Erasmus+ Action Type: KA220-HED - Cooperation partnerships in higher education
Climate change, cities, communities and Equity in health Cli-CC.HE
Project Reference: 2021-1-IT02-KA220-HED-000032223

Lecture

Monday 15th of May, 11:00 AM

Climate adaptation through fostering health perspective in urban planning

CNR Team-Stefania La Grutta, Velia Malizia , Giacomo Ilardo, Anna Bonomolo, Omar Shatarat

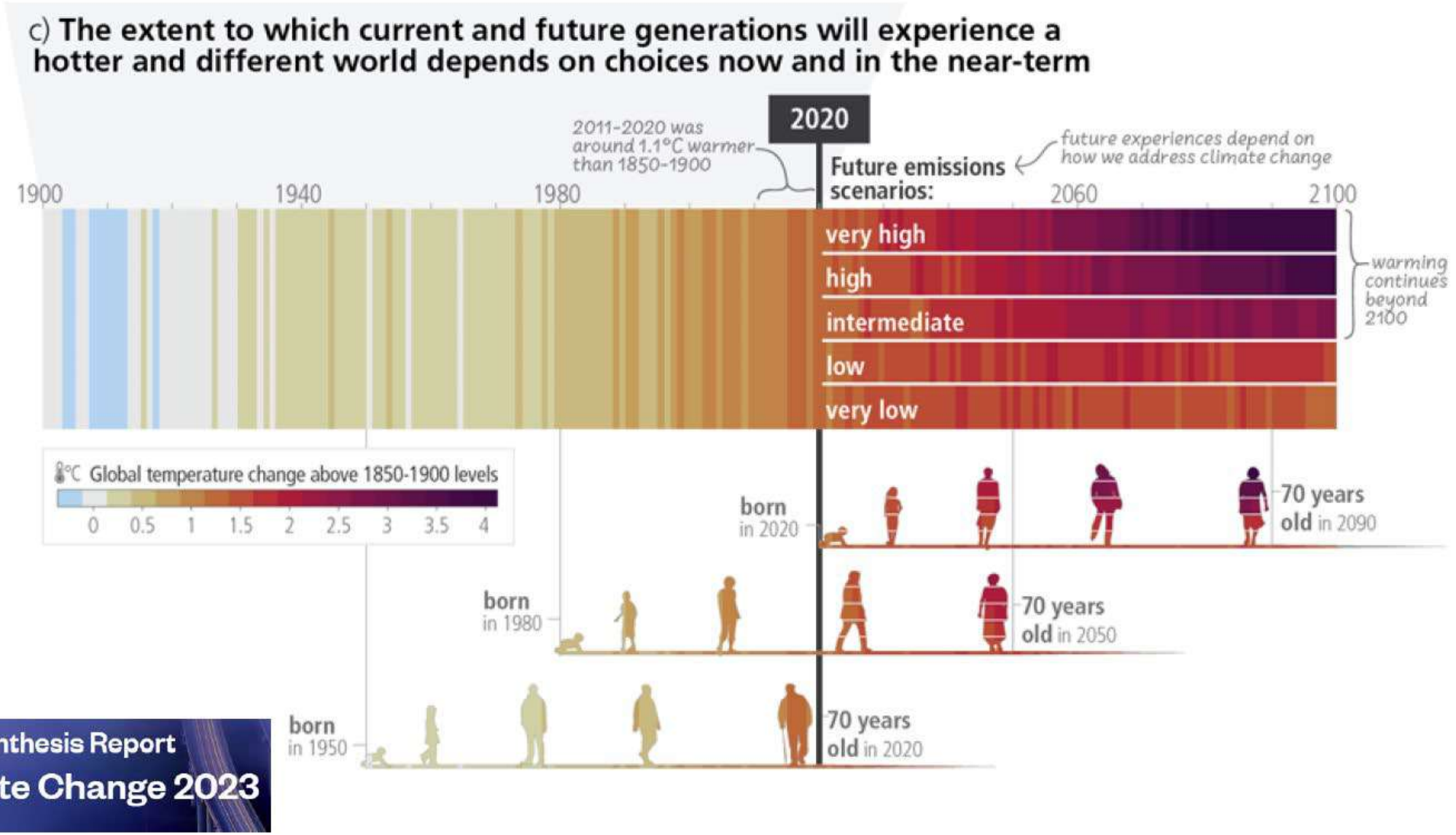
Co-funded by the Erasmus+ Programme of the European Union

OUTLINE

- Climate and health: Evidence and effects of climate change on health
- Temperature, Climate change and health effects (mortality)
- Adaptation and mitigation: The role of public health where we are and what we can do
- Conclusion

Global heating: an urgent call for action to protect health The Lancet November 4, 2022

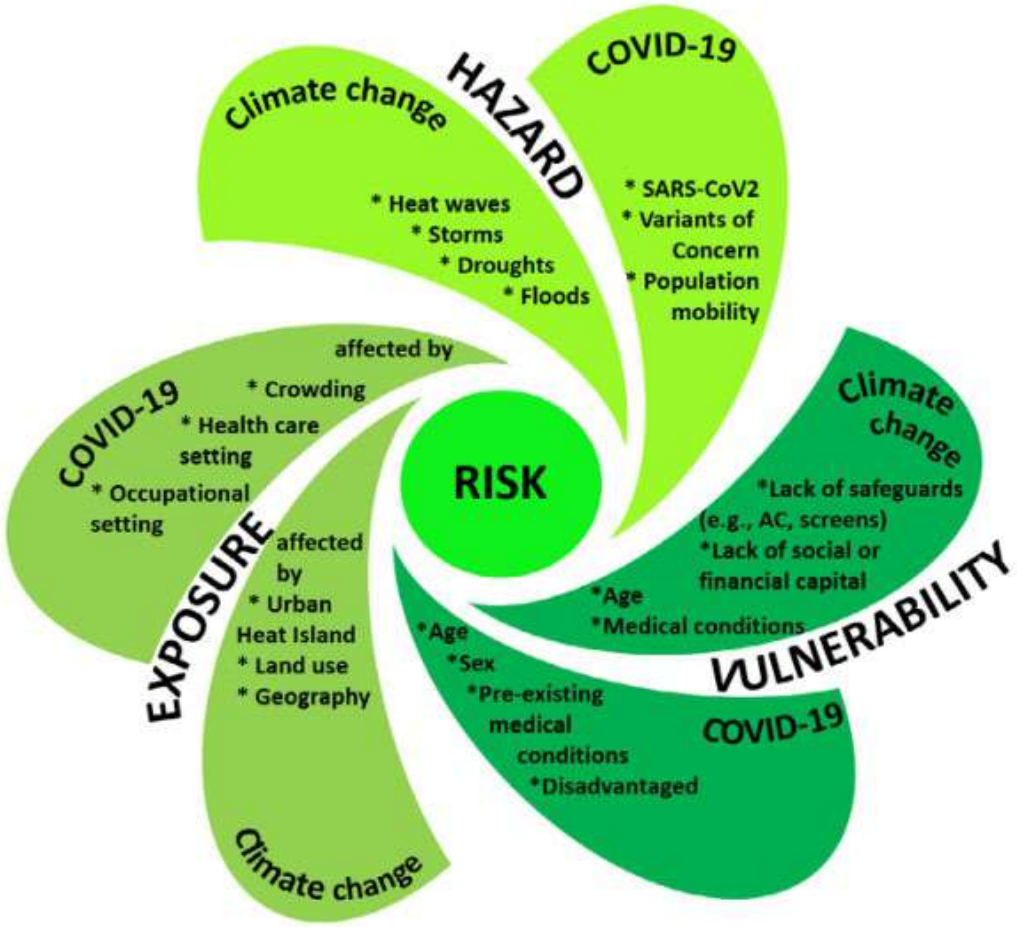
- **Accelerating collapse of some of the most important planetary systems underpinning human survival.**
  - The Antarctic ice-shelf has contracted by almost 2% since 1997; further loss and thinning could lead to substantial sea-level rises.
  - Climate change is causing rapid acidification of the Arctic Ocean, risking long-lasting damage to the region's ecology.
  - Climate effects are endangering the ability of forests to mitigate adverse atmospheric changes, especially in the Amazon and North America. Forest resilience is declining, with a halving of tree life expectancies in some regions.
  - The world is edging closer to multiple tipping points that, once crossed, will drive temperature change well above 2°C.
- **The key conclusion from these findings is that our current actions are insufficient to limit heating to the Paris target of 1·5°C**



Lecture
Monday 15th of May, 11:00 AM

Co-funded by the Erasmus+ Programme of the European Union

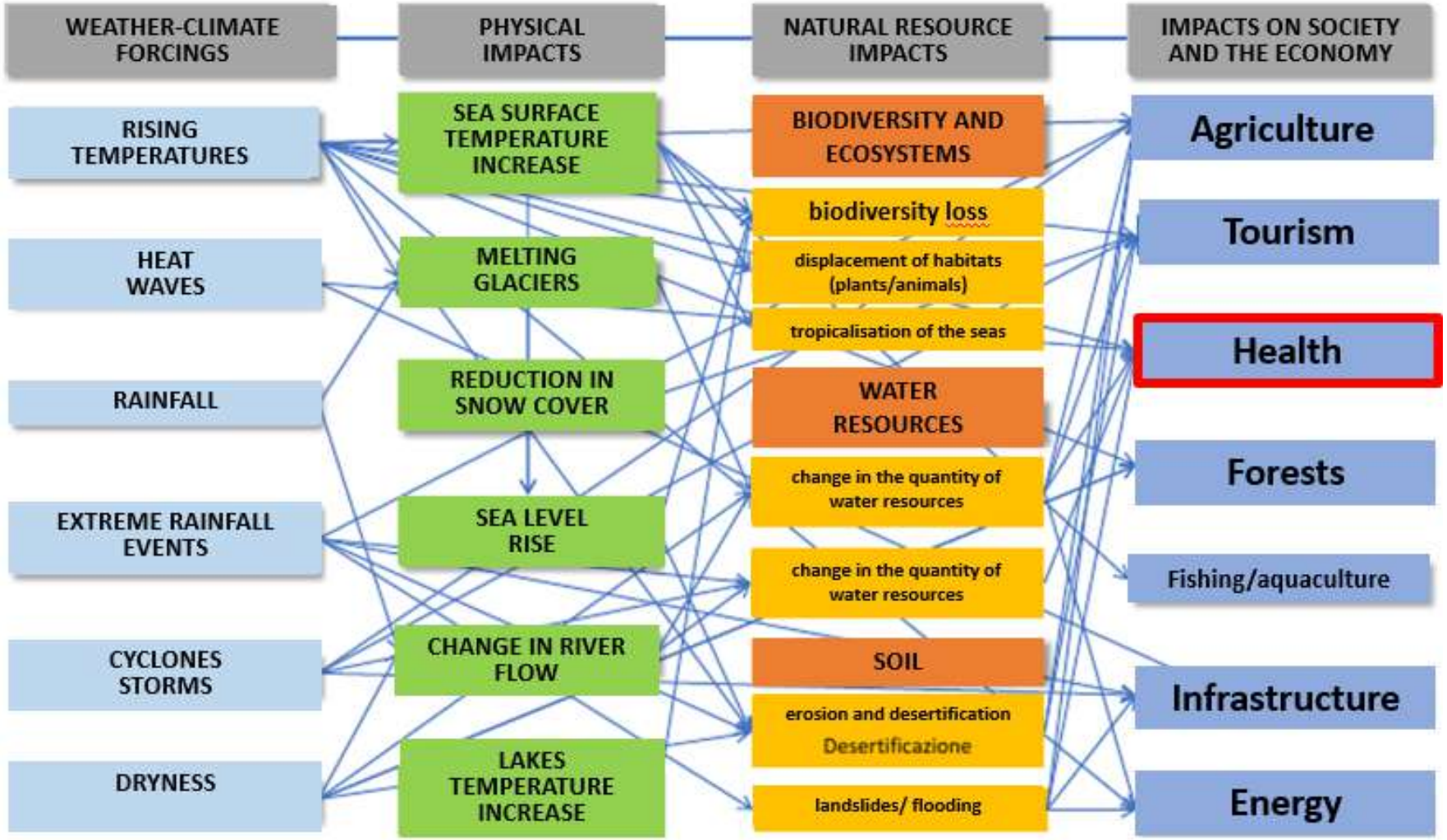
Multiple risks, complexity in managing the response to change. Example COVID-19 and Climate Change.



IMPACTS

- Adaptation and resilience
- Mitigation
- Governance and funding

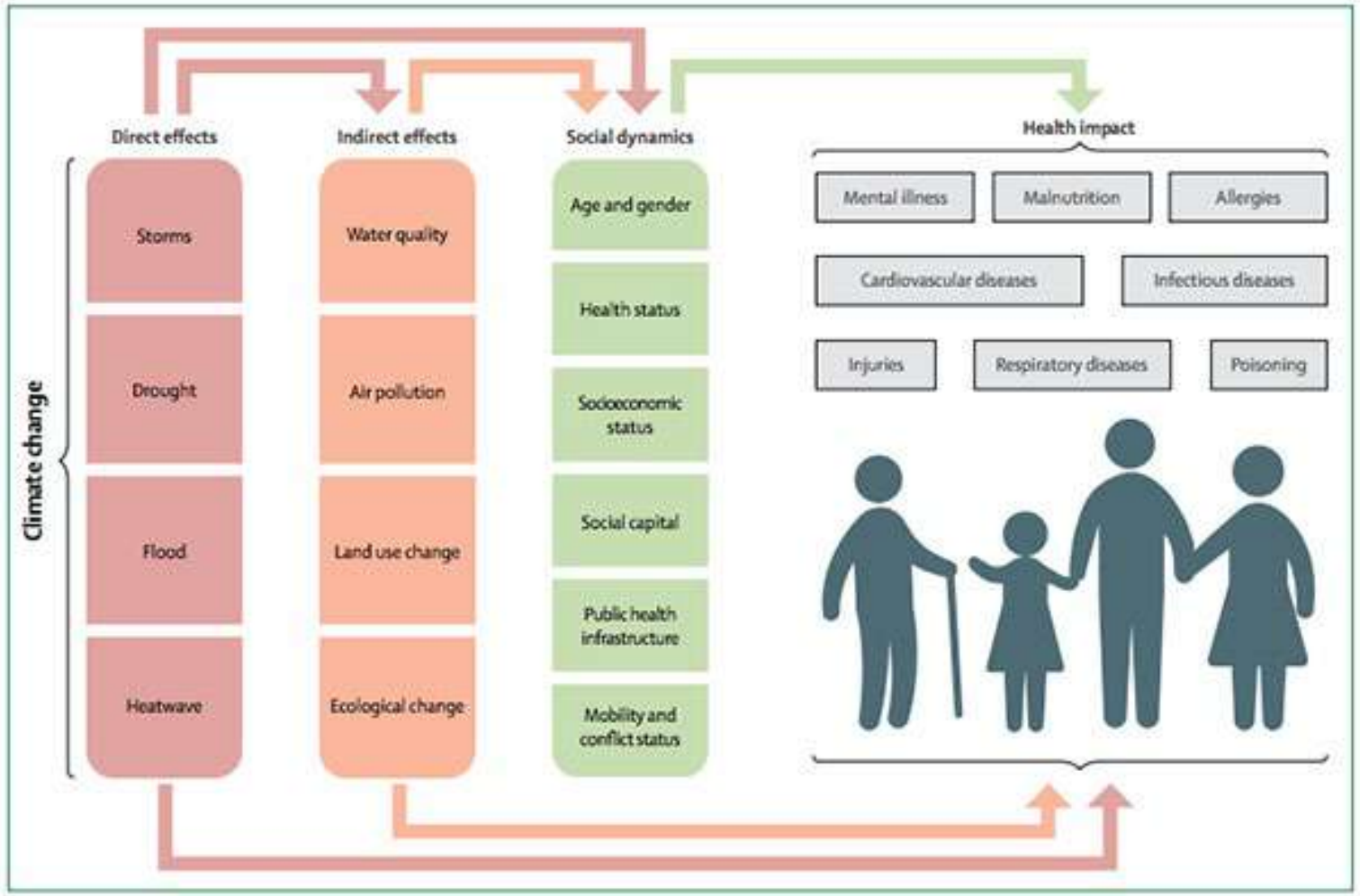
Impact of climate change: an illustrative framework

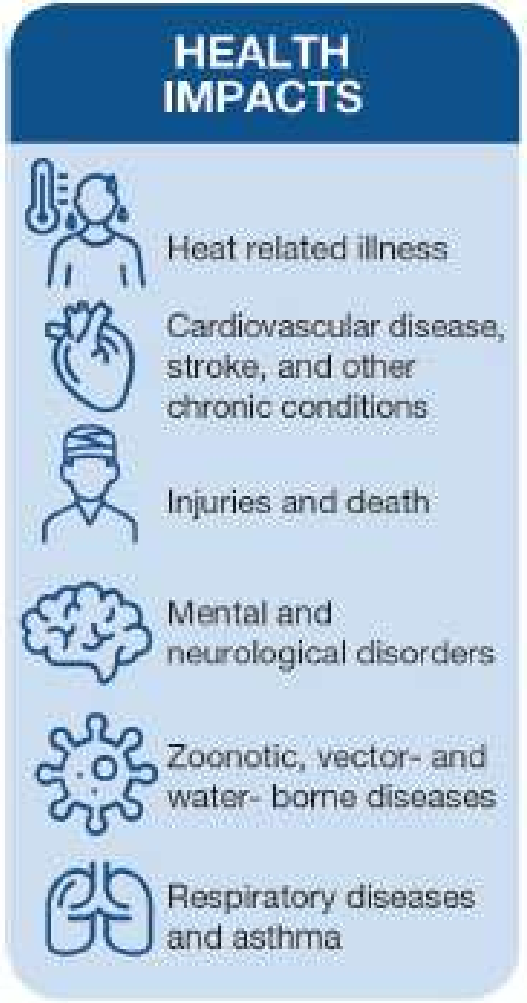


Lecture
Monday 15th of May, 11:00 AM

Co-funded by the Erasmus+ Programme of the European Union

Direct and indirect effects of climate change on health





OUTLINE

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Lecture
Monday 15th of May, 10:05-10:25

