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Respiratory, Sensory and General Health Symptoms among Populations Exposed to Air Pollution from Biodegradable Wastes

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Background

- A large number of potentially hazardous pollutants are emitted during handling, storage, treatment and disposal of agricultural, animal and municipal biodegradable wastes.

- However, few investigations have examined the adverse effects that chronic exposures to low-to-moderate air pollution from biodegradable wastes, may have on the health of local residents.

- Besides, most studies have relied on distances to waste sites to assign exposure status, and have not investigated whether these potential exposure-health associations were direct or indirect (stress-mediated).

Methods:

- Individual-specific exposures to a proxy indicator of biodegradable waste pollution (ammonia, NH₃) in non-urban residences (6 regions of 12x12 km, n=454) during 2005-2010 were calculated by the Danish Eulerian long range transport model (DEHM) and the local-scale transport deposition model (OML-DEP).

- Logistic regression and mediating analyses were used to examine associations between exposures and questionnaire-based cross-sectional data on odor annoyance and symptoms, after adjusting by person-specific covariates.

Results

- Individual NH₃ exposures were associated with odor annoyance, increased frequency of "eyes itching, dryness or irritation" and "cough" (ORₐdj =3.72; 95%CI: 2.41–5.75; ORₐdj = 1.69; 95%CI: 1.09-2.61 and ORₐdj = 1.75; 95%CI: 1.12-2.74, respectively, for each unit increase in Logₑ(NH₃ exposure)). Significant associations were also found between individual NH₃ exposures and "chest wheezing or whistling" and "runny nose".

- Associations between exposures and some health symptoms ("nose itching, dryness or irritation" and "runny nose", nausea, headache, dizziness, difficulty concentrating and unnatural fatigue) were indirect (annoyance-mediated).

- Partial mediation (involving both direct and indirect effects) was found for "eyes itching, dryness or irritation" and "cough".

Conclusions

- Environmental exposures play an important role in the genesis of respiratory, sensory and general health symptoms among residents exposed to low-to-moderate air pollution from biodegradable wastes.

- People exposed air pollution from these wastes experienced an increased frequency of respiratory and sensory irritation symptoms, and those increases showed a dose-response.

- In some cases, the health effects of air pollution seem to be indirect, relayed through stress-related mechanisms. However, we found evidence of direct effects for some of the symptoms as well.

References and more information:

