Real-time tracking of emergency ambulance dispatches and heat wave warning system

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Health effects of heat waves

- Mortality
- Hospital admissions
- General practitioners and call center
- Emergency ambulance dispatches

Heat and mortality

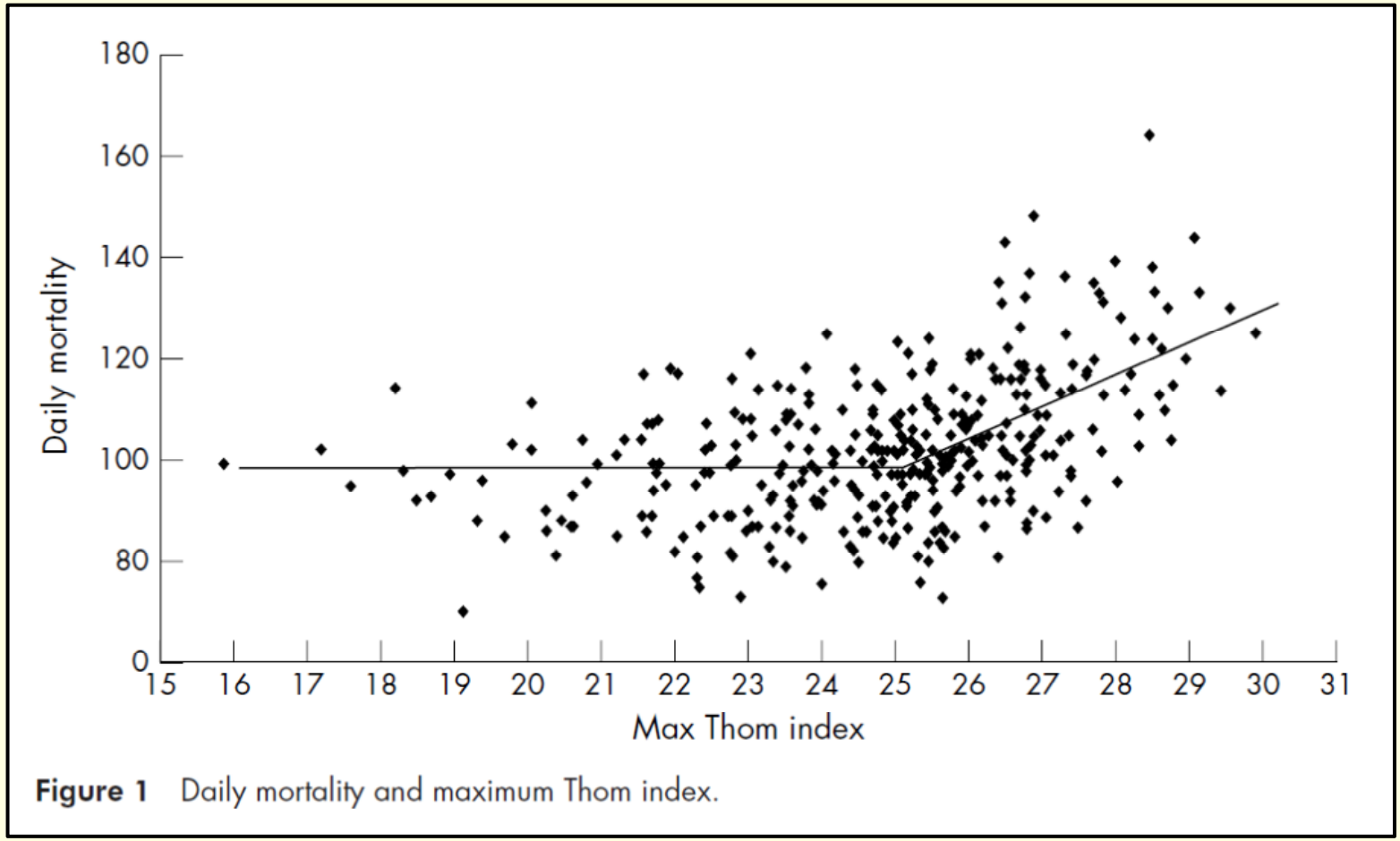


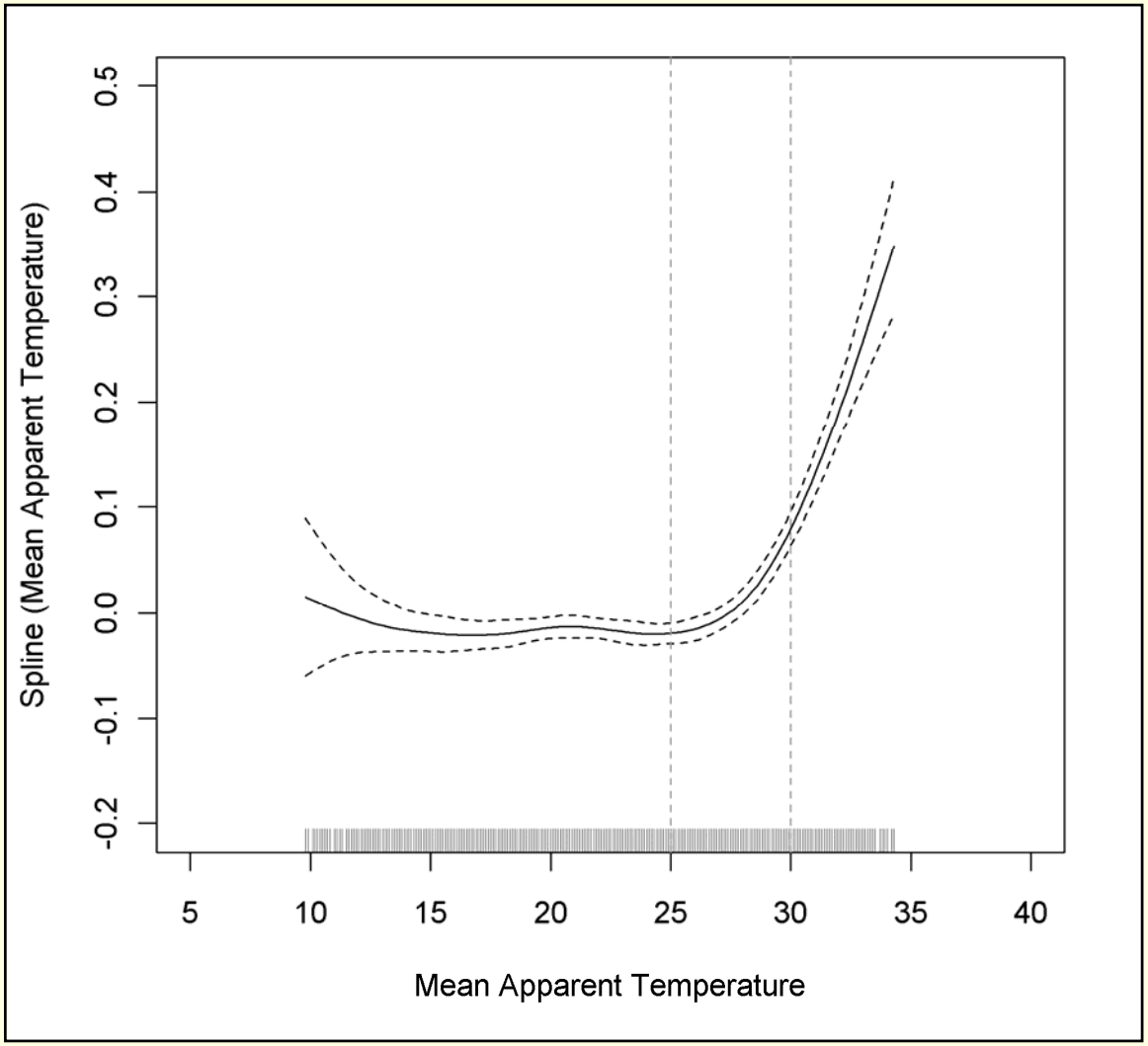
Figure 1 Daily mortality and maximum Thom index.

