L’impatto delle temperature sulla mortalità secondo gli scenari di cambiamento climatico in Italia

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Roma, 14 marzo 2023

DEP Lazio
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SISTEMA SANITARIO REGIONALE
ASL ROMA 1
REGIONE LAZIO

THE LANCET
Planetary Health

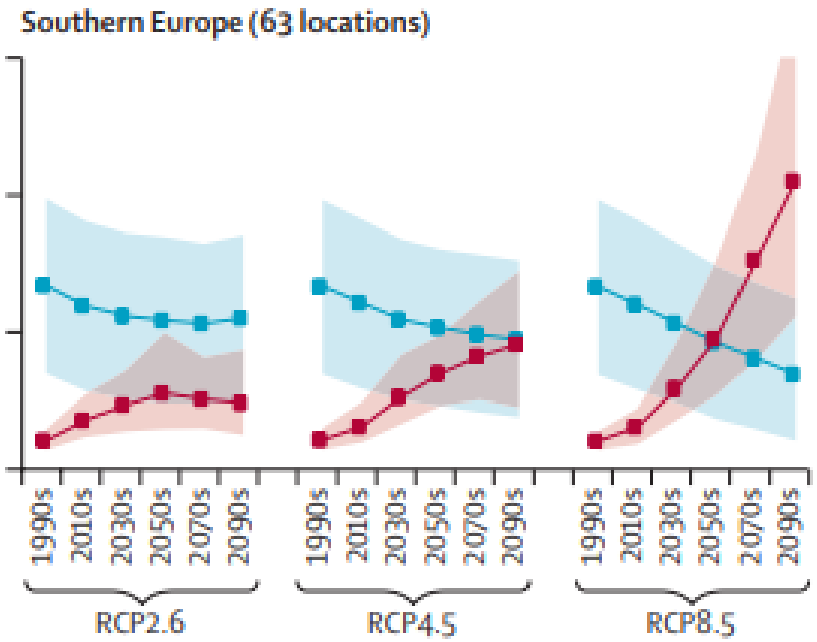
ARTICLES | VOLUME 1, ISSUE 9, E360-E367, DECEMBER 2017

Projections of temperature-related excess mortality under climate change scenarios

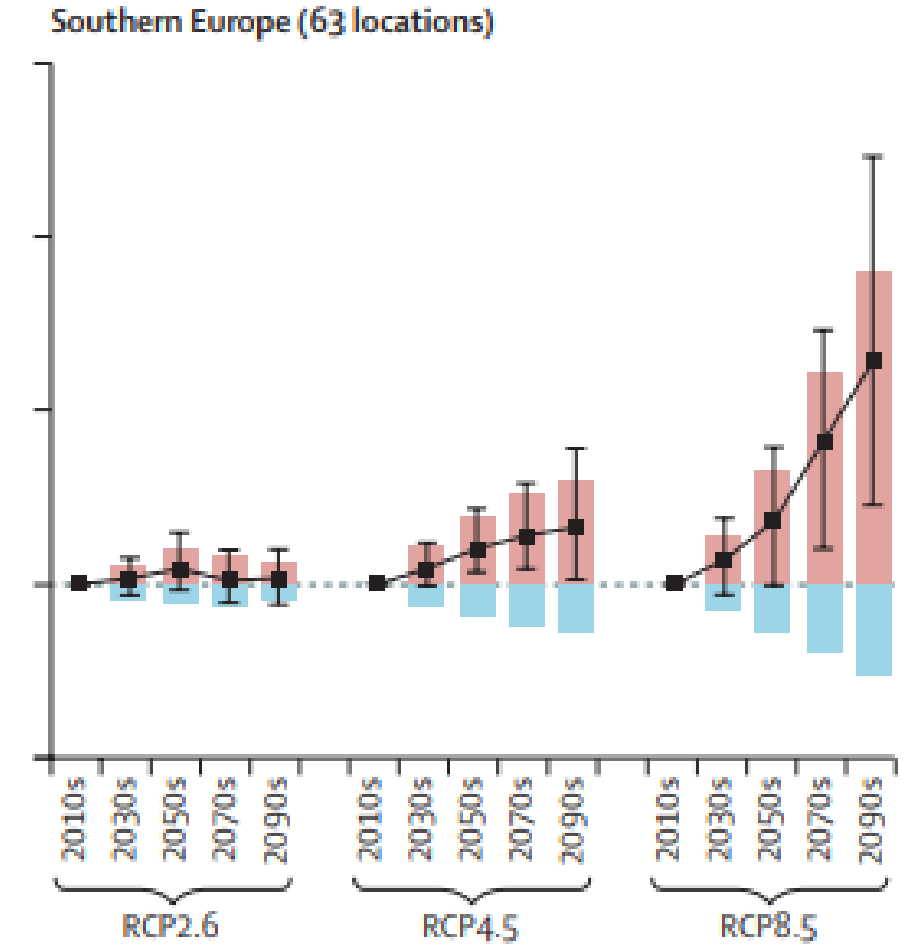
Antonio Gasparrini, PhD • Yuming Guo, PhD • Francesco Sera, MSc • Ana Maria Vicedo-Cabrera, PhD • Veronika Huber, PhD • Prof Shilu Tong, PhD • et al. Show all authors

Open Access • Published: November 13, 2017 • DOI: https://doi.org/10.1016/S2542-5196(17)30156-0 •

Trends in heat-related and cold-related excess mortality by region (% excess mortality)



Temporal change in excess mortality by region (difference in %excess)



THE LANCET
Planetary Health

ARTICLES | VOLUME 5, ISSUE 7, E446-E454, JULY 2021

Projections of temperature-attributable mortality in Europe: a time series analysis of 147 contiguous regions in 16 countries

Èrica Martínez-Solanas, PhD † • Marcos Quijal-Zamorano, MSc † • Hicham Achebak, PhD • Desislava Petrova, PhD • Prof Jean-Marie Robine, PhD • Prof François R Herrmann, MD • Prof Xavier Rodó, PhD • Joan Ballester, PhD • Show less • Show footnotes

Open Access • Published: July, 2021 • DOI: https://doi.org/10.1016/S2542-5196(21)00150-9 • Check for updates

