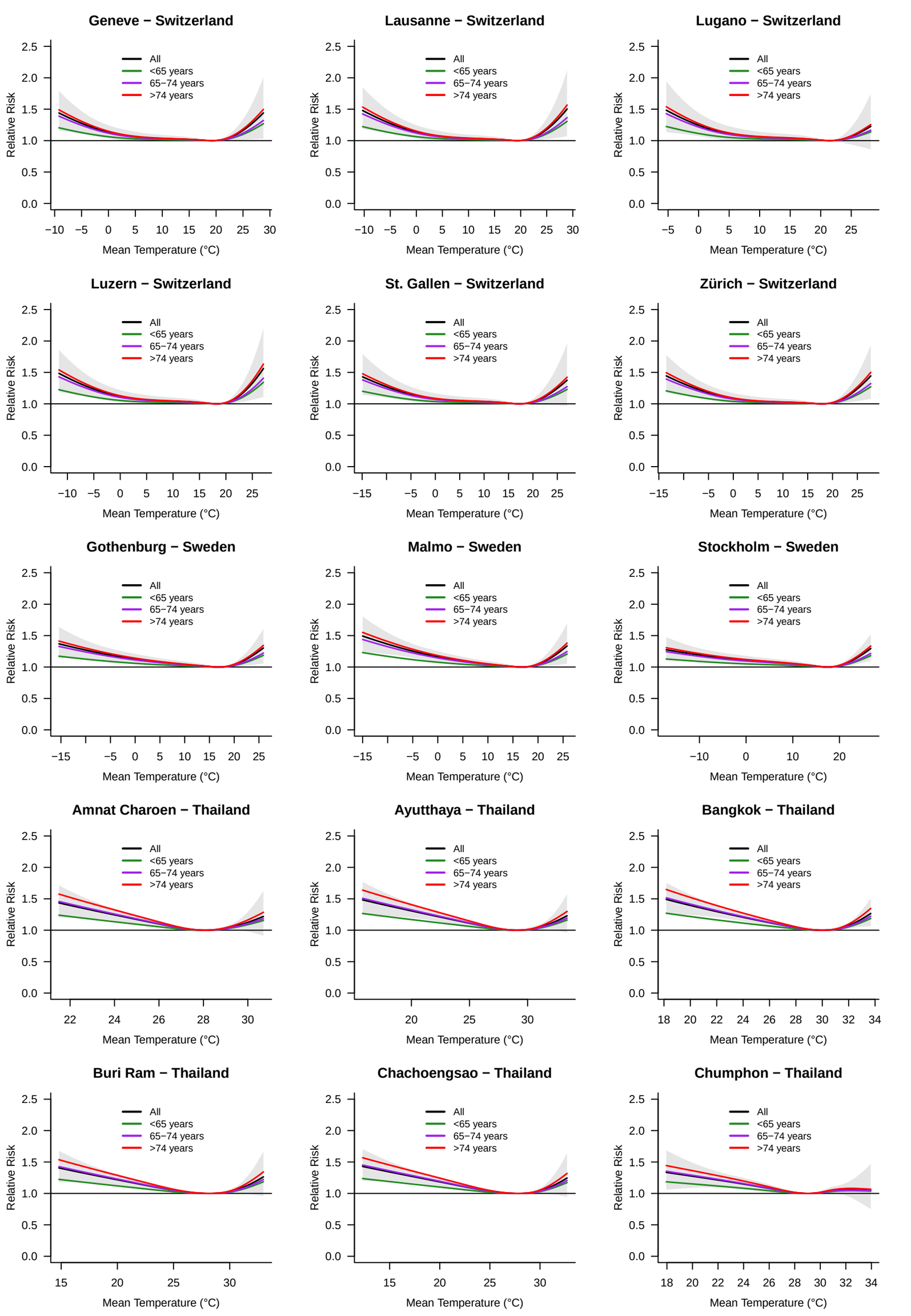

Mopani − South Africa
Ngaka Modiri Molema − South Africa
Nkangala − South Africa
Nelson Mandela Bay − South Africa
Namakwa − South Africa
O.R.Tambo − South Africa
Overberg − South Africa
Pixley ka Seme − South Africa
Sisonke − South Africa
Siyanda − South Africa
Thabo Mofutsanyane − South Africa
Ugu − South Africa
uMgungundlovu − South Africa
uMkhanyakude − South Africa
uMzinyathi − South Africa
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

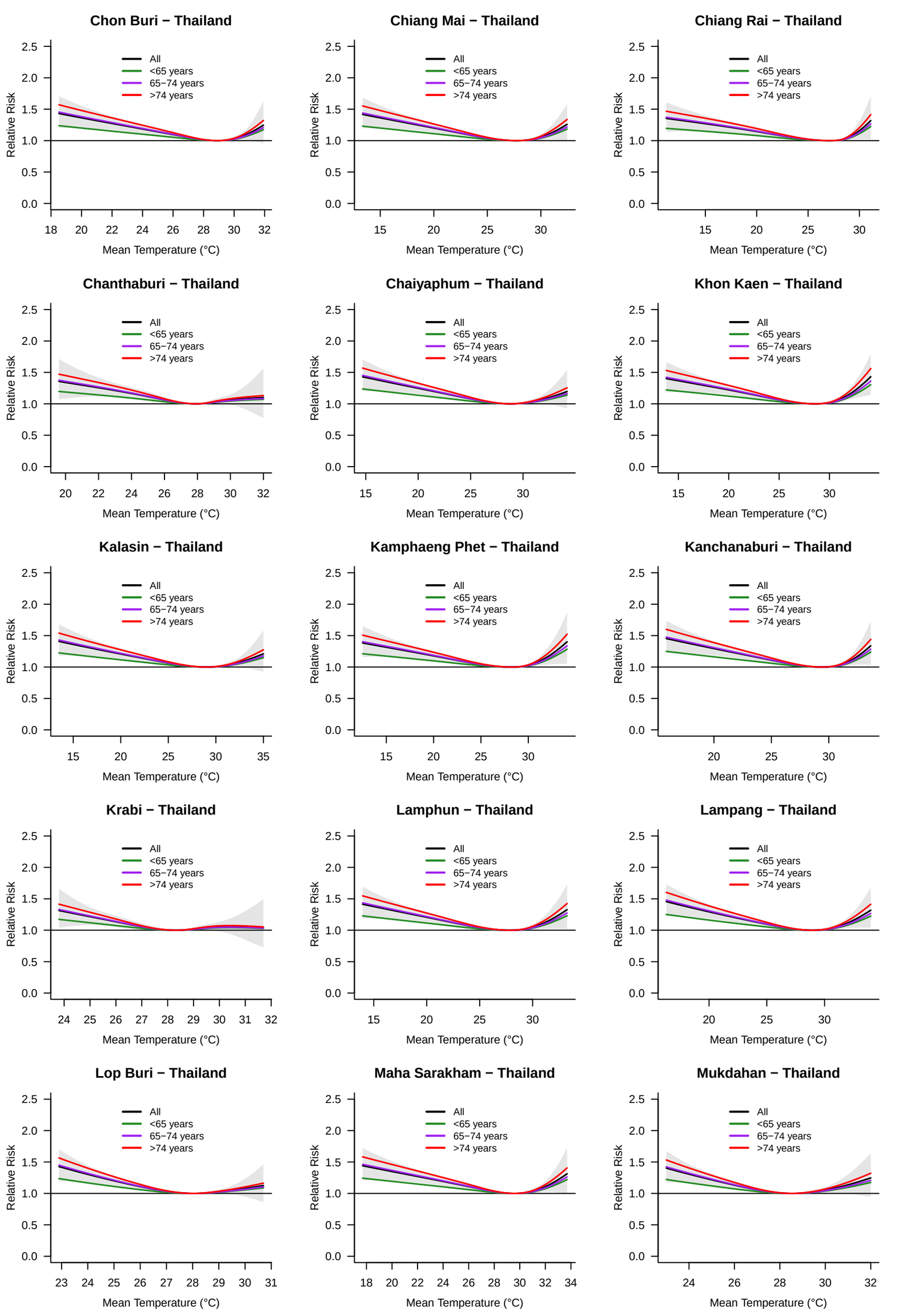

uThukela − South Africa
uThungulu − South Africa
Vhembe − South Africa
West Coast − South Africa
Waterberg − South Africa
A Coruna − Spain
Albacete − Spain
Alicante − Spain
Almeria − Spain
Avila − Spain
Badajoz − Spain
Bilbao − Spain
Barcelona − Spain
Burgos − Spain
Cadiz − Spain
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Caceres − Spain
Ciudad Real − Spain
Ceuta − Spain
Cordoba − Spain
Castellon − Spain
Cuenca − Spain
Guadalajara − Spain
Girona − Spain
Granada − Spain
Huelva − Spain
Huesca − Spain
Jaen − Spain
Leon − Spain
Logrono − Spain
Lleida − Spain
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

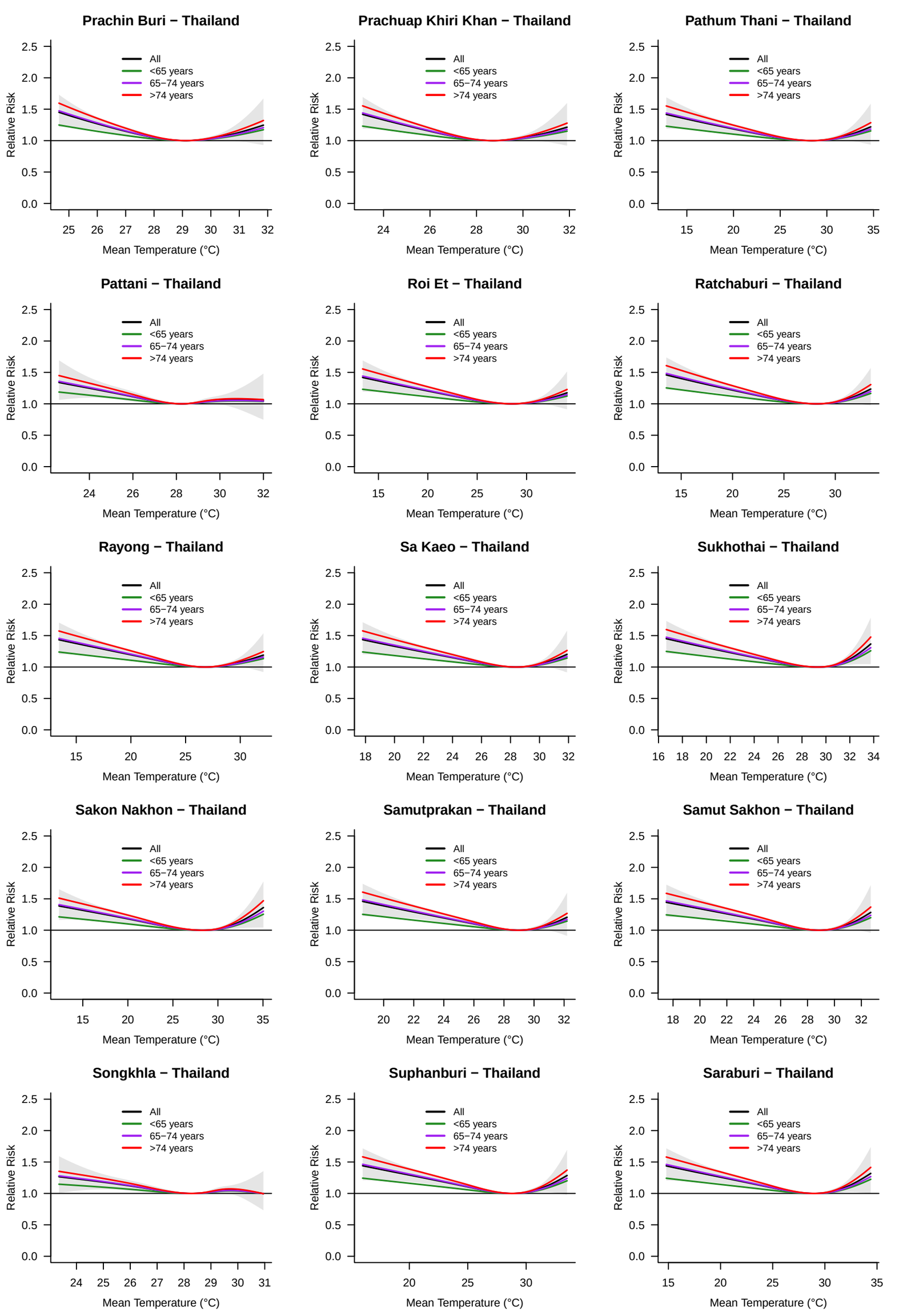

Lugo − Spain
Malaga − Spain
Madrid − Spain
Melilla − Spain
Murcia − Spain
Ourense − Spain
Oviedo − Spain
Palmas G. Canaria − Spain
Palma Mallorca − Spain
Palencia − Spain
Pamplona − Spain
Pontevedra − Spain
Segovia − Spain
Salamanca − Spain
San Sebastian − Spain
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

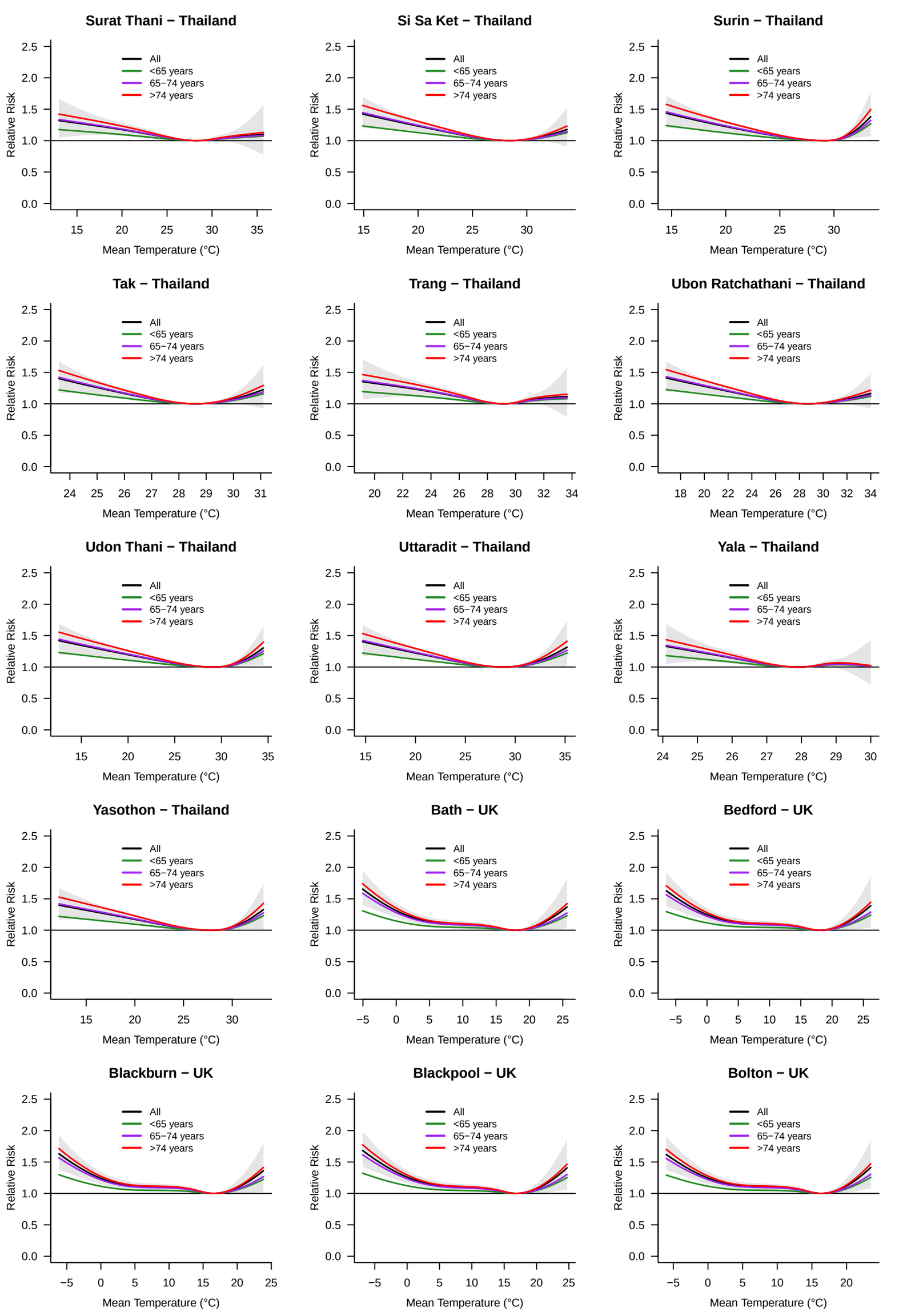

Santander − Spain
Soria − Spain
Sevilla − Spain
Teruel − Spain
Tenerife − Spain
Toledo − Spain
Tarragona − Spain
Vitoria − Spain
Valladolid − Spain
Valencia − Spain
Zamora − Spain
Zaragoza − Spain
Belgrade − Serbia
Basel − Switzerland
Bern − Switzerland
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

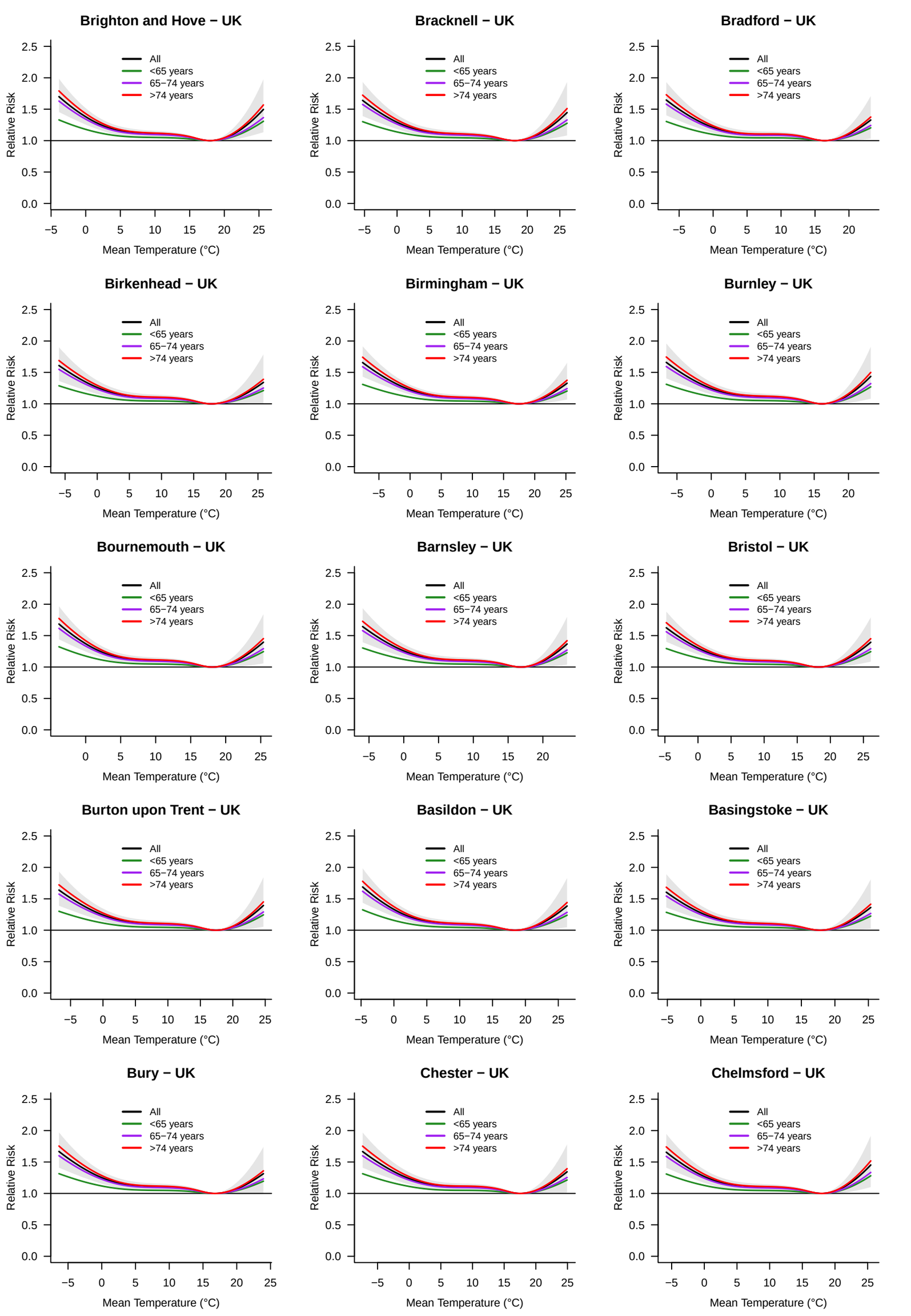

Geneve − Switzerland
Lausanne − Switzerland
Lugano − Switzerland
Luzern − Switzerland
St. Gallen − Switzerland
Zürich − Switzerland
Gothenburg − Sweden
Malmo − Sweden
Stockholm − Sweden
Amnat Charoen − Thailand
Ayutthaya − Thailand
Bangkok − Thailand
Buri Ram − Thailand
Chachoengsao − Thailand
Chumphon − Thailand
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

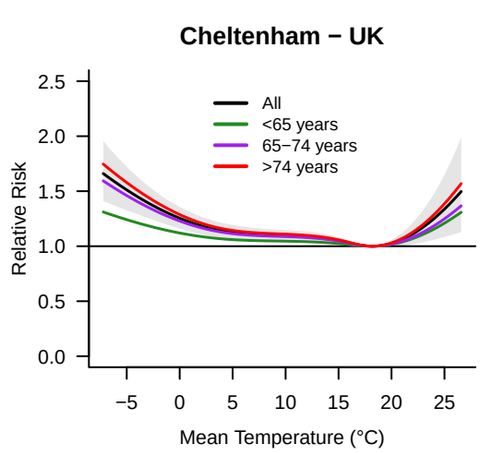

Chon Buri − Thailand
Chiang Mai − Thailand
Chiang Rai − Thailand
Chanthaburi − Thailand
Chaiyaphum − Thailand
Khon Kaen − Thailand
Kalasin − Thailand
Kamphaeng Phet − Thailand
Kanchanaburi − Thailand
Krabi − Thailand
Lamphun − Thailand
Lampang − Thailand
Lop Buri − Thailand
Maha Sarakham − Thailand
Mukdahan − Thailand
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

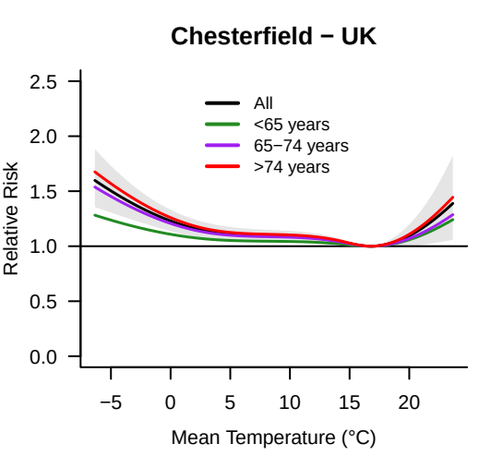
Nan − Thailand
Nong Bua Lam Phu − Thailand
Nakhon Ratchasima − Thailand
Nakhon Sawan − Thailand
Nakhon Phanom − Thailand
Nakhon Pathom − Thailand
Nakhon Si Thammarat − Thailand
Nong Khai − Thailand
Nonthaburi − Thailand
Narathiwat − Thailand
Phayao − Thailand
Phetchaburi − Thailand
Phichit − Thailand
Phrae − Thailand
Phitsanulok − Thailand
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

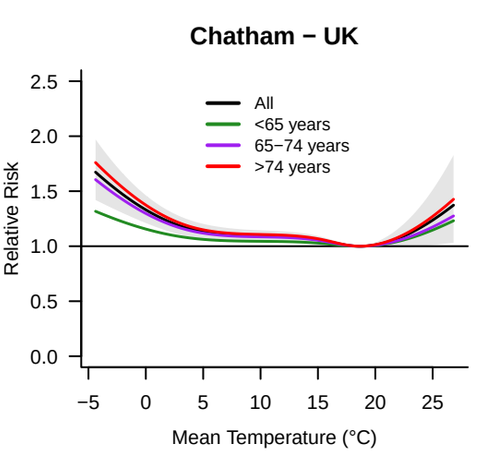

Prachin Buri − Thailand
Prachuap Khiri Khan − Thailand
Pathum Thani − Thailand
Pattani − Thailand
Roi Et − Thailand
Ratchaburi − Thailand
Rayong − Thailand
Sa Kaeo − Thailand
Sukhothai − Thailand
Sakon Nakhon − Thailand
Samutprakan − Thailand
Samut Sakhon − Thailand
Songkhla − Thailand
Suphanburi − Thailand
Saraburi − Thailand
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