Zauli Sajani et al. J Epidemiol Community Health. 2002;56(7):536-7

Heat and mortality

Heat and emergency ambulance dispatches

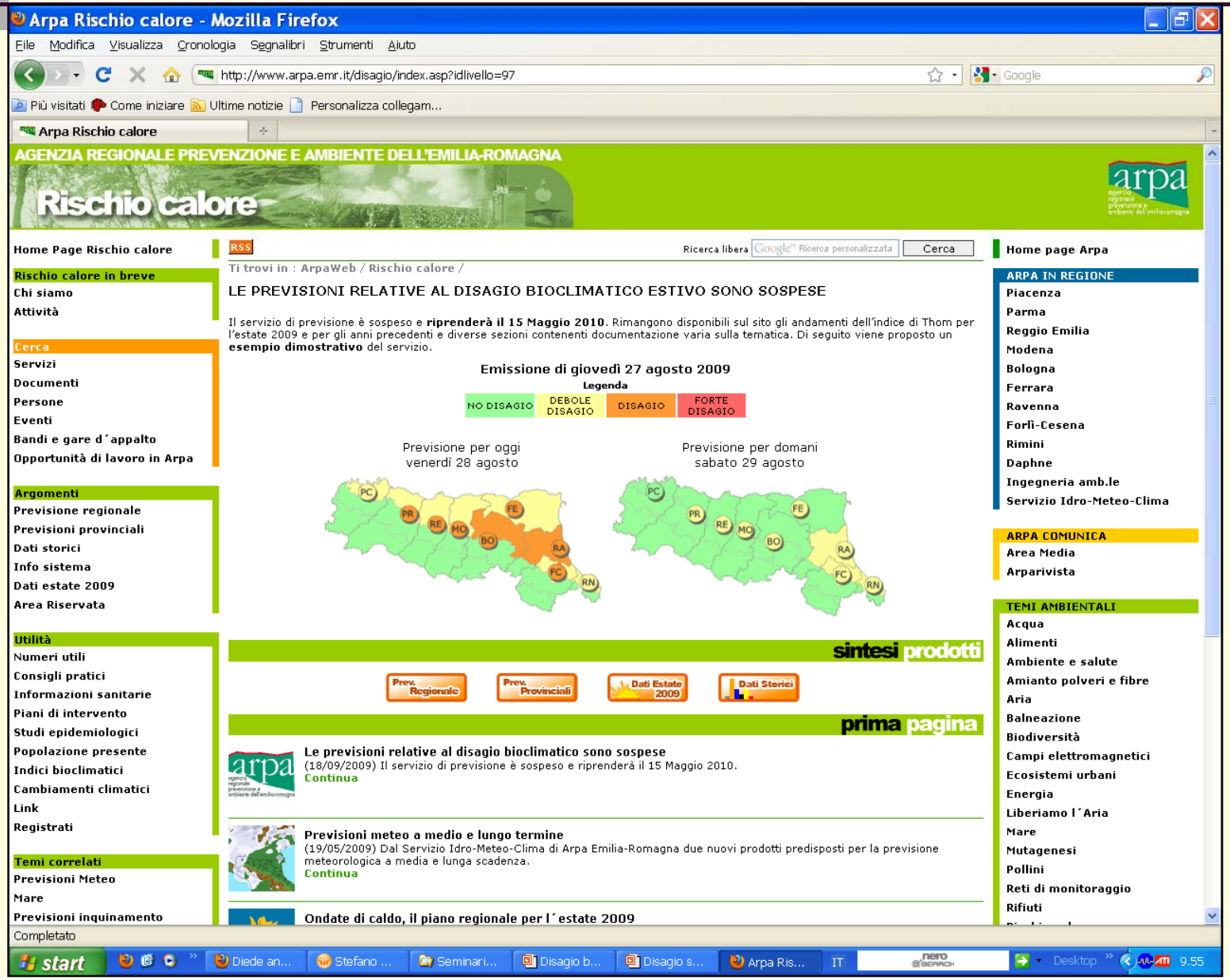
Heat /health watch/warning system



Alessandrini et al. Environ Res. 2011;111(8):1192-200

Heat warning system

Heat /health watch/warning system



http://www.arpa.emr.it/disagio

Heat warning system

Heat /health watch/warning system

BOLOGNA

Sistema di allarme per la prevenzione degli effetti
delle ondate di calore sulla salute

	Previsioni		
Giorno	24/05/2007	25/05/2007	26/05/2007
	Livello 2	**Livello 2**	**Livello 1**
Temperatura ore 8:00	21,1	21,7	21,9
Temperatura ore 14:00	29,5	33,0	28,6
Temperatura max percepita	31,2	34,8	30,1

Legenda

Livello 0	Condizioni meteorologiche non a rischio per la salute della popolazione.
Livello 1	Condizioni meteorologiche che non rappresentano un rischio per la salute della popolazione ma possono precedere il verificarsi di condizioni di livello 2.
Livello 2	Temperature elevate e condizioni meteorologiche che possono avere effetti negativi sulla salute della popolazione a rischio*.
Livello 3	**Ondata di calore** (condizioni meteorologiche a rischio che persistono per tre o più giorni consecutivi). E' necessario adottare interventi di prevenzione mirati alla popolazione a rischio*.

* Vedi su questo sito il documento "Prevenzione Caldo: informazioni per la popolazione".

