

3.061 Health Impacts of Energy-Related Urban Air Pollution in South Africa.

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Abstract:

The dual issues of energy and air pollution are increasingly a problem associated with developing countries. While there are a plethora of epidemiological studies that quantify the relationship between mortality and morbidity due to air pollution in North America and Europe (Atkinson et al., 2011; Pope et al., 1995; van der Kamp et al., 2015), there is a paucity of similar data for developing countries. South Africa is a middle-income country that relies on coal for 93% of electricity supply (IRP, 2011). The Vaal Triangle-Highveld region, which includes the Johannesburg-Pretoria megacity, is the largest NO₂ hotspot in the southern hemisphere due to the presence of 11 coal-fired power stations that are not fitted with technologies to reduce NO₂ emissions (or SO₂ emissions), and this small area accounts for 91% of South Africa's NO_x emissions (Wells et al., 1996; Lourens et al., 2012). However, the magnitude of the external costs of coal on human health and economic growth in South Africa are as yet unknown. This work aims to provide the first estimates of the health and economic burden of urban air pollution in South Africa, and to quantify the benefits that can be gained from improved air quality. The environmental Benefits Mapping and Analysis Program (BenMAP) model, which systematizes the health impact calculation process, was applied to South Africa using municipality-level census data, air pollutant monitoring data, baseline incidence rates for overall-mortality, and local concentration-response functions (Wichmann et al., 2012). The model was then used to calculate the number of mortalities associated with 1) the current concentrations of NO₂, SO₂, and PM₁₀, and 2) a reduction of current concentrations to WHO-recommended levels. This study provides the first estimates of the health impacts of urban air pollution at the spatial resolution necessary for establishing cost-effective air quality standards in South Africa.