MORTALITY RATES IN APPALACHIAN COAL MINING COUNTIES

Recent studies have indicated that adverse health outcomes, including mortality, occur at higher rates in the Appalachian region of the US. However, conflicting evidence has been found regarding whether these disparities are due primarily to coal mining (Hendryx et al. 2008, Hendryx 2009) or to other factors in Appalachia (Borak et al., 2012).

ARIES STUDY DESCRIPTION

As a part of a project in ARIES Area 6, the research team at the University of Pittsburgh Graduate School of Public Health, led by Dr. Jeanine Buchanich, examined select mortality rates in West Virginia coal-mining counties compared to mortality in Appalachian non-coal mining counties.

We conducted descriptive and statistical analyses of the total and select cause-specific mortality rates in the coal mining and non-coal mining counties for 5-year time periods from 1950-2007 (cancer causes) or 1960-2007 (non-cancer causes). We attempted to control for socioeconomic status (SES) by matching to control counties of median income. We controlled for age, time, race, and sex by utilizing age-time-race-specific mortality rates in our statistical comparisons. We examined mortality rates for: total mortality, all cancers, respiratory system cancer, kidney cancer, diabetes mellitus, heart disease, cerebrovascular disease, non-malignant respiratory disease, and all external causes.

Graphs showed the age-adjusted mortality rate and its associated 95% confidence interval (CI) for each time period; the rates for the coal mining counties and non-coal mining counties were considered statistically significantly different if the 95% confidence intervals were not overlapping.

KEY FINDINGS

- Higher rates of mortality in coal mining counties compared to non-coal mining counties for total mortality, and all cancer, respiratory cancer, diabetes and heart disease mortality
- Higher rates of mortality in non-coal mining counties for kidney cancer and stroke
- Higher rates of non-malignant respiratory disease mortality among males, but not females, in coal mining counties, indicative of occupational, not environmental exposure
- Additional analyses need to control for personal risk factors, environmental toxics, and other potential confounding factors
RESULTS AND IMPLICATIONS

This study found limited evidence of elevated total and cause-specific mortality rates when comparing coal mining to non-coal mining counties in Appalachia. As shown in Figure 1, total mortality was statistically significantly higher across all time periods for men and women in coal mining compared to non-coal mining counties. We also found higher rates of all cancer, respiratory cancer, diabetes, and heart disease in coal mining compared to non-coal mining counties.

Higher mortality in coal mining counties was not consistently found across all causes examined, including kidney cancer and stroke, where non-coal mining counties had higher mortality. We found higher rates of non-malignant respiratory disease (Figure 2) in coal mining counties for males, but not for females, arguing for an occupational, rather than a pervasive environmental effect.

The categories in which we found excesses in coal mining counties are arguably heavily influenced by personal behaviors and risk factors, including heart disease, diabetes, and lung cancer. We were not able to control for personal risk factors in these analyses, including causes of death highly affected by smoking, such as heart disease and respiratory system cancer.

The results of these analyses indicate that total and cause-specific mortality is elevated in WV coal-mining counties relative to Appalachian non-coal mining counties for certain causes of death. Additional studies of Appalachian mortality are required to understand the complex interactions of factors and determine the extent to which coal mining plays a part.

PUBLICATION PLANS

The results of this project are to be published in the proceedings of the "Environmental Considerations in Energy Production" symposium, which will be held April 14-18, 2013 in Charleston, WV. Additional journal articles will be prepared as appropriate given additional findings.

RELATED ARIES RESEARCH

Research into the relationships between coal mining and community health is being carried out by a number of ARIES researchers at Virginia Tech, The Edward Via College of Osteopathic Medicine and Ohio State University. These studies will help elucidate the complex relationship between coal mining and health in Appalachia.

REFERENCES