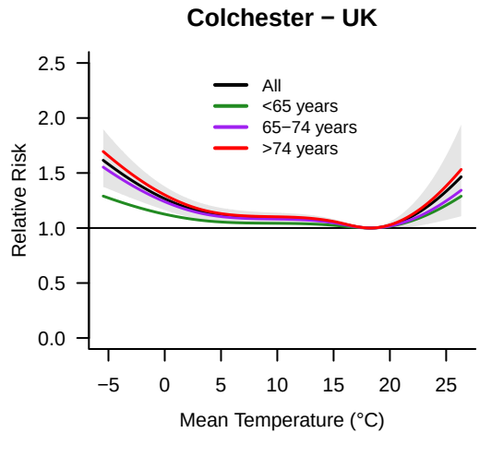

Surat Thani − Thailand
Si Sa Ket − Thailand
Surin − Thailand
Tak − Thailand
Trang − Thailand
Ubon Ratchathani − Thailand
Udon Thani − Thailand
Uttaradit − Thailand
Yala − Thailand
Yasothon − Thailand
Bath − UK
Bedford − UK
Blackburn − UK
Blackpool − UK
Bolton − UK
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

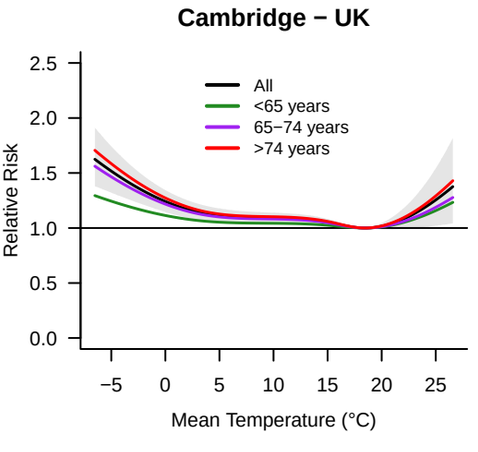

Brighton and Hove − UK
Bracknell − UK
Bradford − UK
Birkenhead − UK
Birmingham − UK
Burnley − UK
Bournemouth − UK
Barnsley − UK
Bristol − UK
Burton upon Trent − UK
Basildon − UK
Basingstoke − UK
Bury − UK
Chester − UK
Chelmsford − UK
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

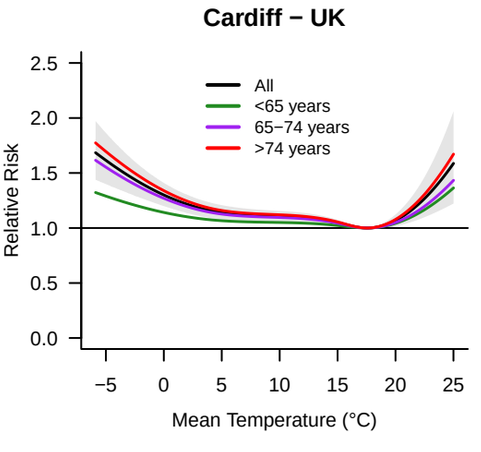

Cheltenham − UK
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

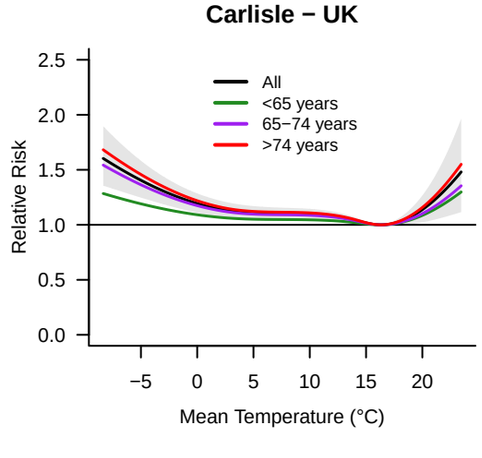

Chesterfield − UK
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

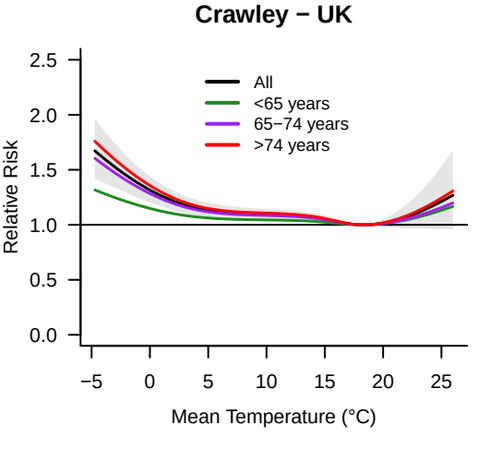

Chatham − UK
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

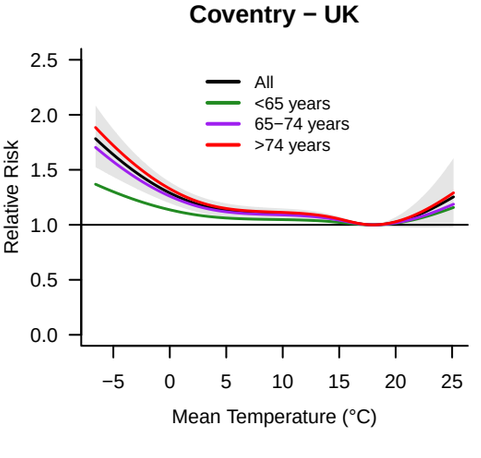

Colchester − UK
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

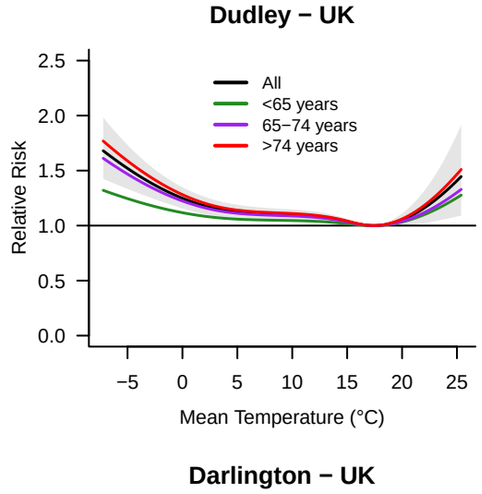

Cambridge − UK
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

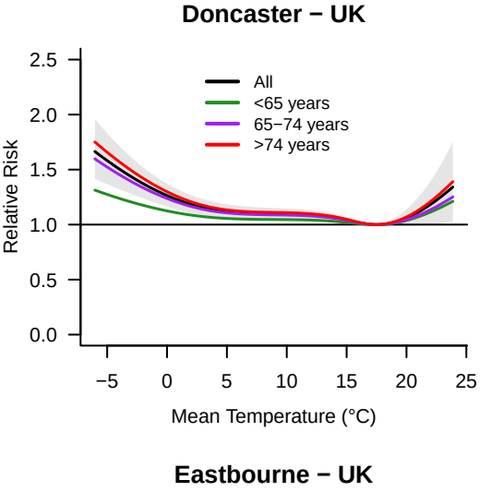

Cardiff − UK
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

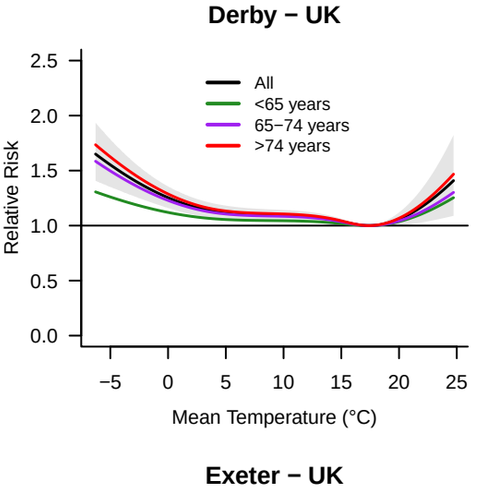

Carlisle − UK
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

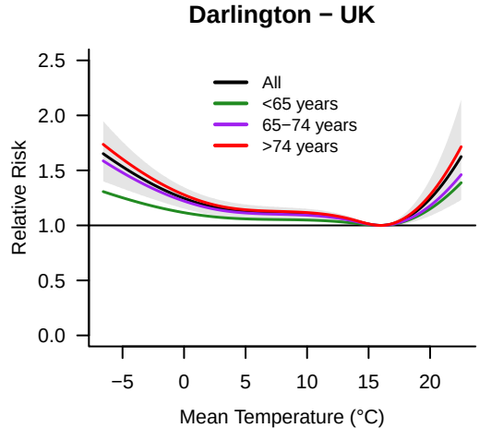

Crawley − UK
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

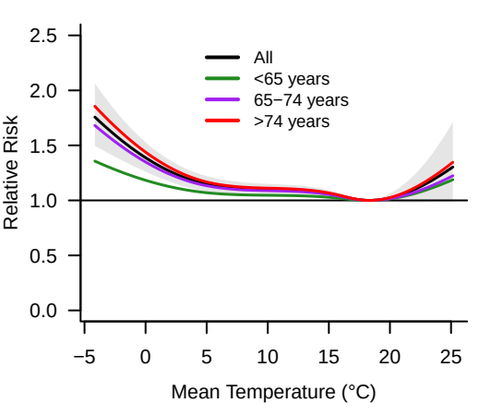

Coventry − UK
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

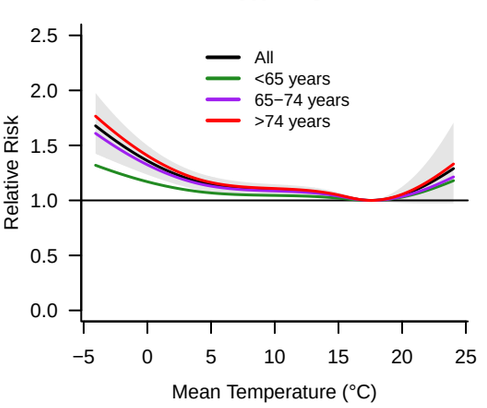

Dudley − UK
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

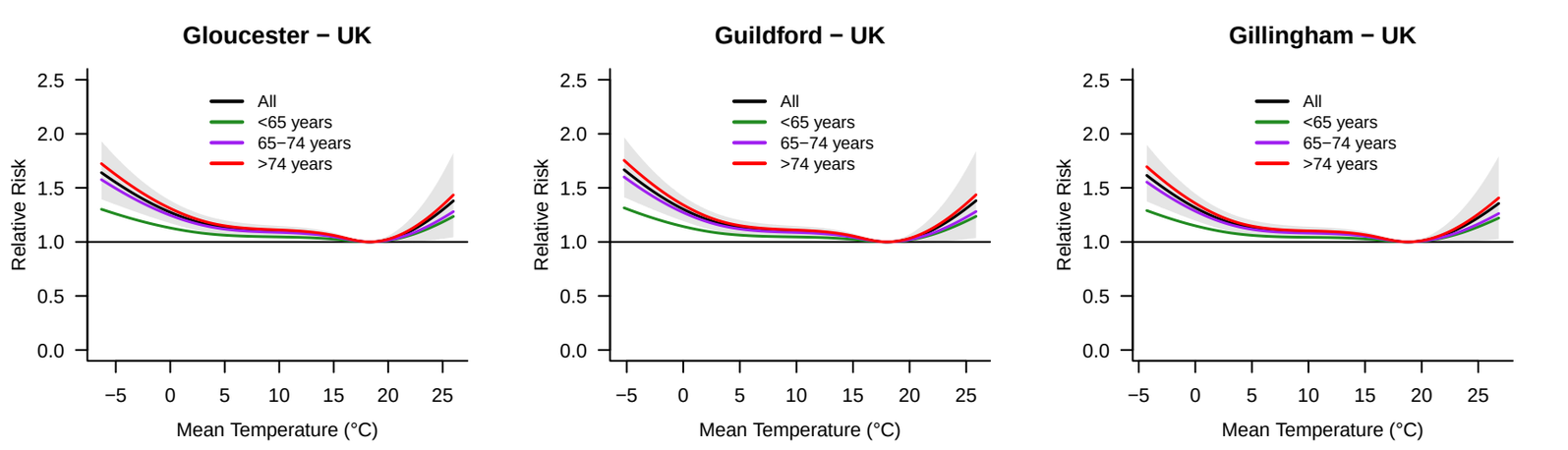

Doncaster − UK
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Derby − UK
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Darlington − UK
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

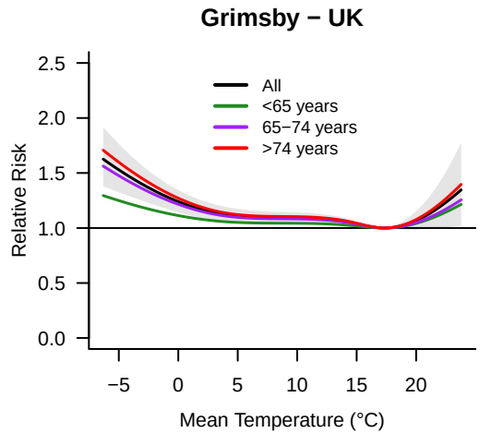

Eastbourne − UK
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

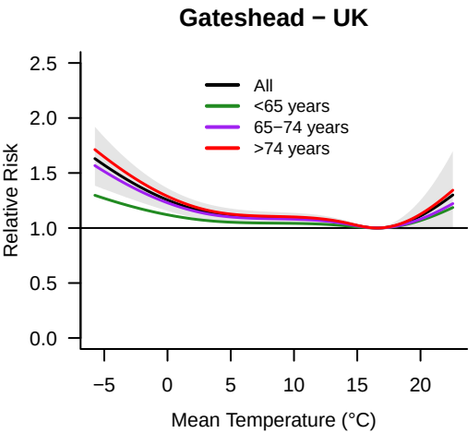

Exeter − UK
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

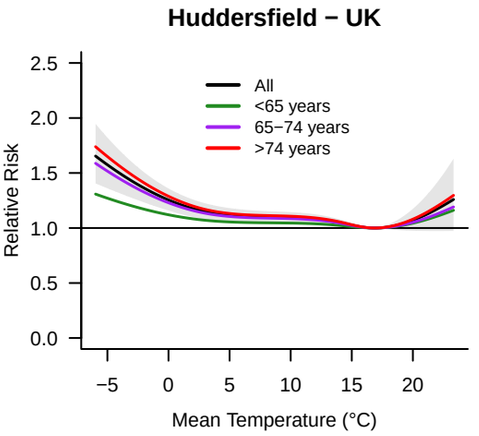

Gloucester − UK
Relative Risk
Mean Temperature (°C)
All
<65 years
65−74 years
>74 years

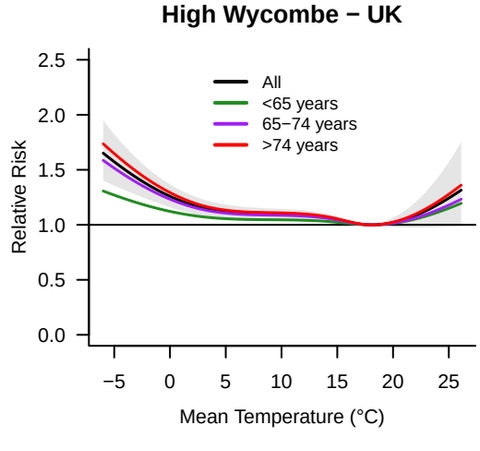
Guildford − UK
Relative Risk
Mean Temperature (°C)
All
<65 years
65−74 years
>74 years

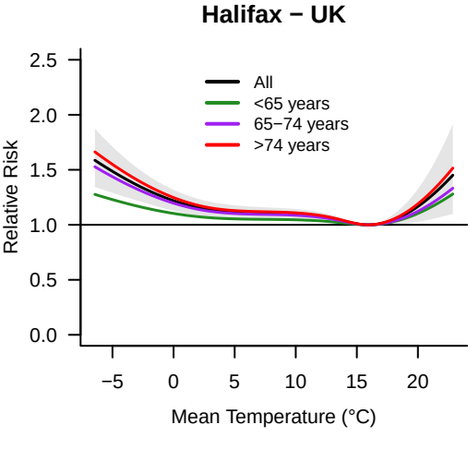
Gillingham − UK
Relative Risk
Mean Temperature (°C)
All
<65 years
65−74 years
>74 years

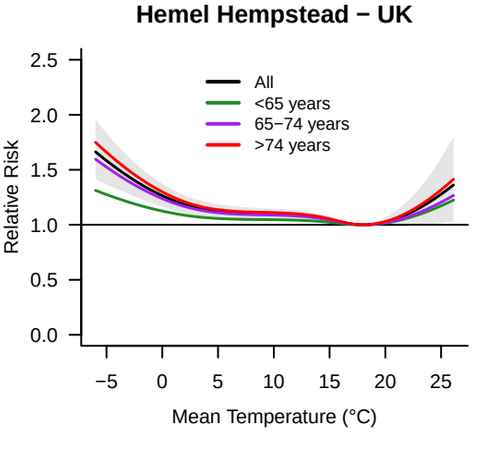

Grimsby − UK
Relative Risk
Mean Temperature (°C)
All
<65 years
65−74 years
>74 years

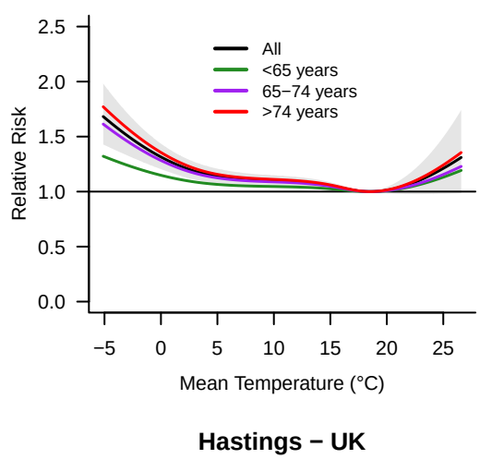

Gateshead − UK
Relative Risk
Mean Temperature (°C)
All
<65 years
65−74 years
>74 years

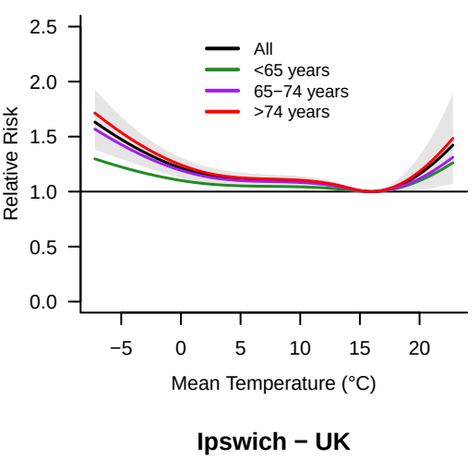

Huddersfield − UK
Relative Risk
Mean Temperature (°C)
All
<65 years
65−74 years
>74 years

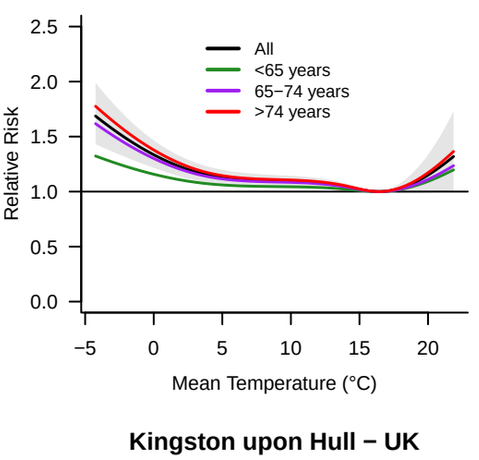

High Wycombe − UK
Relative Risk
Mean Temperature (°C)
All
<65 years
65−74 years
>74 years

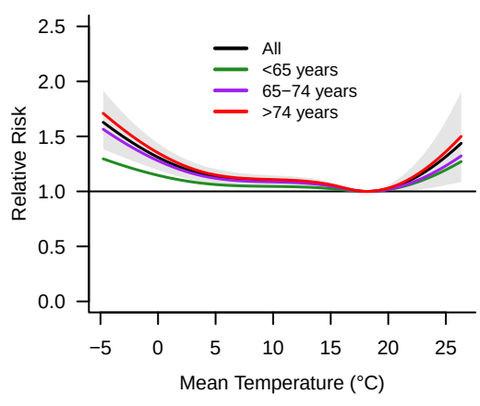

Halifax − UK
Relative Risk
Mean Temperature (°C)
All
<65 years
65−74 years
>74 years

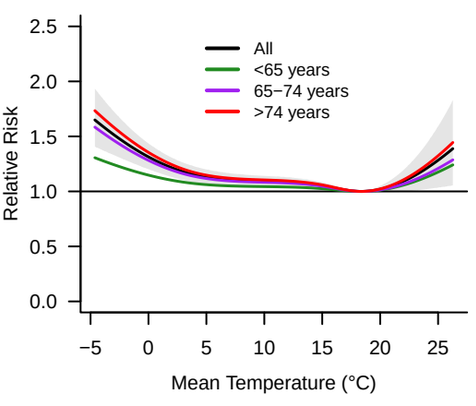

Hemel Hempstead − UK
Relative Risk
Mean Temperature (°C)
All
<65 years
65−74 years
>74 years

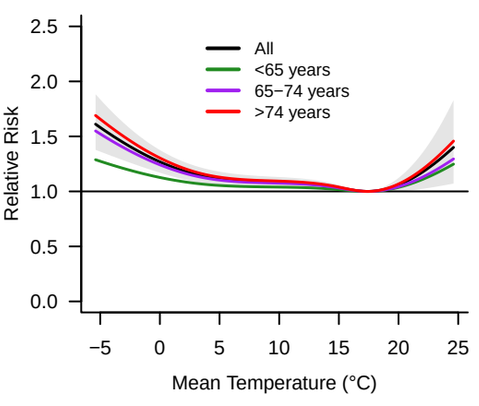

Harlow − UK
Relative Risk
Mean Temperature (°C)
All
<65 years
65−74 years
>74 years


Harrogate − UK
Relative Risk
Mean Temperature (°C)
All
<65 years
65−74 years
>74 years

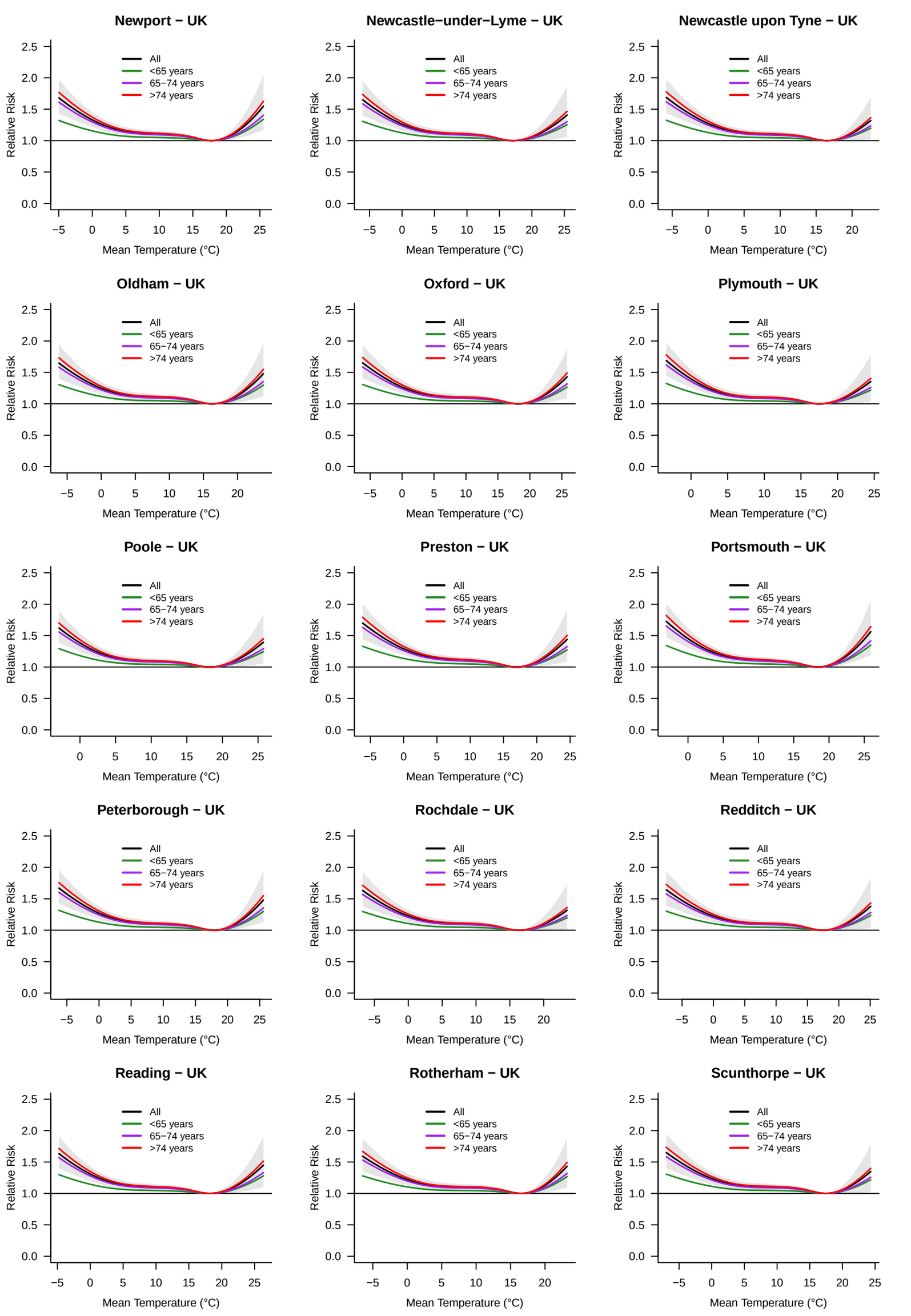

Hartlepool − UK
Relative Risk
Mean Temperature (°C)
All
<65 years
65−74 years
>74 years