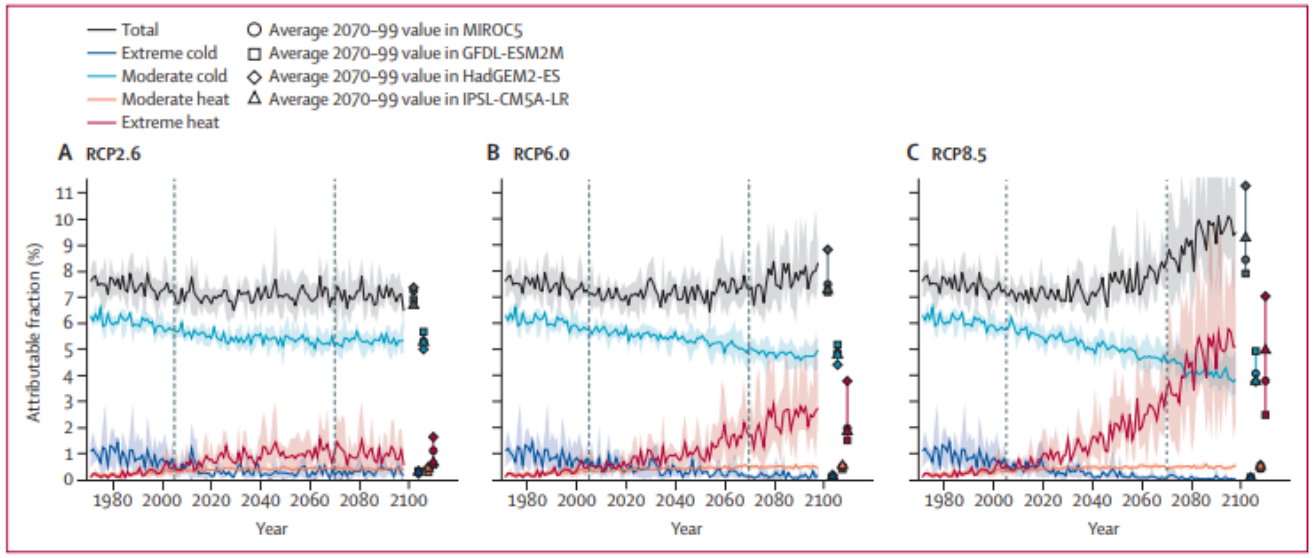


Figure 5: **Projections of attributable fraction by RCP scenario in Europe**
The attributable fraction is shown for all, extreme cold, moderate cold, moderate heat, and extreme heat temperatures. Projections correspond to the average of the four models. The shaded areas are CIs to the range of the ensemble of models. RCP=Representative Concentration Pathway.

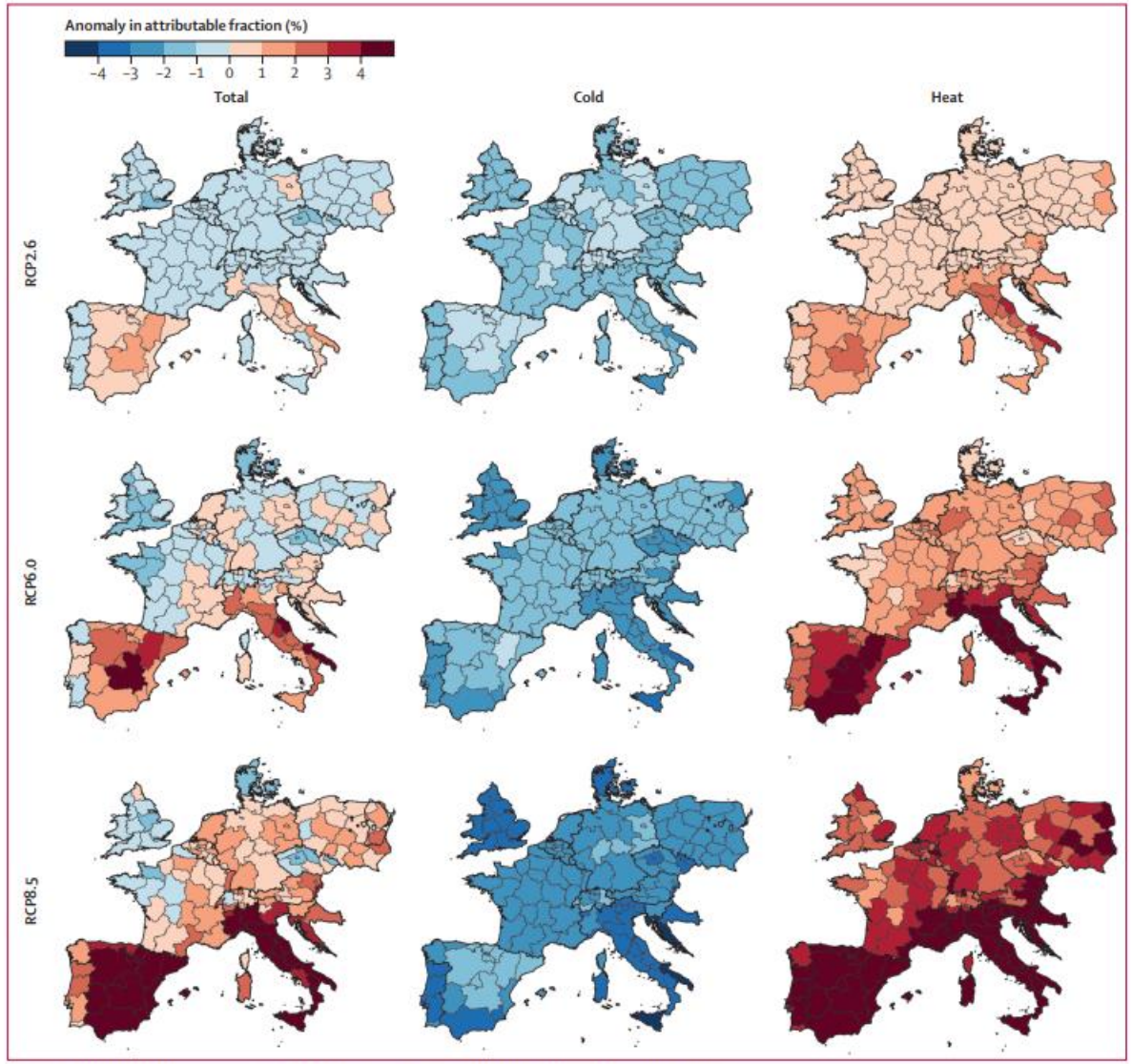


Figure 4: **Attributable fraction anomalies by RCP scenario at the end of the 21st century (2070–2099)**
Anomalies are calculated as the average of the four models, and expressed with respect to the reference period (1976–2005). RCP=Representative Concentration Pathway.

PLOS MEDICINE

RESEARCH ARTICLE

Quantifying excess deaths related to heatwaves under climate change scenarios: A multicountry time series modelling study

Yuming Guo[1]*, Antonio Gasparrini[2], Shanshan Li[1]*, Francesco Sera[2], Ana Maria Vicedo-

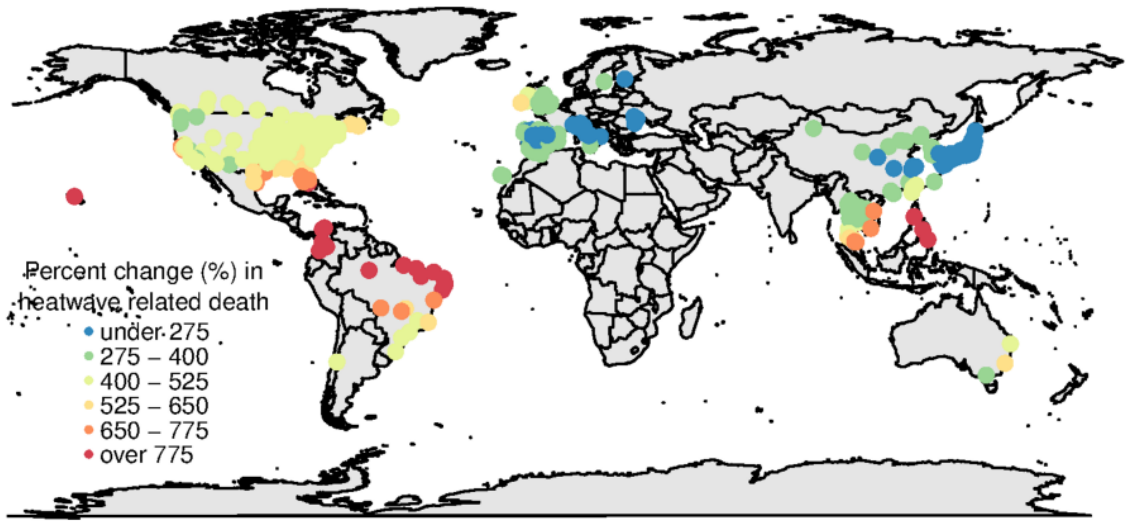


Fig 1. Locations of communities and mean percent change of heatwave-related excess deaths in 2031–2080 comparing to 1971–2020, under RCP8.5 scenario and high-variant population scenario, with assumption of nonadaptation. RCP, Representative Concentration Pathway.