Prevention system

Heat /health watch/warning system

RegioneEmiliaRomagna

Piano di intervento di contrasto alla solitudine e all'isolamento con particolare riferimento alle ondate di calore - Estate **2013**

arpa

Struttura Tematica di Epidemiologia Ambientale
Servizio Idro-Meteorologico
ARPA EMILIA-ROMAGNA

IL SISTEMA DI PREVISIONE DEL DISAGIO BIOCLIMATICO IN EMILIA-ROMAGNA - **Estate 2013**

- Verifica funzionamento servizio

- Risultati dell'indagine sul gradimento del servizio

Surveillance system: why?

Heat /health watch/warning system

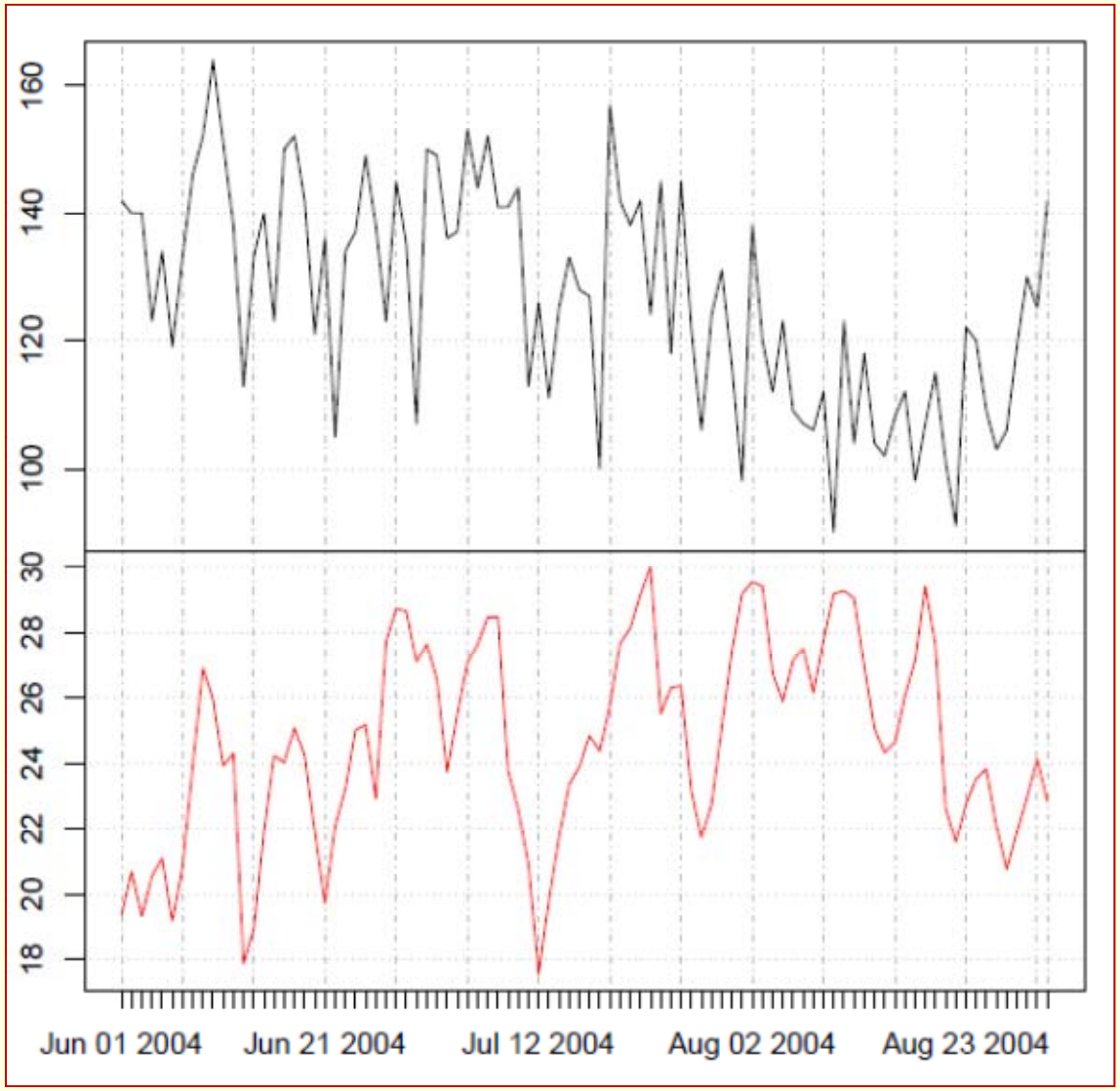
Large differences in health impact of heat waves due to:

- Time varying number of frailty people in the population
- Uncertain effects of duration and timing during the summer season of heat waves
- Uncertain effects of interaction between air pollution and bioclimatic discomfort
- Uncertain effects of preventive actions