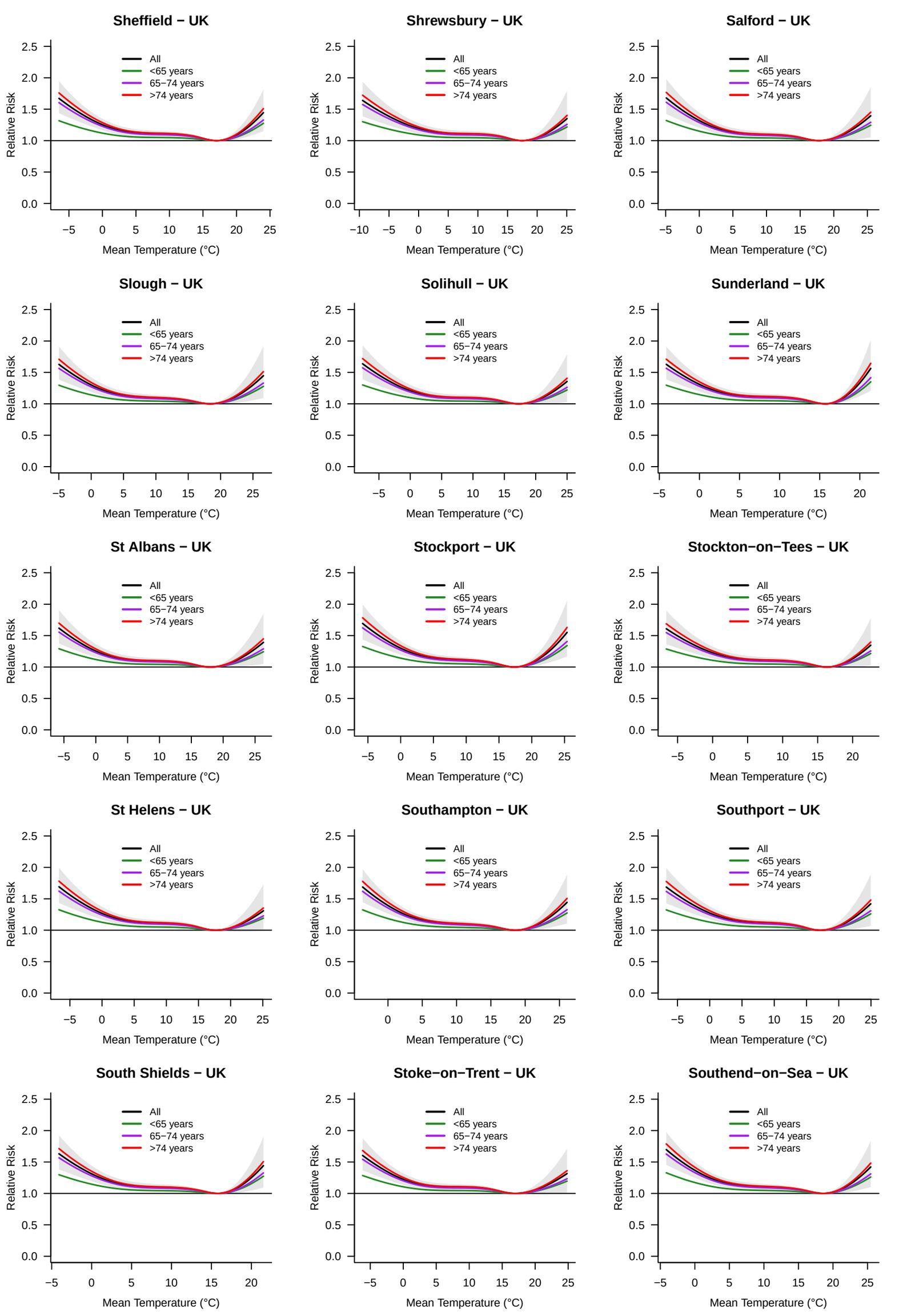

Hastings − UK
Relative Risk
Mean Temperature (°C)
All
<65 years
65−74 years
>74 years


Ipswich − UK
Relative Risk
Mean Temperature (°C)
All
<65 years
65−74 years
>74 years

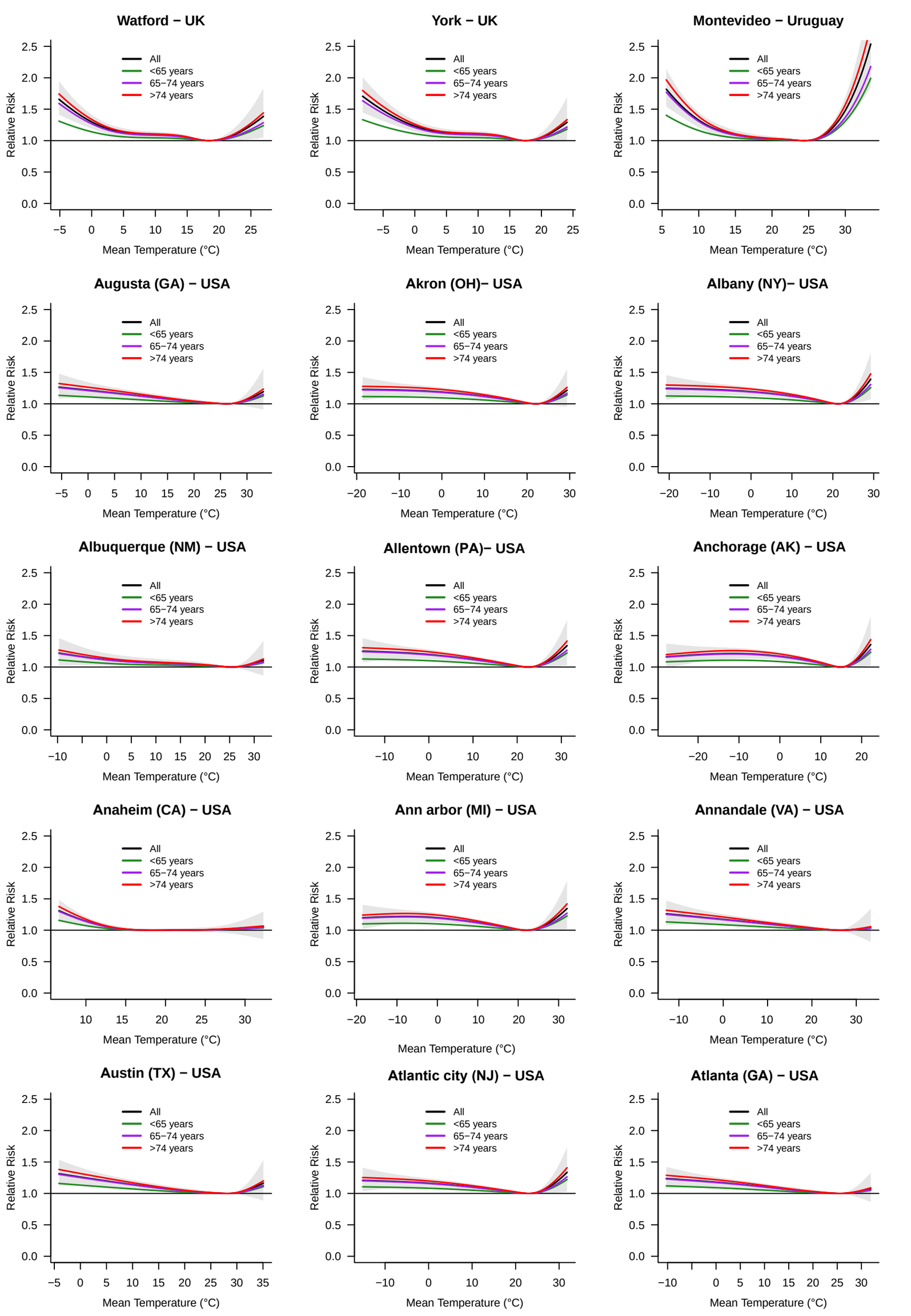

Kingston upon Hull − UK
Relative Risk
Mean Temperature (°C)
All
<65 years
65−74 years
>74 years

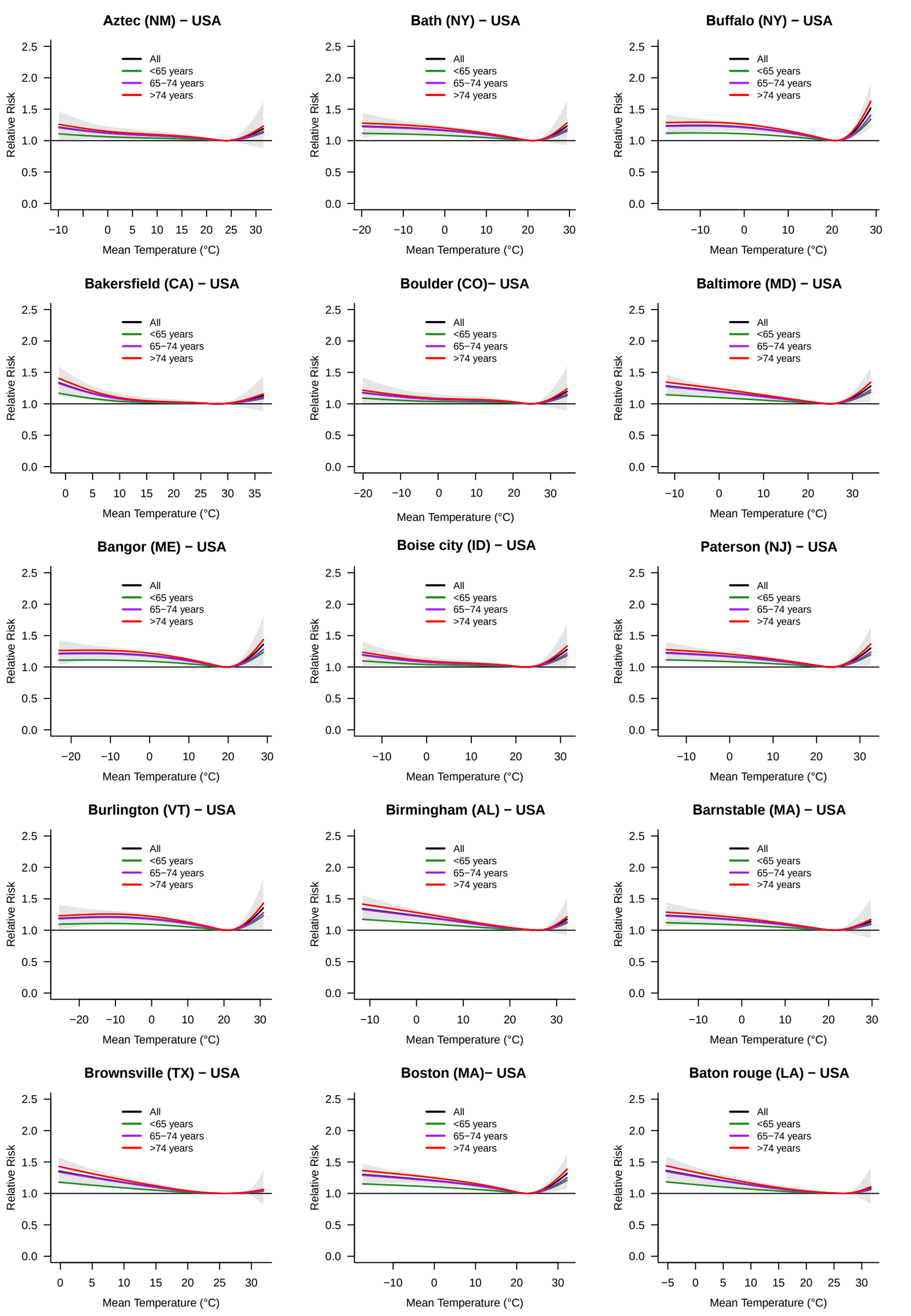
Leicester − UK
Leeds − UK
Lincoln − UK
London − UK
Luton − UK
Liverpool − UK
Middlesbrough − UK
Maidstone − UK
Milton Keynes − UK
Manchester − UK
Mansfield − UK
Nuneaton − UK
Northampton − UK
Norwich − UK
Nottingham − UK
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

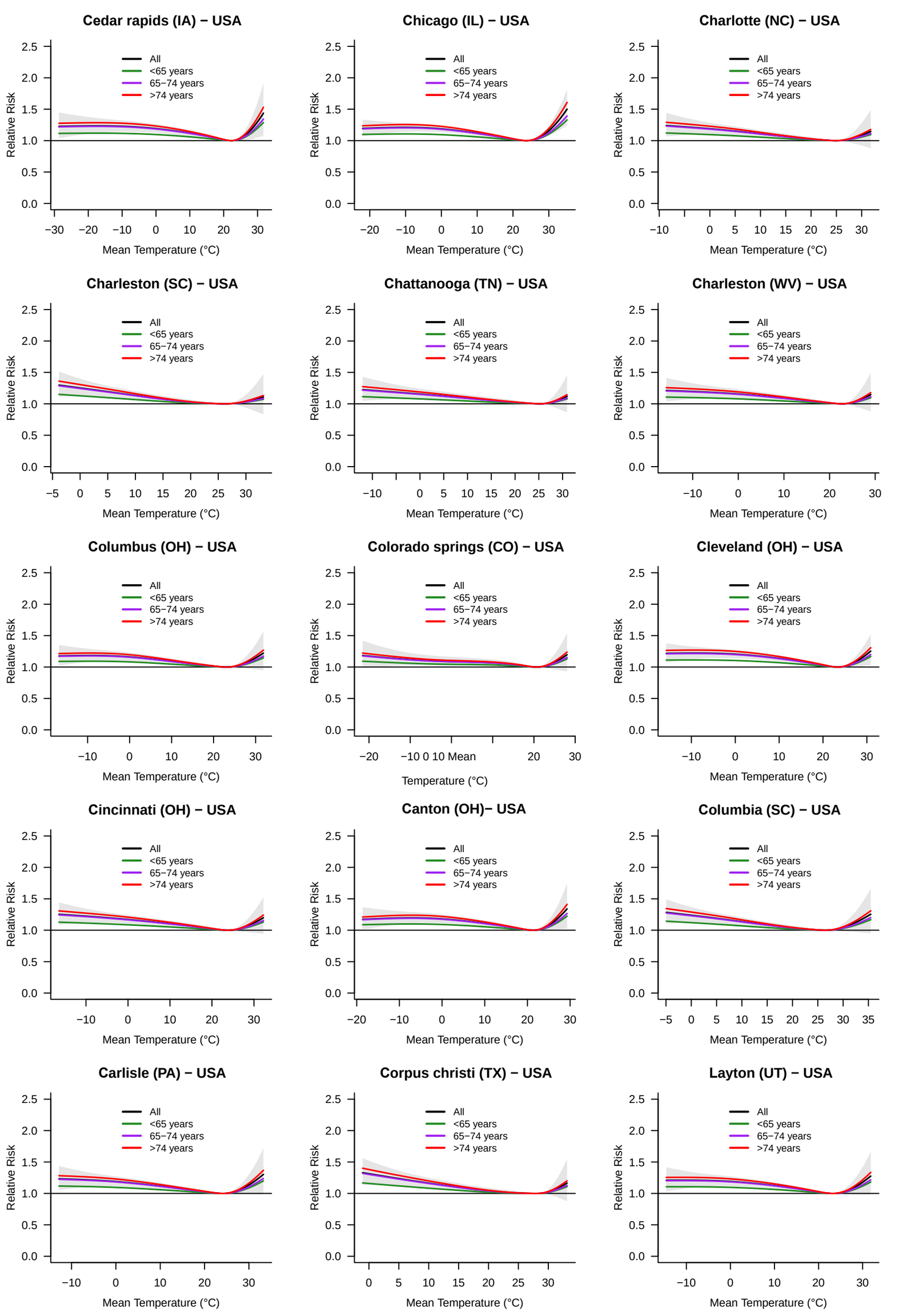

Newport − UK
Newcastle−under−Lyme − UK
Newcastle upon Tyne − UK
Oldham − UK
Oxford − UK
Plymouth − UK
Poole − UK
Preston − UK
Portsmouth − UK
Peterborough − UK
Rochdale − UK
Redditch − UK
Reading − UK
Rotherham − UK
Scunthorpe − UK
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Sheffield − UK
Shrewsbury − UK
Salford − UK
Slough − UK
Solihull − UK
Sunderland − UK
St Albans − UK
Stockport − UK
Stockton−on−Tees − UK
St Helens − UK
Southampton − UK
Southport − UK
South Shields − UK
Stoke−on−Trent − UK
Southend−on−Sea − UK
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

Sutton Coldfield − UK
Stevenage − UK
Swindon − UK
Swansea − UK
Telford − UK
Wigan − UK
Wakefield − UK
Woking − UK
Walsall − UK
Wolverhampton − UK
Worcester − UK
Warrington − UK
Worthing − UK
Weston−Super−Mare − UK
West Bromwich − UK
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

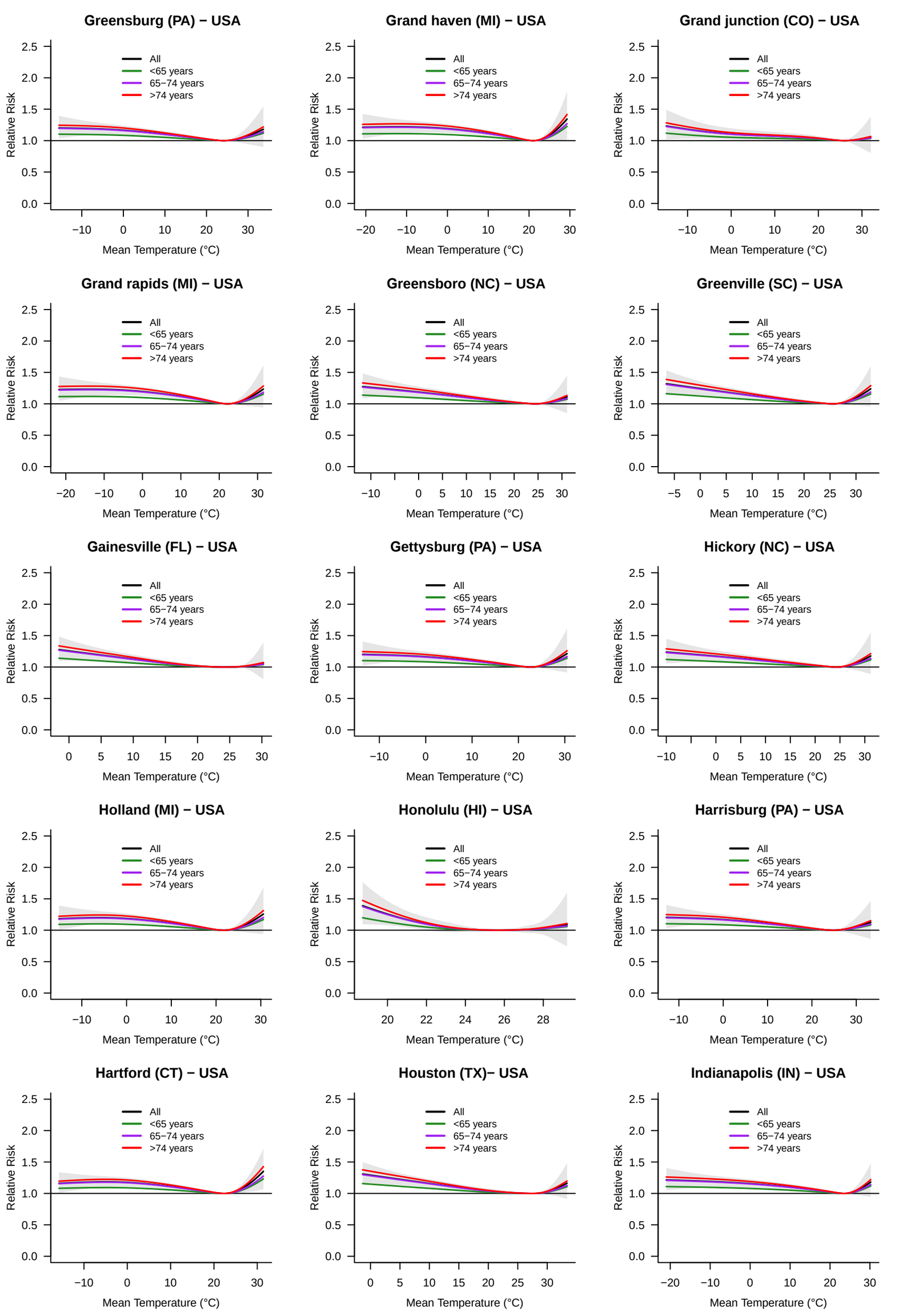

Watford − UK
York − UK
Montevideo − Uruguay
Augusta (GA) − USA
Akron (OH)− USA
Albany (NY)− USA
Albuquerque (NM) − USA
Allentown (PA)− USA
Anchorage (AK) − USA
Anaheim (CA) − USA
Ann arbor (MI) − USA
Annandale (VA) − USA
Austin (TX) − USA
Atlantic city (NJ) − USA
Atlanta (GA) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

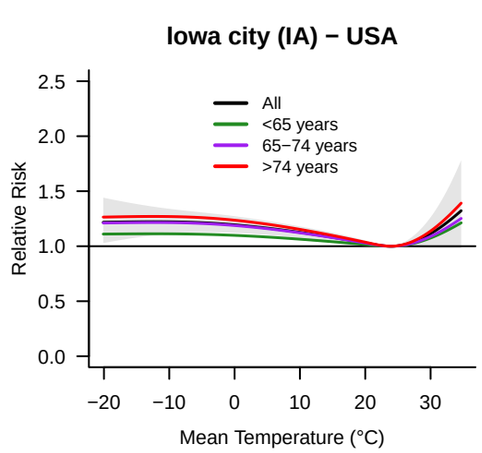

Aztec (NM) − USA
Bath (NY) − USA
Buffalo (NY) − USA
Bakersfield (CA) − USA
Boulder (CO)− USA
Baltimore (MD) − USA
Bangor (ME) − USA
Boise city (ID) − USA
Paterson (NJ) − USA
Burlington (VT) − USA
Birmingham (AL) − USA
Barnstable (MA) − USA
Brownsville (TX) − USA
Boston (MA)− USA
Baton rouge (LA) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

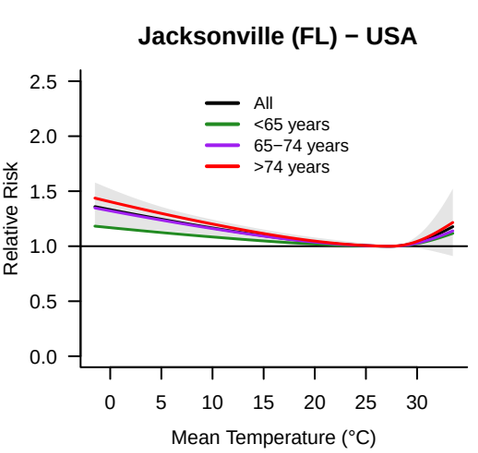

Cedar rapids (IA) − USA
Chicago (IL) − USA
Charlotte (NC) − USA
Charleston (SC) − USA
Chattanooga (TN) − USA
Charleston (WV) − USA
Columbus (OH) − USA
Colorado springs (CO) − USA
Cleveland (OH) − USA
Cincinnati (OH) − USA
Canton (OH)− USA
Columbia (SC) − USA
Carlisle (PA) − USA
Corpus christi (TX) − USA
Layton (UT) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)
Temperature (°C)