What did the researchers do and find?

- We developed a model to estimate heatwave–mortality associations in 412 communities within 20 countries/regions from January 1, 1984 to December 31, 2015. The associations were used to project heatwave-related excess mortality, with projected daily mean temperature series from four scenarios of greenhouse gas emissions during 1971–2099.
- We used three scenarios of population changes (low, moderate, and high variant) and two adaptation scenarios (no adaptation and hypothetical adaptation).
- If people cannot adapt to future climate change, heatwave-related excess mortality is expected to increase the most in tropical and subtropical countries/regions, while European countries and the United States will have smaller increases. The more serious the greenhouse gas emissions, the higher the heatwave-related excess mortality in the future.
- If people have ability to adapt to future climate change, the heatwave-related excess mortality is expected to still increase in future under the most serious greenhouse gas emissions and high-variant population scenarios. However, the increase is expected to be much smaller than the no adaptation scenario.

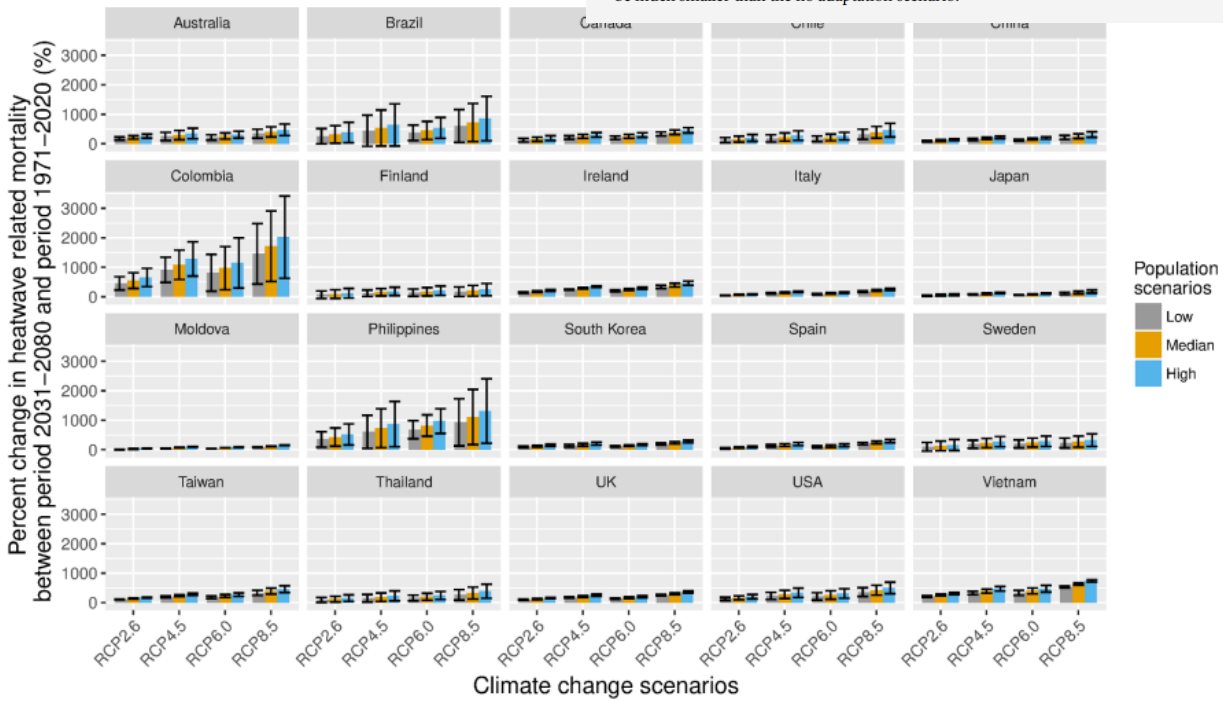


Fig 2. Mean percent change heatwave-related excess deaths in 2031–2080 in comparison to 1971–2020, in 20 countries/regions under RCP2.6, RCP4.5, RCP6.0, and RCP8.5 scenarios and high-variant, median-variant, and low-variant population scenarios, with assumption of nonadaptation. The high–low line indicates 95% eCI. Please refer to Table C in S1 Appendix for effect estimates. eCI, empirical confidence interval; RCP, Representative Concentration Pathway.

ONDATE DI CALORE ED EFFETTI SULLA SALUTE. IMPATTI FUTURI SECONDO GLI SCENARI DI CAMBIAMENTO CLIMATICO IN ITALIA.

Francesca de'Donato[1], Matteo Scortichini[1], V. Villani [2], P. Mercogliano[2,3], Manuela De Sario[1], M. Davoli[1], Paola Michelozzi[1]

[1] Dipartimento di Epidemiologia ASL Roma 1 – SSR Regione Lazio.

[2] Fondazione CMCC – Centro Euro-Mediterraneo sui Cambiamenti Climatici, Regional Models and geo-Hydrological Impacts Division (REMHI)

[3] C.I.R.A. – Centro Italiano di Ricerche Aerospaziali

CLIMATE AND HEALTH COUNTRY PROFILE
ITALY

World Health Organization

United Nations Framework Convention on Climate Change

OVERVIEW

Italy, located in the middle of the Mediterranean basin, is comprised of a continental northern sector, a peninsular central-southern sector, two large islands (Sardegna and Sicilia) and various archipelagos and minor islands. Italy has a heterogeneous climate which leads to differences in the immediate risks posed by climate change throughout the country.

Climate change impacts are already exacerbating existing infrastructural deficiencies, post-industrial pollution phenomena and the intrinsic hydro-geological and seismic vulnerability of the country. Rising temperatures, coastal erosion, flooding and drought may lead to water scarcity (6 out of 20 regions called on the government to declare a state of emergency due to water stress in 2017). Water stress could also lead to a reduction in agricultural production, higher risk of forest fires, increased desertification and could threaten economic progress. In addition, climate change impacts air quality, particularly in urban settings, and may lead to changes in the spatial distribution of flora and fauna which degrades biodiversity.

