Additional file 2. R-code

```
#Association between heat waves and mortality for the different investigated groups for Rome and Stockholm

 Mort_ij <- gam (N_deaths_i ~ as.factor(wday) + as.factor(hday)

                + s(doy,k=4, by=as.factor(year), fx=T)

                + hw_tappmax_95 ,

                 data=j, family=poisson, offset=log(N_TotPop_i)    )
```

where i represents the different investigated groups: Congestive Heart Failure (CHF), chronic obstructive pulmonary disease (COPD), diabetes, or psychiatric disorders, survivors of Myocardial Infarction (MI), the Low-Risk subgroup (LR) and the general population.

and j represents data from the cites if Rome and Stockholm

```
# Association between heat waves and mortality for the different investigated groups for Rome and Stockholm before and after the heat wave of 2003

j_1 <- subset(j, year %in% 2000:2002)

j_2 <- subset(j, year %in% 2005:2008)

Mort_ij <- gam (N_deaths_i ~ as.factor(wday) + as.factor(hday)

                + s(doy,k=4, by=as.factor(year), fx=T)

                + hw_tappmax_95 ,

                 data=j_1, family=poisson, offset=log(N_TotPop_i)    )

Mort_ij <- gam (N_deaths_i ~ as.factor(wday) + as.factor(hday)

                + s(doy,k=4, by=as.factor(year), fx=T)

                + hw_tappmax_95 ,

                 data=j_2, family=poisson, offset=log(N_TotPop_i)    )
```

where i represents the different investigated groups: Congestive Heart Failure (CHF), chronic obstructive pulmonary disease (COPD), diabetes, or psychiatric disorders, survivors of Myocardial Infarction (MI), the Low-Risk subgroup (LR) and the general population.

and j represents data from the cites if Rome and Stockholm

```
# Yearly estimates of the impact of heat waves on mortality

Year_ij <- gam (N_deaths_i ~ as.factor(wday) + as.factor(hday)

                + as.factor(year)

                + s(doy,k=4, by=as.factor(year), fx=T)

                + hw_tappmax_95:as.factor(year) ,

                 data=j, family=poisson, offset=log(N_TotPop_i)    )
```

where i represents the different investigated groups: Congestive Heart Failure (CHF), chronic obstructive pulmonary disease (COPD), diabetes, or psychiatric disorders, survivors of Myocardial Infarction (MI), the Low-Risk subgroup (LR) and the general population.

and j represents data from the cites if Rome and Stockholm