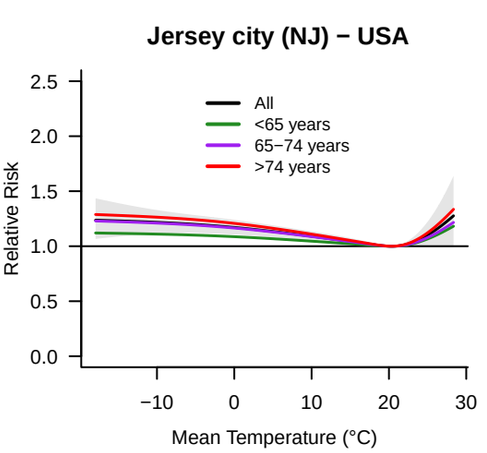
Dallas (TX) − USA
Denver (CO) − USA
Beaver dam (WI) − USA
Dover (DE) − USA
Durham (NC)− USA
Des moines (IA) − USA
Detroit (MI)− USA
Davenport (IA) − USA
Daytona beach (FL) − USA
Dayton (OH) − USA
El centro (CA) − USA
Elkhart (IN)− USA
El paso (TX) − USA
Elizabeth (NJ) − USA
Erie (PA) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

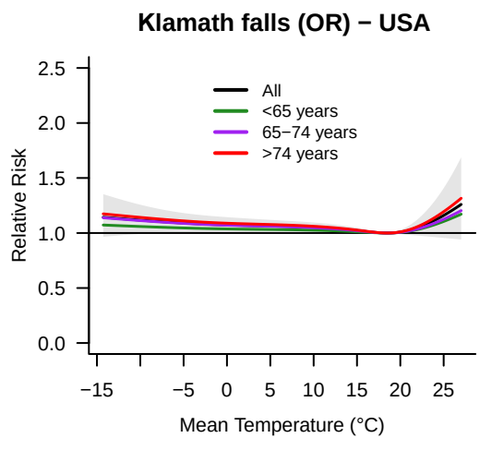
Essex (MA) − USA
Eugene (OR) − USA
Evansville (IN) − USA
Everett (WA) − USA
Fargo (ND) − USA
Flint (MI) − USA
Fresno (CA) − USA
Fort lauderdale (FL) − USA
Fort myers (FL) − USA
Fort pierce (FL) − USA
Fort worth (TX)− USA
Fort wayne (IN) − USA
Fayetteville (NC) − USA
Gary (IN) − USA
Green bay (WI) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

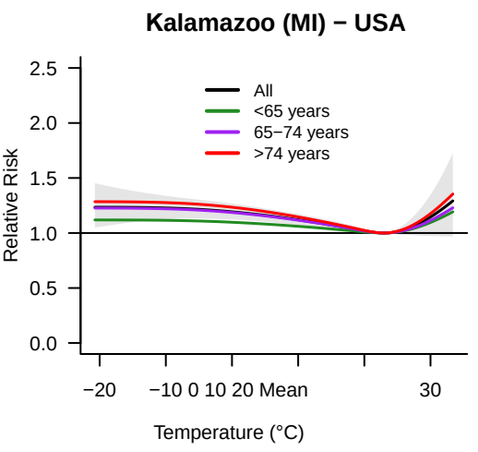

Greensburg (PA) − USA
Grand haven (MI) − USA
Grand junction (CO) − USA
Grand rapids (MI) − USA
Greensboro (NC) − USA
Greenville (SC) − USA
Gainesville (FL) − USA
Gettysburg (PA) − USA
Hickory (NC) − USA
Holland (MI) − USA
Honolulu (HI) − USA
Harrisburg (PA) − USA
Hartford (CT) − USA
Houston (TX)− USA
Indianapolis (IN) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

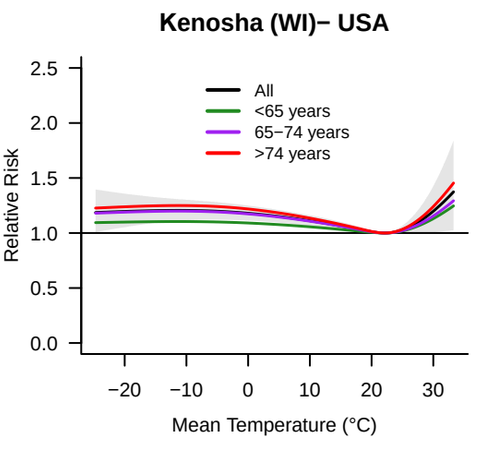

Iowa city (IA) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

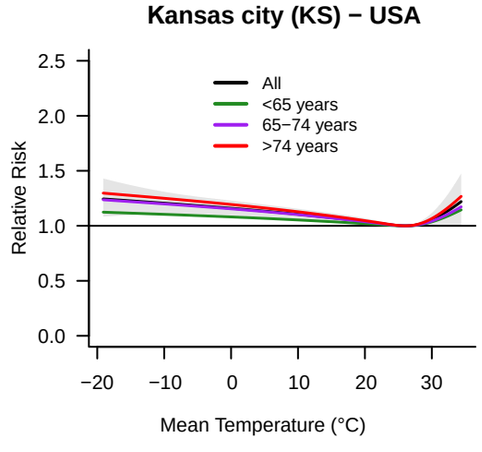

Jacksonville (FL) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

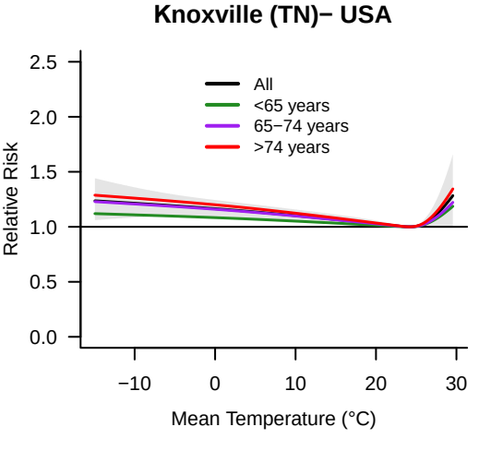

Jersey city (NJ) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

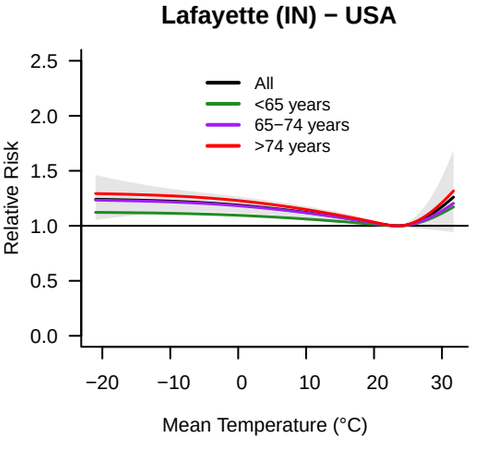

Klamath falls (OR) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

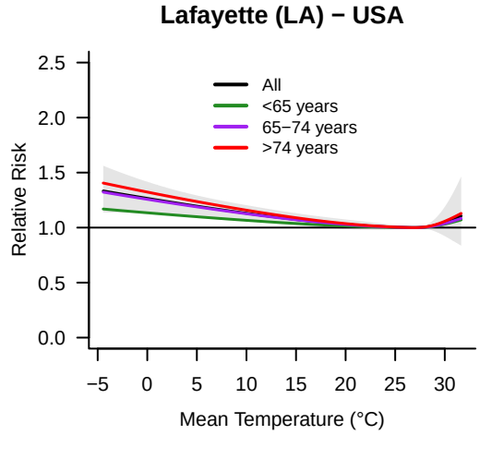

Kalamazoo (MI) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Temperature (°C)

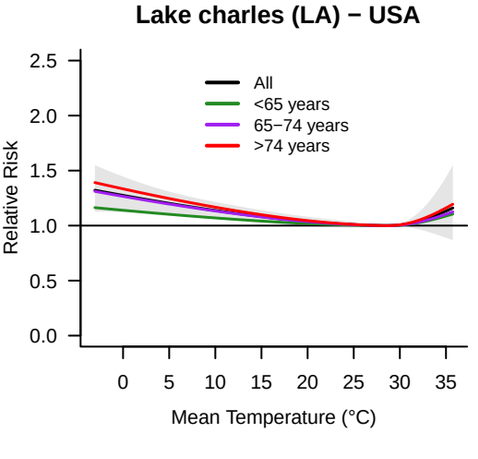

Kenosha (WI)− USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

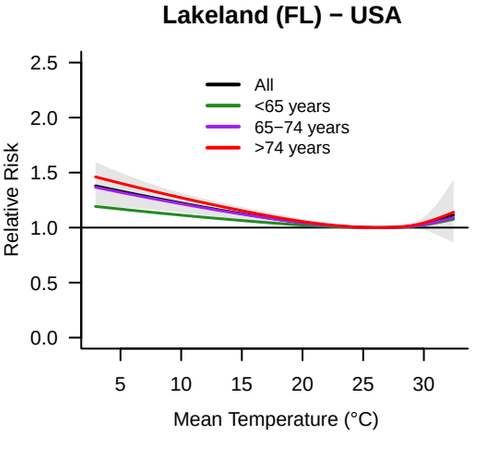

Kansas city (KS) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

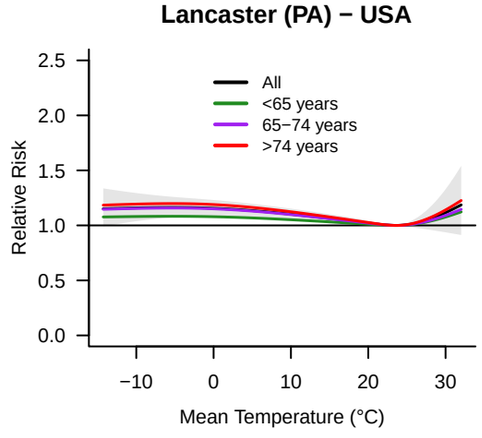

Knoxville (TN)− USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

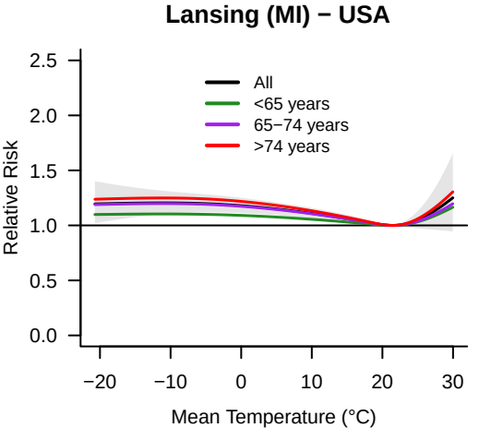

Lafayette (IN) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

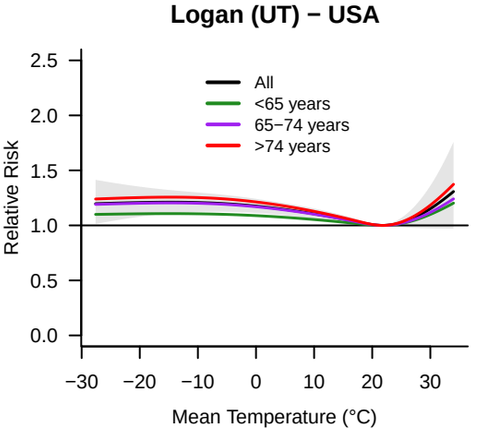

Lafayette (LA) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

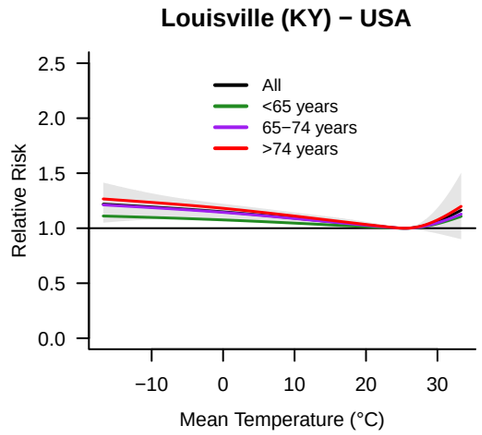

Lake charles (LA) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

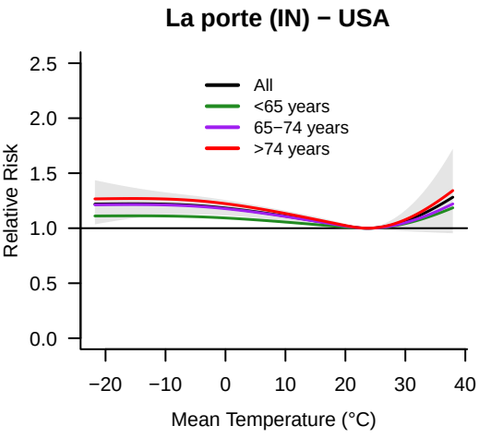

Lakeland (FL) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

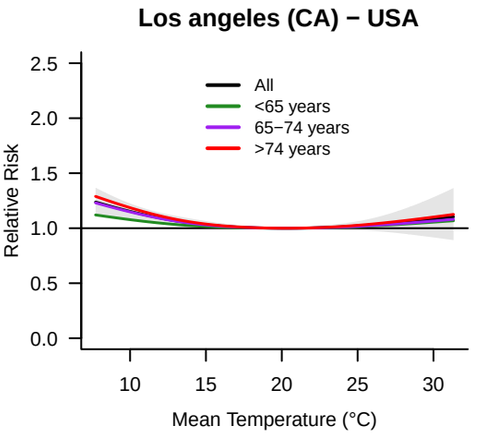

Lancaster (PA) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

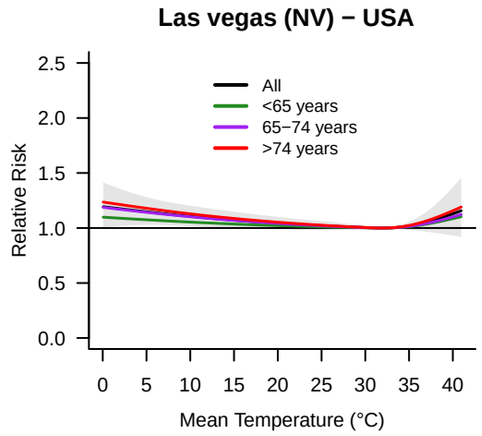

Lansing (MI) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

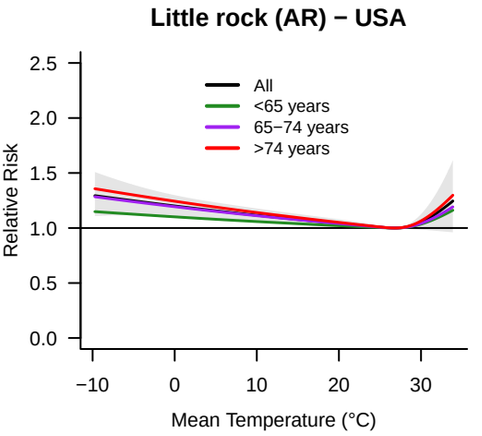

Logan (UT) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

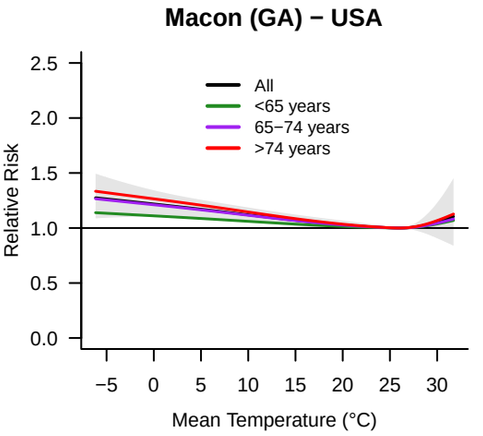

Louisville (KY) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

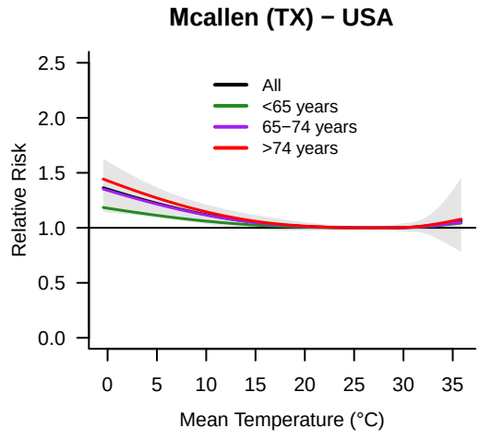

La porte (IN) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

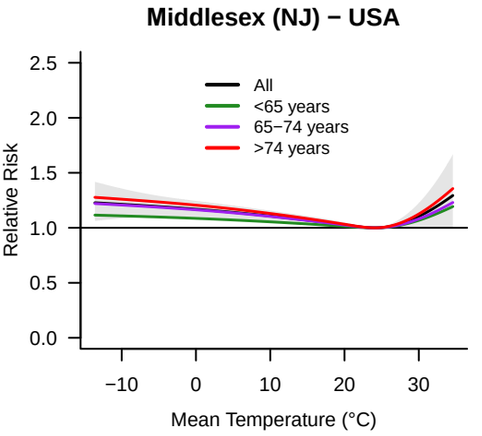

Los angeles (CA) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

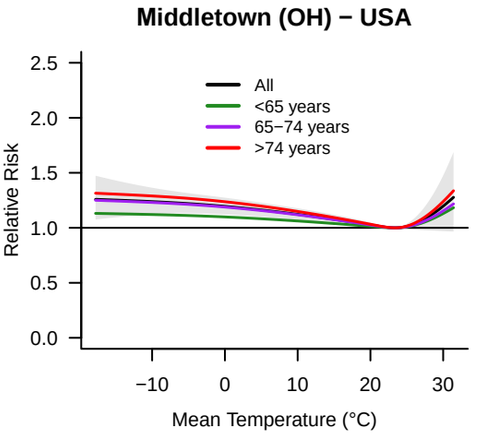

Las vegas (NV) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

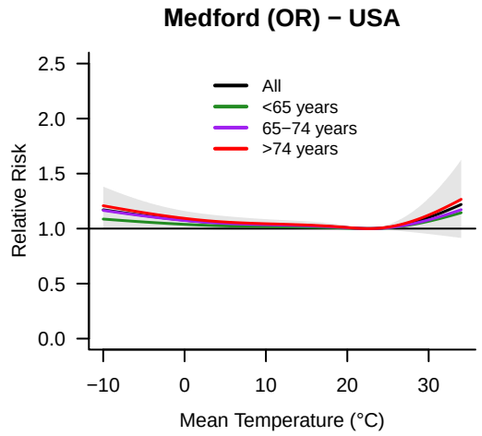

Little rock (AR) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

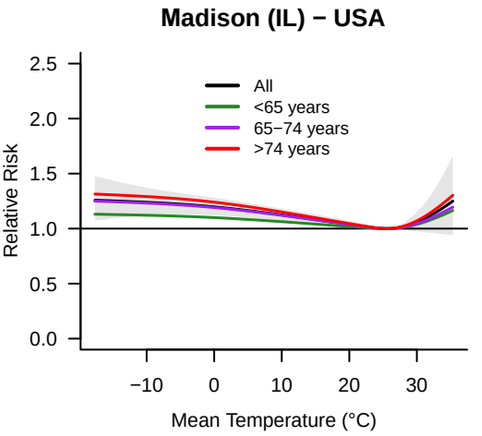

Macon (GA) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

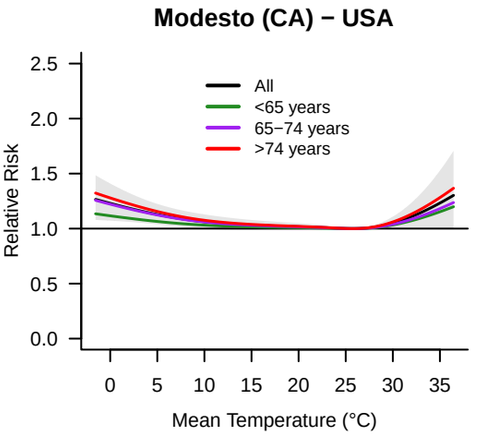

Mcallen (TX) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

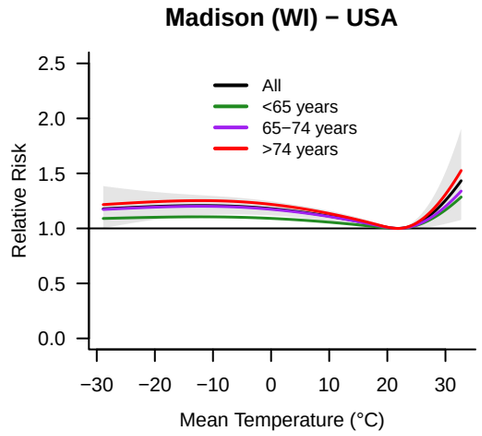

Middlesex (NJ) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

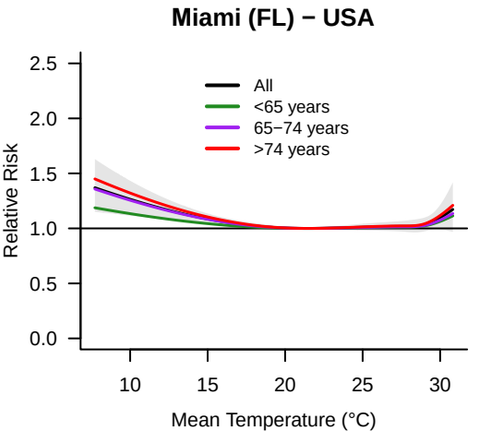

Middletown (OH) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

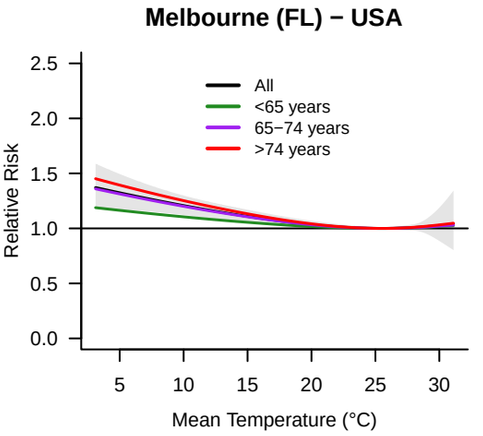

Medford (OR) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Madison (IL) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