There is a concrete risk of the re-emergence of previously endemic agents (with the occurrence of wild poliovirus in neighbouring countries, or a potential increase of TB incidence), or the arrival of exotic communicable diseases, such as dengue, chikunguny a, Zika, Crimean-Congo fever, West Nile fever or blue tongue. Protection strategies have been strengthened, but the risk is increasing. Italy is also impacted by population movements, with an increasingly large population being rescued at sea by our vessels. Migrants to Italy are now totalling close to half a million people. Less than 10% of migrants qualify as refugees as they are mainly economic and climate migrants, moving from areas of drought and desertification.

OPPORTUNITIES FOR ACTION

In Italy, the Ministry for the Environment Land and Sea is carrying out activities on climate change at the national level. In 2015, Italy adopted the National Adaptation Strategy to climate change (NAS) with the aim to give a common path, at national level, to deal with the impacts of climate change on natural systems and socio-economic sectors. The Ministry for the Environment is currently working for the implementation of the NAS through the development of the National Adaptation Plan to climate change (NAP). It updates background information about the impacts of climate change and outlines possible adaptation actions for specific sectors, including the health sector. Specific cooperation projects driven by the Ministry of Health are being implemented in parallel to strengthen adaptive and preventative measures to cope with environmental health and climate change-related hazards. These include:

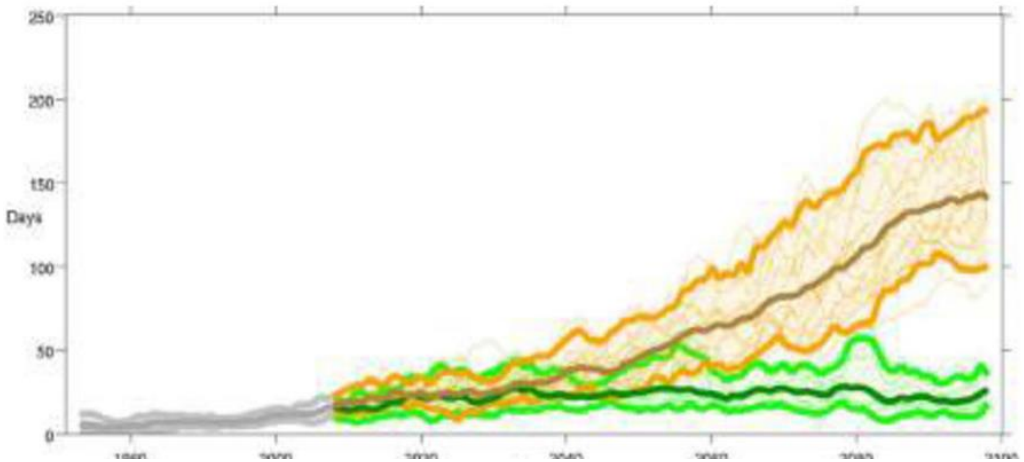
1) Adaptation
- Evaluation of existing national information systems on climate and health.
- Estimation of the costs of the impacts of climate change on health.

2) National Policy Implementation
- Strengthening of the efforts to raise awareness and capacity building to deal with the impacts of climate change on health.
- Strengthening of multilevel governance on the issue of climate change and health, with the aim to ensure coherence between national, regional and local planning.

DEMOGRAPHIC ESTIMATES	
Population (2017) [1]	60,579,000
Population growth rate (2017) [1]	0%
Population living in urban areas (2017) [2]	69.3%
Population age average, years (2017) [3]	44.9
Population 65 years or over (2017) [3]	22.3%
Life expectancy at birth, years (2017) [4]	80,6 (males), 85,1 (females)
ECONOMIC AND DEVELOPMENT INDICATORS	
GDP per capita (current US$, 2016) [5]	30,527 USD
Total expenditure on health as % of GDP (2014) [6]	9.3%
Average annual HDI growth, 2010-2015 (%) [7]	0.34

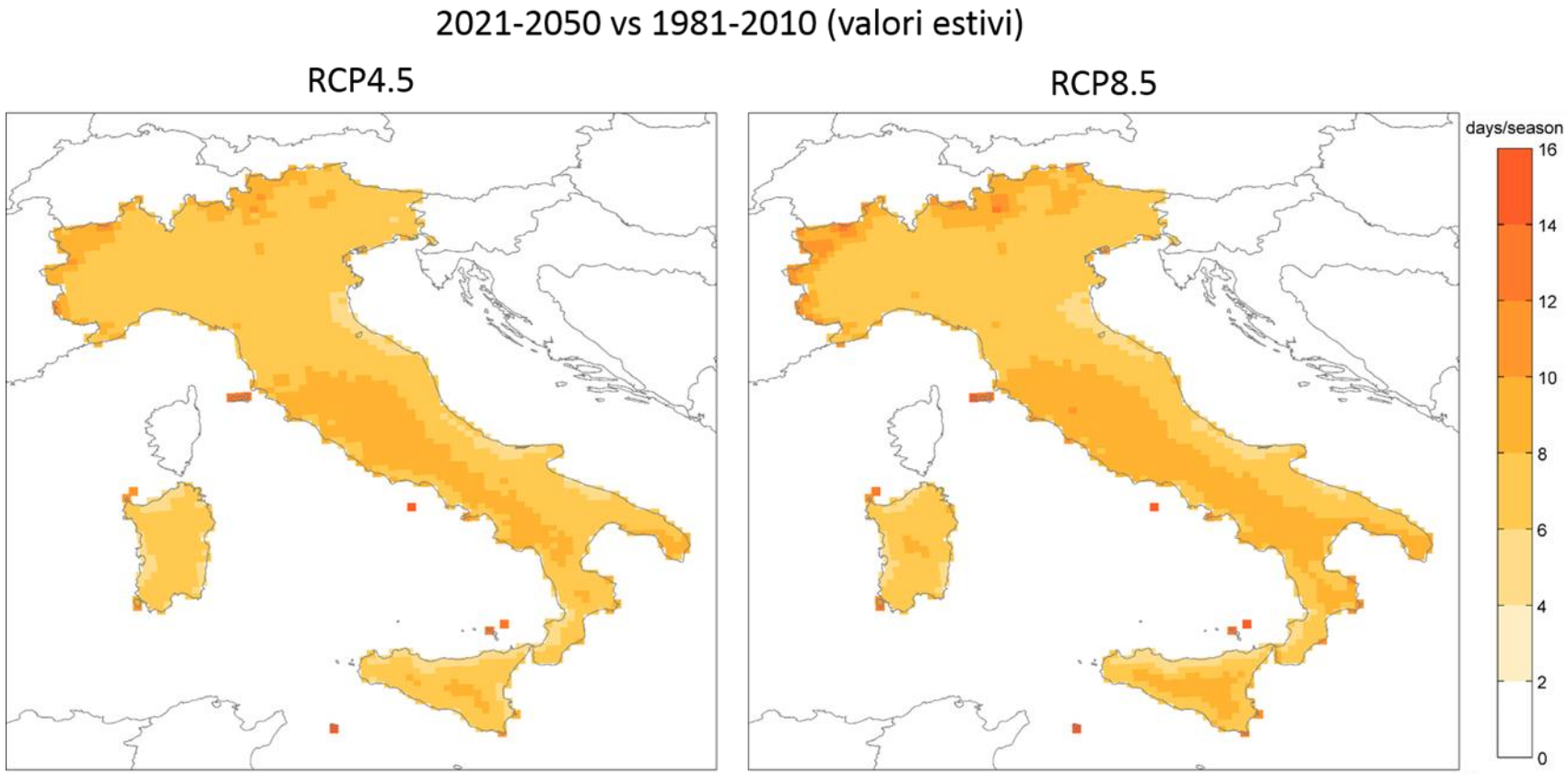
* For references please see page 16.

