

Title: EFFECT MODIFICATION BY INFLUENZA ON THE ACUTE RELATIONSHIP BETWEEN COLD TEMPERATURE AND CARDIOVASCULAR MORTALITY IN 67 U.S. CITIES

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Background: A better understanding of the effects of temperature on human health is needed to improve estimates of the health effects of climate change. Cardiovascular mortality (CVD) has been associated with periods of cold temperature and influenza epidemics. However, the manner in which these two exposures interact on the outcome of CVD has yet to be determined. We investigated a potential role of the intensity of influenza-like illness (ILI) on the relationship between cold temperatures on daily cardiovascular death.

Methods: The data available for this study includes 67 United States metropolitan areas from the fall of 2003 through the end of 2006. We used a Poisson time-series regression model to estimate the effects of temperature at its lowest quintile in each city in each year during the cold season (October – March) at lag 0 through 3 days, adjusting for temporal trends and day of week. In a second-stage random effects model, we included the annual ILI mean intensity for each city and each year, as well as other potential predictors such as average annual temperature, population density, and the percent of population over age 65.

Results: Of the effect lags considered, the 2-day lagged coldest quintile of temperature showed the strongest and most significant association with increased CVD mortality, with an excess risk of 3.9% (95% confidence interval: 0.16, 7.70%). We found a significant

effect modification of the temperature effect by the influenza intensity, with an inter-quartile range increasing the excess risk by 31%.

Conclusions: These findings suggest that ILI rates may modify cold temperature effects on CVD mortality.