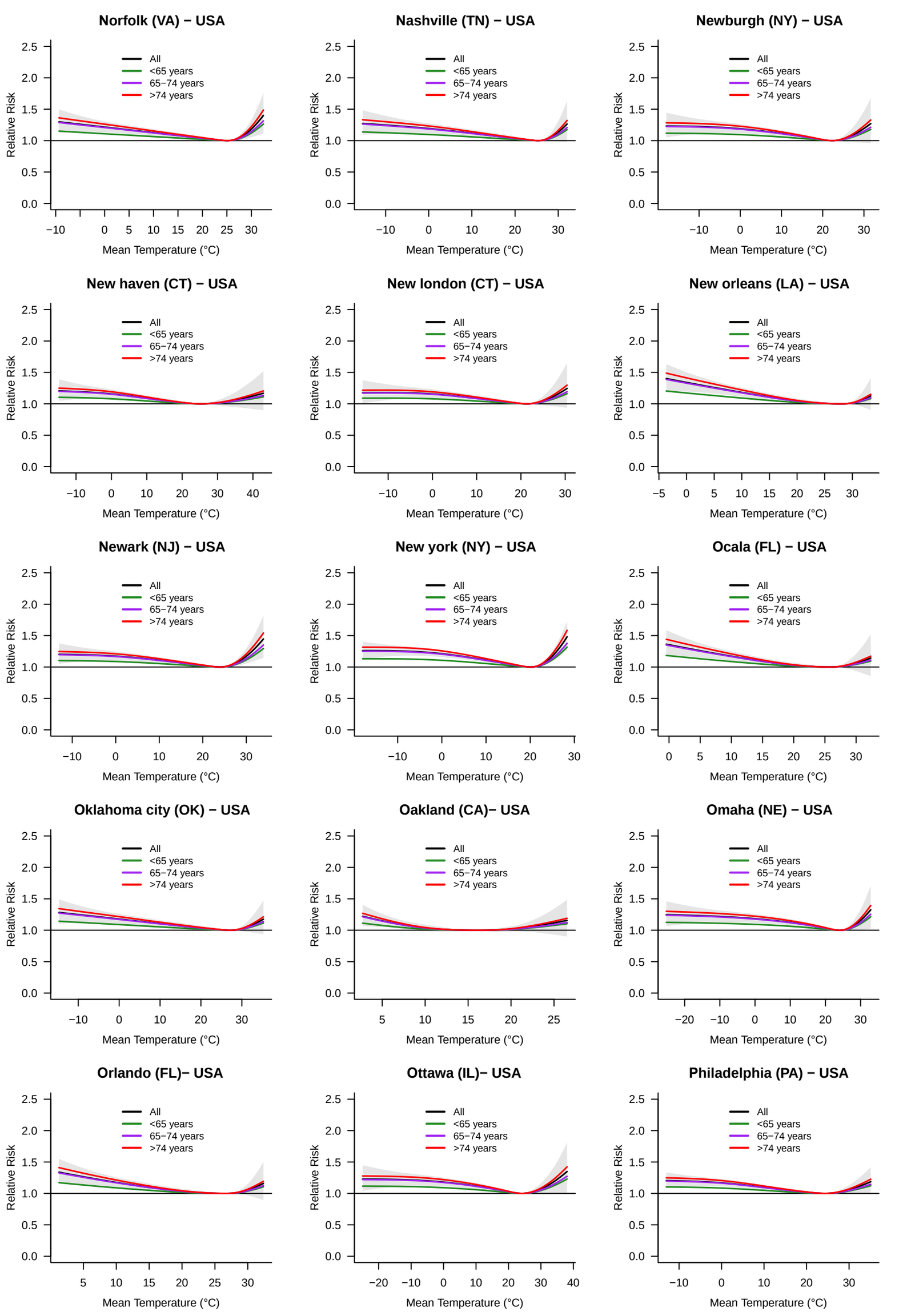

Modesto (CA) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

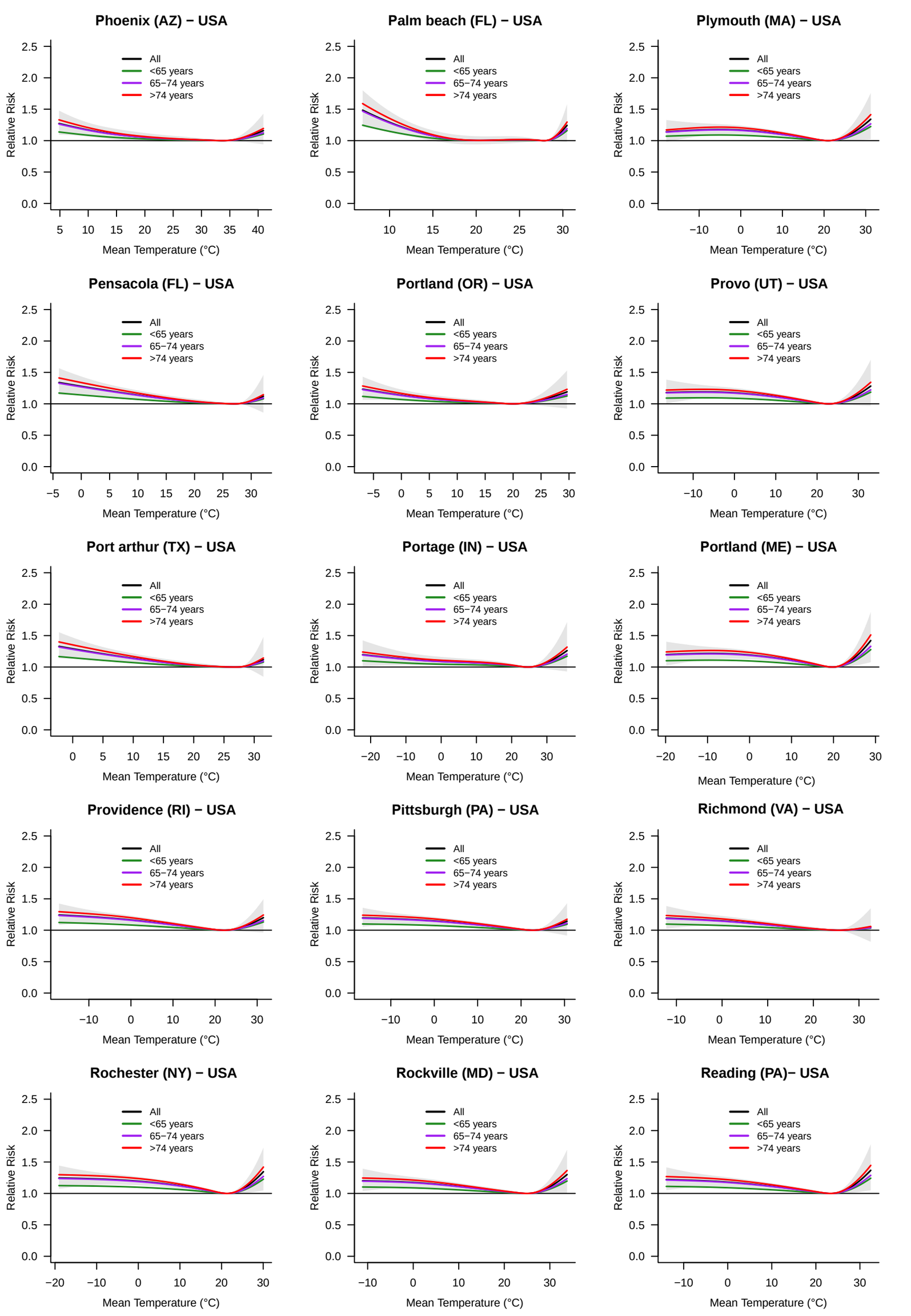

Madison (WI) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

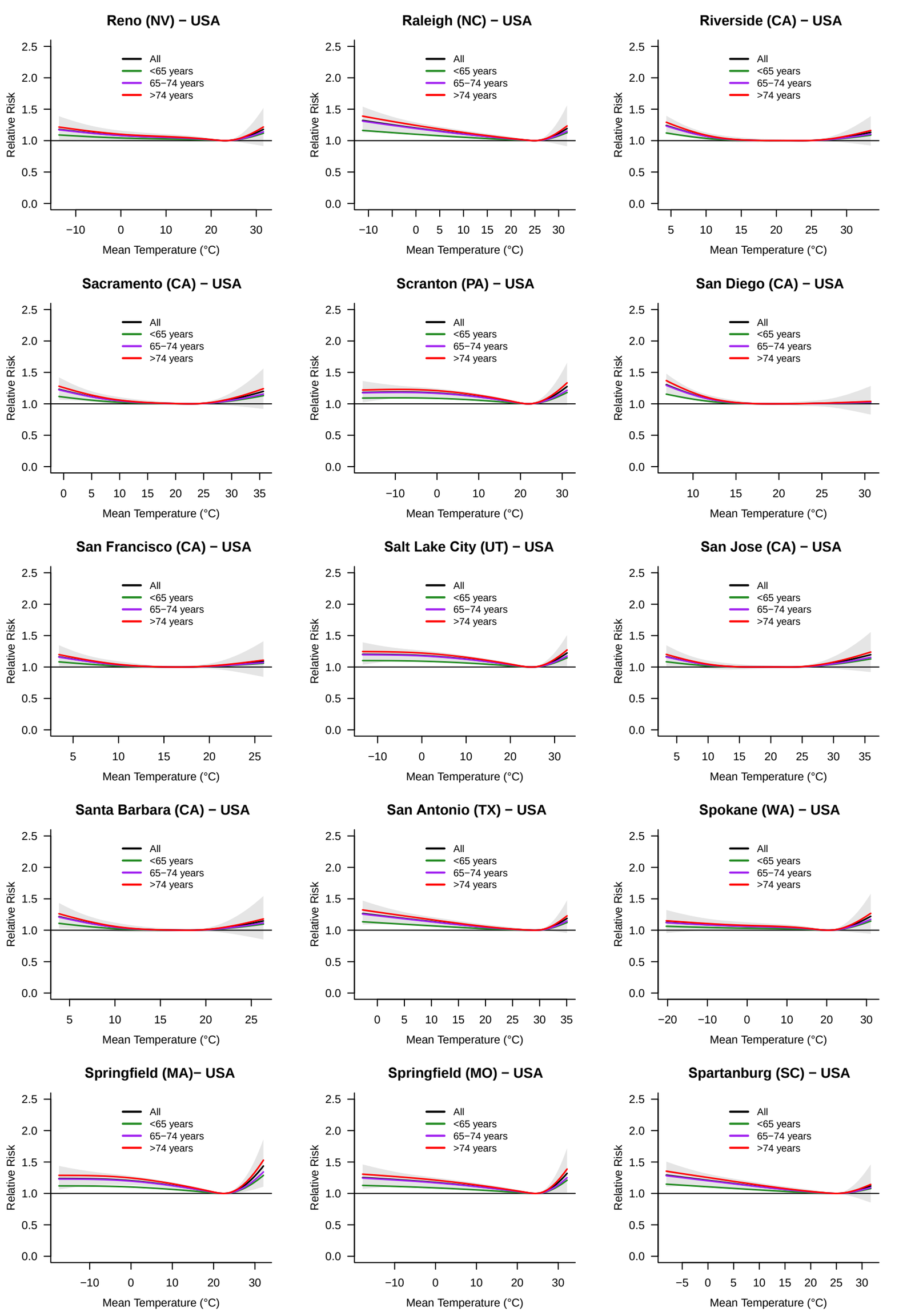

Miami (FL) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

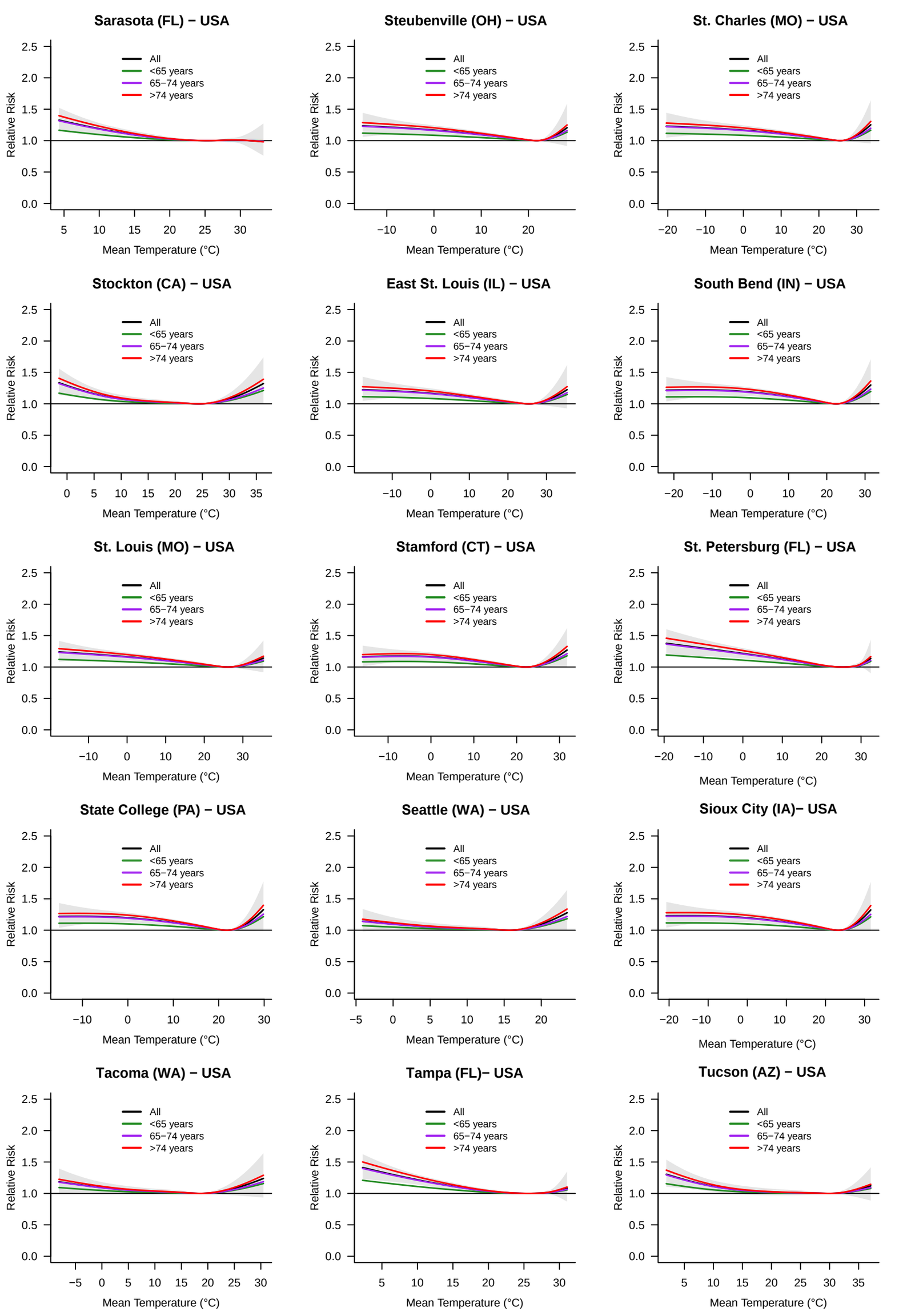

Melbourne (FL) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

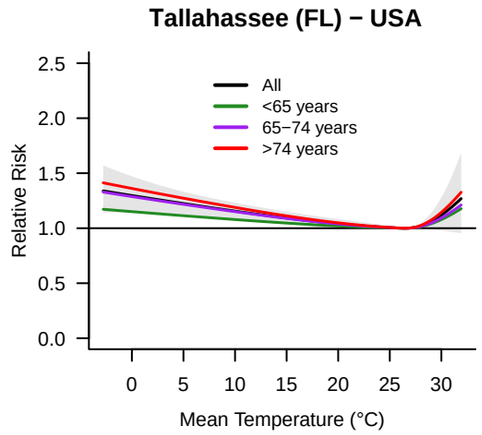
Milwaukee (WI) − USA
Memphis (TN) − USA
Toms river (NJ) − USA
Minneapolis (MN) − USA
Montgomery (AL) − USA
Mobile (AL) − USA
Monroe (LA) − USA
Mercer (PA) − USA
Upper marlboro (MD) − USA
Muskegon (MI) − USA
Muncie (IN) − USA
Myrtle beach (SC) − USA
Nashua (NH)− USA
Melville (NY) − USA
Niles (MI) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

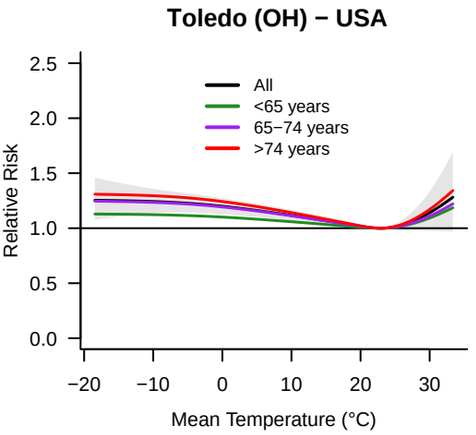

Norfolk (VA) − USA
Nashville (TN) − USA
Newburgh (NY) − USA
New haven (CT) − USA
New london (CT) − USA
New orleans (LA) − USA
Newark (NJ) − USA
New york (NY) − USA
Ocala (FL) − USA
Oklahoma city (OK) − USA
Oakland (CA)− USA
Omaha (NE) − USA
Orlando (FL)− USA
Ottawa (IL)− USA
Philadelphia (PA) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

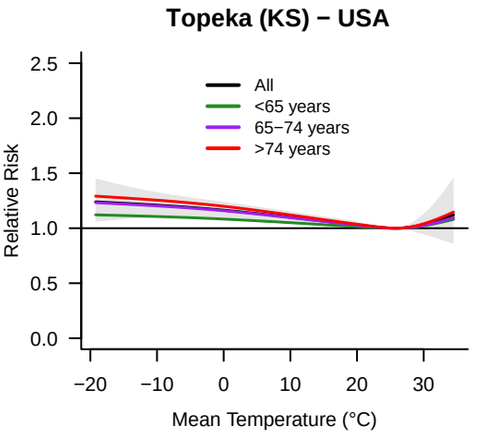

Phoenix (AZ) − USA
Palm beach (FL) − USA
Plymouth (MA) − USA
Pensacola (FL) − USA
Portland (OR) − USA
Provo (UT) − USA
Port arthur (TX) − USA
Portage (IN) − USA
Portland (ME) − USA
Providence (RI) − USA
Pittsburgh (PA) − USA
Richmond (VA) − USA
Rochester (NY) − USA
Rockville (MD) − USA
Reading (PA)− USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

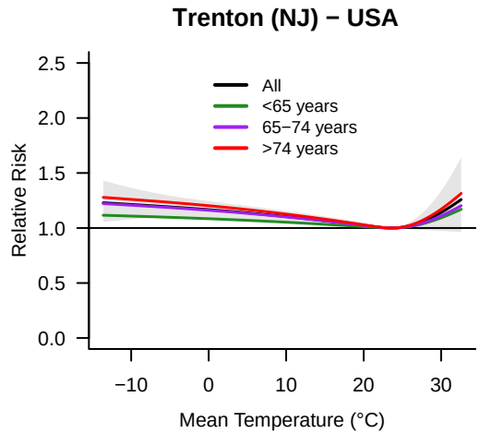

Reno (NV) − USA
Raleigh (NC) − USA
Riverside (CA) − USA
Sacramento (CA) − USA
Scranton (PA) − USA
San Diego (CA) − USA
San Francisco (CA) − USA
Salt Lake City (UT) − USA
San Jose (CA) − USA
Santa Barbara (CA) − USA
San Antonio (TX) − USA
Spokane (WA) − USA
Springfield (MA)− USA
Springfield (MO) − USA
Spartanburg (SC) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

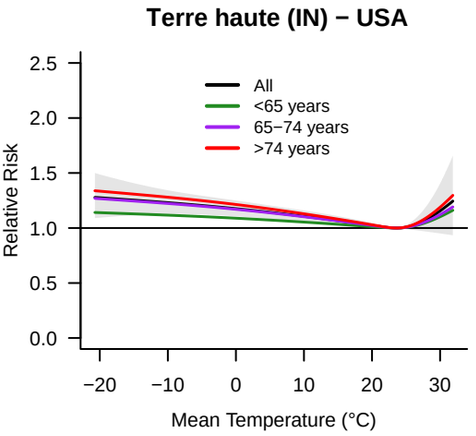

Sarasota (FL) − USA
Steubenville (OH) − USA
St. Charles (MO) − USA
Stockton (CA) − USA
East St. Louis (IL) − USA
South Bend (IN) − USA
St. Louis (MO) − USA
Stamford (CT) − USA
St. Petersburg (FL) − USA
State College (PA) − USA
Seattle (WA) − USA
Sioux City (IA)− USA
Tacoma (WA) − USA
Tampa (FL)− USA
Tucson (AZ) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