EUROCORDEX future projections of heat wave days for Italy under RCP2.6 (green) e RCP8.5 (orange) scenarios.



Italian cities: increase between 5.5 and 8.2 HW days/year for RCP4.5 and between 6-8.4 days/year for RCP8.5 predicted for 2021-2050

EUROCORDEX future projections of heat wave days ws3di for Italy under RCP4,5 (left) e RCP8.5 (right) scenarios.



Italian cities: increase between 5.5 and 8.2 HW days/year for RCP4.5 and between 6-8.4 days/year for RCP8.5 predicted for 2021-2050

Metodo

obiettivo: Valutare l'impatto futuro delle ondate di calore sulla mortalità nelle città italiane nel periodo futuro 2021-2050 considerando due scenari di cambiamento climatico RCP4.5 e RCP8.5.

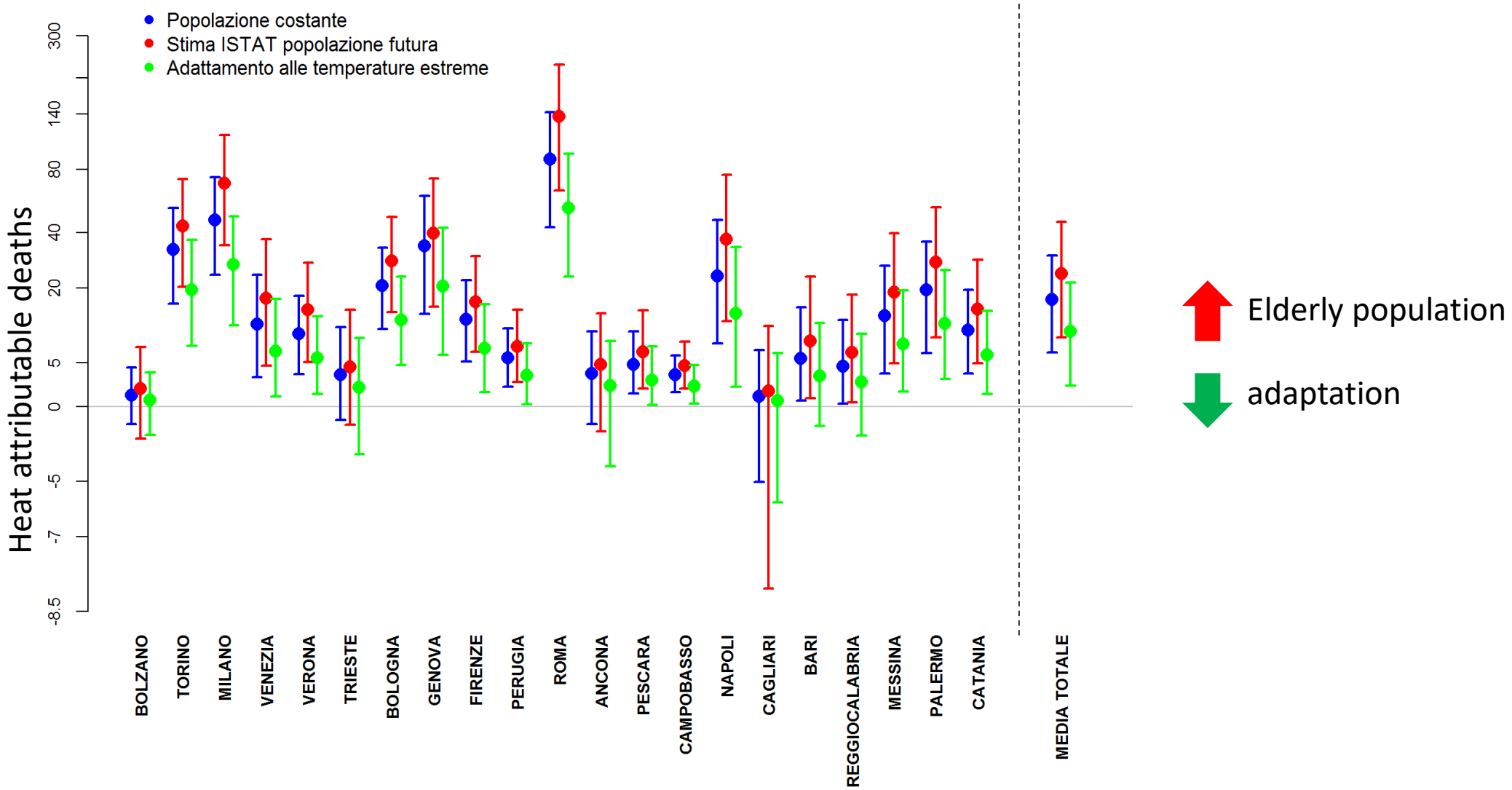
Metodi

L'ondata di calore è definita come 3 o più giorni consecutivi con valori di Tmax superiori al 90° percentile estivo. Stime future secondo scenari RCP4.5 e RCP8.5 utilizzando il modello EUROCORDEX con una risoluzione spaziale di 12km.

Attraverso modelli di Poisson città-specifici è stato stimato il rischio di mortalità (RR) nei giorni di ondata di calore rispetto ai giorni di "non ondate" nella popolazione 65+ anni, in 21 comuni italiani nel periodo estivo e poi calcolati i decessi medi attribuibili a giorni di ondata di calore.

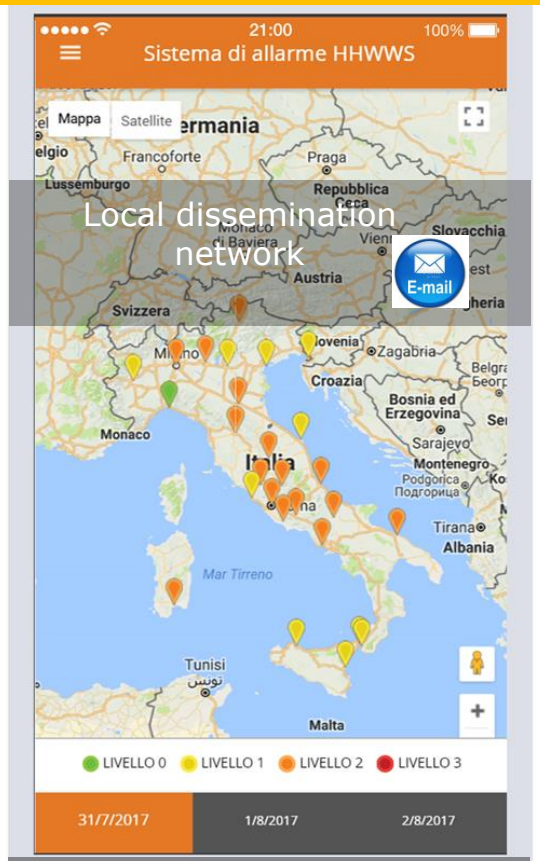
l'impatto futuro moltiplicando la media giornaliera di decessi attribuibili a giorni di ondata di calore per la variazione nel numero di giorni di ondata per ogni scenario tenendo conto anche dell'adattamento e l'invecchiamento della popolazione.