Co-funded by the Erasmus+ Programme of the European Union

Erasmus+ Action Type: KA220-HED - Cooperation partnerships in higher education
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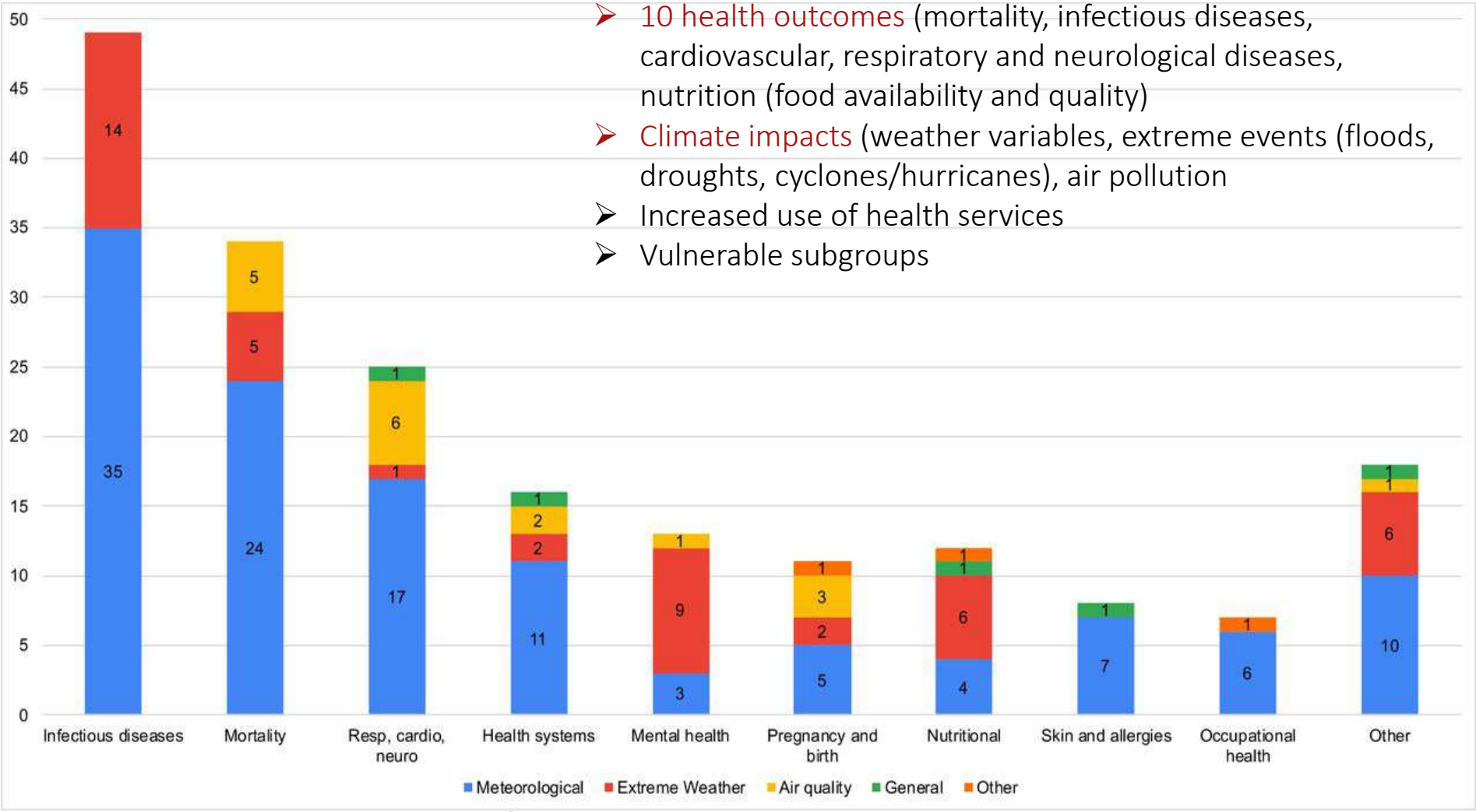
Evidence on climate change and health effects

Rocque *et al*. *BMJ Open* 2021

Overview of the systematic reviews

- 94 reviews with at least 1 health outcome related to CC
- 10 health outcomes (mortality, infectious diseases, cardiovascular, respiratory and neurological diseases, nutrition (food availability and quality)
- Climate impacts (weather variables, extreme events (floods, droughts, cyclones/hurricanes), air pollution
- Increased use of health services
- Vulnerable subgroups

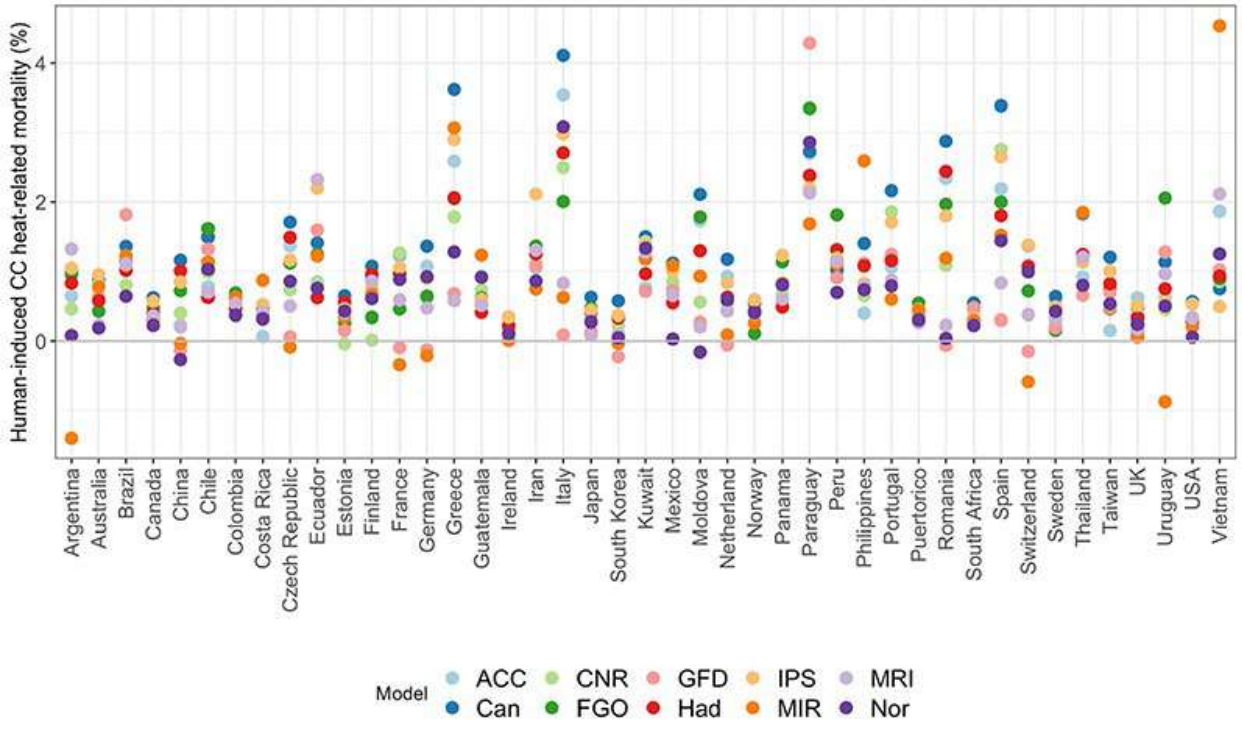


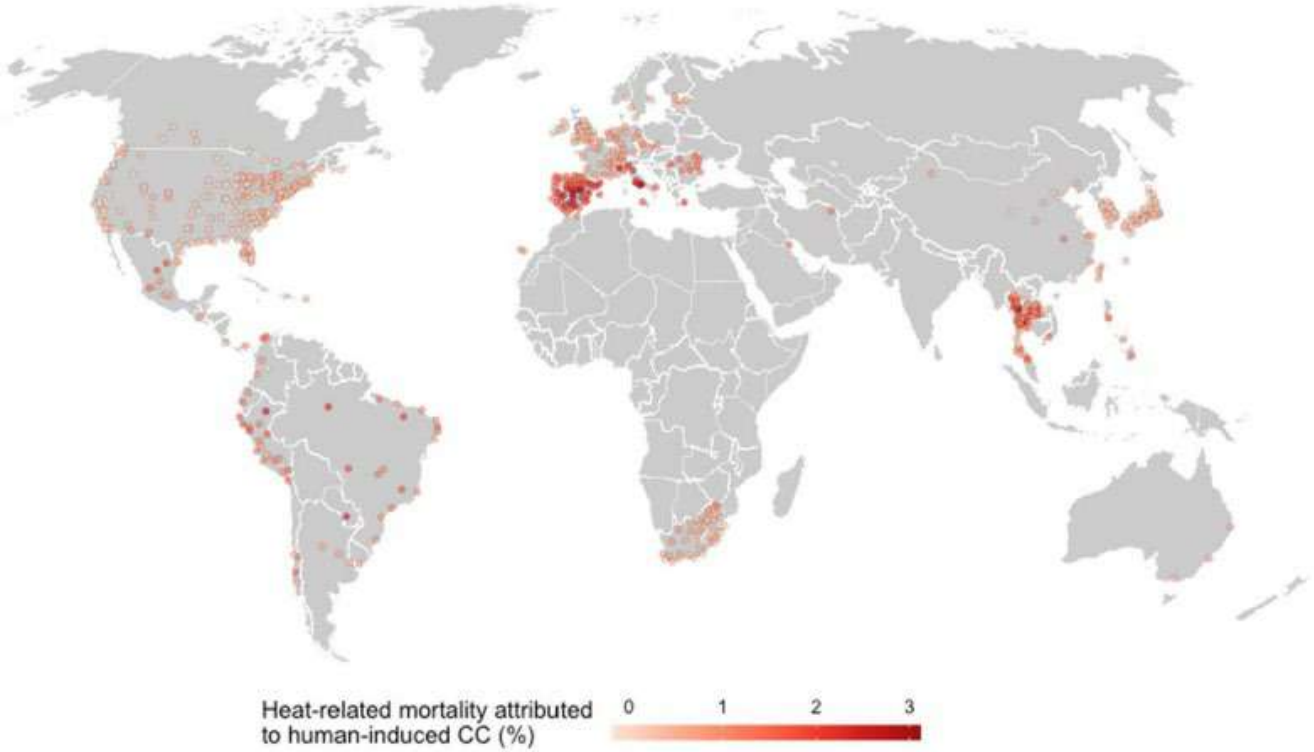
Frequency of climate change impact studies by health outcome

Lecture
Monday 15th of May, 11:00 AM

Co-funded by the Erasmus+ Programme of the European Union

GLOBAL. Anthropogenic contribution to climate change and impacts in terms of change in the heat-attributable mortality fraction.





Increases in heat-related mortality over the period 1991-2018 due to climate change. Europe and the Mediterranean among the areas most at risk. In Italy 30% of heat-related mortality is caused by anthropogenic climate change (var%)

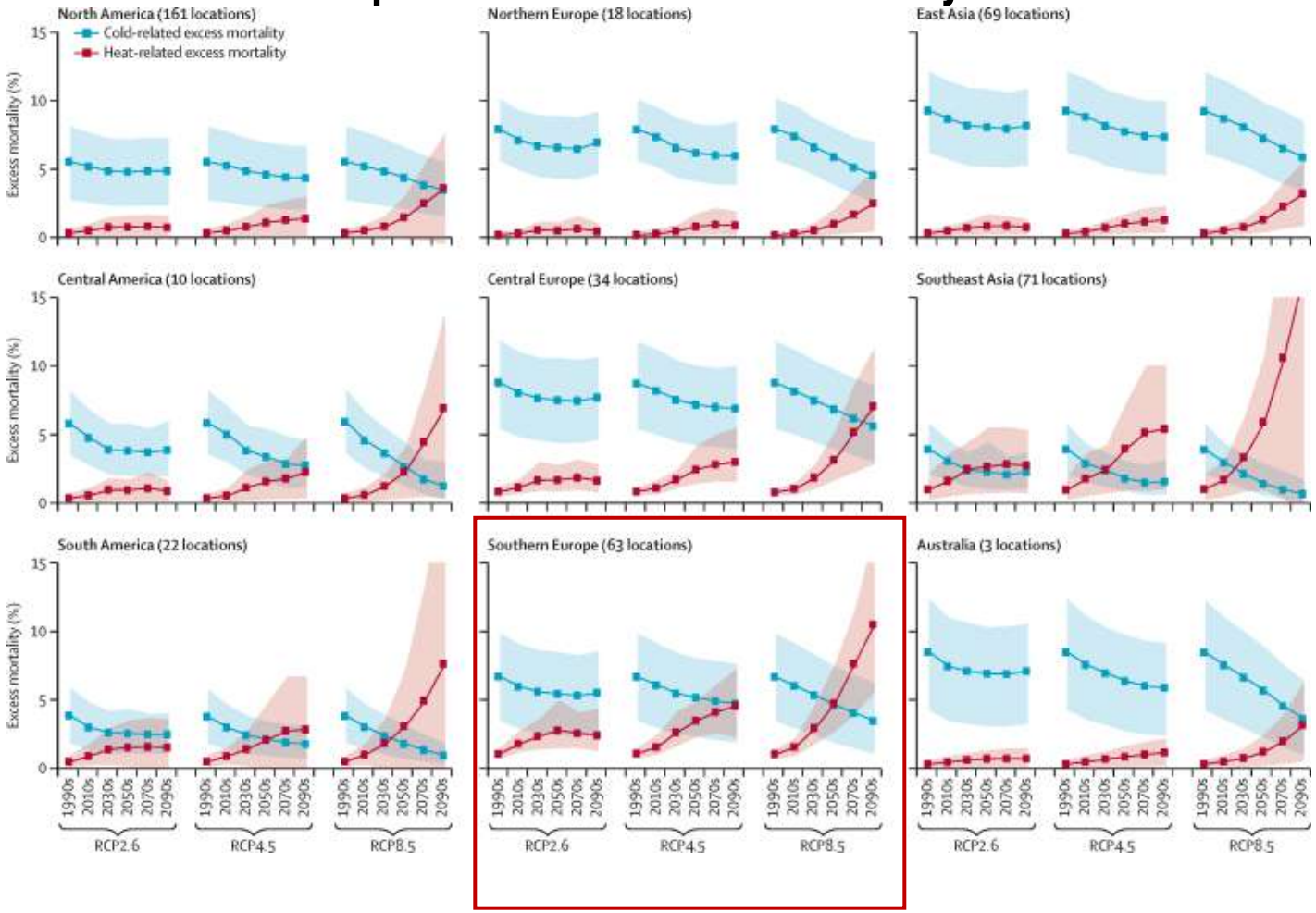
Extended Data Fig. 4. Location-specific heat-related mortality attributed to human-induced climate change (CC) between 1991–2018.

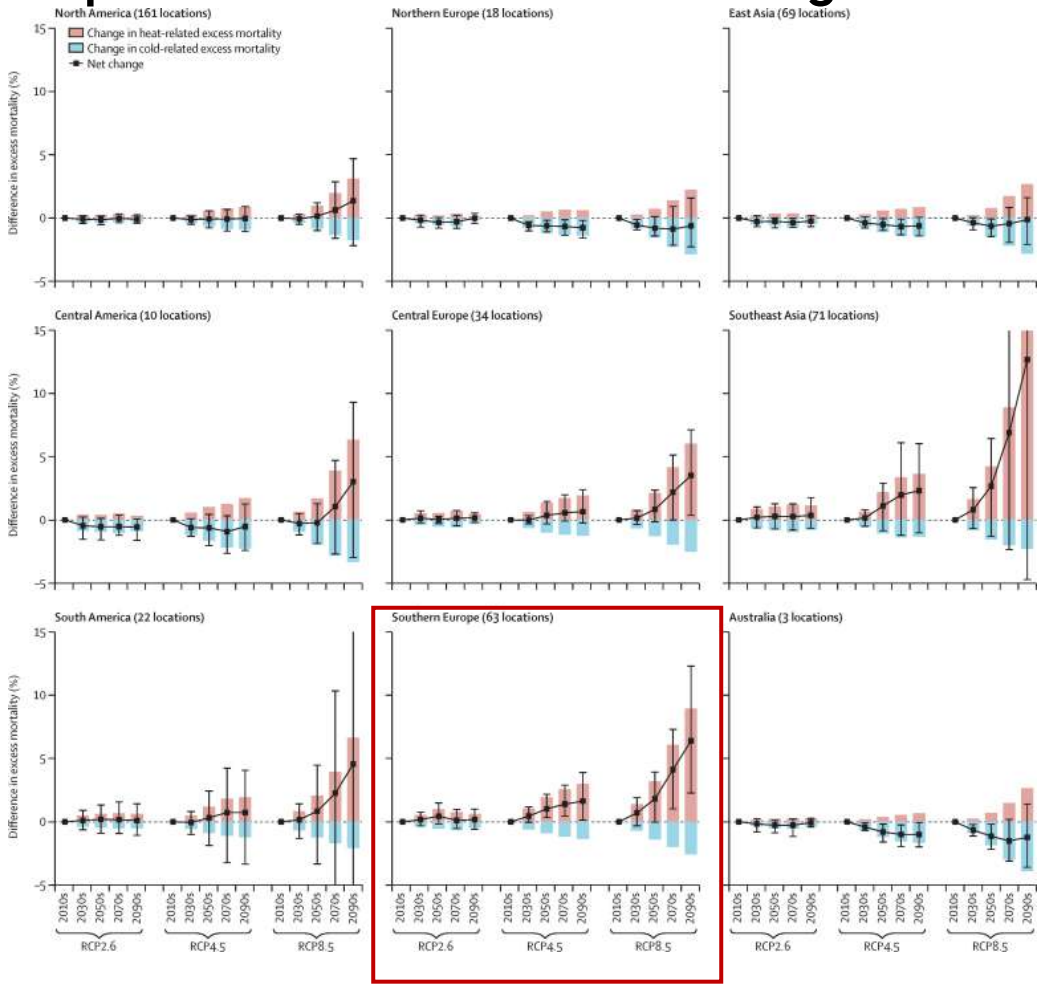
Vicedo-Cabrera et al. 2021

Lecture
Monday 15th of May, 11:00 AM

Co-funded by the Erasmus+ Programme of the European Union

GLOBAL. Temperature and mortality effects: future impacts under climate change





Positive trend with increase in excess mortality due to heat and reduction in mortality associated with cold.
Mediterranean among the areas at greatest risk.