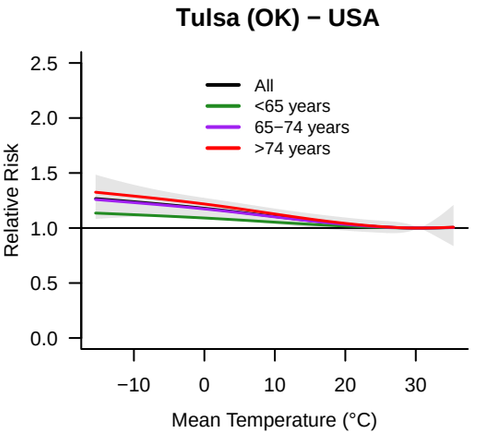

Tallahassee (FL) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

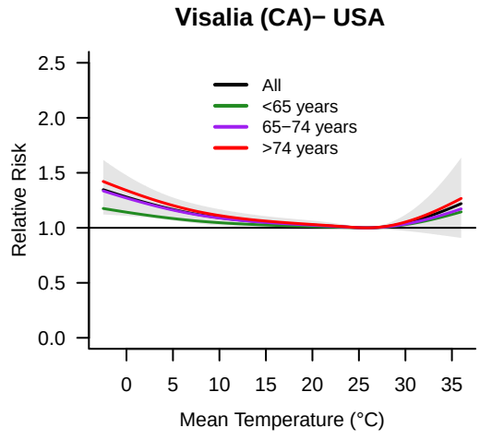

Toledo (OH) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

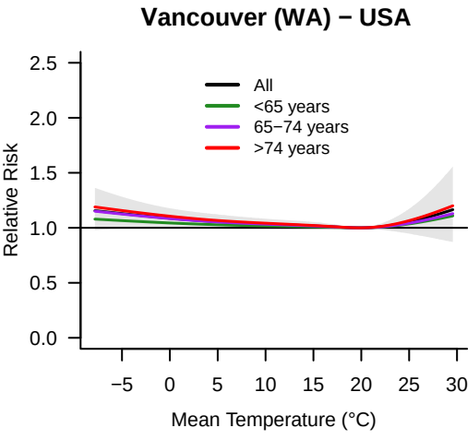

Topeka (KS) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

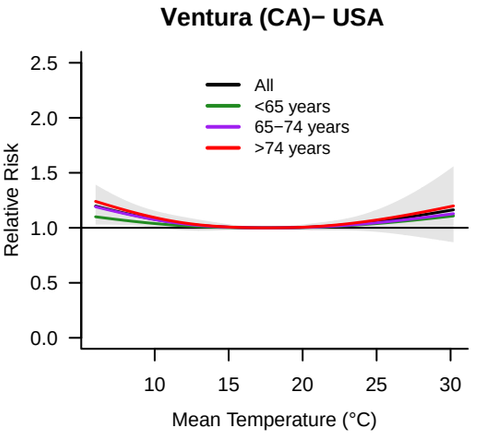

Trenton (NJ) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

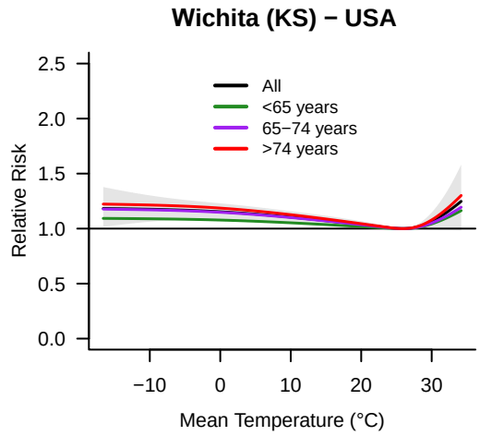

Terre haute (IN) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

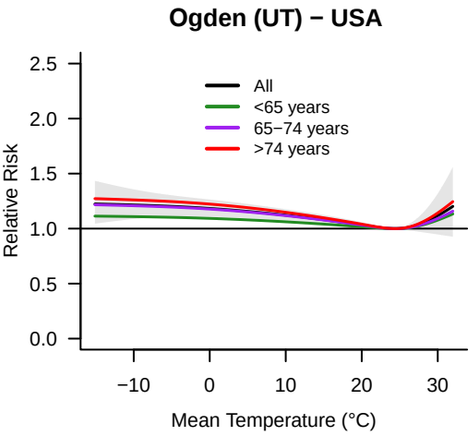

Tulsa (OK) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

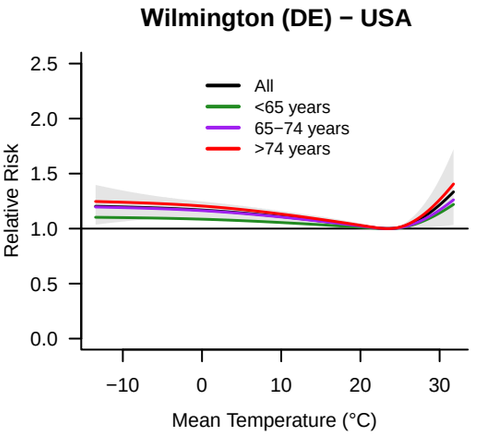

Visalia (CA)− USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

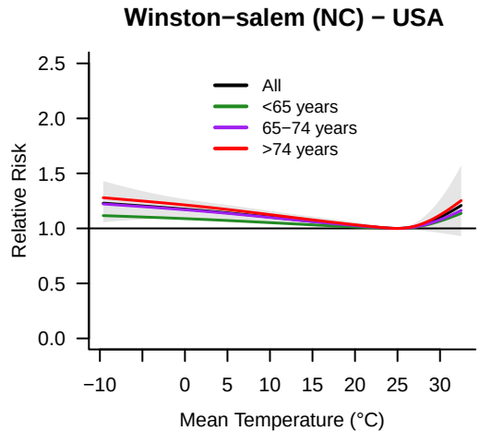

Vancouver (WA) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

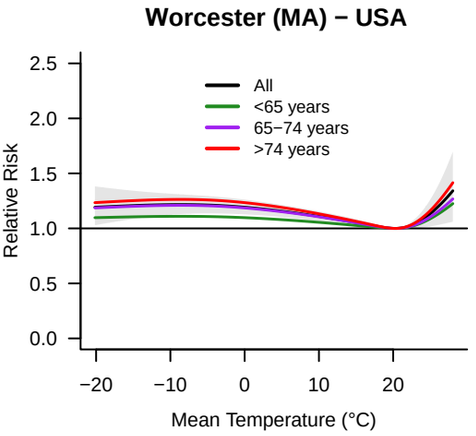

Ventura (CA)− USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

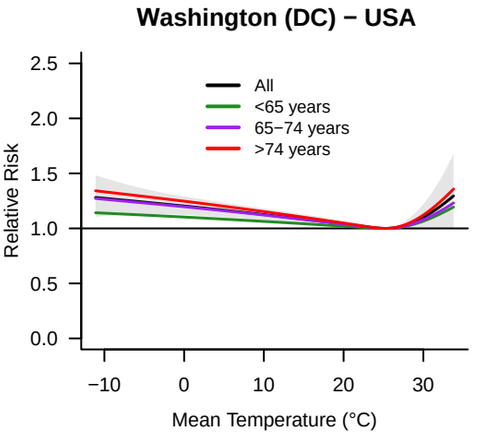

Wichita (KS) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

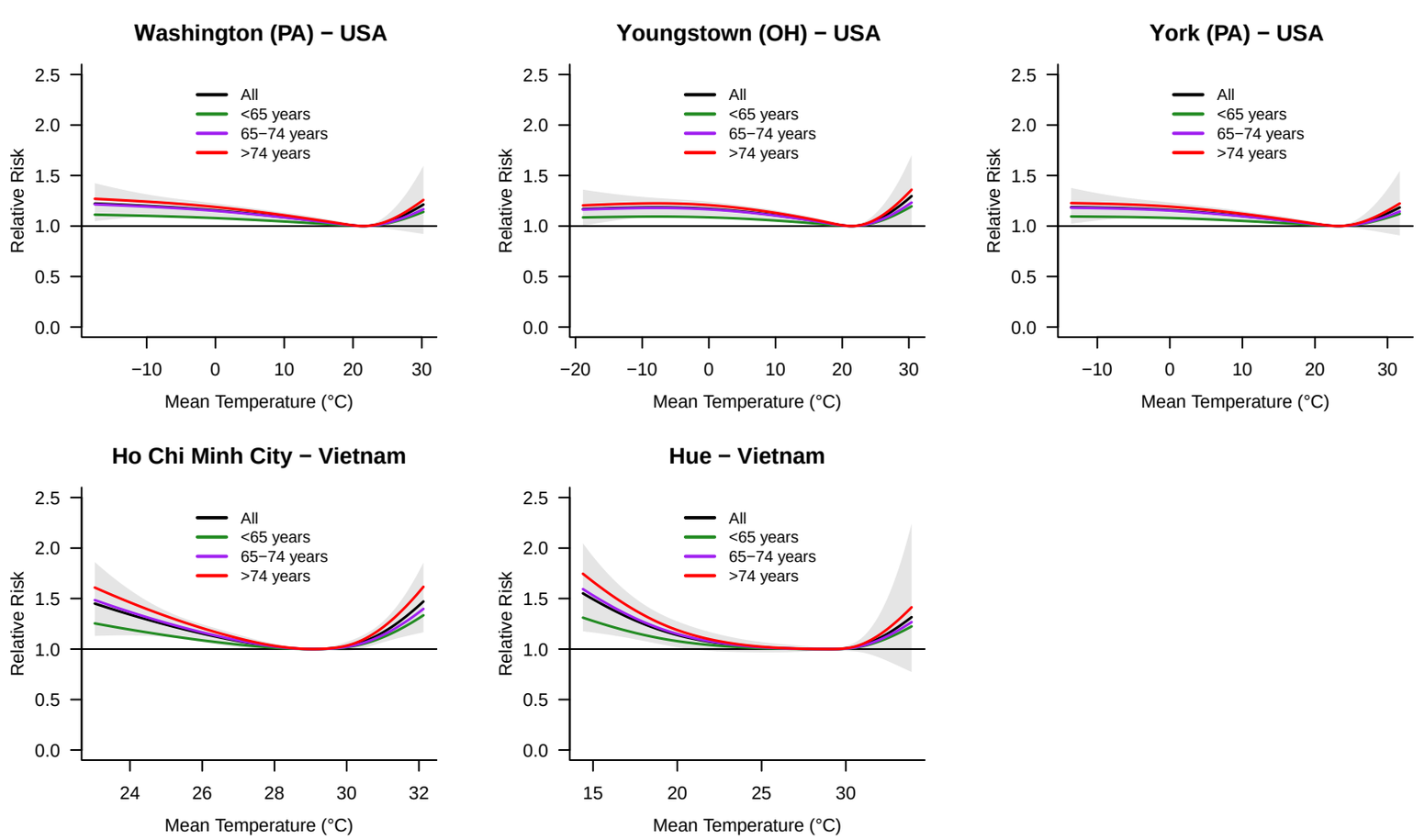

Ogden (UT) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Wilmington (DE) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)

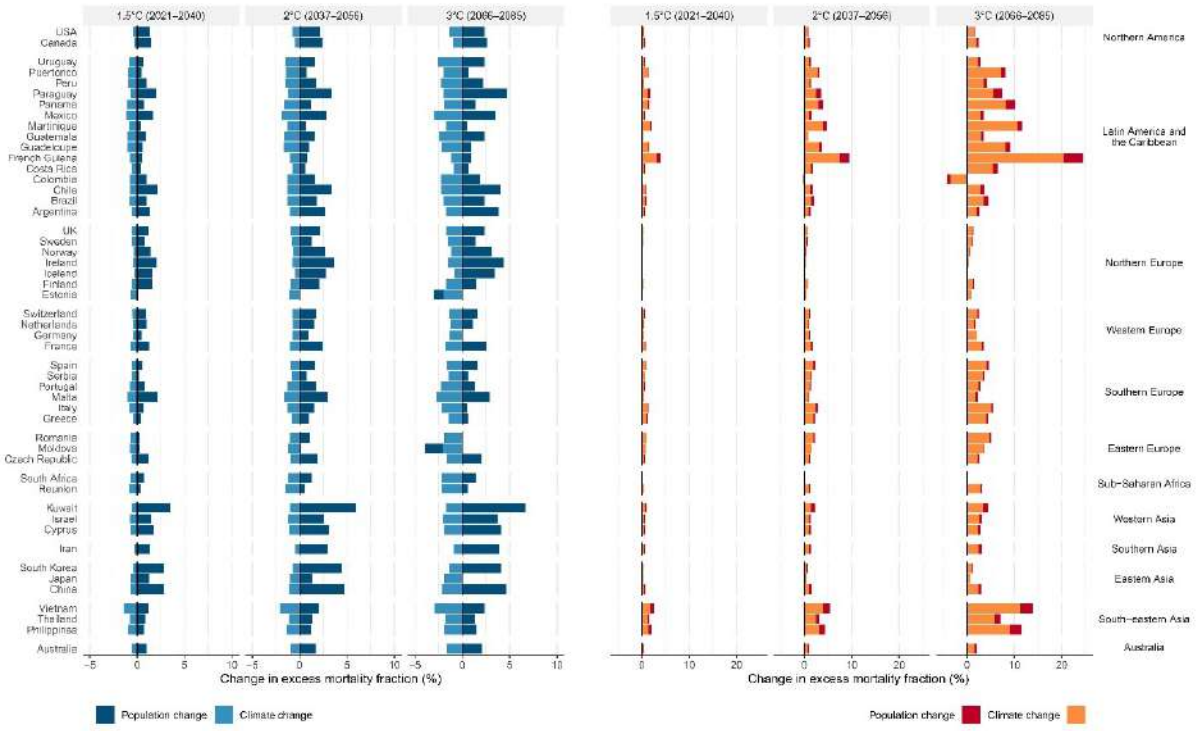

Winston−salem (NC) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Worcester (MA) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)


Washington (DC) − USA
All
<65 years
65−74 years
>74 years
Relative Risk
Mean Temperature (°C)



Supplementary Figure 3. Temperature-mortality associations by age groups in 800 studied locations. Exposure-response associations are estimated as best linear unbiased predictions (BLUPs) and reported as relative risk (RR) for a cumulative 21-day lag of daily temperature, versus the minimum mortality temperature. Black, solid line represents the association for all age groups (with 95% CI, shaded grey); whereas blue, orange, and red dashed lines represent the association for 0-64, 65-74, and ≥75 years age groups, respectively.



Supplementary Figure 4. Contributions of climate change and population change to the changes cold- (A) and heat-related (B) mortality at different levels of global warming under SSP3-7.0. Country/area-level changes by climate change and population aging are shown at 1.5°C, 2°C, and 3°C of global warming using 20-year window compared with the historical period 1995-2014. The future periods in which the 20-year running mean of global mean temperature first reaches the 1.5 °C, 2 °C, and 3 °C of warming above pre-industrial level (1850-1900) are 2021-2040, 2037–2056, 2066–2085, respectively under SSP3-7.0.

Supplementary Table 1. Description of the observed temperature and mortality data in the MCC locations.

Country/ area	N locations	Period	Mortality data	Temperature data	Notes
Argentina	3 cities	2005-2014	Non-external causes only (ICD-9: 0-799; ICD-10: A00-R99) from National Ministry of Health.	Mean daily temperature (in ˚C), computed as the 24-hour average based on hourly measurements from one meteorological station in each city provided by the National Weather Service.	Missing data amount for 0.91% and 0.00% of the mortality and temperature series, respectively.
Australia	3 cities	1995-2009	Non-external causes only (ICD-9: 0-799; ICD-10: A00-R99) from Australian Bureau of Statistics.	Mean daily temperature (in ˚C), computed as the 24-hour average based on hourly measurements from meteorological stations located within ≤30 km of each city provided by Australian Bureau of Meteorology.	Missing data amount for 0.18% and 0.00% of the mortality and temperature series, respectively.
Brazil	18 cities	1997-2014	Non-external causes only (ICD-9: 0-799; ICD-10: A00-R99) from the Ministry of Health.	Mean daily temperature (in ˚C), computed from the 24-h average of hourly measurements, from weather stations located within the urban area provided by National Institute of Meteorology of Brazil	Missing data amount for 1.85% and 3.21% of the mortality and temperature series, respectively.
Canada	25 census metropolitan areas (CMA) and 1 city (Hamilton)	1995-2014	All causes collected from Canadian Mortality Database.	Mean daily temperature (in ˚C), computed as the 24-hour average based on hourly measurements, were obtained from Environment Canada collected from monitoring stations located closest to the CMA centre.	Missing data amount for 0.82% and 2.79% of the mortality and temperature series, respectively.
Chile	4 cities	2004-2014	All causes provided by the Departamento de Estadísticas e Información de Salud (Ministerio de Salud))	Mean daily temperature (in ˚C), computed as 24-hour average based on hourly measurements, were obtained from Sistema de Información Nacional de Calidad del Aire (SINCA), Ministerio del Medio Ambiente.	Missing data amount for 0.15% and 9.7% of the mortality and temperature series, respectively.
China	14 cities	1996-2014	Non-external causes only (ICD-9: 0-799; ICD-10: A00-R99) from Municipal Center for	Mean daily temperature (in ˚C), computed as averaged hourly temperatures, were obtained from China Meteorological Data Sharing Service System (http:// data.cma.cn/).	Missing data amount for 6.98% and 7.35% of the mortality and temperature series, respectively.

			Disease Control and Prevention in each city.		Data on 17 cities were originally collected, but we excluded 3 cities (Tangshan, Nanjing, Guangzhou) because of no data on non-external or suspected errors in data collection.
Colombia	5 cities	1998-2013	All causes provided by the National Administrative Department of Statistics DANE	Mean daily temperature (in ˚C), computed as 24-hour average based on hourly measurements, were obtained from Instituto de Hidrología, Meteorología y Estudios Ambientales de Colombia (IDEAM)	Missing data amount for 0.00% and 3.98% of the mortality and temperature series, respectively.
Costa Rica	1 city	2000-2014	All causes provided by the Instituto Nacional de Estadística y Censo. Open Access.	Meterological data were obtained from WMO-NOAA (Surface Data Hourly Global, DS3505)	Missing data amount for 0.00% and 0.97% of the mortality and temperature series, respectively.
Cyprus	5 cities	2004-2014	All causes provided by the Health Monitoring Unit of the Ministry of Health of Cyprus	Meterological data were obtained from the Department of Meteorology, Ministry of Agriculture, Rural Development, and the Environment.	Missing data amount for 0.0% and 0.0% of the mortality and temperature series, respectively.
Czech Republic	3 cities and 1 rural region	1995-2014	All causes provided by the Czech Statistical Office and the Institute of Health Information and Statistics	Meteorological data (temperature) were obtained from stations operated by the Czech Hydrometeorological Institute (measurements in standard climatic terms 7:00, 14:00 and 21:00 local time, and daily means)	Missing data amount for 0.00% and 0.00% of the mortality and temperature series, respectively.
Estonia	4 cites and 1 region	1997-2014	All causes provided by *Estonian Causes of Death Registry*	Mean daily temperature (in ˚C) were computed as the 24-h average of hourly measurements collected from *Estonian Environment Agency*.	Missing data amount for 0.0% and 0.0% of the mortality and temperature series, respectively.
Finland	1 metropolitan area	1995-2014	All causes provided by Statistics Finland	Mean daily temperature (in ˚C), Finnish Meteorological Institute. The weather stations around the country were interpolated onto a 10×10 km grid covering the whole of Finland, using a Kriging model.	Missing data amount for 0.00% and 4.88% of the mortality and temperature series, respectively.
France	20 cities	2000-2014	All causes provided by French National Institute of	Mean daily temperature (in ˚C), computed as the mean of the minimal and maximal	Missing data amount for 0.25% and 0.04% of the mortality and

			Health and Medical Research (CepiDC),	temperature, were obtained from the Meteo France. A single weather station was selected for each city.	temperature series, respectively.
French Guiana	1 city	2000-2014	All causes provided by French National Institute of Health and Medical Research	Mean, Max, Min daily temperature (in ˚C) were obtained from the Météo-France for a reference station.	Missing data amount for 0.00% and 0.00% of the mortality and temperature series, respectively.
Germany	15 cities	1995-2014	All causes provided by Research Data Centres of the Federation and the Federal States of Germany (Forschungsdatenzentrum der Statistischen Ämter des Bundes und der Länder),	Mean daily temperature (in ˚C), computed as the 24-h average based on hourly measurements, was obtained from the Climate Data Centre of the German National Meteorological Service (Deutscher Wetterdienst).	Missing data amount for 0.00% and 0.00% of the mortality and temperature series, respectively.
Greece	1 city	2001-2010	All causes provided by Hellenic Statistical Authority	Mean daily temperature (in ˚C) and relative humidity (%) were computed as the 24-h average based on hourly measurements collected from the National observatory of Athens (http://www.noa.gr/) from site "Thisio" located in the city of Athens.	Missing data amount for 0.00% and 7.05% of the mortality and temperature series, respectively.
Guadeloupe	1 city	2000-2014	All causes provided by French National Institute of Health and Medical Research	Mean, Max, Min daily temperature (in ˚C) were obtained from the Météo-France for a reference station.	Missing data amount for 0.00% and 0.00% of the mortality and temperature series, respectively
Guatemala	1 city	2009-2014	All causes provided by the Instituto Nacional de Estadística, Unidad de Estadística de Salud.	Temperature data are provided by the Instituto Nacional de Sismología, Vulancología, Meteorología y Hidrología.	Missing data amount for 0.00% and 2.15% of the mortality and temperature series, respectively.
Iceland	1 city	2000-2014	All causes in individuals 18 years or older provided by the Directorate of Health in Iceland, Causes of Death Register.	Mean, Max, Min daily temperature (in ˚C) were obtained from the databank of the Icelandic meteorological institute 2021.	Missing data amount for 0.00% and 0.00% of the mortality and temperature series, respectively
Iran	2 cities	2002-2014	All causes provided by the Ferdows organization of Mashhad Municipality	Mean, Max, Min daily temperature (in ˚C), computed as the 24-hour average based on hourly measurements collected from IRAN Meteorological Organization (IRIMO) (http://www.irimo.ir)	Missing data amount for 0.00% and 0.00% of the mortality and temperature series, respectively

Island of Ireland	4 regions covering all Island population (ROI) and 2 in the Northern Ireland (NI))	1995-2007	Non-external causes only (ICD-9: 0-799; ICD-10: A00-R99) provided by Irish Central Statistics Office Northern and Ireland Social Research Agency.	Mean daily temperature (in ˚C), computed as the 24-hour average based on hourly measurements, were obtained from two weather stations for each ROI regions and NI regions from Met Eireann, and the United Kingdom Meteorological Office.	Missing data amount for 0.01% and 0.00% of the mortality and temperature series, respectively
Israel	2 cities and 2 districts	1995-2014	All causes provided by the Israeli Central Bureau of Statistics.	Mean daily temperature (in ˚C) were obtained from 7 weather stations in Israel.	Missing data amount for 0.00% and 0.38% of the mortality and temperature series, respectively
Italy	11 cities	1987-2010	All causes provided by the obtained from local mortality registries and from the rapid mortality surveillance system	Mean daily temperature (in ˚C) was computed as the 24-h average based on 6-h measurements obtained from the Meteorological Service of the Italian Air Force. A single weather station was selected for each city, using the airport monitoring station located closest to the city center.	Missing data amount for 1.26% and 2.34% of the mortality and temperature series, respectively. Data on 12 cities were initially collected, but 1 (Rieti) was excluded because of potential problems in data collection (strange temporal patterns).
Japan	47 prefectures	1995-2014	All causes provided by Ministry of Health, Labour and Welfare.	Weather station located within the urban area of the capital city (Japan Meteorology Agency)	Missing data amount for 0.00% and 0.04% of the mortality and temperature series, respectively
Kuwait	1 city	2000-2014	Non-external causes only (ICD-9: 0-799; ICD-10: A00-R99) provided by the National Center for Health Information, Ministry of Health, Kuwait	Mean daily temperature (in ºC), computed as the 24-hour average based on hourly measurements from two sources: the Directorate General of Civil Aviation (Kuwait Airport) and Kuwait's Environmental Public Authority.	Missing data amount for 0.00% and 0.00% of the mortality and temperature series, respectively
Malta	1 city	1995-2014	All causes provided by the Ministry for Health in Malta	Mean daily temperature (in ˚C) was obtained from Malta’s airport station.	Missing data amount for 0.04% and 0.00% of the mortality and temperature series, respectively
Martinique	1 city	2000-2014	All causes provided by French National Institute of Health and Medical Research	Mean, Max, Min daily temperature (in ˚C) were obtained from the Météo-France for a reference station.	Missing data amount for 0.00% and 0.02% of the mortality and temperature series, respectively
Mexico	10 metropolitan areas	1998-2014	All causes provided by National Institute of Statistics, Geography and Informatics	Mean daily temperature (in ˚C) was computed as the 24-hour average based on hourly measurements collected through the Servicio Meteorológico Nacional	Missing data amount for 0.00% and 27.03% of the mortality and temperature series, respectively

				(SMN) and the Instituto Nacional de Ecología y Cambio Climático (INECC).	
Moldova	4 cities	2001-2010	All causes provided by National Centre for Health Management	Mean daily temperature (in ˚C) computed as the average between daily minimum and maximum, were obtained from State Hydrometeorological Service, Moldova. A single weather station was selected for each city	Missing data amount for 0.00% and 0.00% of the mortality and temperature series, respectively
The Netherlands	4 regions	1995-2014	All causes provided by Statistics Netherlands	Mean daily temperature (in ˚C) was obtained from the Royal Dutch Meteorological Institute (KNMI) as 24-hour average based on hourly measurements	Missing data amount for 0.00% and 0.00% of the mortality and temperature series, respectively
Norway	1 city	1995-2014	All causes provided by Norwegian Cause of Death registry	Mean daily temperature (in ˚C) based on an observational modeled dataset from the Norwegian Meteorological Institute.	Missing data amount for 2.02% and 3.85% of the mortality and temperature series, respectively
Panama	1 city	2013-2014	All causes provided by Instituto Nacional de Estadística y Censo, Centro de Información Estadística.	Temperature data are provided by the Empresa de Transmisión Eléctrica, S.A. (ETESA). Open Access.	Missing data amount for 0.00% and 10.66% of the mortality and temperature series, respectively
Paraguay	1 city	2004-2014	All causes provided by Ministerio de Salud Pública y Bienestar Social, Dirección General de Información Estratégica en Salud, Subsistema de Información de Estadísticas Vitales	Temperature data are obtained from the Global Historical Climatology Network (NOAA/WMO)	Missing data amount for 0.00% and 0.00% of the mortality and temperature series, respectively
Peru	18 regions	2008-2014	All causes provided by the Peruvian Ministry of Health (MINSA in Spanish)	Mean daily temperature (in ˚C) was obtained from the National Meteorology and Hydrology Service of Peru (SENAMHI in Spanish). A total of 18 weather stations (one station per Region) contributed data to each department series.	Missing data amount for 2.73% and 12.12% of the mortality and temperature series, respectively
Philippines	12 cities	2006-2014	All causes provided by Philippine Statistics Agency	Mean daily temperature (in ˚C), computed as 24-hour average based on hourly measurements, were obtained from National Oceanic and Atmospheric Administration (NOAA).	Missing data amount for 0.04% and 0.00% of the mortality and temperature series, respectively

Portugal	6 districts	1995-2014	All causes provided by Statistics Portugal.	Mean daily temperature (in ˚C) was computed as the 24-hour average based on hourly measurements collected from the National Oceanic and Atmospheric Administration (NOAA)	Missing data amount for 0.00% and 0.00% of the mortality and temperature series, respectively
Puerto Rico	1 city	2009-2014	All causes provided by Instituto de Estadísticas Vitales de Puerto Rico, Área de Estadísticas Vitales del Departamento de Salud	Temperature data are obtained from the Global Historical Climatology Network (NOAA/WMO)	Missing data amount for 0.00% and 5.02% of the mortality and temperature series, respectively
Reunion	1 city	2000-2014	All causes provided by French National Institute of Health and Medical Research	Mean, Max, Min daily temperature (in ˚C) were obtained from the Météo-France for a reference station.	Missing data amount for 0.00% and 0.00% of the mortality and temperature series, respectively.
Romania	8 cities	1995-2014	All causes provided by Romanian National Institute of Statistics	Meteorological data (temperature) were obtained from stations operated by the National Meteorological Administration of Romania (NMA RO) (measurements in standard climatic terms, mean daily) by https://www.ecad.eu/	Missing data amount for 0.00% and 0.00% of the mortality and temperature series, respectively
Serbia	1 city	1995-2014	All causes, provided by the Statistical office of the Republic of Serbia	Mean daily temperature (in ˚C), computed as the 24-hour average based on 3-hourly measurements, were obtained from the Integrated Surface Dataset (ISD), National Climatic Data Center (NCDC) of the National Oceanic and Atmospheric Administration (NOAA).	Missing data amount for 0.00% and 0.00% of the mortality and temperature series, respectively
South Africa	45 district municipalities	1997-2013	All causes provided by Statistics South Africa, which had no role in the design, analysis or interpretation of the study.	Mean daily temperature (in ˚C) was computed as the average between daily minimum and maximum collected from the Agricultural Research Council of South Africa and the National Oceanic and Atmospheric Administration (NOAA).	Missing data amount for 0.00% and 12.27% of the mortality and temperature series, respectively 7 locations were excluded because of a high % of missing data or unstable temporal patterns in the mortality data, possibly due to problems with data collection.

