PM NAAQS Risk Assessment – specification of the C-R function for long-term PM$_{2.5}$ exposure-related mortality (including treatment of uncertainty)

February 26, 2010

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Overview of PM NAAQS risk assessment (goals and design) - GOALS

- Goals of the human health risk assessment:
  - Characterize the nature and magnitude of risk experienced by populations at a set of urban study areas
  - Assess overall confidence in these risk estimates
  - Evaluate the degree to which they are representative in the broader national context
Treatment of uncertainty – core analysis and sensitivity analysis

Core analysis – inputs with strongest support in the literature

Sensitivity analysis – set of additional risk estimates (also supported by the literature)

Set of reasonable risk estimates for Los Angeles

(lower risk) → (higher risk)

( % of IHD mortality incidence associated with PM$_{2.5}$ exposure )
Selection of core epidemiological study

Krewski et al., 2009 (extension of the ACS prospective cohort study)

- Extended air quality analysis (now 18 yrs),
- Rigorous examination of range of C-R functions
- Range of ecological variables considered
- Examination of exposure time windows
- Inclusion of more spatially-refined analysis (LA and NYC)
- Large dataset – 1.2 million individuals and 156 cities
Selection of C-R functions: core analysis

- Selected Cox model with adjustment for ecological covariates
  - Supported by EPA’s Clean Air Scientific Advisory Committee (CASAC)

- Considered other models – random effects with adjustment for ecological covariates
  - Wasn’t specified for the two time periods
Selection of C-R functions: sensitivity analysis

- Alternative C-R functions from Krewski et al., 2009:
  - Random effects model (log-linear and log-log)

- Alternative study - Krewski et al., 2000
  - Multi-pollutant models based on ACS
  - Six Cities study-based C-R functions