Gasparrini et al. 2017

Lecture
Monday 15th of May, 11:00 AM

Co-funded by the Erasmus+ Programme of the European Union

European Commission. Impacts of climate change (temperature extremes) on mortality

European Commission

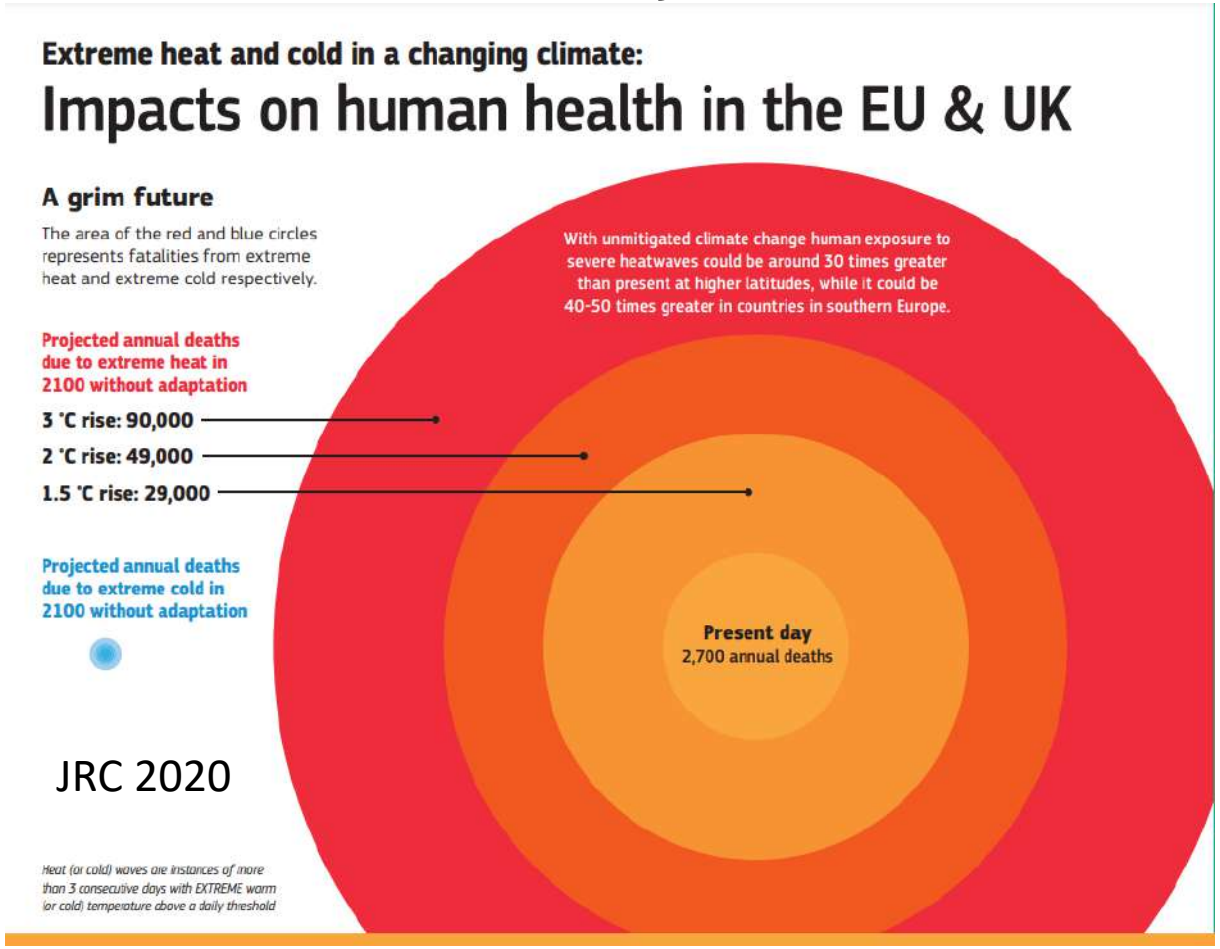
JRC TECHNICAL REPORT

Global warming and human impacts of heat and cold extremes in the EU

JRC PESETA IV project – Task 11

Naumann G., Russo S., Formetta G., Barreta D., Forzieri G., Girardello M., and Feyen L.

2020



EUROPE. Future impacts according to climate change scenarios in Europe. Variation in temperature effects (hot and cold) on mortality.

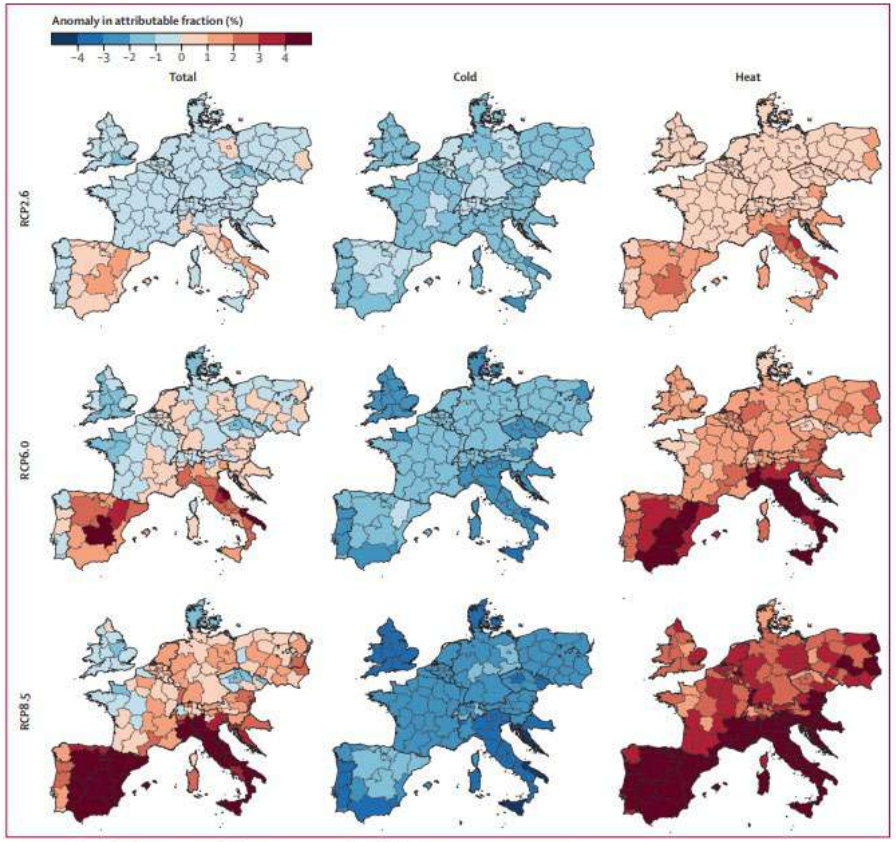


Figure 4: **Attributable fraction anomalies by RCP scenario at the end of the 21st century (2070–2099)**
Anomalies are calculated as the average of the four models, and expressed with respect to the reference period (1976–2005). RCP=Representative Concentration Pathway.

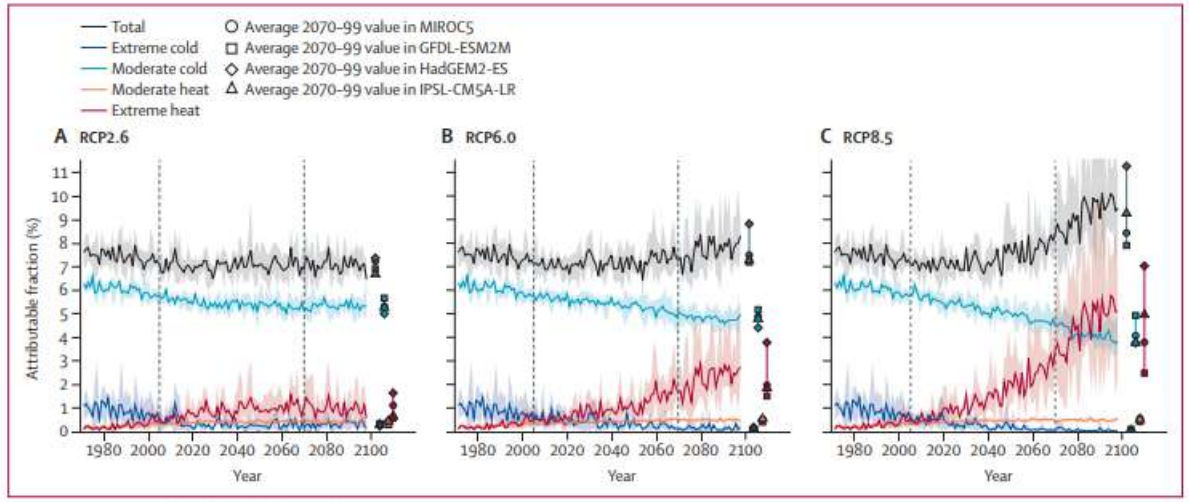


Figure 5: **Projections of attributable fraction by RCP scenario in Europe**
The attributable fraction is shown for all, extreme cold, moderate cold, moderate heat, and extreme heat temperatures. Projections correspond to the average of the four models. The shaded areas are CIs to the range of the ensemble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

Limits

- Does not consider adaptation, population variation
- Change in temperature-mortality association

Change in temperature impact on mortality (% attributable fraction change) under different climate change scenarios for the period 2070-2099. Mediterranean among the areas at greatest risk, Italy 9·87% (8·53-11·19).

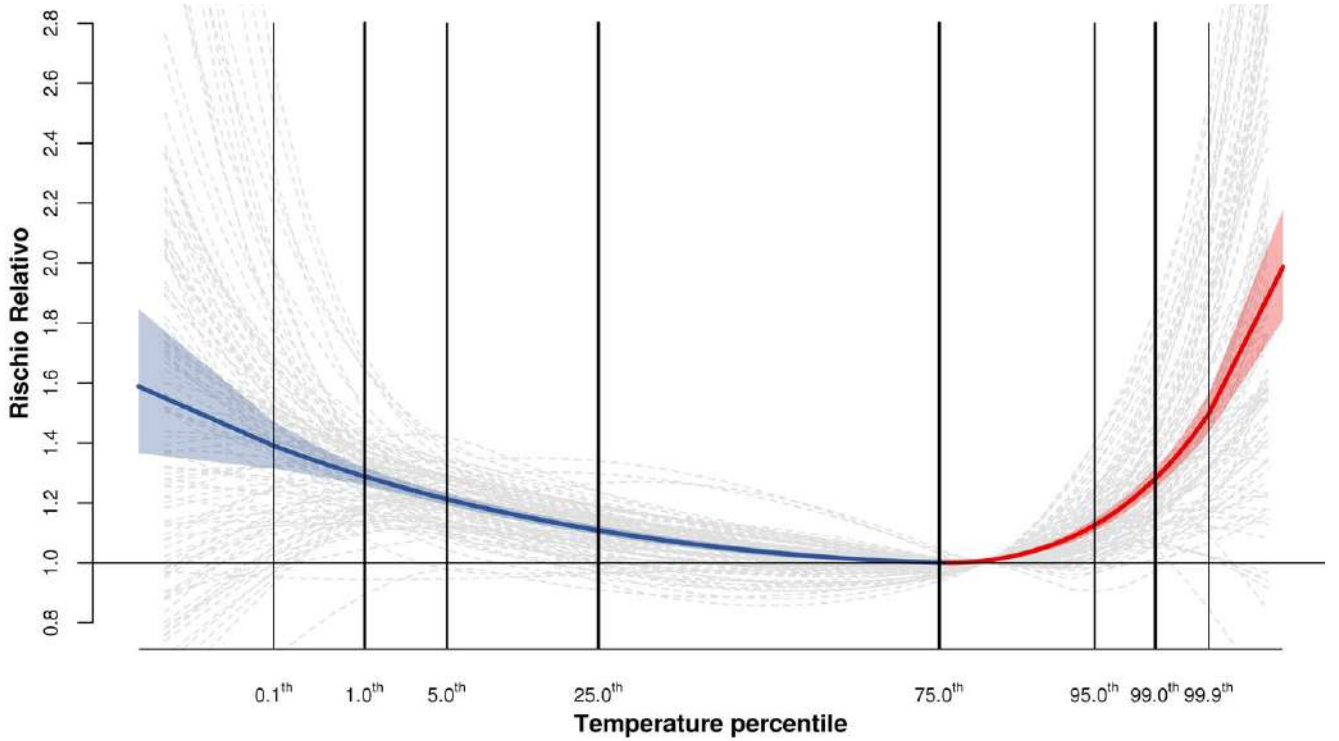
Martinez Solanas et al, 2021

ITALY. Effects of extreme temperatures on mortality by cause at national level

- In each province, **time series by municipality** with: daily count of deaths (**outcome**), municipal daily average temperature (**exposure**), daily confounders (time trends, day of the week, flu epidemics, summer holidays/seasons, etc.).

- Analysis by: **cause of death, age** (0-74, 75+), **gender**, **type of municipality** (urban, suburban, rural)

- Conditional Poisson regression with over-dispersion (*gnm*, libreria *gnm*, software *R*)

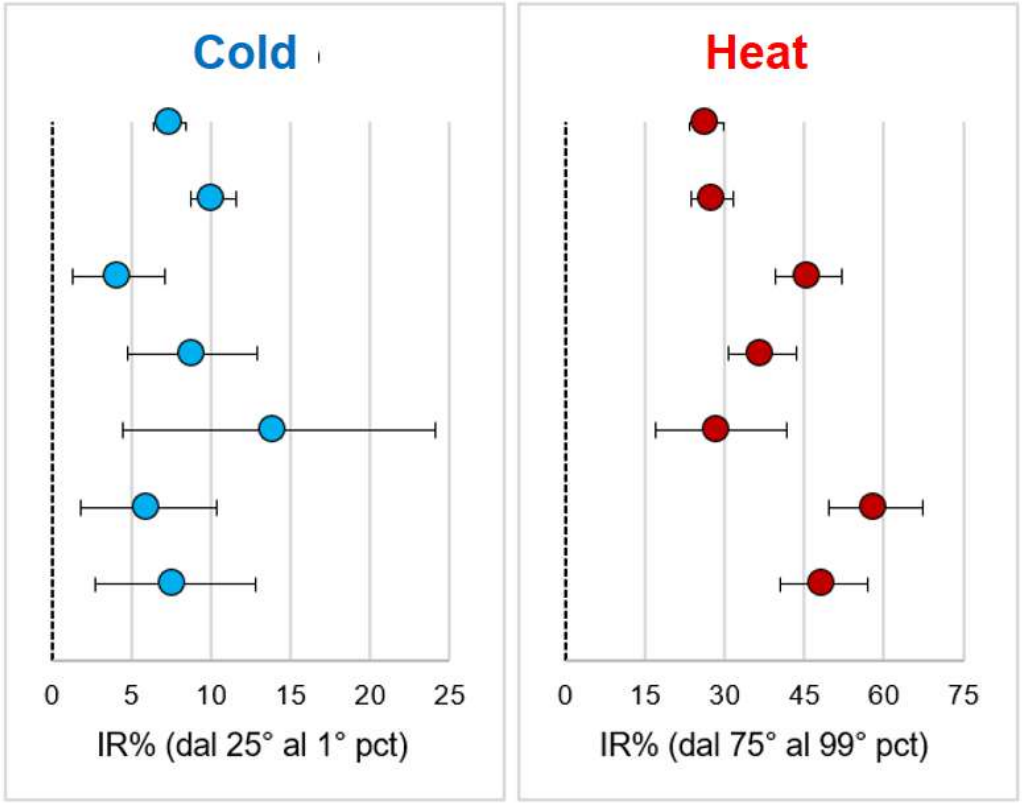


- **Cold**: RR at the 1st percentile (of the province-specific distribution) compared to the 25th percentile, used as a reference
- **HEAT**: RR at the 99th percentile (of the province-specific distribution) compared to the 75th percentile, used as a reference