South Korea	36 cities	1997-2018	All causes provided by Korea Bureau of Statistics	Mean daily temperature (in ˚C, computed as the 24-hour average based on hourly measurements, were obtained from weather stations located within the urban area managed by Korea Meteorological Administration.	Missing data amount for 0.00% and 0.01% of the mortality and temperature series, respectively
Spain	52 cities	1995-2014	Non-external causes (ICD-9: 0-799; ICD-10: A00-R99) from the Spain National Institute of Statistics.	Mean daily temperature (in ˚C), computed as the 24-hour average based on hourly measurements, and was obtained from weather stations of the Spain National Meteorology Agency. A single weather station, located within the urban area or at the near airport, was selected for each city	Missing data amount for 0.00% and 0.84% of the mortality and temperature series, respectively
Sweden	3 cities	1995-2014	All causes provided by the Swedish Cause of Death Register at the Swedish National Board of Health and Welfare	Mean daily temperature (in ˚C, computed as the 24-hour average based on hourly measurements, were obtained from the Environment and Health Administration.	Missing data amount for 0.00% and 2.06% of the mortality and temperature series, respectively
Switzerland	7 cities and 1 metropolitan area (Lugano)	1995-2013	Non-external causes only other than accidents (ICD-10codes A00-R99, V01-V99, W00-X59) provided from Federal Office of Statistics (Switzerland)	Mean daily temperature (in ˚C), computed as the 24-hour average based on hourly measurements, were obtained from the IDAWEB database (a service provided by MeteoSwiss, the Swiss Federal Office of Meteorology and Climatology). A single weather station located within or near the urban area was selected for each city.	Missing data amount for 0.0% and 0.0% of the mortality and temperature series, respectively.
Thailand	61 regions	1999-2008	Non-external (ICD-9: 0-799; ICD-10: A00-R99) mortality, provided the Ministry of Public Health, Thailand.	Mean daily temperature (in ˚C), computed as the average between daily minimum and maximum, were obtained from the Meteorological Department, Ministry of Information and Communication Technology, Thailand.	Missing data amount for 0.00% and 4.99% of the mortality and temperature series, respectively. The region of Phetchabun was excluded because of high percentage of missing data.
UK	112 built-up areas	1995-2014	All causes provided by the Office of National Statistics.	Mean daily temperature (in ˚C) was computed as the 24-hour average based on hourly measurements from UKCP09 5kmx5km product	Missing data amount for 0.00% and 0.00% of the mortality and temperature series, respectively
Uruguay	1 city	2012-2014	Non-external causes are provided by the Ministerio de Salud Publica (MSP).	Temperature data are provided by the Instituto Uruguayo de Meteorología (INUMET)	Missing data amount for 0.00% and 0.00% of the mortality and temperature series, respectively

USA	210 cities	1995-2006	All causes provided by the National Center for Health Statistics (NCHS).	Mean daily temperature (in ˚C), computed as the 24-hour average based on hourly measurements, were obtained from the National Climatic Data Center (NCDC) of the National Oceanic and Atmospheric Administration (NOAA).	Missing data amount for 2.65% and 2.70% of the mortality and temperature series, respectively. 1 city was excluded (Nampa) because of high percentage of missing.
Vietnam	2 cities	2009-2013	All causes provided by Provincial Department of Health.	Mean daily temperature (in ˚C), computed as computed from the 24-h average of hourly measurements, were obtained from National Oceanic and Atmospheric Administration's (NOAA) National Climate Data Center (NCDC). A single weather station was selected for each city.	Missing data amount for 0.00% and 0.57% of the mortality and temperature series, respectively

Supplementary Table 2. Descriptive statistics of observation data by region and country/area.

Country	N of cities	Period	Total deaths	Daily mean temperature (°C) [mean (min-max)]
Northern America				
USA	210	1995 - 2006	14,582,845	14.1 (3.4-25.0)
Canada	26	1995 - 2014	2,590,214	7.0 (2.5-10.9)
Latin America and the Caribbean				
Guadeloupe	1	2000 - 2014	24,492	26.6
Martinique	1	2000 - 2014	18,641	27.0
Puerto Rico	1	2009 - 2014	20,192	26.7
Costa Rica	1	2000 - 2014	25,337	22.6
Guatemala	1	2009 - 2014	47,939	19.3
Mexico	10	1998 - 2014	2,980,086	18.8 (13.9-23.3)
Panama	1	2013 - 2014	5,779	28.0
Argentina	3	2005 - 2014	623,834	18.1 (17.8-18.5)
Brazil	18	1997 - 2014	3,079,875	23.3 (18.8-27.8)
Chile	4	2004 - 2014	325,462	13.7 (11.5-15.4)
Colombia	5	1998 - 2013	956,539	23.4 (13.9-28.0)
French Guiana	1	2000 - 2014	6,592	27.0
Paraguay	1	2004 - 2014	33,303	23.2
Peru	18	2008 - 2014	633,137	17.9 (4.6-27.0)
Uruguay	1	2012 - 2014	91,041	18.7
Northern Europe				
Estonia	5	1997 - 2014	137,946	6.1 (5.5-6.7)
Finland	1	1995 - 2014	146,417	6.3
Iceland	1	2000 - 2014	19,182	5.4
Ireland	6	1995 - 2007	557,877	10.0 (9.5-10.9)
Norway	1	1995 - 2014	96,765	5.1
Sweden	3	1995 - 2014	533,181	8.5 (7.8-8.9)
UK	112	1995 - 2014	4,448,105	10.5 (9.3-11.7)
Western Europe				
France	20	2000 - 2014	1,693,354	12.6 (10.8-16.3)
Germany	15	1995 - 2014	3,079,580	10.2 (9.5-11.0)
Netherland	4	1995 - 2014	2,754,019	10.3 (9.8-10.7)
Switzerland	8	1995 - 2013	243,638	10.4 (8.6-12.9)
Southern Europe				
Cyprus	5	2004 - 2014	51,927	20.4 (19.9-21.3)
Greece	1	2001 - 2010	287,969	18.7
Italy	11	1995 - 2010	613,479	15.5 (12.5-18.4)
Malta	1	1995 - 2014	61,757	19.3
Portugal	6	1995 - 2014	1,010,888	16.3 (15.1-18.2)
Spain	52	1995 - 2014	2,452,909	15.6 (11.1-21.9)
Eastern Europe				
Czech Republic	4	1995 - 2014	643,810	9.0 (8.2-9.8)
Moldova	4	2001 - 2010	59,906	10.7 (10.2-11.3)
Romania	8	1995 - 2014	824,327	10.7 (8.2-12.6)
Serbia	1	1995 - 2014	393,574	13.0
Sub-Saharan Africa				
South Africa	45	1997 - 2013	7,775,888	18.0 (12.4-22.8)

Country	N of cities	Period	Total deaths	Daily mean temperature (°C) [mean (min-max)]
Reunion	1	2000 - 2014	12,946	24.5
Western Asia				
Israel	4	1995 - 2014	356,920	20.4 (18.4-21.5)
Kuwait	1	2000 - 2014	63,184	27.0
Southern Asia				
Iran	2	2002 - 2014	763,675	16.7 (16-17.3)
Eastern Asia				
China	14	1996 - 2014	1,026,772	14.5 (7.4-23.7)
Japan	47	1995 - 2014	21,353,321	15.5 (9.2-23.3)
South Korea	36	1997 - 2014	2,445,155	13.1 (9.1-17.1)
South-Eastern Asia				
Philippines	12	2006 - 2014	408,430	28.2 (27.9-28.6)
Thailand	61	1999 - 2008	1,801,653	27.6 (25.1-29.3)
Vietnam	2	2009 - 2013	108,173	27.1 (25.7-28.5)
Australia				
Australia	3	1995 - 2009	789,037	18.2 (15.9-20.3)

Supplementary Table 3. CMIP6 GCMs used in this study.

Model Name	Modeling Center	Instituion Id	Nominal Resolution
ACCES-CM2	Commonwealth Scientific and Industrial Research Organisation and Australian Research Council Centre of Excellence for Climate System Science, Australia	CSIRO-ARCCSS	250 km
AWI-CM-1-1-MR	Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, Germany	AWI	100 km
BCC-CSM2-MR	Beijing Climate Center, China	BCC	100 km
CESM2	National Center for Atmospheric Research, USA	NCAR	100 km
CNRM-CM6-1	Centre National de Recherches Meteorologiques and Centre Europeen de Recherche et de Formation Avancee en Calcul Scientifique, France	CNRM-CERFACS	250 km
CNRM-CM6-1-HR		CNRM-CERFACS	50 km
CNRM-ESM-2-1		CNRM-CERFACS	250 km
GFDL-ESM4	National Oceanic and Atmospheric Administration, Geophysical Fluid Dynamics Laboratory, USA	NOAA-GFDL	100 km
IITEM-ESM	Centre for Climate Change Research, Indian Institute of Tropical Meteorology Pune, India	CCCR-IITM	250 km
INM-CM4-8	Institute for Numerical Mathematics, Russian Academy of Science, Russia	INM	100 km
INM-CM5-0		INM	100 km
IPSL-CM6A-LR	Institut Pierre Simon Laplace, France	IPSL	250 km
MIROC6	Japan Agency for Marine-Earth Science and Technology; Atmosphere and Ocean Research Institute, The University of Tokyo; National Institute for Environmental Studies; and RIKEN Center for Computational Science; Japan	MIROC	250 km
MIROC-ES2L		MIROC	500 km
MPI-ESM1-2-LR	Max Planck Institute for Meteorology, Germany	MPI-M	250 km
MRI-ESM2-0	Meteorological Research Institute, Japan	MRI	100 km
NORESM2-MM	NorESM Climate modeling Consortium consisting of CICERO (Center for International Climate and Environmental Researc), MET-Norway (Norwegian Meteorological Institute), NERSC (Nansen Environmental and Remote Sensing Center), NILU (Norwegian Institute for Air Research), UiB (University of Bergen), UiO (University of Oslo) and UNI (Uni Research), Norway.	NCC	100 km
UKESM1-0-LL	Met Office Hadley Centre, UK	MOHC	250 km

Supplementary Table 4. Projected changes (95% eCIs) in cold- and heat-related excess mortality (%) at different levels of global warming under SSP5-8.5 by country/area under the "climate only" scenario.

Country/area	Changes in cold-related mortality (%)			Changes in heat-related mortality (%)		
	1.5 °C	2 °C	3 °C	1.5 °C	2 °C	3 °C
Overall	-0.6 (-1.0 -0.3)	-1.1 (-1.6, -0.6)	-1.7 (-2.6, -1.0)	0.4 (0.0, 0.8)	0.8 (0.0, 1.7)	1.8 (-0.5, 4.5)
Australia						
Australia	-0.5 (-1.0, -0.1)	-0.9 (-1.6, -0.4)	-1.6 (-2.8, -0.6)	0.3 (0.1, 0.7)	0.6 (0.2, 1.3)	1.5 (0.6, 3.3)
Eastern Asia						
China	-0.8 (-1.3, -0.4)	-1.3 (-2.0, -0.7)	-2.3 (-3.3, -1.3)	0.5 (0.1, 1.2)	1.1 (0.3, 2.2)	2.6 (0.6, 5.5)
Japan	-0.6 (-1.2, -0.2)	-1.1 (-1.7, -0.6)	-1.9 (-2.8, -1.1)	0.2 (0.0, 0.5)	0.3 (-0.1, 0.9)	0.7 (-0.2, 1.9)
South Korea	-0.5 (-0.9, -0.2)	-0.8 (-1.3, -0.4)	-1.4 (-2.2, -0.6)	0.2 (0.0, 0.7)	0.5 (0.0, 1.1)	1.1 (0.0, 2.7)
Eastern Europe						
Czech Republic	-0.6 (-1.0, -0.2)	-0.9 (-1.6, -0.5)	-1.6 (-2.7, -0.9)	0.5 (0.1, 0.9)	1.0 (0.3, 1.9)	2.2 (0.9, 4.8)
Moldova	-0.7 (-1.2, -0.2)	-1.2 (-1.8, -0.6)	-2.0 (-3.3, -1.1)	0.8 (0.2, 1.7)	1.6 (0.5, 3.0)	3.6 (1.6, 6.8)
Romania	-0.6 (-1.0, -0.2)	-1.0 (-1.6, -0.6)	-1.8 (-3.1, -1.0)	1.1 (0.4, 1.8)	2.2 (0.8, 3.4)	4.8 (2.4, 7.9)
Serbia	-0.6 (-0.9, -0.1)	-0.8 (-1.3, -0.4)	-1.4 (-2.6, -0.7)	0.8 (0.1, 1.5)	1.5 (0.3, 2.3)	3.3 (1.3, 5.8)
South America						
Costa Rica	-0.6 (-2.2, 1.1)	-0.7 (-3.1, 1.7)	-0.9 (-4.0, 2.5)	0.5 (-0.7, 2.0)	1.4 (-1.8, 5.0)	5.2 (-6.9, 18.7)
Guatemala	-0.9 (-2.2, 0.1)	-1.5 (-3.6, 0.1)	-2.4 (-5.6, 0.4)	0.2 (-0.4, 0.9)	0.6 (-1.2, 2.7)	2.5 (-4.4, 10.3)
Mexico	-1.1 (-1.9, -0.6)	-1.9 (-2.6, -1.3)	-3.0 (-4.1, -2.1)	0.5 (0.1, 0.9)	1.0 (0.3, 1.8)	2.7 (0.6, 5.0)
Panama	-1.1 (-3.0, 0.4)	-1.5 (-4.4, 0.6)	-2.0 (-5.5, 0.9)	1.1 (-1.3, 3.4)	2.7 (-3.7, 7.7)	7.9 (-15.1, 25.0)
Argentina	-0.6 (-1.0, 0.0)	-0.9 (-1.6, -0.4)	-1.8 (-2.8, -1.0)	0.4 (0.0, 0.9)	0.8 (0.3, 1.5)	1.9 (0.7, 3.8)
Brazil	-0.7 (-1.4, 0.0)	-1.2 (-2.2, -0.5)	-2.0 (-3.1, -1.0)	0.7 (-0.1, 1.4)	1.5 (0.2, 3.3)	3.5 (-0.2, 8.6)
Chile	-0.7 (-1.4, -0.2)	-1.2 (-2.3, -0.6)	-2.2 (-3.8, -1.1)	0.5 (0.2, 1.0)	1.1 (0.4, 2.1)	2.8 (0.9, 5.2)
Colombia	-0.7 (-1.6, 0.0)	-1.3 (-2.8, -0.1)	-2.2 (-4.4, -0.2)	0.0 (-1.7, 1.1)	-0.3 (-6.4, 2.8)	-3.4 (-38.6, 10.5)
French Guiana	-0.8 (-2.2, 0.6)	-1.0 (-2.9, 0.9)	-1.2 (-3.4, 1.1)	2.8 (-4.0, 9.7)	6.9 (-11.8, 20.5)	19.3 (-45.4, 53.9)
Paraguay	-0.7 (-1.6, -0.2)	-1.2 (-2.7, -0.4)	-2.1 (-3.7, -0.8)	1.2 (0.0, 4.0)	2.4 (0.3, 7.6)	5.6 (1.1, 11.9)
Peru	-0.9 (-2.0, 0.0)	-1.5 (-3.1, 0.0)	-2.3 (-4.8, 0.1)	0.3 (-0.9, 1.5)	1.0 (-2.6, 4.1)	3.3 (-9.8, 13.4)
Uruguay	-0.8 (-1.7, -0.1)	-1.3 (-2.8, -0.5)	-2.5 (-4.2, -1.5)	0.4 (0.1, 1.2)	0.9 (0.4, 1.7)	2.2 (0.8, 4.6)
Guadeloupe	-1.1 (-2.2, -0.2)	-1.6 (-3.1, -0.3)	-2.2 (-4.3, -0.2)	1.3 (-1.0, 3.9)	2.9 (-2.9, 8.1)	8.1 (-10.5, 22.5)

Country/area	Changes in cold-related mortality (%)			Changes in heat-related mortality (%)		
	1.5 °C	2 °C	3 °C	1.5 °C	2 °C	3 °C
Martinique	-0.9 (-2.1, 0.1)	-1.2 (-2.9, 0.2)	-1.7 (-3.9, 0.6)	1.6 (-0.5, 4.3)	3.8 (-1.4, 8.9)	10.5 (-5.6, 25.7)
Puerto Rico	-0.9 (-2.1, 0.0)	-1.4 (-3.2, 0.1)	-2.0 (-4.6, 0.3)	1.2 (-0.6, 3.2)	2.6 (-1.6, 6.8)	7.1 (-6.2, 18.5)
Northern America						
Canada	-0.3 (-0.6, -0.1)	-0.6 (-1.0, -0.2)	-1.0 (-1.8, -0.4)	0.4 (0.1, 0.9)	0.8 (0.2, 1.9)	2.0 (0.5, 4.8)
USA	-0.5 (-0.8, -0.2)	-0.8 (-1.3, -0.4)	-1.4 (-2.1, -0.8)	0.3 (-0.1, 0.8)	0.6 (-0.2, 1.5)	1.4 (-0.4, 3.6)
Northern Europe						
Estonia	-0.7 (-1.3, -0.2)	-1.1 (-2.2, -0.5)	-1.9 (-3.5, -0.9)	0.2 (-0.1, 0.7)	0.4 (-0.1, 1.3)	0.8 (-0.3, 2.8)
Finland	-0.6 (-1.2, -0.1)	-0.9 (-1.9, -0.4)	-1.6 (-3.1, -0.6)	0.3 (-0.2, 0.9)	0.6 (0.0, 1.6)	1.3 (0.2, 3.8)
Iceland	-0.3 (-1.2, 0.5)	-0.5 (-1.6, 0.3)	-0.8 (-2.5, 0.4)	0.0 (-0.1, 0.2)	0.0 (-0.3, 0.4)	0.1 (-0.7, 1.2)
Ireland	-0.4 (-1.2, 0.3)	-0.8 (-1.8, -0.1)	-1.5 (-2.9, -0.1)	0.1 (-0.2, 0.3)	0.1 (-0.3, 0.6)	0.3 (-0.8, 1.8)
Norway	-0.4 (-0.9, 0.0)	-0.6 (-1.5, -0.1)	-1.1 (-2.5, -0.2)	0.1 (-0.2, 0.5)	0.3 (-0.4, 1.0)	0.6 (-1.0, 2.5)
Sweden	-0.5 (-1.1, -0.1)	-0.9 (-1.7, -0.4)	-1.5 (-2.6, -0.6)	0.3 (-0.1, 0.6)	0.5 (0.1, 1.2)	1.1 (0.2, 2.9)
UK	-0.5 (-1.1, 0.0)	-1.0 (-1.7, -0.4)	-1.6 (-2.9, -0.8)	0.2 (-0.2, 0.7)	0.5 (-0.1, 1.2)	1.2 (0.2, 3.4)
South-eastern Asia						
Philippines	-0.9 (-1.9, -0.2)	-1.4 (-2.7, -0.2)	-1.9 (-3.6, -0.3)	1.3 (0.3, 2.7)	3.1 (0.4, 6.3)	8.9 (-0.7, 20.5)
Thailand	-0.7 (-1.4, -0.1)	-1.2 (-2.1, -0.5)	-1.9 (-3.0, -0.9)	1 (-0.2, 2.9)	2.3 (-0.2, 5.8)	6 (-1.8, 17.4)
Vietnam	-1.4 (-2.6, -0.5)	-2.1 (-3.8, -0.8)	-2.9 (-5.0, -1.0)	1.7 (0.4, 3.4)	3.9 (0.9, 8.0)	11 (1.3, 26.8)
Sub-Saharan Africa						
South Africa	-0.6 (-1.1, -0.3)	-1.1 (-1.8, -0.6)	-2.1 (-3.4, -1.2)	0 (-0.4, 0.4)	0 (-0.9, 0.8)	-0.2 (-3.9, 2)
Reunion	-0.8 (-1.9, -0.1)	-1.4 (-2.8, -0.1)	-2.1 (-4.2, 0.0)	0.4 (-0.6, 1.4)	0.9 (-1.7, 3.3)	2.7 (-5.9, 9.9)
Southern Asia						
Iran	-0.3 (-0.5, -0.1)	-0.5 (-0.9, -0.2)	-0.9 (-1.5, -0.3)	0.5 (0.0, 1.0)	1.0 (0.2, 2.0)	2.5 (0.6, 4.7)
Southern Europe						
Cyprus	-0.7 (-1.4, -0.1)	-1.1 (-1.9, -0.4)	-1.9 (-3.3, -0.8)	0.5 (-0.1, 1.2)	1.0 (-0.2, 2.4)	2.4 (-0.4, 5.4)
Greece	-0.5 (-1.0, -0.2)	-0.8 (-1.4, -0.4)	-1.4 (-2.4, -0.6)	1.0 (0.3, 2.4)	1.9 (0.7, 3.8)	4.1 (1.8, 7.2)
Italy	-0.8 (-1.3, -0.2)	-1.3 (-1.9, -0.6)	-2.1 (-3.3, -1.2)	1.3 (0.6, 2.7)	2.6 (1.0, 3.9)	5.3 (2.8, 9.1)
Malta	-1.0 (-1.8, -0.3)	-1.6 (-2.5, -0.7)	-2.7 (-4.3, -1.3)	0.4 (0.0, 0.9)	0.8 (0.1, 1.7)	1.9 (0.2, 3.9)
Portugal	-0.7 (-1.3, -0.3)	-1.3 (-2.0, -0.6)	-2.2 (-3.5, -1.3)	0.5 (-0.1, 1.2)	1.0 (0.0, 1.7)	2.4 (1.0, 3.8)

Country/area	Changes in cold-related mortality (%)			Changes in heat-related mortality (%)		
	1.5 °C	2 °C	3 °C	1.5 °C	2 °C	3 °C
Spain	-0.6 (-1.0, -0.2)	-0.9 (-1.5, -0.4)	-1.6 (-2.5, -0.9)	0.9 (0.4, 1.7)	1.8 (1.0, 2.8)	4.2 (2.4, 6.3)
Western Asia						
Israel	-0.7 (-1.4, 0.1)	-1.2 (-1.9, -0.5)	-2.1 (-3.2, -1.1)	0.5 (-0.1, 1.2)	1.2 (-0.2, 2.5)	2.8 (-0.3, 6.0)
Kuwait	-0.6 (-1.1, -0.1)	-1.0 (-1.7, -0.3)	-1.8 (-3.0, -0.7)	0.7 (-0.3, 1.8)	1.5 (-0.7, 3.6)	3.4 (-1.6, 7.7)
Western Europe						
France	-0.6 (-1.1, -0.1)	-1.0 (-1.7, -0.5)	-1.8 (-2.9, -1.0)	0.7 (0.2, 1.2)	1.4 (0.6, 2.3)	3.2 (1.5, 6.2)
Germany	-0.5 (-0.9, -0.1)	-0.7 (-1.3, -0.4)	-1.2 (-2.1, -0.6)	0.4 (0.0, 0.9)	0.9 (0.3, 1.8)	2.1 (0.8, 4.7)
Netherland	-0.4 (-0.9, 0.0)	-0.7 (-1.3, -0.4)	-1.2 (-2.1, -0.5)	0.4 (0.0, 0.8)	0.7 (0.1, 1.4)	1.6 (0.6, 3.5)
Switzerland	-0.5 (-0.9, -0.1)	-0.8 (-1.4, -0.3)	-1.3 (-2.4, -0.5)	0.5 (0.0, 1.1)	1.0 (0.0, 2.2)	2.2 (0.0, 5.3)

Supplementary Table 5. Projected changes (95% eCIs) in cold- and heat-related excess mortality (%) at different levels of global warming under SSP5-8.5 by country/area under the "climate-population" scenario.

