Supplemental Material for "Lights out: Impact of the August 2003 power outage on mortality in New York, NY"

Contents

Supplemental explanation of methods

We modeled daily mortality using a Poisson distribution with overdispersion, described by the following model:

$$log(\mu_t) = \alpha + \beta A_t + \gamma_t D_t + f(T_t) + f(H_t) + f(L_t) \quad (1)$$

where:

μ_t Expected mortality rate on day t

α Model intercept

β Coefficient of power outage effect

A_t Indicator of power outage on day t:

$A_t = 1$ for August 14–15, 2003;

$A_t = 0$ otherwise

γ_t Vector of coefficients for day of week

D_t Day of week for day t

$f(T_t)$ Natural cubic spline of mean temperature on day t, 3 degrees of freedom (df)

$f(H_t)$ Natural cubic spline of adjusted dew point temperature on day t, 3 df

$f(L_t)$ Natural cubic spline of time, used to model long-term and seasonal trends, 7 df/year

The coefficient β determined by this model estimates the log relative risk of mortality during blackout days compared to other days. The relative risk associated with the blackout is estimated by $exp(\beta)$.

eTable 1. International Classification of Diseases (ICD) codes used to determine causes of death. Codes are shown for both the ninth (ICD-9) and tenth (ICD-10) revisions.

Cause	International Classification of Diseases, Ninth Revision (ICD-9)	International Classification of Diseases, Tenth Revision (ICD-10)
Accidental	$\geq$800	$\geq$ Chapter S
Cardiovascular	390–448	Chapter I, <800
Respiratory	480–486, 490–497, 507	Chapter J, 100–118, 120–189, 209–499, 690–700
Non-cardiorespiratory	all other codes	all other codes

eTable 2. Names and locations of weather monitors used for this study.

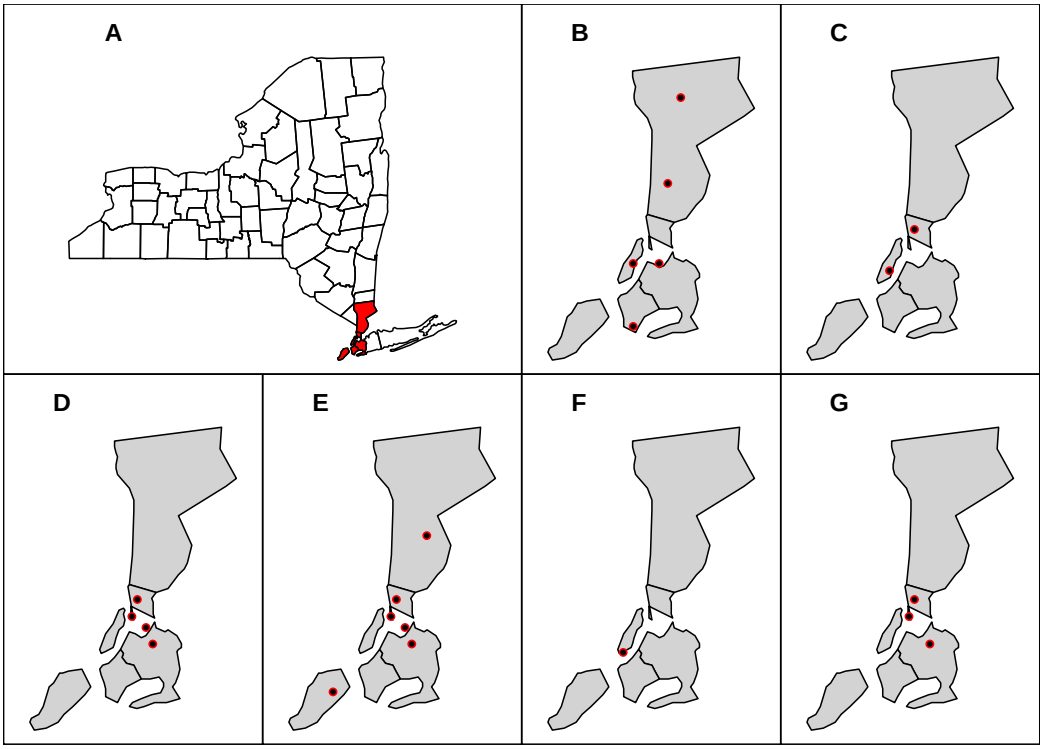
Station Name	Cooperative Observer Program ID	Latitude	Longitude
New York Central Park	305801	40°46’	-73°58’
New York Laguardia AP	305811	40°46’	-73°52’
NY Ave V Brooklyn	305796	40°35’	-73°58’
Dobbs Ferry Ardsley	302129	41°00’	-73°50’
Yorktown Heights	309670	41°15’	-73°47’

eTable 3. US EPA site identifications and locations of pollution monitors used for this study.