ITALY. RESULTS - estimates of temperature effect on mortality by cause

MORTALITY BY CAUSE

Naturals
Cardiovascular
Respiratory
Metabolic
Diabetes
Nervous
Mental



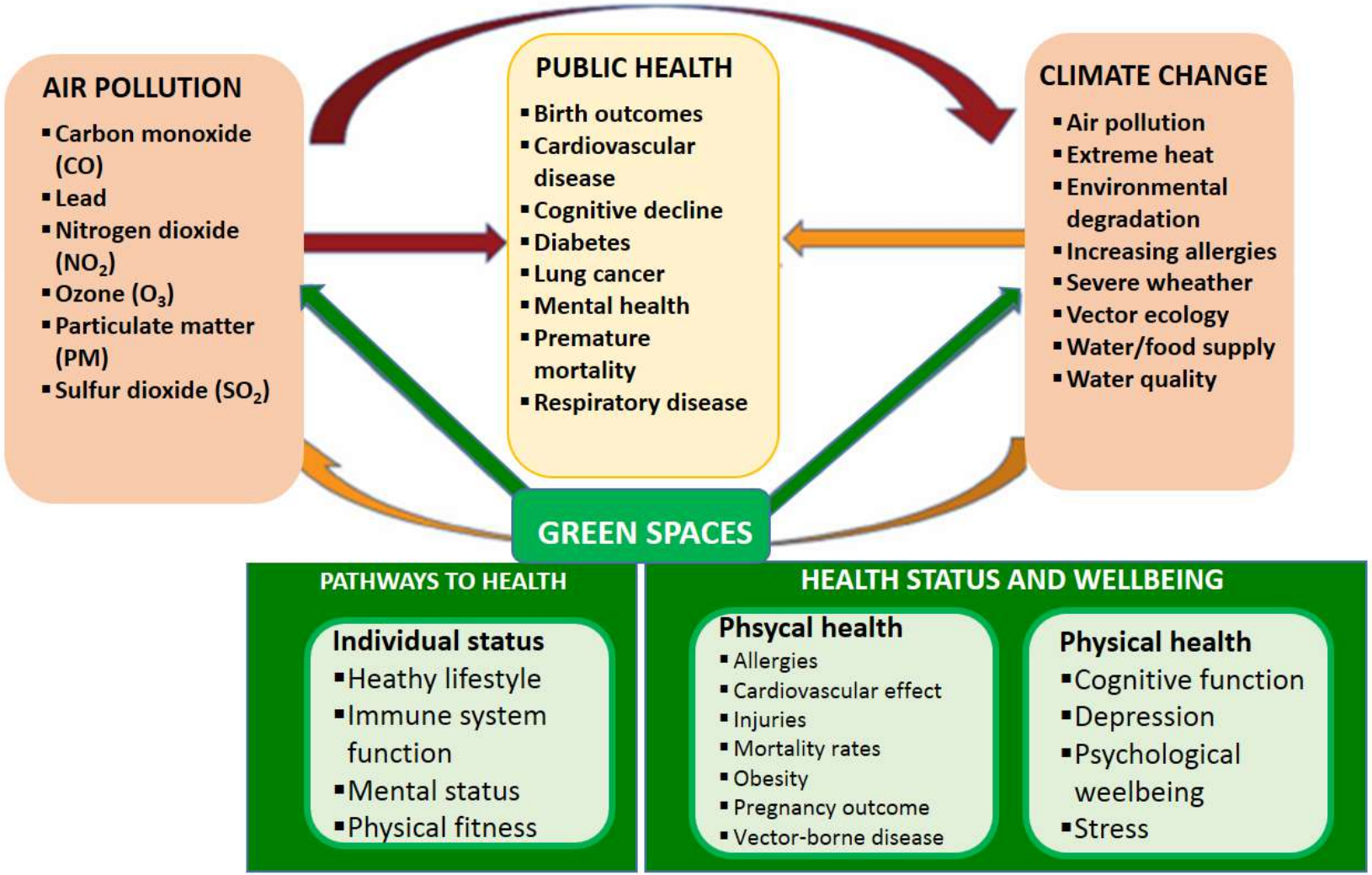
Mortality by cause	Cold			Heat		
	RR	IC 95%		RR	IC 95%	
Naturals	1.074	1.064	1.084	**1.265**	**1.233**	**1.297**
Cardiovascular	**1.101**	**1.087**	**1.116**	**1.277**	**1.238**	**1.318**
Cardiac	1.099	1.082	1.115	**1.253**	**1.219**	**1.288**
Ischaemic	**1.141**	**1.104**	**1.180**	1.095	1.057	1.134
Cerebrovascular	1.121	1.088	1.155	**1.270**	**1.216**	**1.327**
Respiratory	1.042	1.013	1.071	**1.458**	**1.397**	**1.521**
Nervous	1.060	1.018	1.104	**1.583**	**1.497**	**1.675**
Mental	1.076	1.027	1.128	**1.484**	**1.404**	**1.569**
Metaboslic	1.088	1.048	1.129	**1.369**	**1.306**	**1.435**
Diabetes	**1.139**	**1.045**	**1.241**	**1.287**	**1.169**	**1.418**

BIGEPI BIG data per la valutazione degli Effetti sanitari dell'inquinamento atmosferico nella Popolazione Italiana

INAIL ISTITUTO NAZIONALE PER L'ASSICURAZIONE CONTRO GLI INFORTUNI SUL LAVORO

IFC

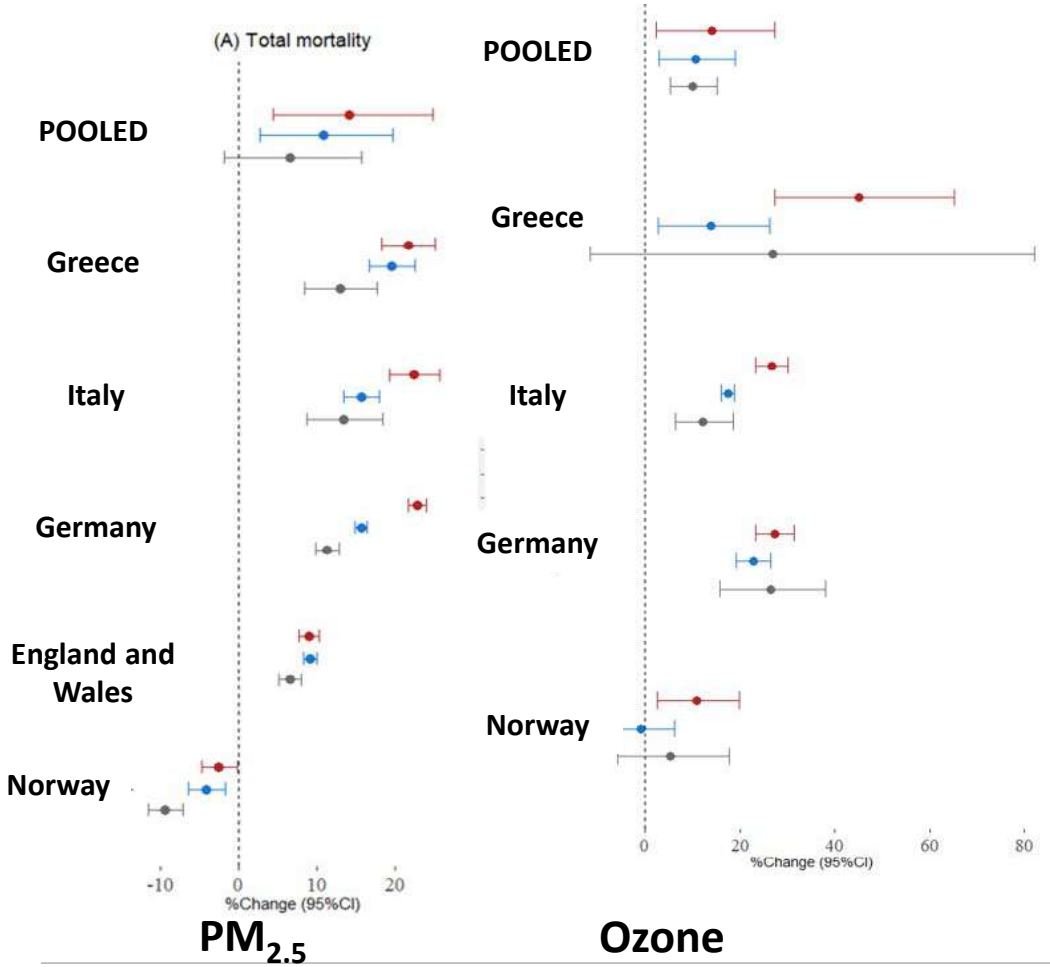
Climate change-air pollution-urban greening



Interaction between air pollution ($PM_{2.5}$ and Ozone) and temperatures

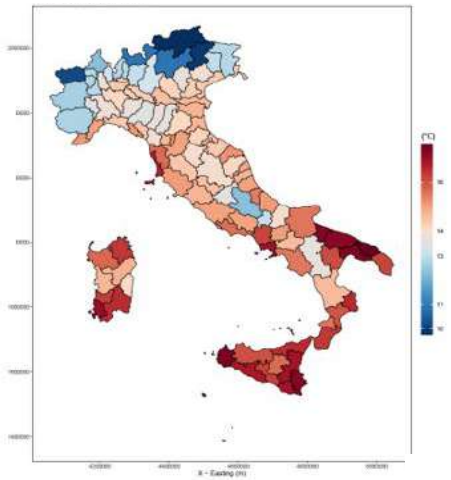
% change in mortality risk from heat exposure by pollution levels in Europe

EXHAUSTION

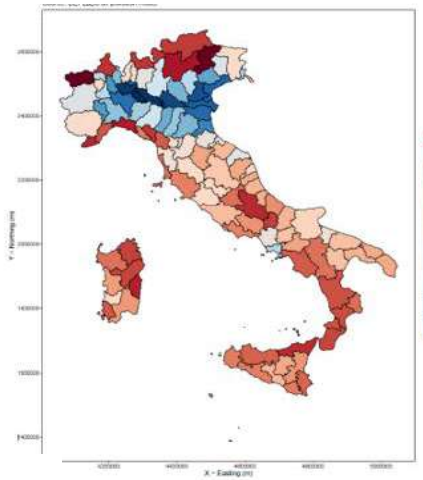


$PM_{2.5}$ Ozone

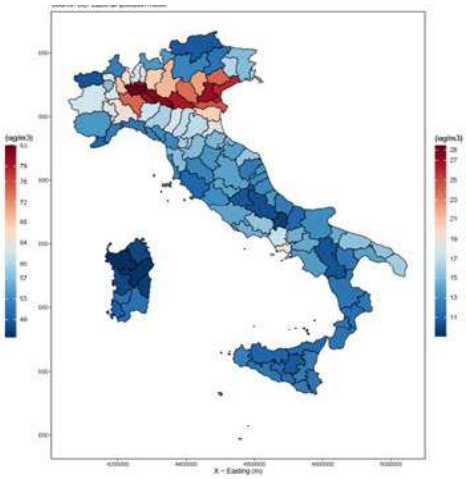
Annual average temperature for Italy, 2015



Annual average O_3 for Italy, 2015



Annual average $PM_{2.5}$ for Italy, 2015



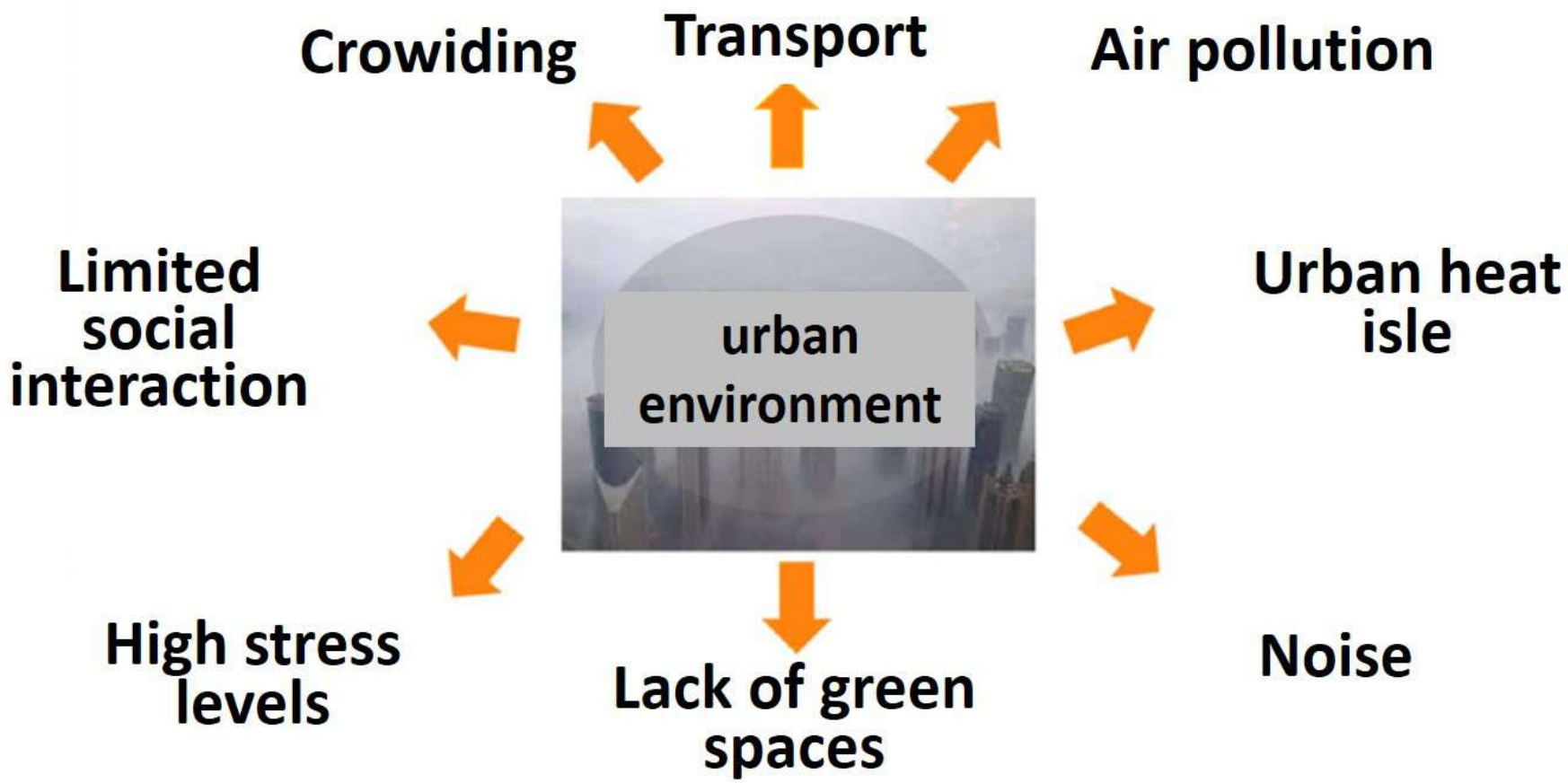
LOW

MEDIUM

HIGH

Air pollution in cities

By 2050, more than 70 per cent of the world's population will live in urban environments (UN, 2014)



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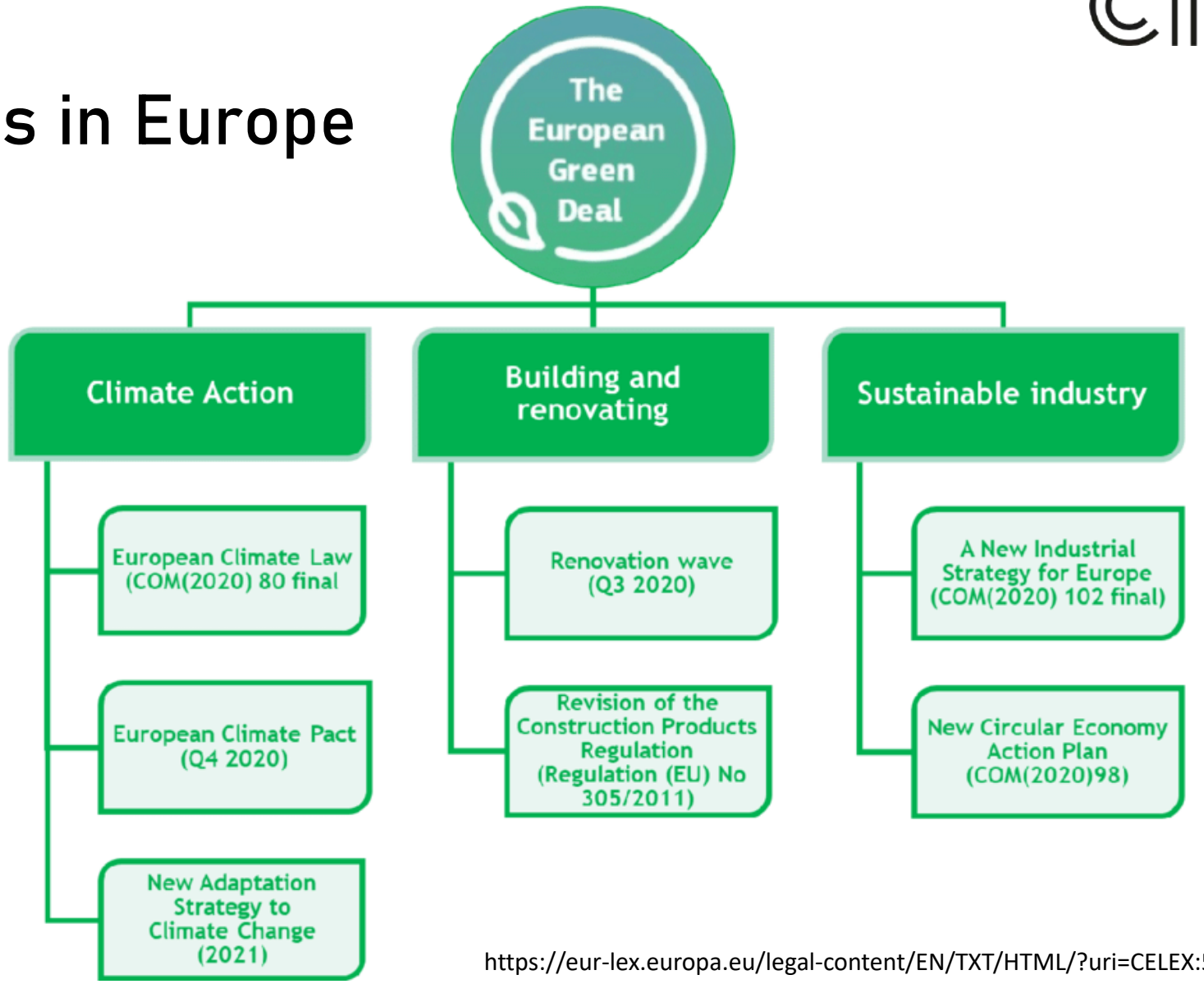
Co-funded by the Erasmus+ Programme of the European Union