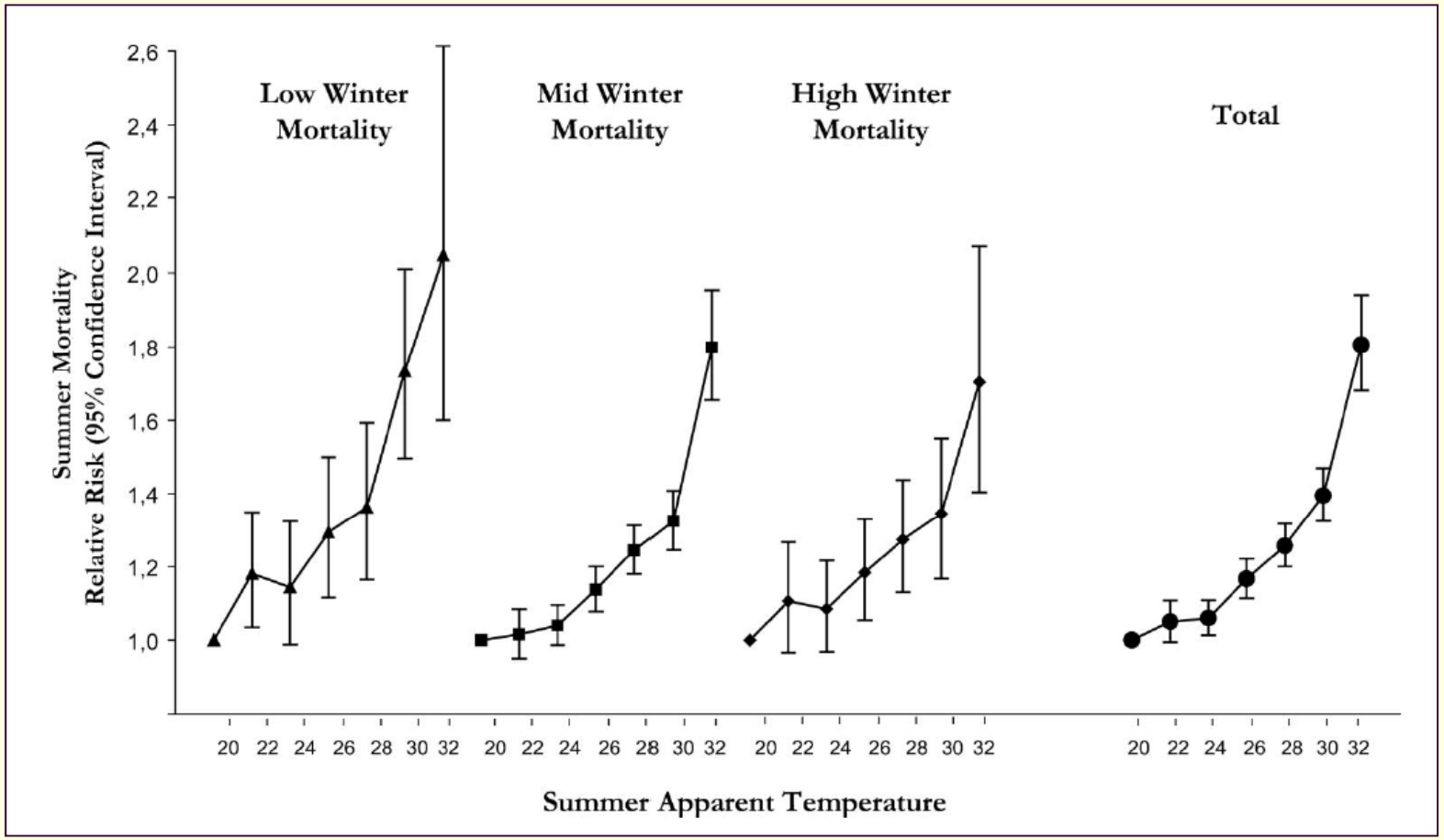
Surveillance system: why?