Decessi attribuibili medi annui per il periodo 2020-2050 secondo lo scenario RCP4.5 considerando nessuna variazione nella popolazione anziana, l'invecchiamento della popolazione e l'adattamento alle ondate di calore.



ADAPTATION - Italian National Heat Plan

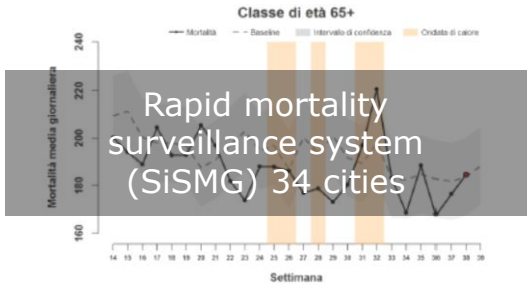
HEAT WARNING SYSTEM



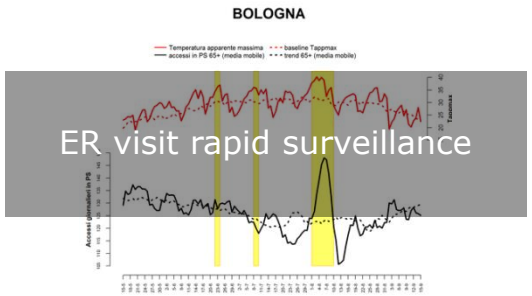
Local dissemination network

Prevention is graded based on level of warnings

HEALTH SURVEILLANCE



Rapid mortality surveillance system (SiSMG) 34 cities



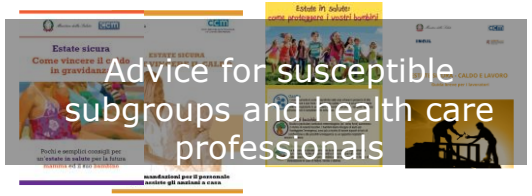
ER visit rapid surveillance

Evaluation fo heat waves on health

PREVENTION

Public Health Guidance

Identification of susceptible subgroups



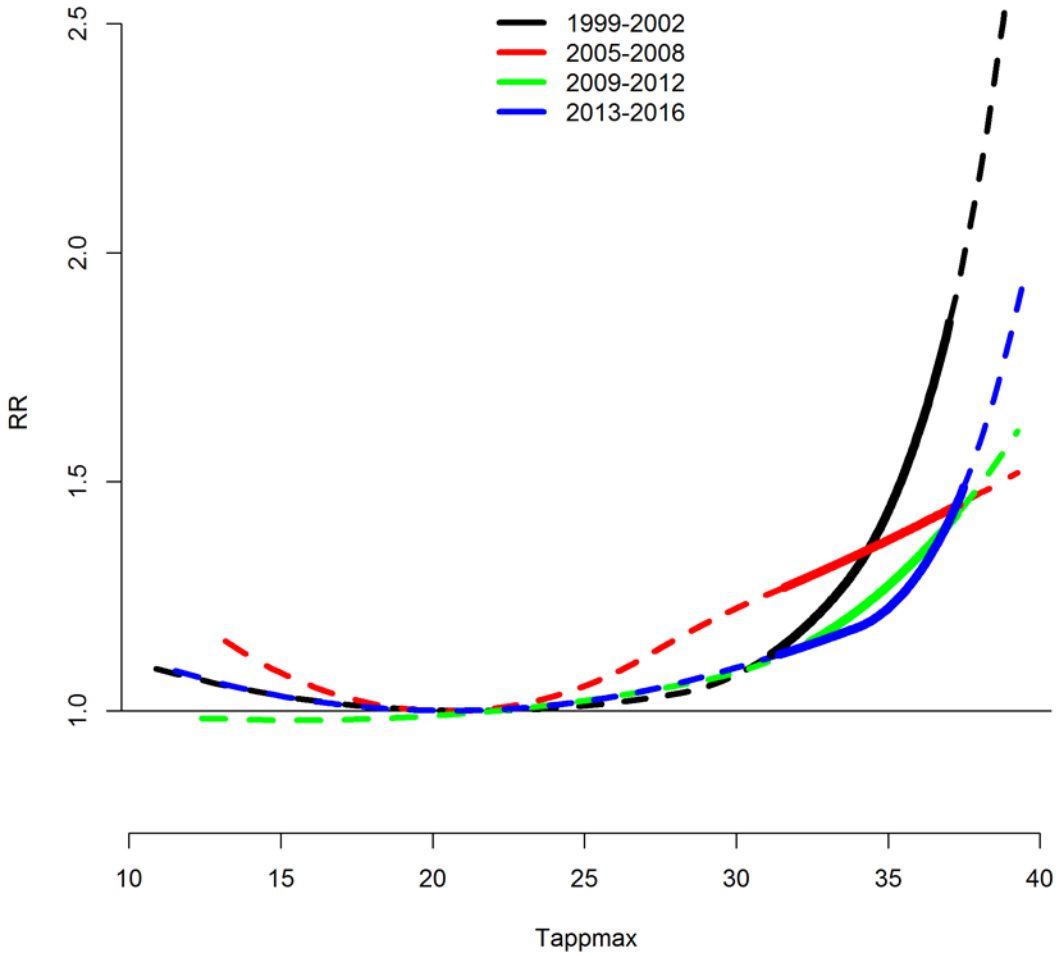
Advice for susceptible subgroups and health care professionals

Survey of local prevention plans and adaptation measures

www.salute.gov.it/caldo

ADAPTATION. Temporal variation in the effect of heat and the role of the Italian heat prevention plan.

Available online at www.sciencedirect.com
Public Health
journal homepage: www.elsevier.com/puhe