Mitigation policies in Europe



https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52019DC0640&from=ET

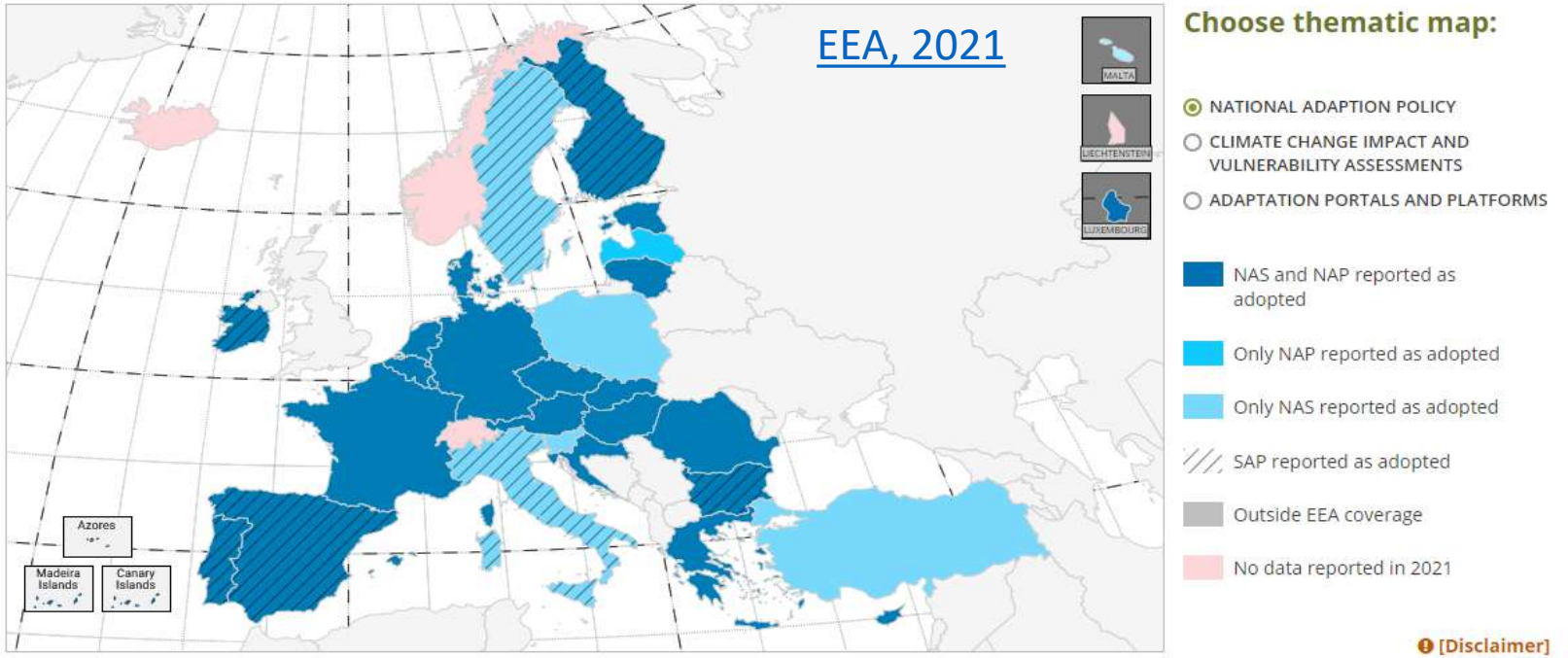
Policies for adaptation to climate change

Climate change adaptation plans

Only 3 EU countries

have specific health plans (Sweden, Finland and Ireland)

The thematic maps illustrate the reported status and information provided by the member countries. The thematic maps don't necessary reflect the formal status in the country.

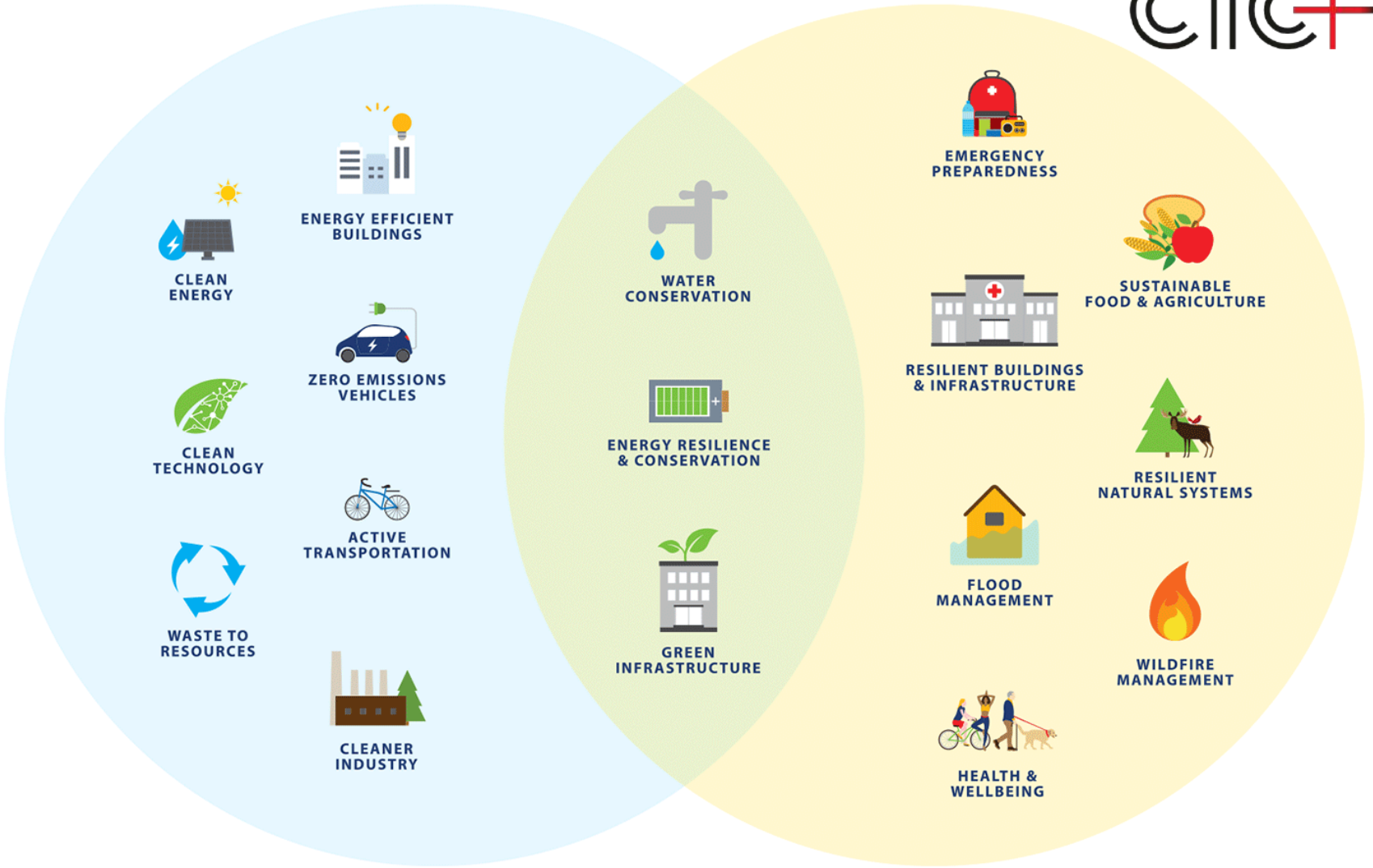


Oct 18, 2021

Mapping of stakeholders in Europe working on adaptation

Connecting HEALTH & CLIMATE CHANGE

Responding to climate change what to do?



Mitigation - reduction of emissions

Adaptation and resilience

Climate change and health: solutions and responses for resilience

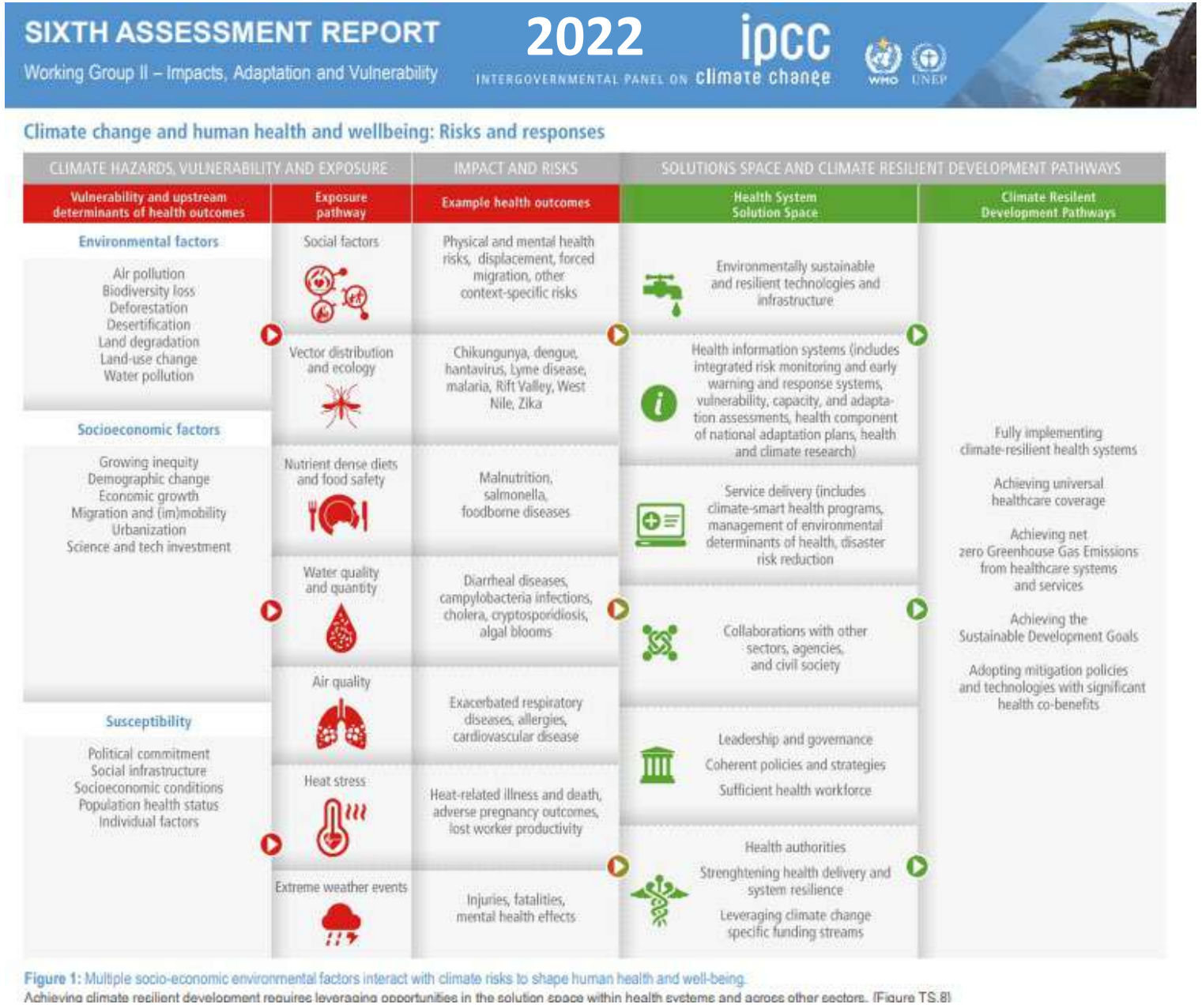
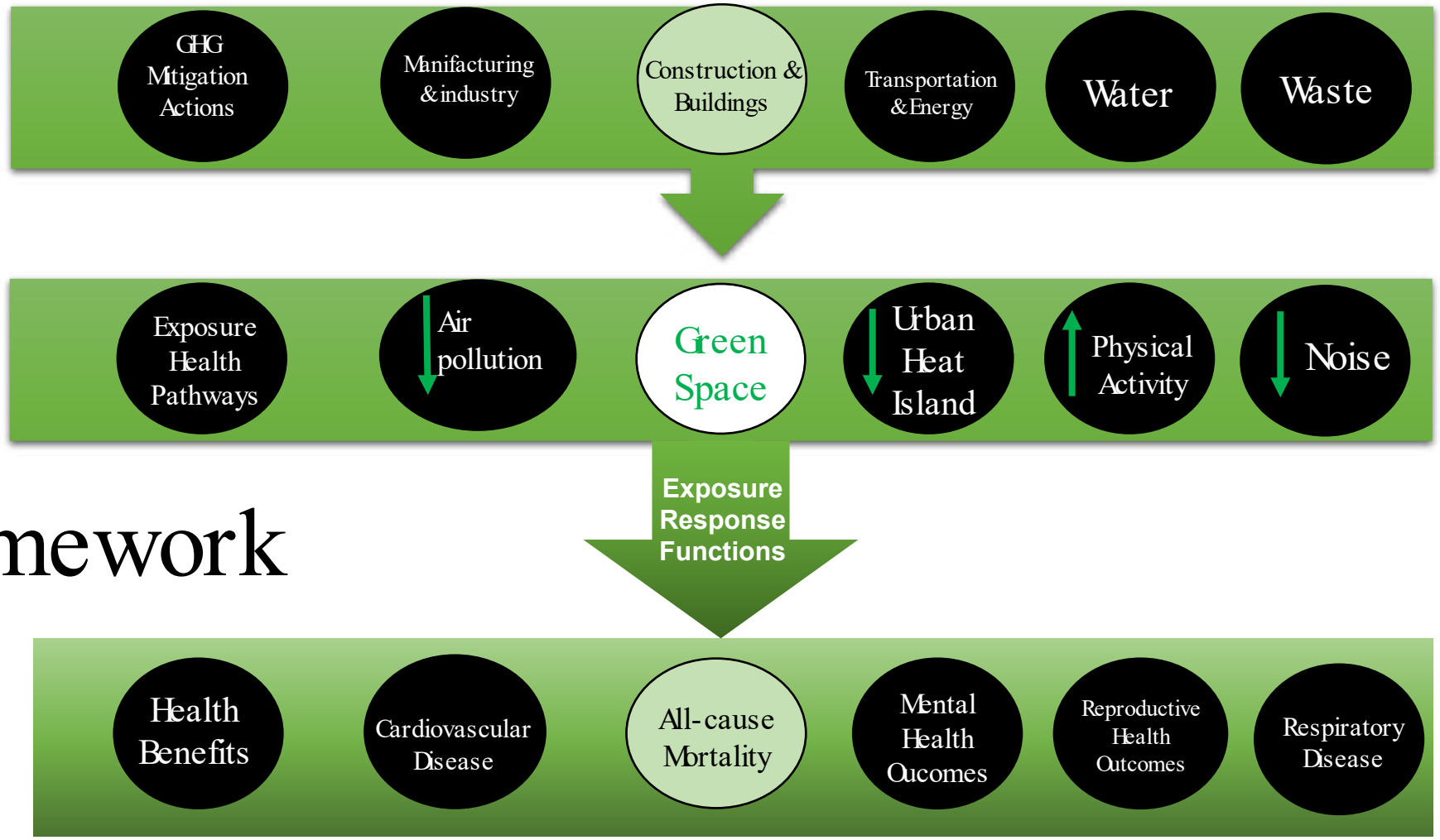


Figure 1: Multiple socio-economic environmental factors interact with climate risks to shape human health and well-being.
Achieving climate resilient development requires leveraging opportunities in the solution space within health systems and across other sectors. (Figure TS.8)

Health mitigation and co-benefits interventions: conceptual framework



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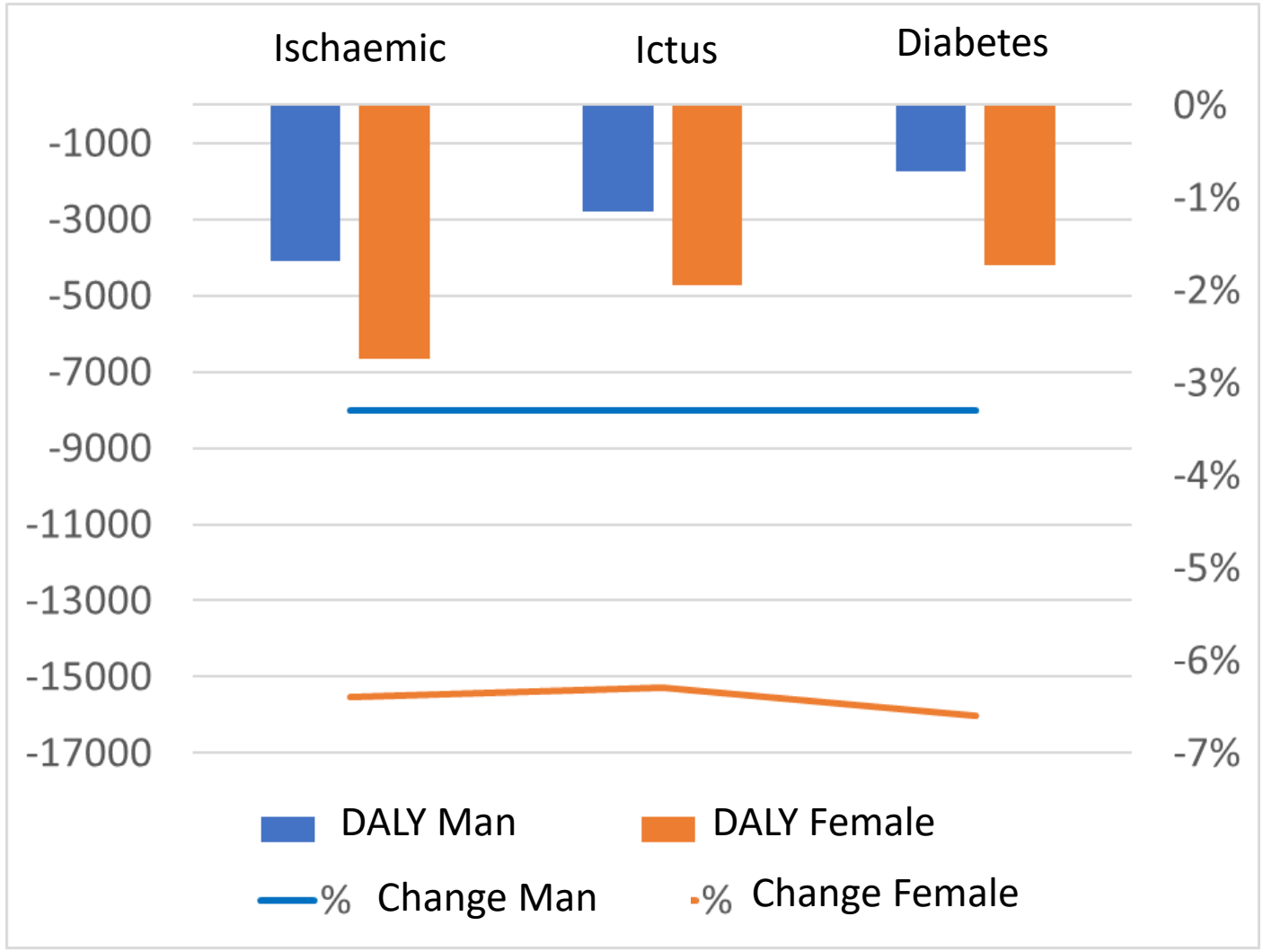
Co-benefit policies: urban transport