Heat /health watch/warning system

2004



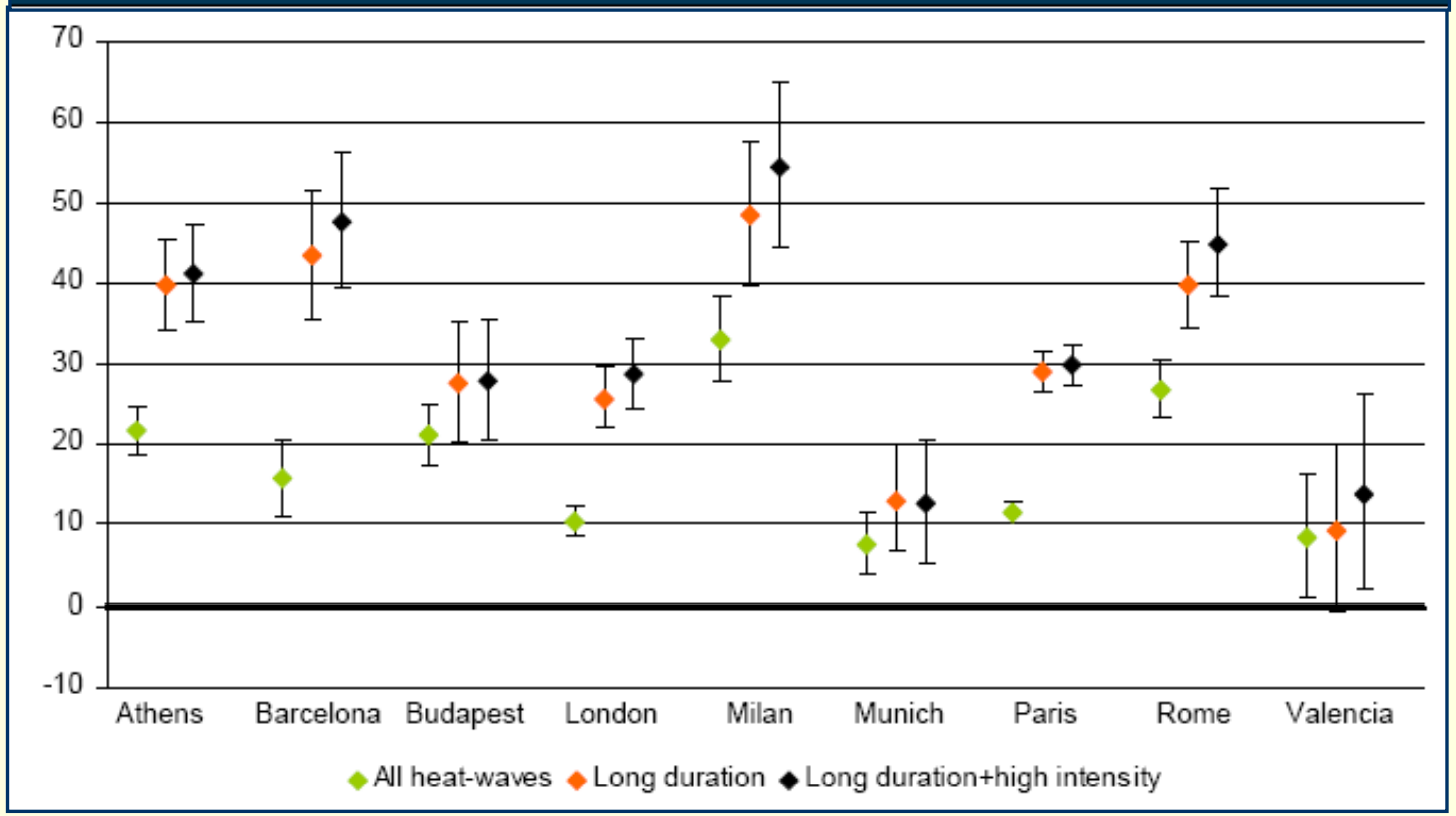
Effect of previous winter mortality



Stafoggia et al. 2009

Effect of duration

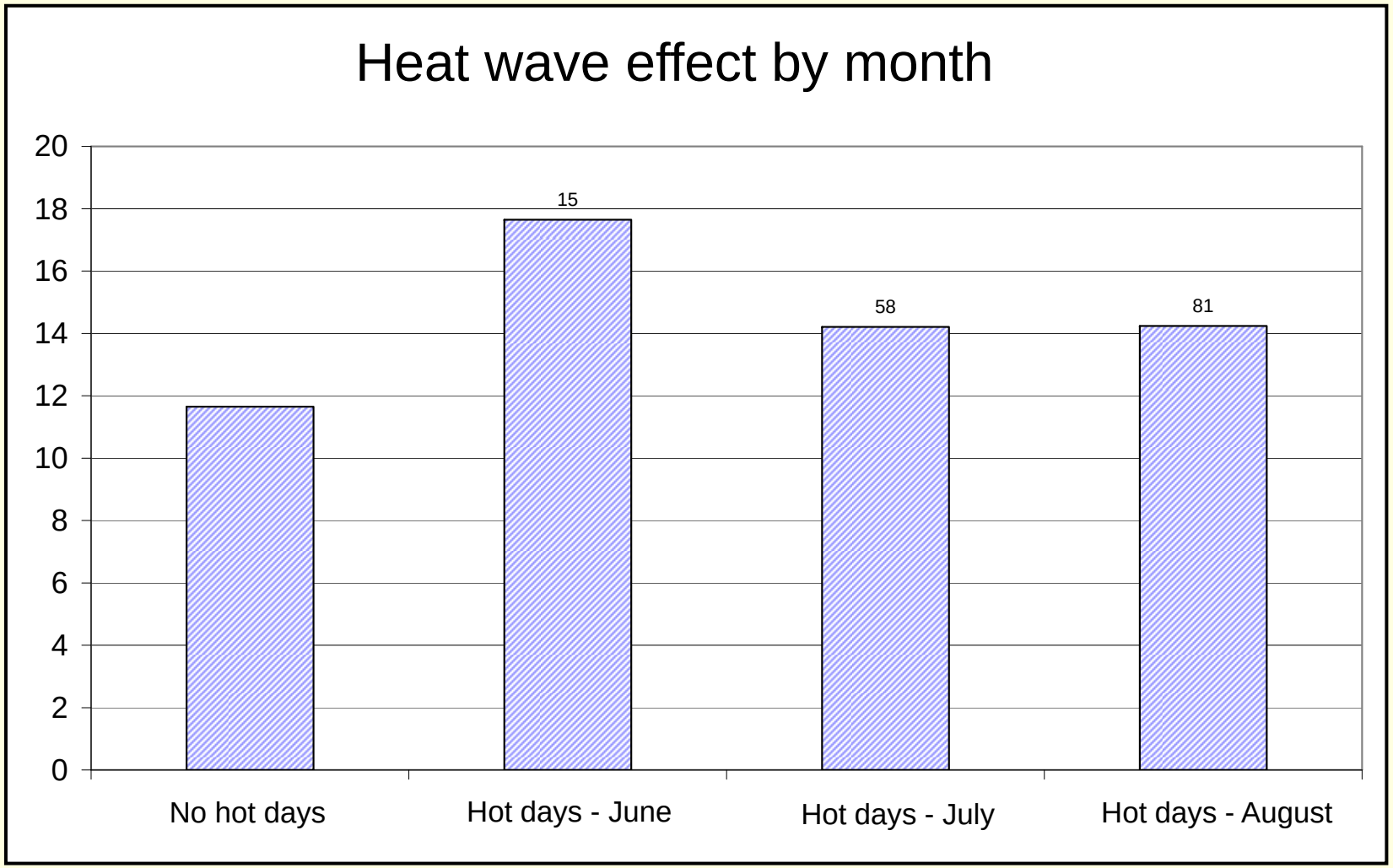
Effect of heat-waves with different characteristics (all, with long duration and high intensity) on total mortality among people aged 65+ (% increase and 90% CI)



Michelozzi et al. 2010

Effect of timing during the summer season

Heat /health watch/warning system



Which data?

- Mortality data are the most reliable but they takes a few days to be available
- Hospital admissions (?)
- Emergency ambulance dispatches are collected and stored with the same software across the region and are available in real time