Country/area	Changes in cold-related mortality (%)			Changes in heat-related mortality (%)		
	1.5 °C	2 °C	3 °C	1.5 °C	2 °C	3 °C
Overall	0.1 (-0.2, 0.4)	0.4 (0.0, 0.8)	0.2 (-0.7, 0.8)	0.5 (0.0, 1.0)	1.0 (0.0, 2.2)	2.5 (-1.3, 5.9)
Australia						
Australia	0.1 (-0.4, 0.6)	0.4 (-0.4, 1.3)	0.3 (-0.8, 1.6)	0.4 (0.1, 0.9)	0.9 (0.3, 1.7)	2.0 (0.8, 4.1)
Eastern Asia						
China	1.0 (0.5, 1.6)	2.3 (1.4, 3.3)	2.3 (1.2, 3.5)	0.7 (0.1, 1.5)	1.6 (0.4, 3.0)	3.5 (0.9, 6.9)
Japan	0.1 (-0.5, 0.5)	-0.2 (-0.8, 0.2)	-1.7 (-2.6, -0.9)	0.2 (0.0, 0.6)	0.4 (-0.1, 1.0)	0.8 (-0.2, 2.1)
South Korea	1.5 (0.9, 2.0)	2.7 (1.7, 3.7)	3.1 (2.0, 4.2)	0.3 (0.0, 0.8)	0.7 (0.0, 1.5)	1.4 (0.0, 3.4)
Eastern Europe						
Czech Republic	-0.2 (-0.6, 0.2)	0.3 (-0.3, 0.7)	0.7 (-0.5, 1.6)	0.5 (0.1, 1.0)	1.2 (0.5, 2.2)	2.7 (1.2, 5.7)
Moldova	-1.4 (-2.0, -0.7)	-2.1 (-3.1, -1.3)	-6.9 (-9.5, -4.4)	0.8 (0.1, 1.6)	1.7 (0.5, 3.1)	3.7 (1.6, 7.1)
Romania	-1.2 (-1.7, -0.7)	-1.4 (-2.0, -0.8)	-1.4 (-2.9, -0.6)	1.0 (0.3, 1.8)	2.3 (0.8, 3.5)	5.3 (2.8, 8.7)
Serbia	-0.9 (-1.4, -0.4)	-0.7 (-1.2, -0.2)	-0.6 (-1.8, 0.2)	0.7 (0.0, 1.5)	1.6 (0.3, 2.4)	3.9 (1.6, 6.6)
Latin America and the Caribbean						
Costa Rica	-0.3 (-1.3, 0.5)	-0.3 (-1.3, 0.6)	-0.3 (-1.4, 0.8)	0.6 (-0.9, 2.6)	1.8 (-2.5, 6.3)	6.5 (-9.2, 22.3)
Guatemala	-0.5 (-1.6, 0.4)	-0.8 (-2.2, 0.4)	-1.2 (-3.1, 0.4)	0.2 (-0.4, 1.1)	0.7 (-1.5, 3.2)	3.3 (-6.2, 12.9)
Mexico	-0.2 (-0.9, 0.3)	0 (-0.7, 0.6)	-0.5 (-1.6, 0.3)	0.6 (0.2, 1.1)	1.4 (0.4, 2.4)	3.6 (0.8, 6.4)
Panama	-0.7 (-2.0, 0.4)	-0.7 (-2.3, 0.3)	-0.8 (-2.4, 0.4)	1.4 (-1.7, 4.1)	3.6 (-5.2, 9.8)	10.2 (-21.6, 29.9)
Argentina	0.0 (-0.3, 0.6)	0.5 (-0.2, 1.1)	0.6 (-0.3, 1.5)	0.5 (0.0, 1.0)	1.1 (0.5, 1.8)	2.5 (1.1, 4.6)
Brazil	-0.1 (-0.8, 0.7)	0.0 (-1.0, 0.8)	-0.2 (-1.1, 0.8)	0.9 (0.0, 1.7)	2.0 (0.4, 4.2)	4.8 (-0.2, 10.9)
Chile	0.6 (-0.1, 1.3)	1.4 (0.1, 2.6)	1.3 (-0.4, 3.0)	0.7 (0.2, 1.3)	1.6 (0.6, 2.9)	3.8 (1.3, 6.7)
Colombia	-0.1 (-0.9, 0.6)	-0.1 (-1.3, 1.0)	-0.8 (-2.1, 0.4)	0.1 (-2.1, 1.4)	-0.3 (-9.4, 3.7)	-4.7 (-66.5, 13.9)
French Guiana	-0.4 (-1.4, 0.3)	-0.4 (-1.2, 0.3)	-0.4 (-1.1, 0.3)	3.7 (-5.3, 11.5)	9.3 (-17.8, 25)	24.5 (-73.6, 61.1)
Paraguay	0.5 (-0.4, 1.3)	1.2 (-0.3, 2.5)	1.5 (0.1, 3.6)	1.6 (0.3, 4.6)	3.3 (1.0, 8.7)	7.6 (2.3, 14.6)
Peru	-0.4 (-1.2, 0.2)	-0.4 (-1.5, 0.4)	-0.9 (-2.6, 0.3)	0.4 (-1.1, 1.7)	1.2 (-3.5, 4.9)	4.2 (-14.7, 16.2)
Uruguay	-1.0 (-1.9, -0.3)	-1.1 (-2.7, -0.4)	-2.2 (-4.0, -1.2)	0.4 (0.1, 1.1)	1.0 (0.5, 1.8)	2.5 (1.0, 5.1)
Guadeloupe	-0.8 (-1.8, -0.2)	-1.0 (-2.1, -0.2)	-1.4 (-2.8, -0.2)	1.5 (-1.2, 4.3)	3.6 (-3.5, 9.4)	9.5 (-12.8, 24.9)
Martinique	-0.7 (-1.8, 0.0)	-0.9 (-2.2, 0.1)	-1.2 (-2.9, 0.3)	1.8 (-0.5, 4.6)	4.4 (-1.5, 10.0)	11.9 (-6.3, 27.7)

Country/area	Changes in cold-related mortality (%)			Changes in heat-related mortality (%)		
	1.5 °C	2 °C	3 °C	1.5 °C	2 °C	3 °C
Puertorico	-0.8 (-1.8, -0.1)	-1.1 (-2.5, 0.0)	-1.9 (-4.4, 0.3)	1.3 (-0.7, 3.6)	3.1 (-1.9, 7.7)	8.1 (-7.3, 20.3)
Northern America						
Canada	0.5 (0.3, 0.7)	1.3 (0.8, 1.7)	1.5 (0.7, 2.0)	0.5 (0.1, 1.0)	1.1 (0.3, 2.3)	2.4 (0.7, 5.6)
USA	0.3 (0.0, 0.6)	0.9 (0.5, 1.4)	0.7 (-0.1, 1.2)	0.4 (-0.1, 0.9)	0.8 (-0.2, 1.9)	1.7 (-0.5, 4.3)
Northern Europe						
Estonia	-1.3 (-2, -0.7)	-2.1 (-3.4, -1.2)	-3.4 (-5.3, -1.9)	0.2 (-0.1, 0.7)	0.4 (-0.1, 1.3)	0.9 (-0.3, 3.1)
Finland	0.2 (-0.4, 0.8)	0.7 (-0.3, 1.5)	-0.2 (-1.6, 0.7)	0.4 (-0.1, 1.0)	0.7 (0.1, 1.9)	1.5 (0.3, 4.3)
Iceland	0.5 (-0.5, 1.6)	1.6 (-0.4, 3.8)	2.3 (-0.7, 5.5)	0.0 (-0.2, 0.2)	0.1 (-0.3, 0.5)	0.2 (-0.9, 1.4)
Ireland	0.7 (0.0, 1.6)	1.7 (0.7, 2.9)	2.6 (1.1, 4.6)	0.1 (-0.2, 0.4)	0.2 (-0.4, 0.8)	0.4 (-1.0, 2.2)
Norway	0.2 (-0.2, 0.6)	1.2 (0.2, 2.2)	1.9 (0.2, 3.6)	0.2 (-0.3, 0.6)	0.3 (-0.6, 1.3)	0.8 (-1.3, 3)
Sweden	-0.3 (-0.8, 0.1)	-0.1 (-0.8, 0.4)	-0.2 (-1.3, 0.5)	0.3 (0.0, 0.6)	0.6 (0.1, 1.3)	1.3 (0.3, 3.3)
UK	-0.2 (-0.8, 0.4)	0.2 (-0.5, 0.8)	0.2 (-0.9, 1.2)	0.3 (-0.2, 0.7)	0.6 (0.0, 1.3)	1.4 (0.3, 3.8)
South-eastern Asia						
Philippines	-0.5 (-1.2, -0.1)	-0.6 (-1.5, -0.1)	-0.8 (-1.7, -0.2)	1.8 (0.5, 3.3)	4.3 (0.7, 7.9)	12.1 (-1.1, 25.3)
Thailand	-0.2 (-0.8, 0.7)	-0.2 (-0.8, 0.7)	-0.6 (-1.5, 0.2)	1.4 (0.0, 3.5)	3.2 (-0.1, 7.4)	7.8 (-2.6, 20.8)
Vietnam	-0.8 (-1.8, -0.2)	-0.7 (-1.8, 0.0)	-1.0 (-2.2, 0.5)	2.1 (0.6, 4.1)	5.3 (1.4, 10.2)	14.2 (2.2, 32.0)
Sub-Saharan Africa						
South Africa	0.0 (-0.5, 0.3)	0.1 (-0.7, 0.7)	0.4 (-1.1, 1.5)	0.0 (-0.5, 0.5)	0.1 (-1.2, 0.9)	-0.3 (-6.6, 2.7)
Reunion	-0.6 (-1.6, -0.1)	-0.9 (-2.2, -0.2)	-1.3 (-3.0, -0.2)	0.5 (-0.8, 1.6)	1.2 (-2.1, 3.9)	3.7 (-9.0, 12.3)
Southern Asia						
Iran	0.3 (0.1, 0.5)	1.4 (0.6, 2.1)	2.6 (1.1, 3.9)	0.6 (0.1, 1.2)	1.4 (0.3, 2.6)	3.4 (0.9, 6.4)
Southern Europe						
Cyprus	0.2 (-0.4, 0.8)	1.2 (0.3, 2.1)	1.8 (0.5, 3.2)	0.6 (-0.1, 1.4)	1.3 (-0.2, 3.0)	3.0 (-0.5, 6.6)
Greece	-0.5 (-0.9, -0.1)	-0.5 (-1.0, -0.1)	-0.7 (-1.5, 0.0)	1.1 (0.3, 2.4)	2.1 (0.9, 4.1)	4.6 (2.2, 8.0)
Italy	-0.8 (-1.3, -0.2)	-0.8 (-1.4, -0.2)	-0.8 (-2.0, 0.1)	1.4 (0.6, 2.8)	2.8 (1.2, 4.3)	5.9 (3.3, 9.9)
Malta	0.2 (-0.6, 1.0)	0.8 (-0.3, 1.9)	-0.1 (-1.5, 1.5)	0.5 (0.0, 1.1)	1.1 (0.1, 2.1)	2.3 (0.3, 4.6)
Portugal	-0.6 (-1.2, -0.2)	-0.6 (-1.2, 0.1)	-0.7 (-1.9, 0.1)	0.6 (-0.1, 1.3)	1.2 (0.1, 2.0)	2.8 (1.4, 4.4)

Country/area	Changes in cold-related mortality (%)			Changes in heat-related mortality (%)		
	1.5 °C	2 °C	3 °C	1.5 °C	2 °C	3 °C
Spain	-0.6 (-1.0, -0.2)	-0.3 (-0.7, 0.2)	0.3 (-0.5, 1.0)	1.0 (0.4, 1.8)	2.1 (1.2, 3.2)	4.8 (2.9, 7.2)
Western Asia						
Israel	0.0 (-0.6, 0.8)	0.5 (-0.4, 1.4)	0.5 (-0.8, 1.7)	0.6 (-0.1, 1.4)	1.4 (-0.2, 2.9)	3.4 (-0.4, 6.9)
Kuwait	1.9 (0.0, 3.5)	4.2 (0.2, 7.5)	5.1 (-0.1, 9.4)	1.1 (-0.5, 2.5)	2.3 (-1, 5.1)	4.9 (-2.4, 10.5)
Western Europe						
France	-0.3 (-0.8, 0.2)	0.2 (-0.4, 0.8)	0.1 (-1.0, 0.8)	0.7 (0.2, 1.3)	1.6 (0.7, 2.7)	3.6 (1.8, 6.8)
Germany	-0.3 (-0.8, 0.1)	-0.4 (-0.9, -0.1)	-0.7 (-1.6, -0.1)	0.5 (0.1, 0.9)	1.1 (0.4, 2.0)	2.3 (0.9, 5.1)
Netherland	0.1 (-0.4, 0.5)	0.3 (-0.3, 0.8)	-0.1 (-0.9, 0.7)	0.5 (0.1, 0.9)	0.9 (0.3, 1.7)	1.9 (0.9, 4.1)
Switzerland	-0.1 (-0.4, 0.3)	0.3 (-0.2, 0.7)	0.3 (-0.6, 1.0)	0.6 (0.0, 1.3)	1.2 (0.0, 2.6)	2.7 (0.0, 6.1)

Supplementary Table 6. Projected changes (95% eCIs) in non-optimal temperature-related excess mortality (%) at different levels of global warming under SSP5-8.5 by country/area under the "climate-population" scenario.

Country/area	1.5 °C	2 °C	3 °C
Overall	0.5 (0.1 to 0.9)	1.5 (0.3 to 2.4)	2.7 (-1.3 to 5.6)
Australia			
Australia	0.5 (0.0, 1.0)	1.3 (0.3, 2.3)	2.3 (0.7, 4.1)
Eastern Asia			
China	1.8 (1.0, 2.6)	3.9 (2.4, 5.3)	5.7 (3.1, 8.5)
Japan	0.3 (-0.3, 0.7)	0.1 (-0.5, 0.7)	-0.9 (-2.2, 0.1)
South Korea	1.8 (1.2, 2.4)	3.4 (2.3, 4.4)	4.5 (2.9, 6.1)
Eastern Europe			
Czech Republic	0.4 (-0.1, 0.8)	1.5 (0.7, 2.4)	3.4 (1.7, 5.5)
Moldova	-0.6 (-1.4, 0.1)	-0.5 (-1.7, 0.9)	-3.2 (-5.9, -0.3)
Romania	-0.2 (-0.8, 0.5)	0.9 (-0.2, 2.0)	3.9 (1.8, 6.1)
Serbia	-0.2 (-0.9, 0.5)	0.9 (-0.1, 1.7)	3.3 (1.2, 5.2)
Latin America and the Caribbean			
Costa Rica	0.3 (-1.2, 2.0)	1.6 (-2.6, 5.8)	6.2 (-9.2, 21.7)
Guatemala	-0.3 (-1.5, 0.7)	-0.1 (-2.5, 2.4)	2.1 (-7.5, 11.2)
Mexico	0.4 (-0.3, 1.1)	1.4 (0.3, 2.3)	3.1 (0.4, 5.4)
Panama	0.7 (-2.3, 3.3)	2.9 (-5.6, 8.9)	9.4 (-22.2, 28.6)
Argentina	0.5 (-0.1, 1.0)	1.6 (0.6, 2.5)	3.1 (1.6, 4.7)
Brazil	0.7 (0.1, 1.4)	2.0 (0.5, 3.5)	4.7 (-0.4, 10.1)
Chile	1.3 (0.4, 2.3)	3.0 (1.3, 4.6)	5.0 (2.1, 7.9)
Colombia	0.0 (-2.3, 1.2)	-0.4 (-9.8, 3.2)	-5.4 (-67.9, 13.3)
French Guiana	3.2 (-5.7, 10.8)	8.9 (-17.9, 24.3)	24.1 (-74, 60.7)
Paraguay	2.1 (0.9, 4.2)	4.5 (2.2, 8.4)	9.1 (4.5, 15.2)
Peru	0.0 (-1.6, 1.1)	0.8 (-4.0, 4.0)	3.3 (-15.8, 14.8)
Uruguay	-0.6 (-1.3, 0.2)	-0.1 (-1.1, 0.7)	0.3 (-1.2, 2.3)
Guadeloupe	0.7 (-2.1, 3.1)	2.7 (-4.5, 8.1)	8.1 (-14.1, 23.1)
Martinique	1.1 (-1.2, 3.6)	3.5 (-2.3, 8.9)	10.6 (-7.3, 26.2)
Puertorico	0.6 (-1.4, 2.5)	2.0 (-2.8, 6.2)	6.2 (-8.7, 17.8)
Northern America			
Canada	1.0 (0.5, 1.4)	2.3 (1.4, 3.4)	3.9 (2.0, 6.6)
USA	0.6 (0.1, 1.1)	1.7 (0.6, 2.7)	2.4 (0.1, 4.6)
Northern Europe			
Estonia	-1.1 (-1.8, -0.5)	-1.7 (-2.9, -0.8)	-2.5 (-4.4, -0.8)
Finland	0.6 (0.0, 1.1)	1.4 (0.4, 2.5)	1.3 (-0.1, 3.1)
Iceland	0.6 (-0.4, 1.6)	1.7 (-0.3, 3.8)	2.5 (-0.4, 5.5)
Ireland	0.8 (0.0, 1.7)	1.9 (0.8, 3.0)	3.1 (0.9, 4.8)
Norway	0.3 (-0.3, 0.8)	1.6 (0.3, 2.8)	2.7 (0.1, 4.9)
Sweden	0 (-0.4, 0.4)	0.5 (-0.2, 1.2)	1.1 (-0.1, 2.4)
UK	0.1 (-0.5, 0.5)	0.7 (0.0, 1.3)	1.6 (0.4, 3.1)

Country/area	1.5 °C	2 °C	3 °C
Overall	0.5 (0.1 to 0.9)	1.5 (0.3 to 2.4)	2.7 (-1.3 to 5.6)
South-eastern Asia			
Philippines	1.3 (-0.1, 2.6)	3.7 (0.1, 7.0)	11.3 (-1.8, 24.3)
Thailand	1.2 (-0.1, 3.0)	3.1 (-0.3, 6.9)	7.2 (-3.2, 19.5)
Vietnam	1.4 (-0.1, 3.3)	4.6 (1.0, 9.0)	13.2 (2.4, 30.4)
Sub-Saharan Africa			
South Africa	0.0 (-0.7, 0.3)	0.2 (-1.3, 0.8)	0.1 (-6.9, 2.3)
Reunion	-0.1 (-1.5, 1.0)	0.2 (-3.0, 2.7)	2.3 (-10.3, 10.4)
Southern Asia			
Iran	0.8 (0.3, 1.4)	2.8 (1.4, 4.1)	6.0 (3.0, 9.0)
Southern Europe			
Cyprus	0.9 (-0.1, 1.8)	2.5 (0.4, 4.5)	4.8 (0.6, 8.6)
Greece	0.6 (-0.1, 1.7)	1.6 (0.5, 3.3)	3.9 (1.8, 6.8)
Italy	0.6 (-0.1, 1.8)	2.0 (0.8, 3.2)	5.1 (2.9, 8.0)
Malta	0.7 (-0.2, 1.6)	1.8 (0.4, 3.2)	2.2 (-0.1, 4.3)
Portugal	0.0 (-0.3, 0.3)	0.6 (0.1, 1.3)	2.1 (1.2, 3.0)
Spain	0.4 (-0.1, 1.2)	1.8 (1.0, 2.9)	5.1 (3.2, 7.3)
Western Asia			
Israel	0.6 (-0.4, 1.5)	1.9 (-0.1, 3.7)	3.8 (-0.3, 7.5)
Kuwait	2.9 (0.4, 5.2)	6.4 (0.9, 11.3)	10.0 (0.1, 17.7)
Western Europe			
France	0.4 (-0.1, 0.9)	1.8 (1.1, 2.6)	3.7 (2.3, 5.9)
Germany	0.1 (-0.4, 0.6)	0.7 (0.1, 1.4)	1.6 (0.4, 3.6)
Netherland	0.5 (0.1, 1.0)	1.3 (0.6, 2.0)	1.8 (0.9, 3.2)
Switzerland	0.5 (-0.2, 1.2)	1.5 (0.1, 2.8)	3.0 (0.1, 6.0)

Supplementary Table 7. Changes (95% eCIs) in non-optimal temperature-related excess mortality (%) due to population aging at different levels of global warming under SSP5-8.5 by country/area under the "climate-population" scenario compared with the "climate-only" scenario.

Country/area	1.5 °C	2 °C	3 °C
Overall	0.8 (0.6 to 0.9)	1.7 (1.2 to 2.1)	2.6 (0.9, 3.5)
Australia			
Australia	0.7 (0.2, 1.2)	1.5 (0.4, 2.7)	2.4 (0.6, 4.0)
Eastern Asia			
China	2.0 (1.4, 2.5)	4.1 (3.0, 5.2)	5.4 (3.9, 6.7)
Japan	0.7 (0.5, 0.9)	0.9 (0.7, 1.1)	0.2 (0.1, 0.3)
South Korea	2.0 (1.4, 2.6)	3.7 (2.5, 4.7)	4.8 (3.3, 6.1)
Eastern Europe			
Czech Republic	0.5 (0.3, 0.6)	1.4 (1.0, 1.8)	2.8 (2.0, 3.6)
Moldova	-0.7 (-1.0, -0.5)	-0.9 (-1.3, -0.5)	-4.8 (-6.5, -3.1)
Romania	-0.6 (-0.8, -0.4)	-0.2 (-0.4, -0.1)	0.9 (0.7, 1.1)
Serbia	-0.4 (-0.5, -0.3)	0.3 (0.2, 0.3)	1.4 (1.0, 1.8)
Latin America and the Caribbean			
Costa Rica	0.4 (-0.8, 1.5)	0.9 (-1.5, 3.0)	1.9 (-3, 5.3)
Guatemala	0.4 (-0.1, 1.0)	0.9 (-0.3, 2.0)	2.0 (-1.2, 4.3)
Mexico	1.0 (0.8, 1.3)	2.2 (1.7, 2.8)	3.4 (2.4, 4.2)
Panama	0.7 (-0.4, 1.6)	1.7 (-1.2, 3.8)	3.5 (-5.8, 7.0)
Argentina	0.7 (0.5, 0.8)	1.7 (1.3, 2.1)	3.0 (2.2, 3.7)
Brazil	0.8 (0.5, 1.0)	1.7 (1.1, 2.2)	3.1 (1.4, 4.3)
Chile	1.5 (0.7, 2.2)	3.1 (1.5, 4.5)	4.4 (2.2, 6.4)
Colombia	0.7 (0.2, 1.0)	1.2 (-1.3, 1.9)	0.2 (-25.9, 3.7)
French Guiana	1.2 (-1.2, 2.7)	3.0 (-5.5, 6.1)	6.0 (-28.6, 9.5)
Paraguay	1.6 (0.9, 2.3)	3.3 (1.8, 4.6)	5.6 (3.2, 7.7)
Peru	0.6 (0.0, 1.1)	1.3 (-0.2, 2.3)	2.2 (-3.7, 4.2)
Uruguay	-0.2 (-0.3, -0.1)	0.2 (0.1, 0.3)	0.6 (0.4, 0.8)
Guadeloupe	0.5 (0.0, 0.9)	1.3 (-0.3, 2.3)	2.2 (-1.7, 3.8)
Martinique	0.3 (0.0, 0.6)	1.0 (-0.1, 1.9)	1.8 (-0.6, 3.0)
Puertorico	0.3 (-0.1, 0.7)	0.8 (-0.2, 1.6)	1.2 (-1.1, 2.0)
Northern America			
Canada	0.9 (0.6, 1.2)	2.1 (1.4, 2.7)	2.9 (1.9, 3.9)
USA	0.8 (0.6, 1.0)	1.9 (1.3, 2.4)	2.4 (1.6, 3.0)
Northern Europe			
Estonia	-0.6 (-0.7, -0.4)	-1.0 (-1.3, -0.7)	-1.4 (-1.8, -0.9)
Finland	0.9 (0.4, 1.3)	1.8 (0.9, 2.6)	1.7 (0.8, 2.4)
Iceland	0.8 (0.0, 1.6)	2.1 (-0.1, 4.1)	3.1 (-0.2, 6.2)
Ireland	1.2 (0.8, 1.4)	2.6 (1.9, 3.3)	4.2 (3.0, 5.2)
Norway	0.6 (0.2, 0.9)	1.9 (0.7, 3.1)	3.2 (1.1, 5.1)
Sweden	0.3 (0.2, 0.4)	0.9 (0.5, 1.2)	1.4 (0.9, 1.9)
UK	0.4 (0.3, 0.4)	1.2 (1.0, 1.4)	2.1 (1.6, 2.5)

Country/area	1.5 °C	2 °C	3 °C
Overall	0.8 (0.6 to 0.9)	1.7 (1.2 to 2.1)	2.6 (0.9, 3.5)
South-eastern Asia			
Philippines	0.8 (0.3, 1.4)	1.9 (0.7, 3.1)	4.3 (0.3, 6.3)
Thailand	0.9 (0.5, 1.4)	2.0 (0.9, 2.9)	3.1 (0.3, 4.7)
Vietnam	1.0 (0.5, 1.8)	2.8 (1.3, 5.1)	5.1 (2.5, 7.8)
Sub-Saharan Africa			
South Africa	0.5 (0.4, 0.7)	1.3 (0.9, 1.5)	2.4 (-0.1, 3.2)
Reunion	0.3 (-0.1, 0.5)	0.6 (-0.4, 1.3)	1.7 (-2.8, 3.5)
Southern Asia			
Iran	0.6 (0.3, 0.9)	2.2 (1.1, 3.2)	4.4 (2.3, 6.2)
Southern Europe			
Cyprus	1.0 (0.4, 1.6)	2.6 (1.0, 3.8)	4.4 (1.7, 6.6)
Greece	0.1 (0.0, 0.1)	0.5 (0.3, 0.7)	1.2 (0.7, 1.7)
Italy	0.1 (0.1, 0.1)	0.7 (0.5, 0.9)	1.9 (1.3, 2.4)
Malta	1.3 (0.6, 1.9)	2.6 (1.2, 3.7)	3.0 (1.4, 4.4)
Portugal	0.2 (0.1, 0.2)	0.9 (0.6, 1.1)	1.9 (1.4, 2.4)
Spain	0.0 (0.0, 0.0)	0.9 (0.6, 1.3)	2.5 (1.5, 3.4)
Western Asia			
Israel	0.8 (0.3, 1.3)	1.9 (0.6, 3.1)	3.1 (1.0, 5.0)
Kuwait	2.7 (0.6, 4.6)	5.9 (1.2, 10.0)	8.4 (1.6, 13.9)
Western Europe			
France	0.3 (0.3, 0.4)	1.5 (1.1, 1.8)	2.3 (1.8, 2.8)
Germany	0.2 (0.1, 0.2)	0.5 (0.3, 0.6)	0.8 (0.5, 1.0)
Netherland	0.6 (0.4, 0.8)	1.3 (0.8, 1.7)	1.4 (1.0, 1.9)
Switzerland	0.5 (0.2, 0.7)	1.3 (0.5, 1.9)	2.0 (0.9, 3.0)

Supplementary References

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