- Scenario in urban transport in 2040 compared to baseline (2012) in São Paulo, Brazil: active transport and reduction in private car and motorbike use
- Greater co-benefits in women associated with increased physical activity
- Reductions are also observed for motorbike accidents and air pollution (in these cases greater co-benefits in men)



DALY, disability-adjusted life year: the sum of the years of life lost to due to premature mortality (YLLs) and the years lived with a disability (YLDs)

Co-funded by the Erasmus+ Programme of the European Union

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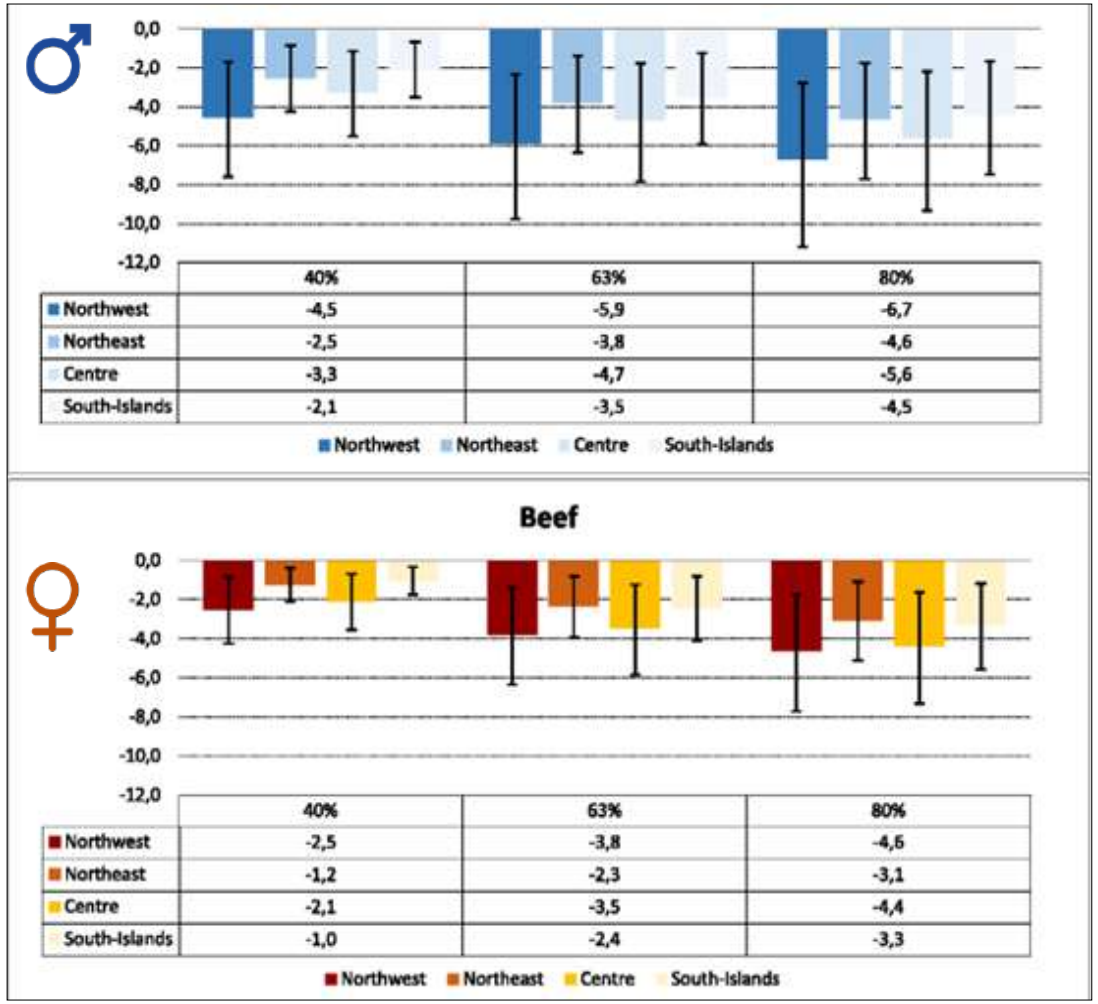
Co-benefit policies: diet

The greatest co-benefits of improving diet, e.g. by reducing red meat consumption in men.

If consumption is reduced to the recommended amount of 150 grams/week* (-63% compared to current consumption) **4.4% of deaths from colorectal cancer can be avoided in men** (avoidable deaths are 3.0% in women)

Similar reductions are observed for cardiovascular deaths, again with the greatest benefits in men.

* Recommended dosage according to the Mediterranean Diet Pyramid



	40%	63%	80%
Northwest	-4,5	-5,9	-6,7
Northeast	-2,5	-3,8	-4,6
Centre	-3,3	-4,7	-5,6
South-Islands	-2,1	-3,5	-4,5

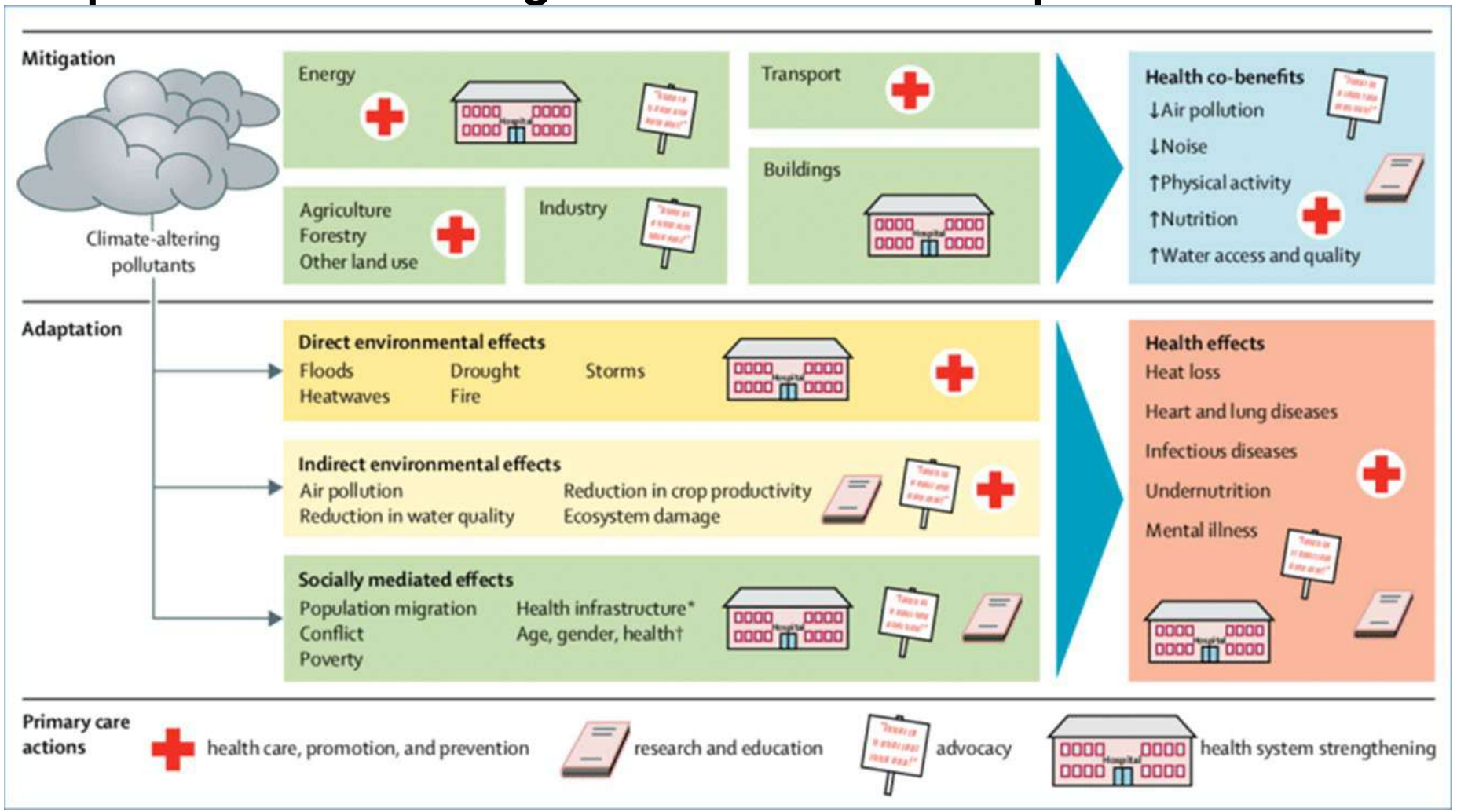
	40%	63%	80%
Northwest	-2,5	-3,8	-4,6
Northeast	-1,2	-2,3	-3,1
Centre	-2,1	-3,5	-4,4
South-Islands	-1,0	-2,4	-3,3

Italy, 2012 (Farchi et al. 2017)

Co-funded by the Erasmus+ Programme of the European Union

Climate change adaptation and mitigation: the role of public health

- Reduce public health emissions (define roadmap and interventions)
- Promote and monitor mitigation actions with health co-benefits
- Investments in sustainable infrastructure and technology
- Training health personnel
- Advocacy
- Leadership and Governance



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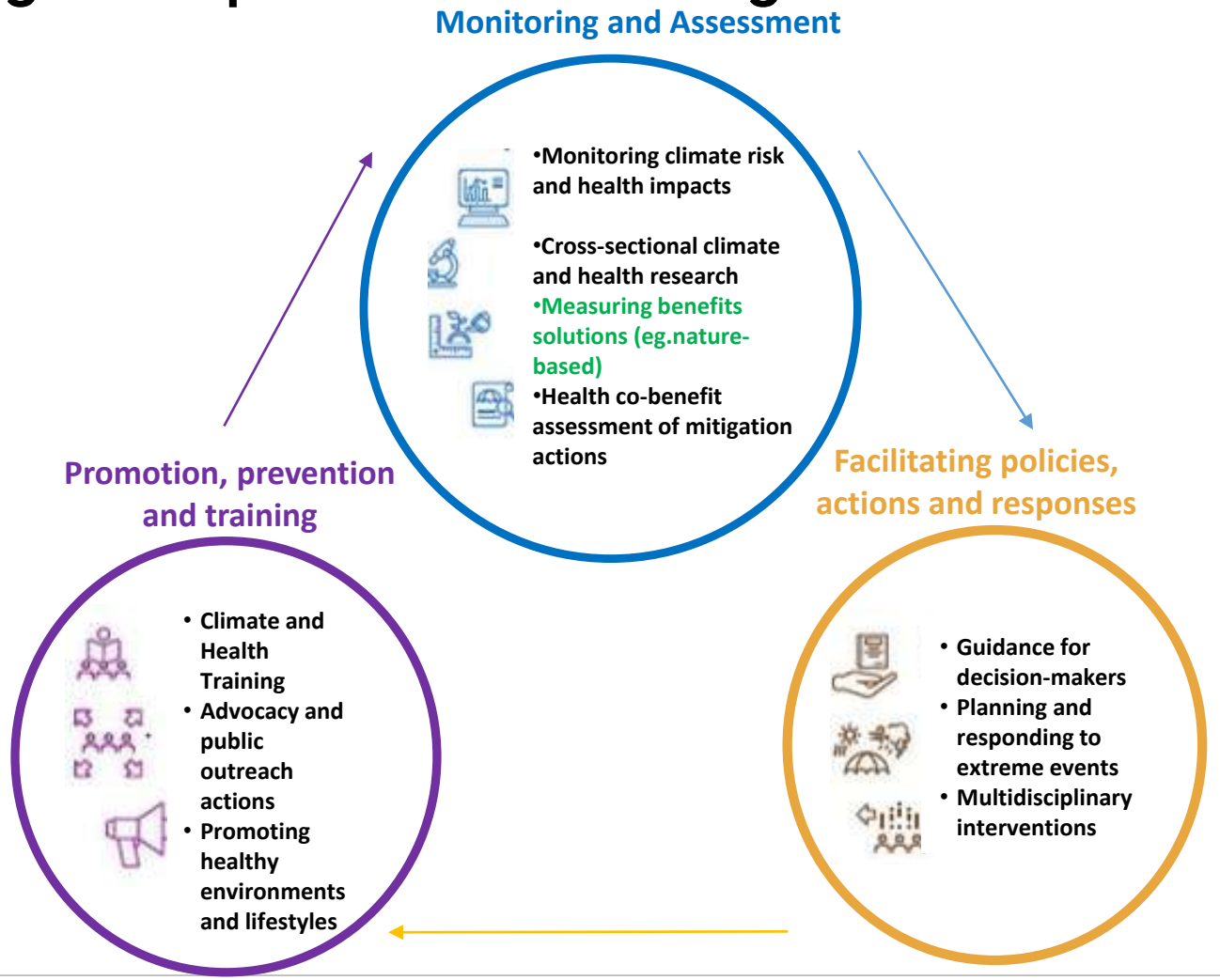
Climate change adaptation and mitigation: the role of public health