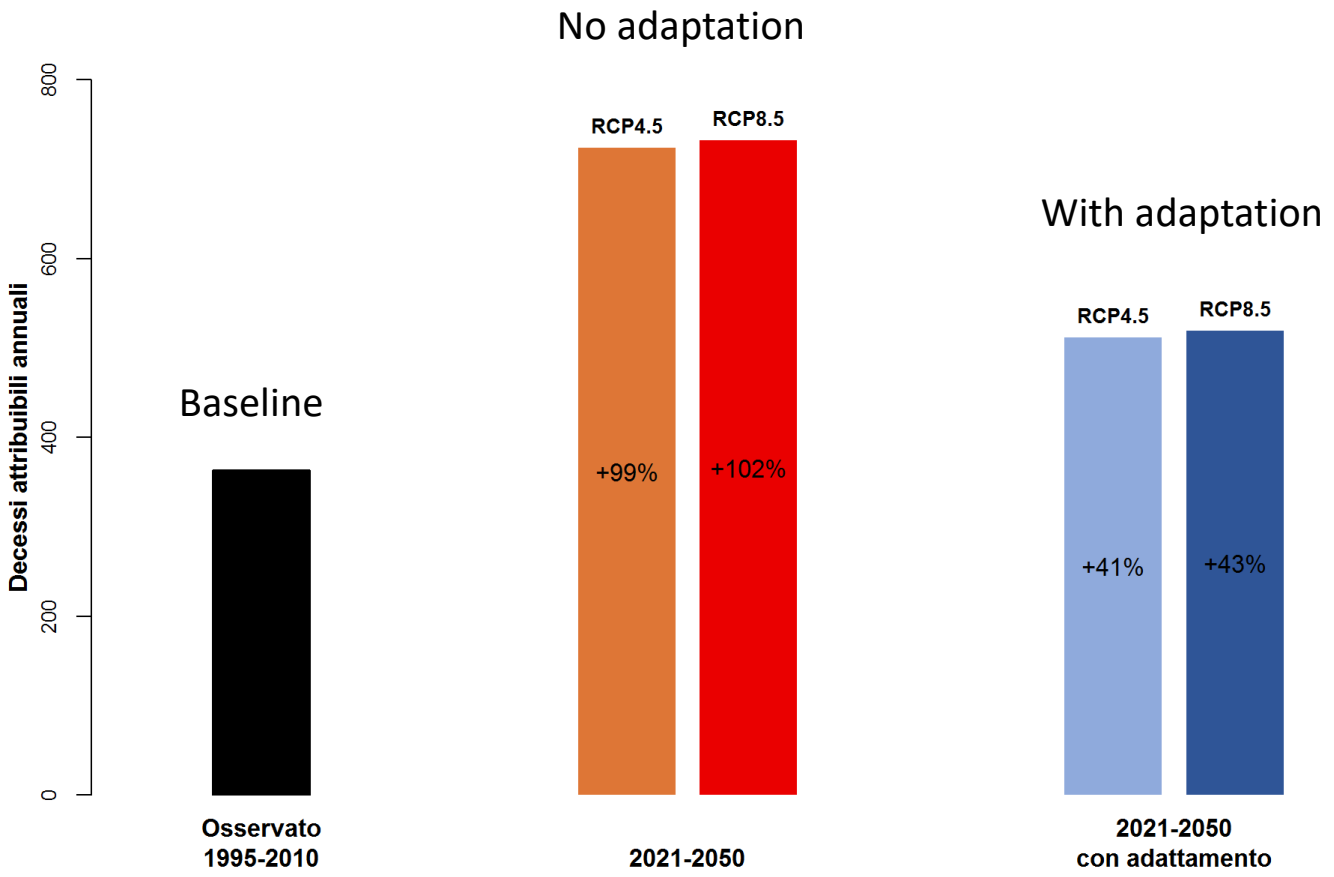


Attributable deaths (CI 95%)			
Period	**99° vs 75° pct**		
PRE	1999-2002	2792	2430 - 3405
	2005-2008	1345	858 - 1949
POST	2009-2012	2238	1741 - 3856
	2013-2016	1856	1364 - 2428

Reduction in heat attributable deaths.

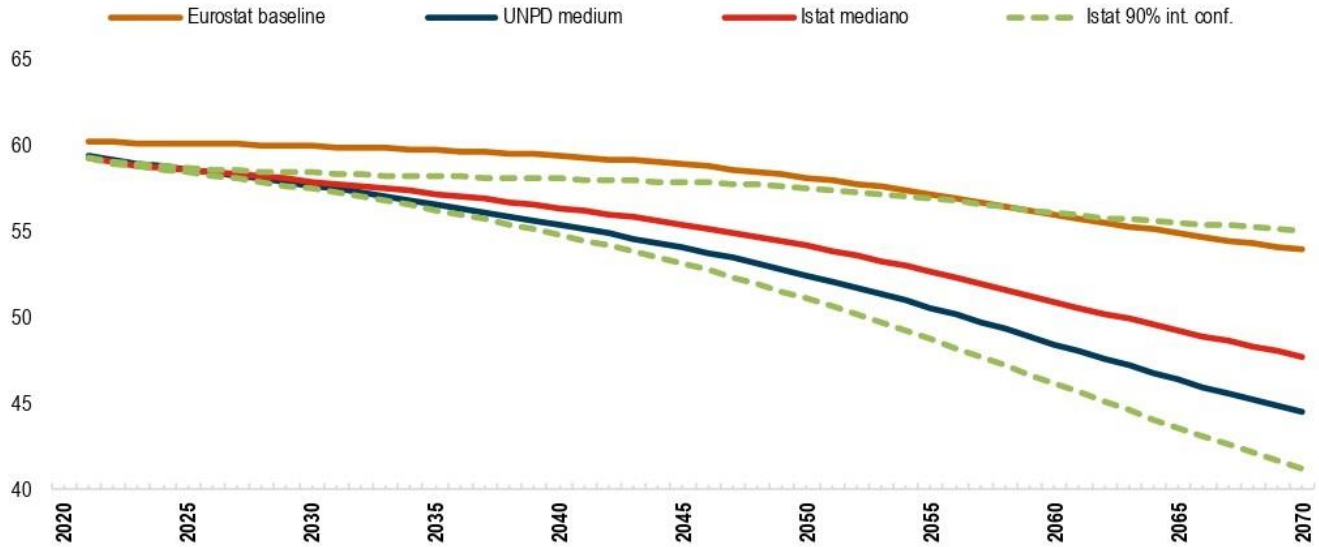
de'Donato et al. 2018, JPH

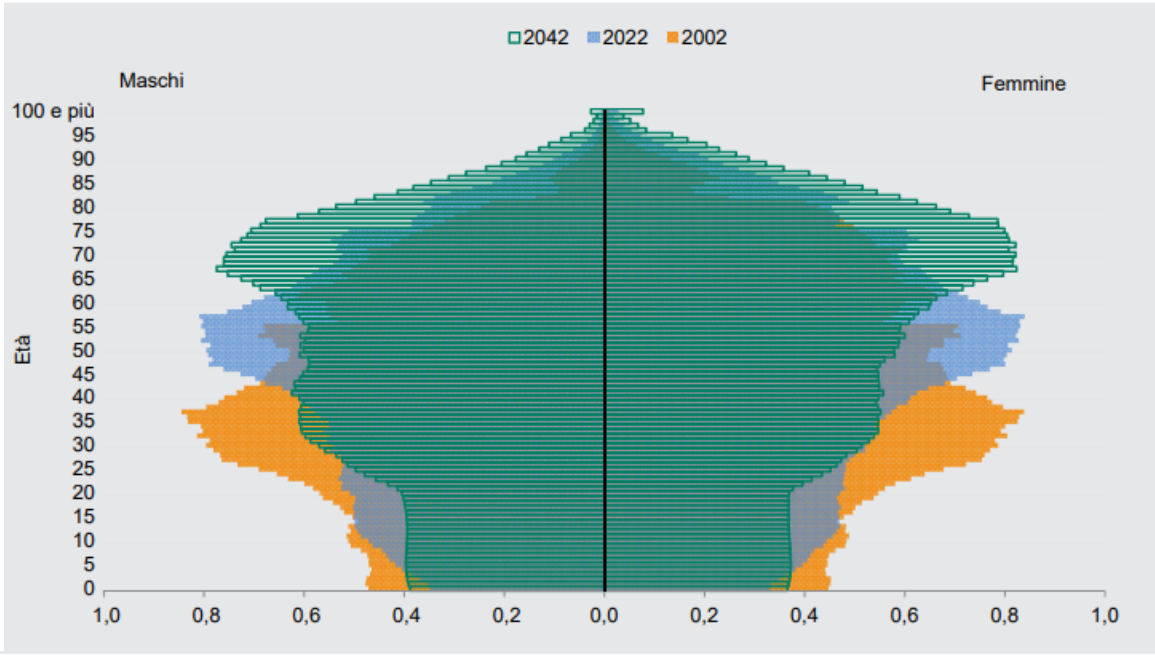
FUTURE IMPACTS OF HEAT WAVES. Heat attributable deaths in Italian cities considering RCP4.5 e RCP8.5 scenarios with and without adaptation.