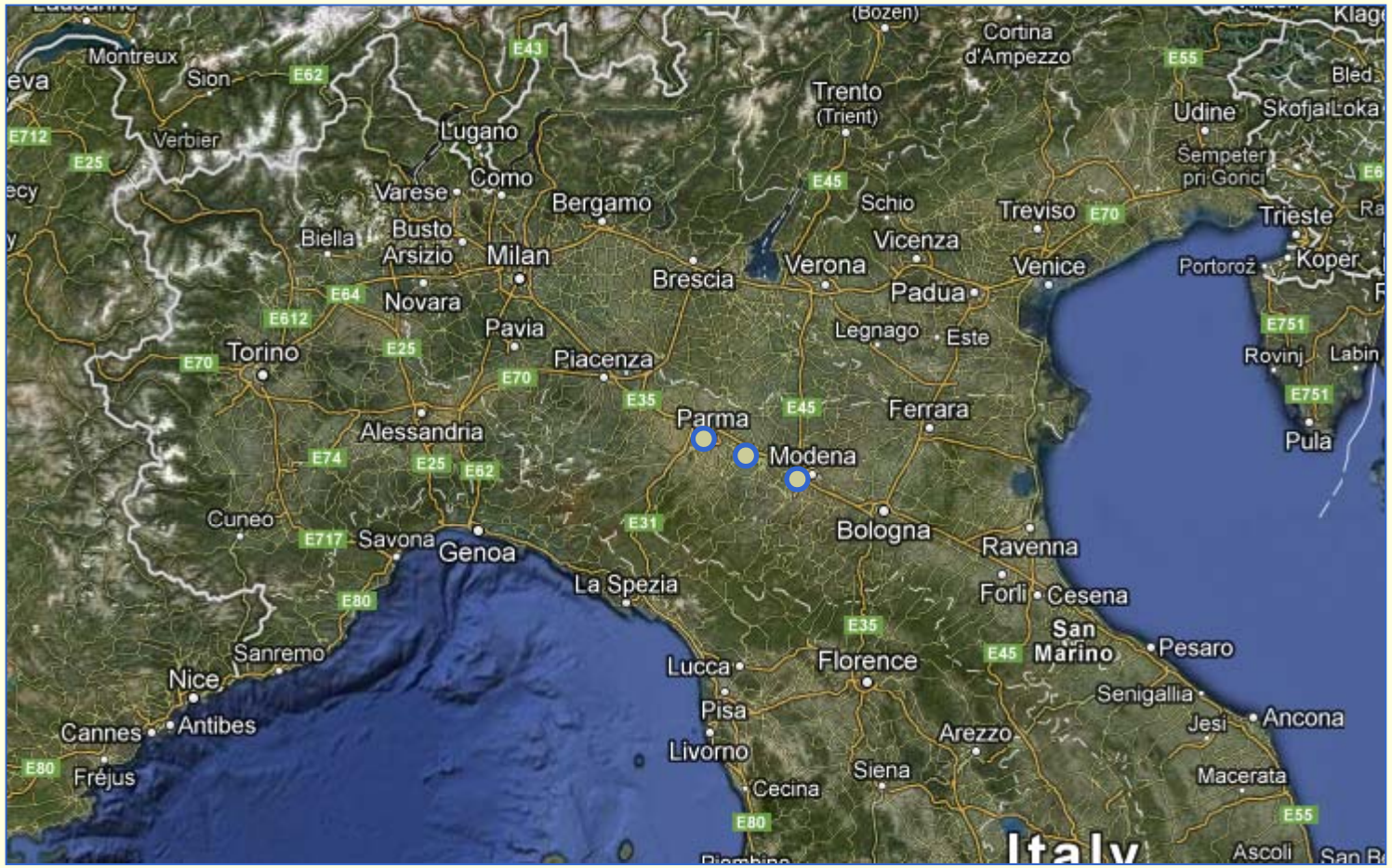
Results (very preliminary)

Tests are on-going

- Different level for thresholds for heat
- Different definition of "elevated" counts of disease (number of standard deviation)
- Different definition of time-dependent reference value for disease counts
- Different spatial aggragation of data

Surveillance system: choice of the area

Heat /health watch/warning system



Settings

		Hot day		
		Yes	No	
Eleveated disease counts	Yes	True Positive (A)	False Positive (B)	A + B
	No	False Negative (C)	True Negative (D)	C + D
		A + C	B + D	

Sensitivity:

- Proportion of hot days that exhibits elevated heat-related disease counts
  A / (A+C)

Specificity:

- Proportion of no hot days with normal numbers of disease
  D / (B+D)

Positive predictive value:

- Proportion of days with elevated disease counts wich are hot
  A / (A+B)

Results

Area: Parma, Reggio Modena

Threshold for hot days: Apparent Temperature 25 °C

Age group: >75

	Number of standard deviations			
	1	1.5	2	2.5
Sensitivity	0.33	0.18	0.13	0.08
Specificity	0.79	0.9	0.96	0.98
Positive Predictive Value	0.68	0.72	0.82	0.82

The stricter the definition of elevated counts, the lower the sensitivity and the higher the specificity

Emergency ambulance dispatches

Strengths:

- Available real time
- Collected in a unique regional database with uniform procedures
- High nomerousness (much more than mortality)
- Indicator of pressure on sanitary system

Weaknesses:

- Low reliability of the causes of diseases
- Non linkability of data with other databases

Conclusions

Heat /health watch/warning system

Relevance of the health impact of heat waves

Importance of a heat warning system and usefulness of a tracking of the health effects of heat (both short term and long term)

Different possible settings of a surveyllance system (dimension of the area, threshold for heat.....) which produce different values for sensibility, specificty and PPV

Different choices are related to different perspectives of the system

Possible integration of the surveillance system into heat warning system

Thank you