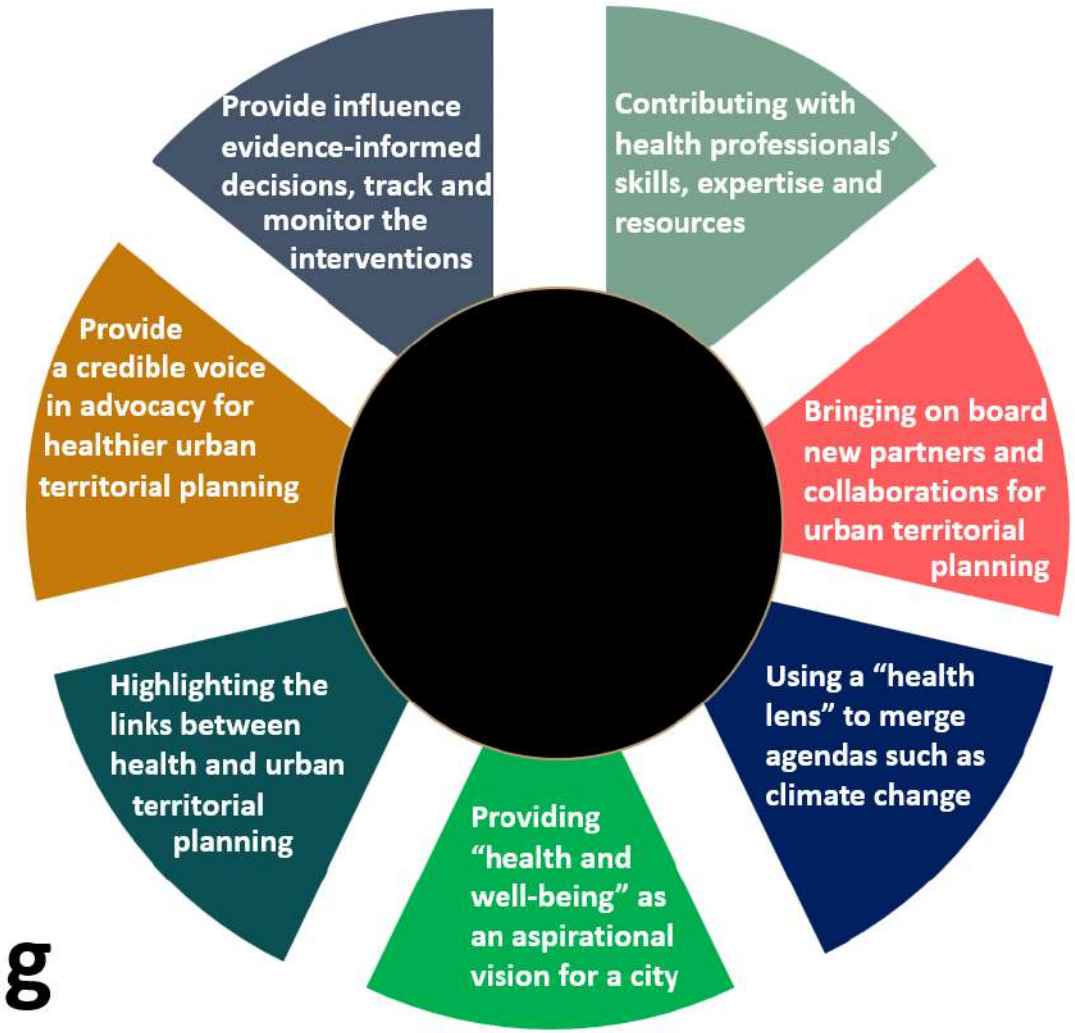
How can

HEALTH

unlock

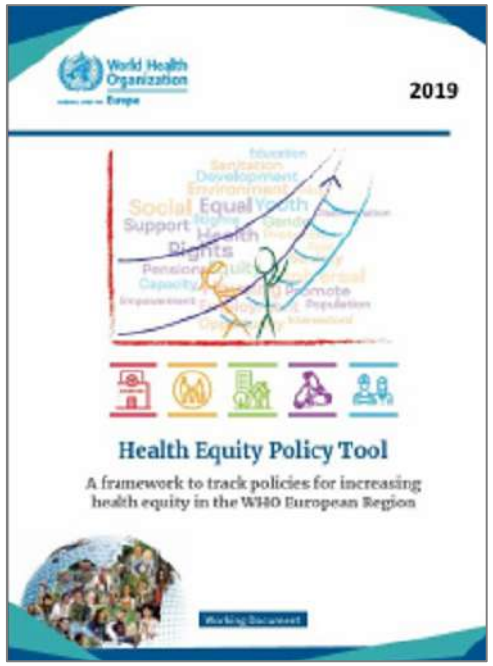
new opportunities for

Urban and Territorial Planning

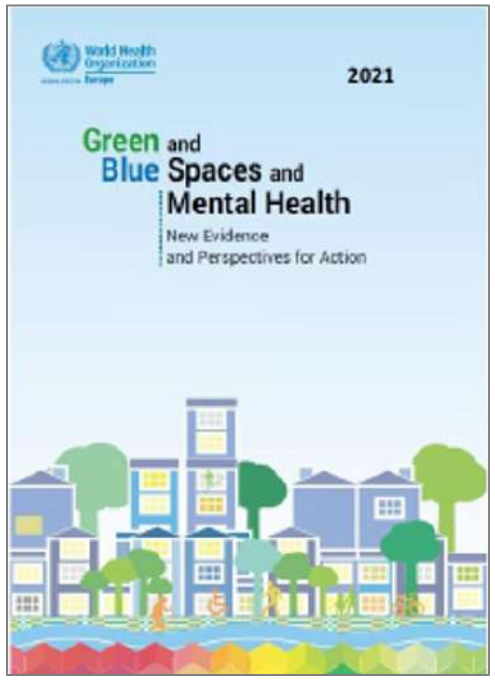


INTEGRATING HEALTH IN URBAN AND TERRITORIAL PLANNING: A SOURCEBOOK,2020

Access to greenery as a service of quality and health

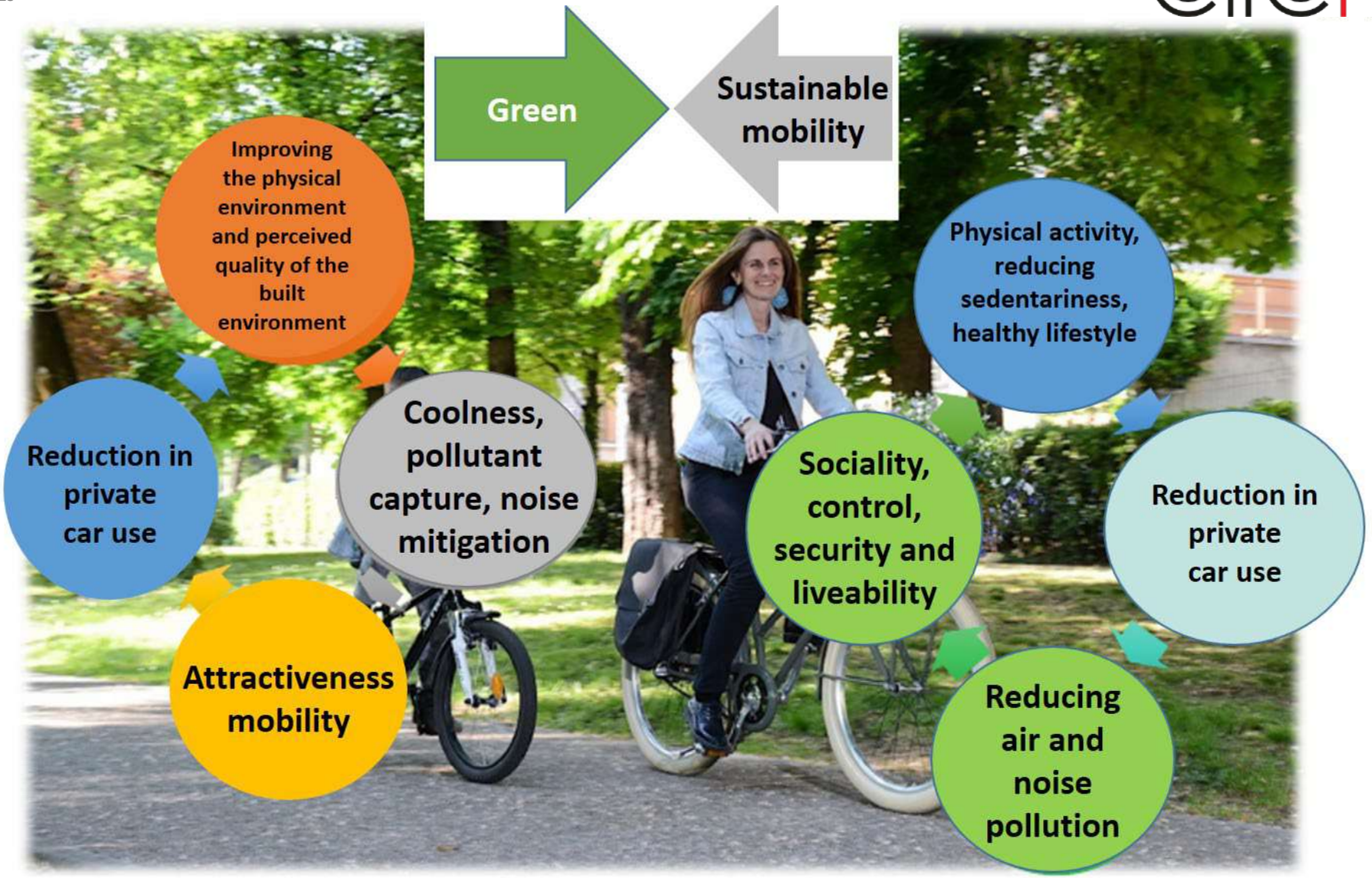


Safe, well-managed and accessible parks and green spaces promote respiratory health, physical activity, mental well-being and social interaction in communities.



Results of reviews on the types and characteristics of green and blue spaces in relation to mental health confirm the beneficial relationship.

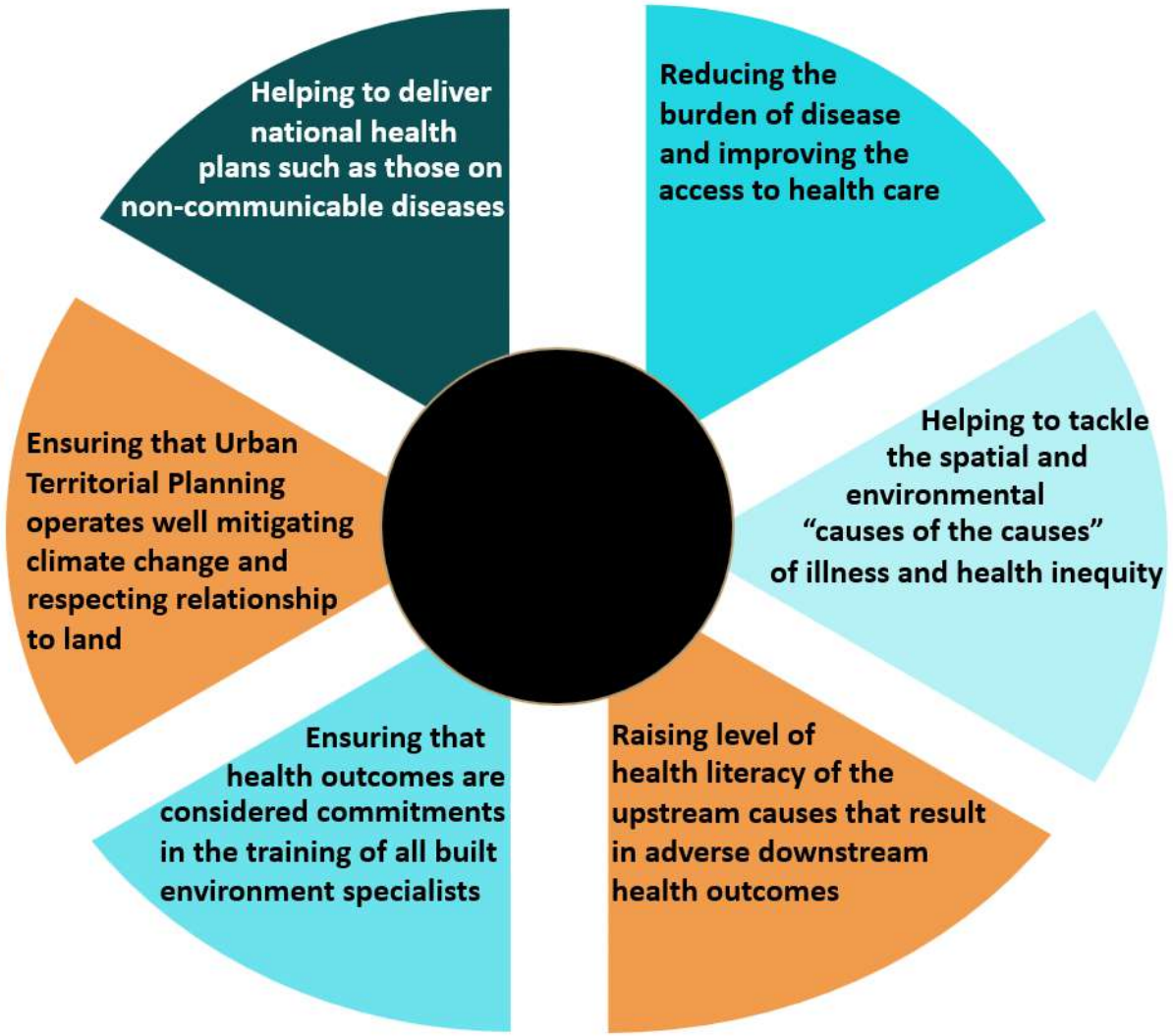
The presence of greenery improves the aesthetic perception of the landscape and lends beauty to urban spaces, increasing property values and making neighbourhoods more attractive.


Green
Sustainable mobility
Improving the physical environment and perceived quality of the built environment
Physical activity, reducing sedentariness, healthy lifestyle
Reduction in private car use
Coolness, pollutant capture, noise mitigation
Sociality, control, security and liveability
Reduction in private car use
Attractiveness mobility
Reducing air and noise pollution

How can

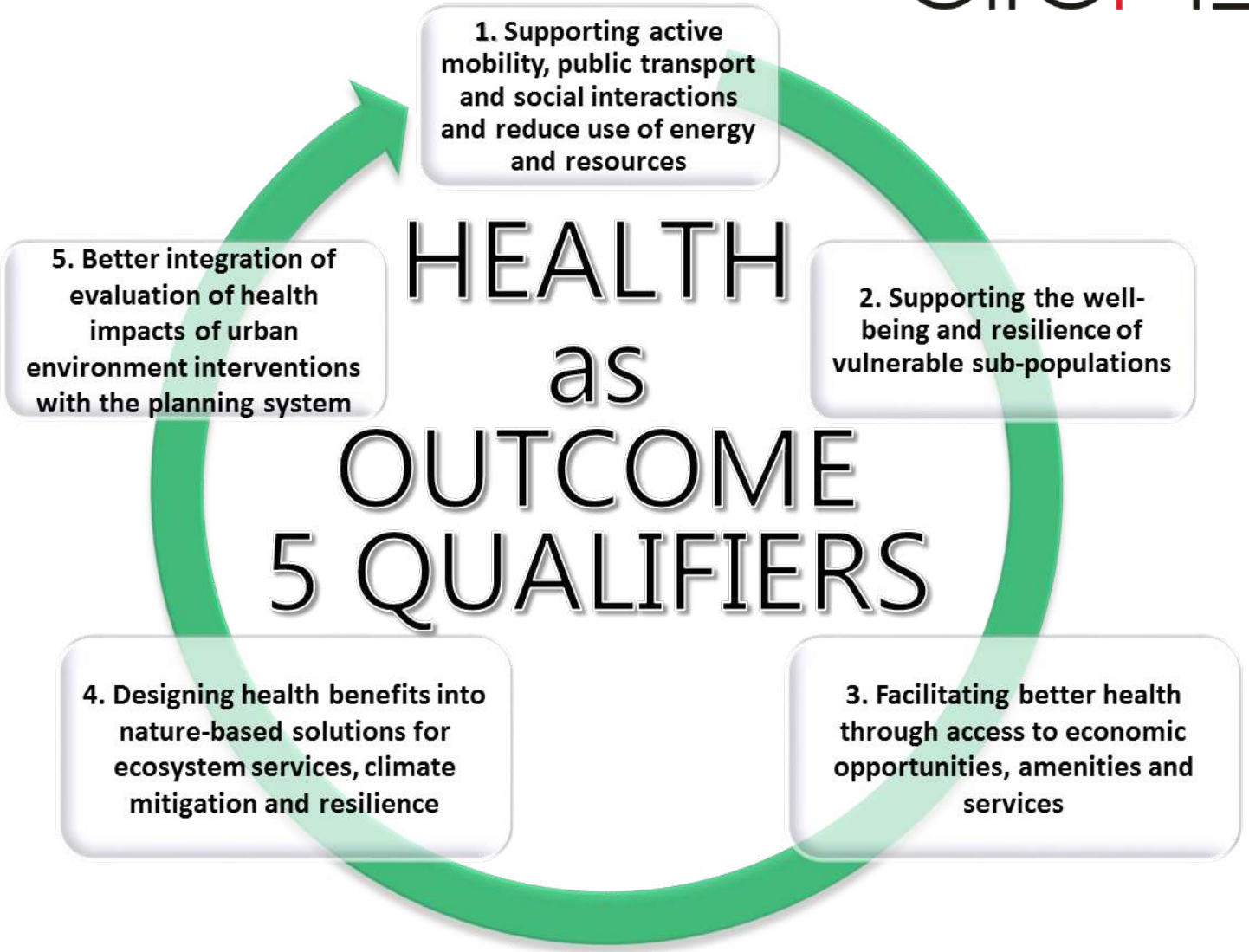
URBAN AND TERRITORIAL PLANNING contribute

HEALTH



INTEGRATING HEALTH IN URBAN AND TERRITORIAL PLANNING: A SOURCEBOOK,2020

FOSTERING SUSTAINABLE URBAN AND TERRITORIAL PLANNING



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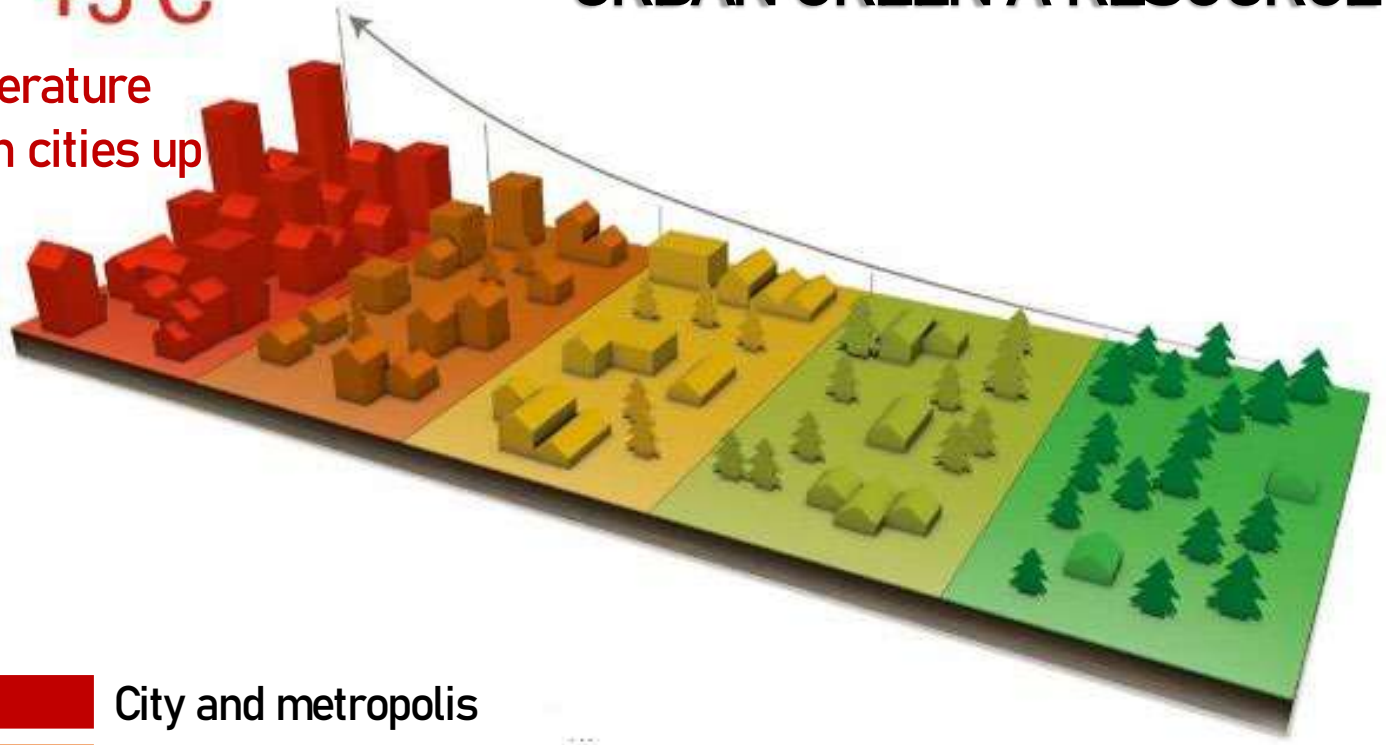
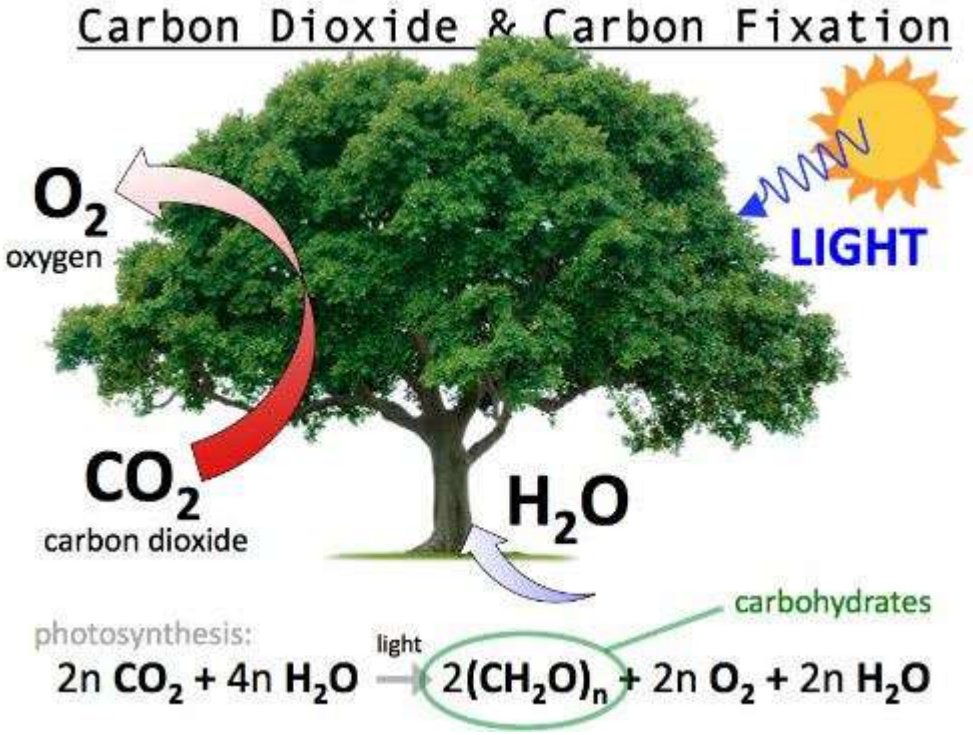
URBAN GREEN A RESOURCE FOR HEALTH

