

Impact of large industrial emission sources on mortality and morbidity in Chile: A small-areas study

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Chile suffers significant pollution from large industrial emitters associated with the mining, metal processing, paper production, and energy industries. The aim of this research was to determine whether the presence of large industrial facilities (i.e. coal- and oil-fired power plants, pulp and paper mills, mining facilities, and smelters) affects mortality and morbidity rates in Chile. For this, we conducted an ecological study that used Chilean communes as small-area observation units to assess mortality and morbidity. Public databases provided information on large pollution sources relevant to Chile. The large sources studied were oil- and coal-fired power plants, copper smelters, pulp and paper mills, and large mining facilities. Large sources were filtered by first year of production, type of process, and size. Mortality and morbidity data were acquired from public national databases, with morbidity being estimated from hospitalization records. Cause-specific rates were calculated for the main outcomes: cardiovascular, respiratory, cancer; and other more specific health outcomes. The impact of the large pollution sources was estimated using Bayesian models that included spatial correlation, overdispersion, and other covariates. Large and significant increases in health risks (around 20%-100%) were found for communes with power plants and smelters for total, cardiovascular, respiratory, all-cancer, and lung cancer mortality. Higher hospitalization rates for cardiovascular disease, respiratory disease, cancer, and pneumonia

(20-100%) were also found for communes with power plants and smelters. The impacts were larger for men than women in terms of both mortality and hospitalizations. The impacts were also larger when the sources were analyzed as continuous (production volume) rather than dichotomous (presence/absence) variables. In conclusion, significantly higher rates of total cardiovascular, respiratory, all-cancer and lung cancer mortality and cardiovascular, respiratory, cancer and pneumonia hospitalizations were observed in communes with power plants and smelters. © 2016

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Cancer

Cardiovascular

Copper smelter

Mining facilities

Power plants

Respiratory

Bayesian networks

Biological organs

Coal

Copper

Fossil fuel power plants

Health risks

Hospitals

Industrial emissions

Industrial plants

Industrial research

Paper and pulp mills

Papermaking machinery

Pollution

Population statistics

Power plants

Pulp

Pulp manufacture

Smelting

Cancer

Cardio-vascular disease

Cardiovascular

Coal-fired power plant

Industrial facilities

Lung cancer mortality

Respiratory

Spatial correlations

Diseases

cancer

cardiovascular disease

health impact

industrial emission

morbidity

mortality

pollutant source

power plant

respiratory disease

Article

Bayes theorem

cardiovascular disease

Chile
coal mining
ecosystem
health hazard
hospitalization
human
industrial area
medical record
morbidity
mortality
neoplasm
paper industry
pneumonia
pollution
priority journal
pulp mill
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smelter
adult
environmental disease
environmental exposure
environmental monitoring
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male

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statistics and numerical data

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