Invecchiamento della popolazione

FIGURA A2. POPOLAZIONE TOTALE PREVISTA SECONDO GLI SCENARI ISTAT, EUROSTAT E UNPD. Anni 2021-2070, milioni di residenti





Sistema di sorveglianza della mortalità giornaliera - SISMG

Operativo dal 2004 (capoluoghi di regione e città con 100,000 abitanti). **2021 estensione totale 53 città**

Sistema sorveglianza near-real time. Dati da fonte anagrafe Comunali.

Sorveglianza dell'impatto sulla salute di **esposizioni ambientali** (caldo, freddo) e altri fattori che influenzano la mortalità (influenza).

Sorveglianza COVID-19. Report settimanali a partire dalla Fase 1 epidemia.

Uso dati SISMG: per sorveglianza e per ricerca. Sintesi pubblicata sul portale ministeriale.

Ministero della Salute

Centro Nazionale Prevenzione e Controllo Malattie

Esempio COPERNICUS - CDS

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Heat wave days and heat related mortality for nine European cities derived from climate projections

To improve our service, we need to hear from you! Please complete this very short survey. Th

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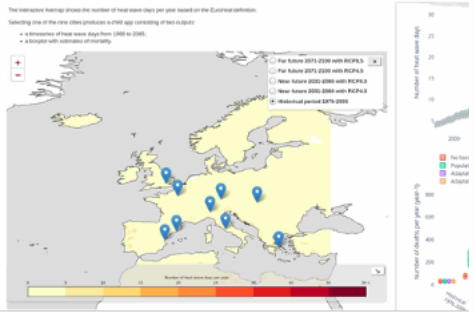
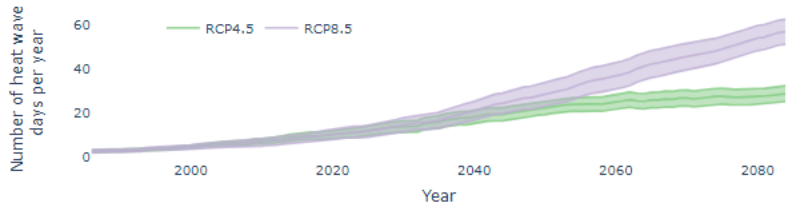
Overview Documentation

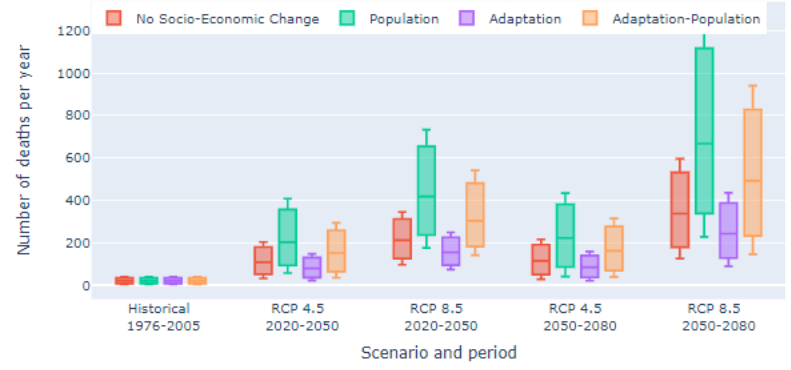
This application presents the number of heat wave days accross Europe and the corresponding number of deaths attributable to heat waves for nine European cities. Estimates of the number of heat wave days are provided for current and future climate considering the RCP 4.5 and RCP 8.5 scenarios. The heat-related mortality estimates are split further to provide estimates considering *no socio-economic change*, *adaptation* and *population* socio-economic scenarios. Estimates of heat-related mortality are derived from estimates of heat waves based on the EURO-CORDEX projections and population projections provided by Eurostat.

This is of great use for public health users to raise awareness of health risks related to climate change and heat waves increases and for the definition and planning of adaptation plans and future policy.



Rome

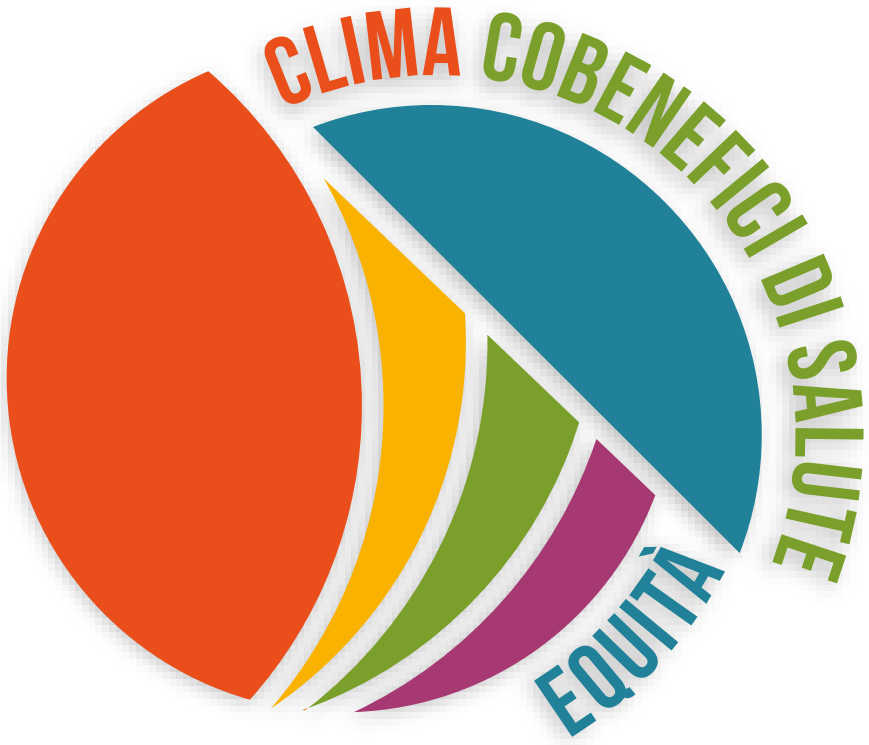




Rome heat wave attributable deaths considering current and future climate. The graph shows the median, interquartile ranges and outliers of the regional climate models under different emission scenarios and socio-economic scenarios.

Proposta DEPLAZIO - CMCC

- Studio nazionale
- Stime CC temperatura e heat wave per l'Italia (CMCC alle 50 città SISMG \livello nazionale comuni/regioni
- Stime rischio di mortalità\decessi attribuibili per temperature estreme, eventi estremi (HW) correnti
- Considerando : Adattamento (da variazione relazione temp\mortalità Piano caldo) e Invecchiamento popolazione
- Stime impatti futuri decessi attribuibili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EQUITÀ