+5°C

Temperature rise in cities up to



- City and metropolis
- Urban centers with medium population density
- Urban suburbs with parks and surrounding greenery
- Rural areas, crops - not very populated
- Natural areas scarcely or not at all populated



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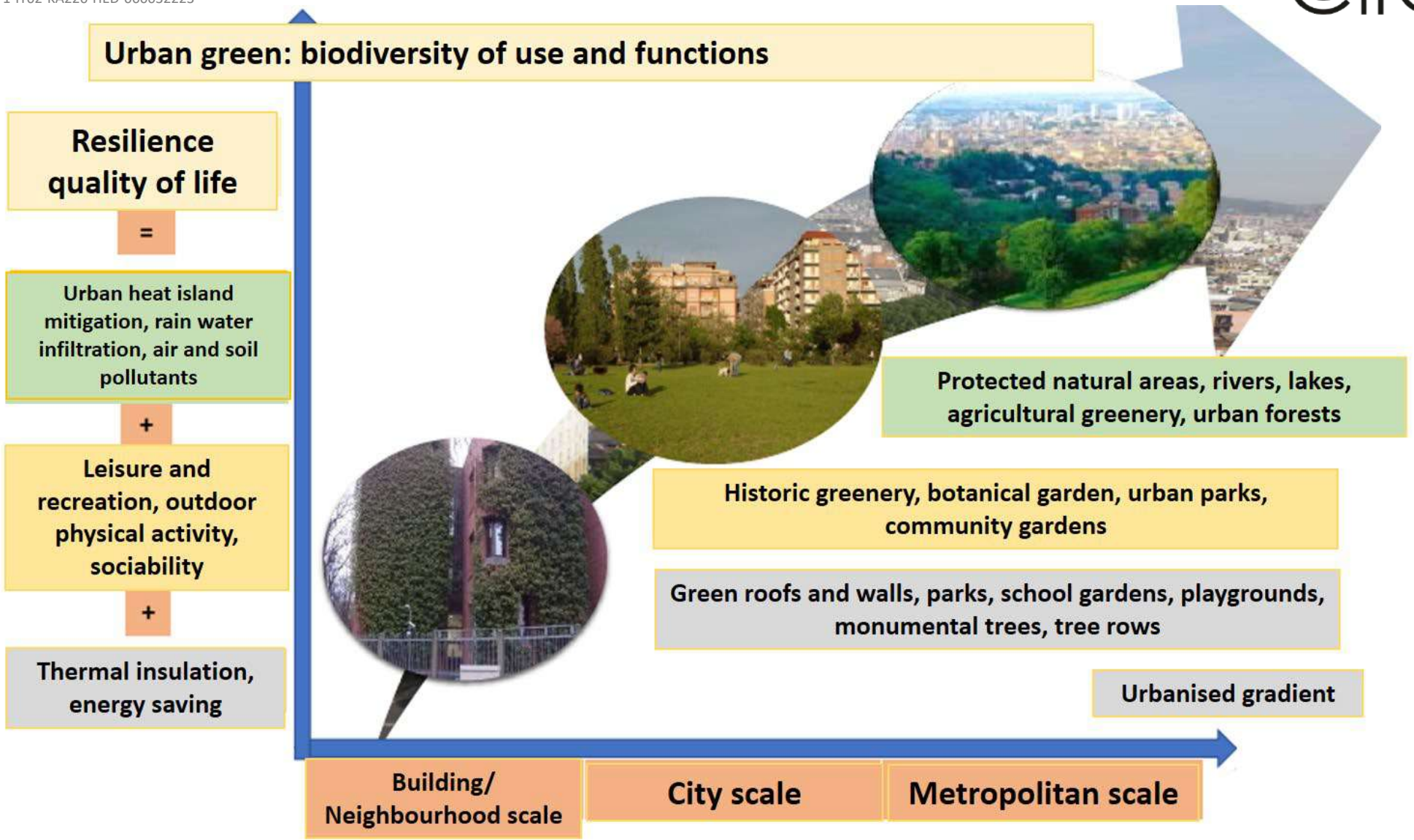
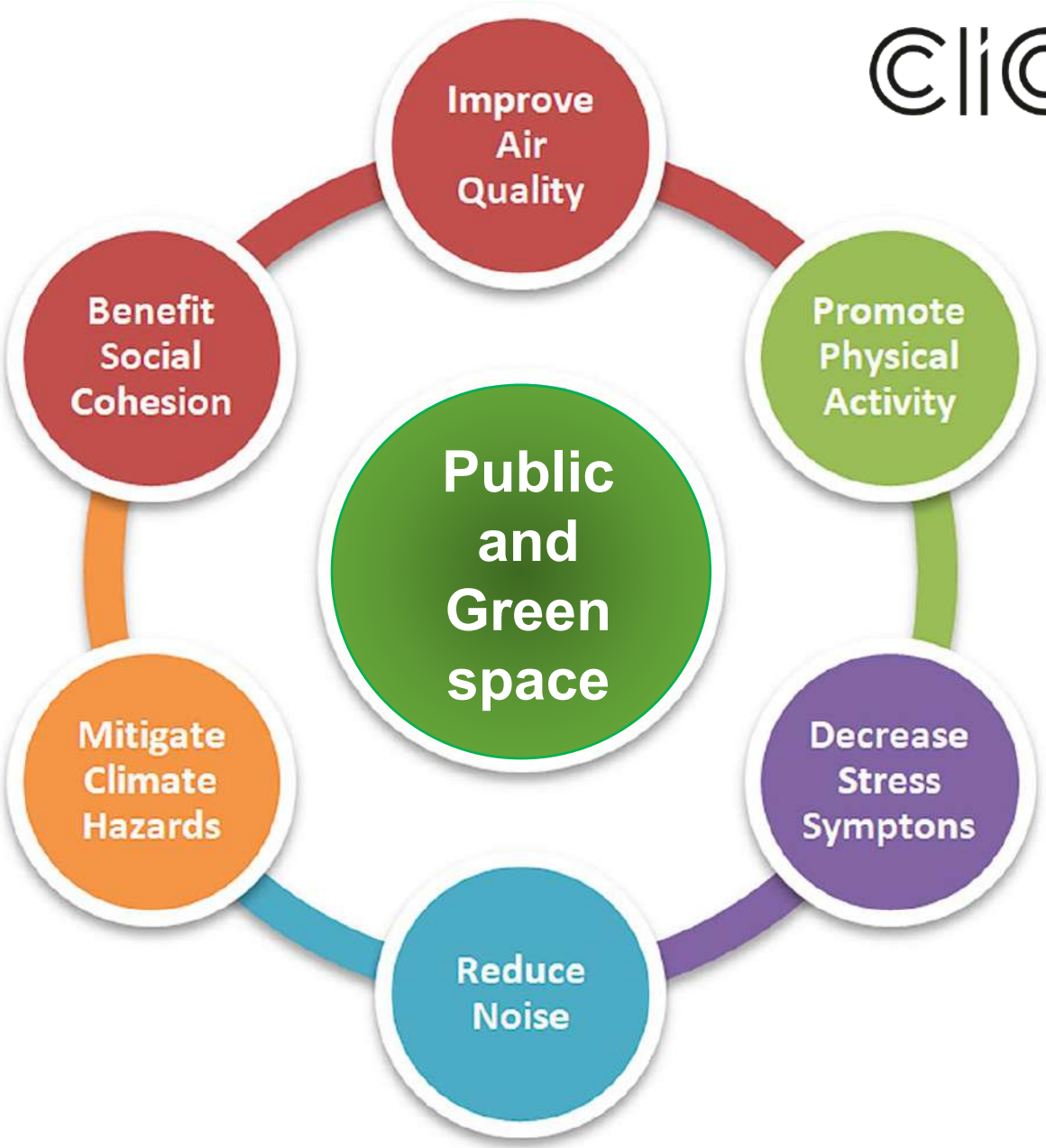

Urban green: biodiversity of use and functions
Resilience quality of life
=
Urban heat island mitigation, rain water infiltration, air and soil pollutants
+
Leisure and recreation, outdoor physical activity, sociability
+
Thermal insulation, energy saving
Protected natural areas, rivers, lakes, agricultural greenery, urban forests
Historic greenery, botanical garden, urban parks, community gardens
Green roofs and walls, parks, school gardens, playgrounds, monumental trees, tree rows
Urbanised gradient
Building/ Neighbourhood scale
City scale
Metropolitan scale

Erasmus+ Action Type: KA220-HED - Cooperation partnerships in higher education
Climate change, cities, communities and Equity in health Cli-CC.HE
Project Reference: 2021-1-IT02-KA220-HED-000032223

URBAN GREEN A RESOURCE FOR HEALTH



Lecture
Monday 15th of May, 10:05-10:25

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URBAN GREEN A RESOURCE FOR HEALTH

HEALTH MITIGATION INTERVENTIONS

Total and average annual reduction of deaths attributable to a temperature reduction of 1.3°C of the specific city average temperature

Total and average annual reduction of deaths attributable to a temperature reduction of 1.3°C and 2°C of the specific city average temperature

Total and average annual reduction of deaths attributable to a temperature reduction of 2°C of the specific city average temperature

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EXAMPLE

Selected area for NBS interventions

Selected area: examples of critical issues

- heavily built up area;
- poor vegetative cover;
- high prevalence of population> 65 years;
- presence of pollutant production activities.

What to do: examples of activities

- analysis of the actual state of the area using microclimatic software;
- survey of plant species present and selection of tree, shrub and herbaceous species to be included;
- elaboration of different cooling scenarios;
- simulation of the scenes with quantification of the benefits (temperature, relative humidity, etc.).

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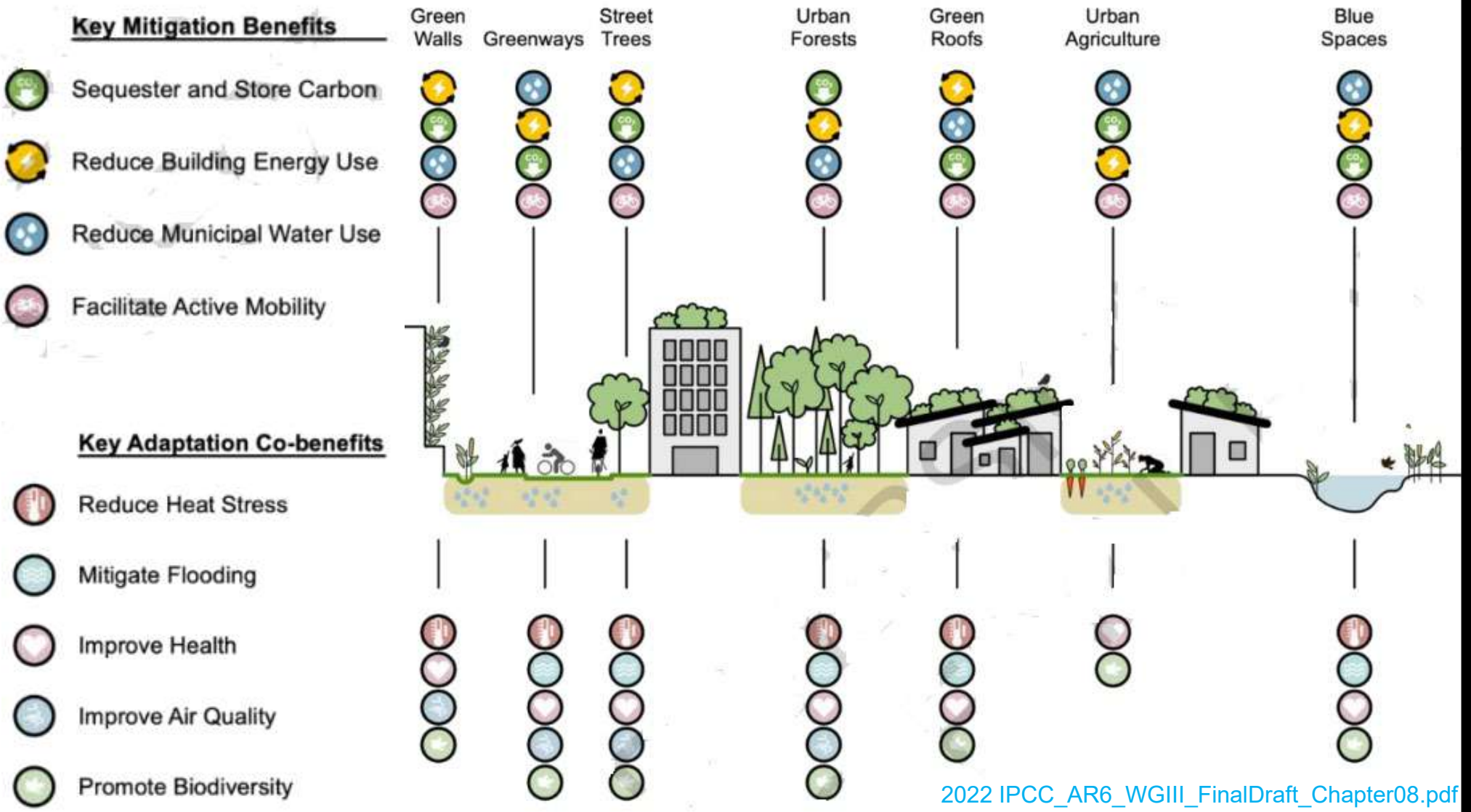

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Potential integration of various green and blue infrastructure strategies within an urban system

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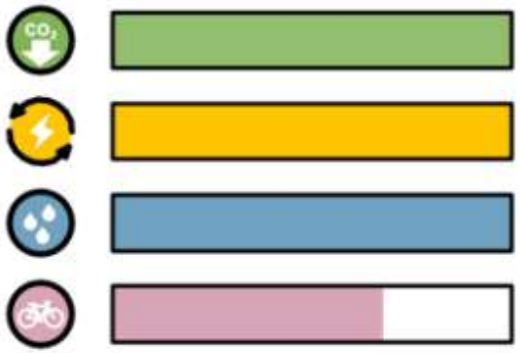
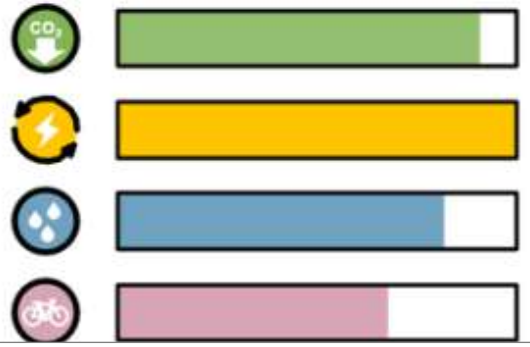
Urban forests and street trees provide the greatest mitigation benefit because of their ability to sequester and store carbon while simultaneously reducing building energy demand.

	Urban Green and Blue Infrastructure	Mitigation Benefits	Adaptation Co-benefits	SDG Linkages
Urban Forests				
Street Trees				

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KEY POINTS

- The assessments of mitigation benefits are dependent on context, scale, and spatial arrangement of each green infrastructure type and their proximity to buildings.

- Local implementations of urban green infrastructure can pursue toward inclusive sustainable urban planning (SDG 11.3) and the provision of safe, inclusive and accessible green and public spaces for all.

OUTLINE

- Climate and health: Evidence and effects of climate change on health
- Temperature, Climate change and health effects (mortality)
- Adaptation and mitigation: The role of public health where we are and what we can do
- Conclusion

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CONCLUSIONS

The importance of urban green infrastructure for reducing the total warming in urban areas due to its local cooling effect on temperature and its benefits for climate adaptation.

Urban green infrastructure involves the protection, sustainable management, and restoration of natural or modified ecosystems while simultaneously providing benefits for human well-being and biodiversity.

Thanks for your attention

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