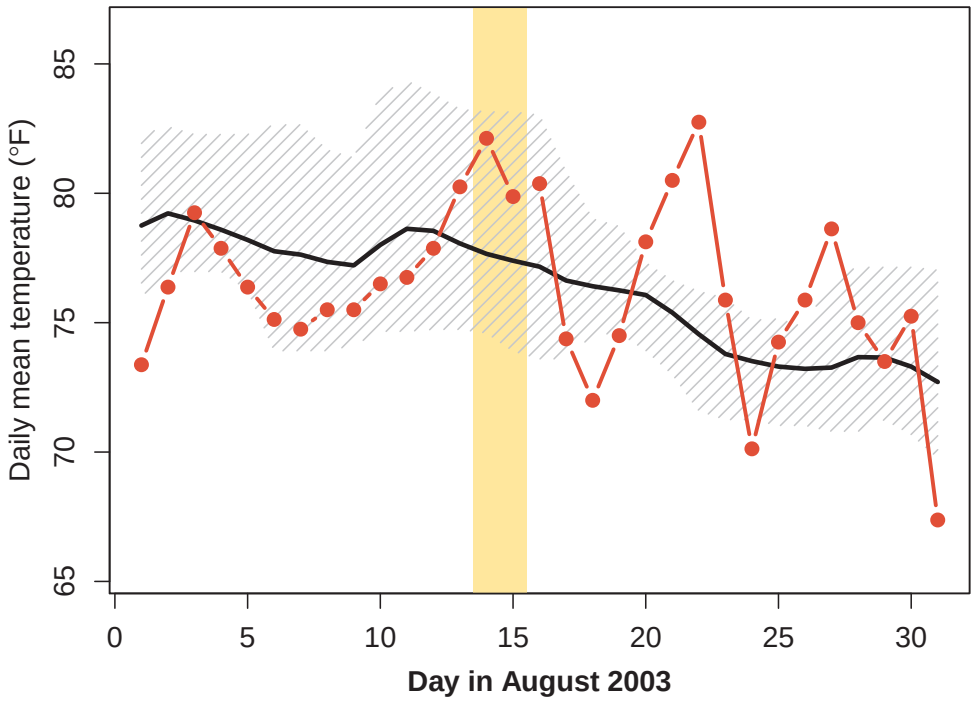
US EPA site identification number	Latitude	Longitude
CO		
36 005 0083	40°52’	-73°53’
36 061 0092	40°45’	-73°59’
NO_2		
36 005 0083	40°52’	-73°53’
36 005 0110	40°49’	-73°54’
36 081 0098	40°47’	-73°50’
36 081 0124	40°44’	-73°49’
O_3		
36 005 0083	40°52’	-73°53’
36 005 0110	40°49’	-73°54’
36 081 0098	40°47’	-73°50’
36 081 0124	40°44’	-73°49’
36 085 0067	40°36’	-74°08’
36 119 2004	41°03’	-73°46’
PM_{10}		
36 061 0125	41°43’	-74°00’
SO_2		
36 005 0083	40°52’	-73°53’
36 005 0110	40°49’	-73°54’
36 081 0124	40°44’	-73°49’

eTable 4. Sensitivity analysis of power outage effects incorporating lagged temperature effects. This table shows effect estimates for the power outage (presented as percent increase in mortality during the power outage) with both the main model from the paper, which controls for temperature using same-day temperature, and with a more complex model, which incorporates lagged effects of temperature from same-day up to four days previous using a distributed lag model.

Stratification	Effect estimates from model controlling for same-day temperature	Effect estimates from model controlling for temperature, lags 0–4
All ages	28.3% (14.6, 43.7%)	27.7% (14.3, 42.7%)
Age		
<65 years	30.1% (6.4, 59.0%)	29.6% (6.1, 58.3%)
65–74 years	44.0% (14.1, 81.8%)	43.4% (13.7, 80.8%)
≥75 years	22.5% (5.6, 42.2%)	21.9% (5.3, 41.2%)
Cause of death		
All non-accidental	25.3% (11.7, 40.5%)	24.7% (11.5, 39.6%)
Cardiovascular	25.9% (7.1, 48.0%)	25.2% (6.8, 46.8%)
Respiratory	11.6% (-26.5, 69.4%)	11.3% (-26.6, 68.9%)
Non-cardiorespiratory	26.8% (8.3, 48.3%)	26.4% (8.1, 47.7%)
Accidental	122.1% (27.6, 286.8%)	120.6% (27.0, 283.4%)



eFigure 1. Monitor locations. Locations of counties included in the study within the state of New York (A), and of monitors used for data on weather (B), CO (C), NO_2 (D), O_3 (E), PM_{10} (F), and SO_2 (G).



eFigure 2. Temperature during August 2003 in New York, NY. Daily mean temperature (in red) compared to average August temperature. Shown for comparison are the mean (black line) and interquartile range (hatched area) of a seven-day moving average of mean temperature in August of the two proceeding (2001, 2002) and two following (2005, 2005) years. Blackout days are highlighted in yellow.