

Environmental noise pollution and maternal-child health: Implications for surveillance of hypertension in pregnancy

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May 28, 2018

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Context



Institut national de santé publique du Québec (INSPQ)

Population health surveillance
Analysis of risk factors for health

Surveillance team working on maternal and infant health

Impact of the physical environment

Background and Objective



Environmental noise exposure is associated with a greater risk of hypertension, but the link with preeclampsia, a hypertensive disorder of pregnancy, is unclear.

Objective: We sought to determine the relationship between environmental noise pollution and risk of preeclampsia during pregnancy.

Methods (1)



Data

269,263 deliveries in Montreal between 2000 and 2013 (hospitalizations in MedEcho)

Outcome - Preeclampsia

Mild vs. Severe Preeclampsia

Exposure - Noise measurement

Total outdoor noise levels for 24 hours (LA_{eq24h}) from a land use regression model based on noise samples in Montreal

Methods (2)



Data analysis

Prevalence rate (95% confidence interval)

Multilevel logistic regression model with participants as a random effect

Models adjusted for traffic pollution (O_3 , NO_2 , $PM_{2.5}$), neighbourhood walkability, maternal age, parity, multiple pregnancy, comorbidity, socioeconomic deprivation, and year of delivery.

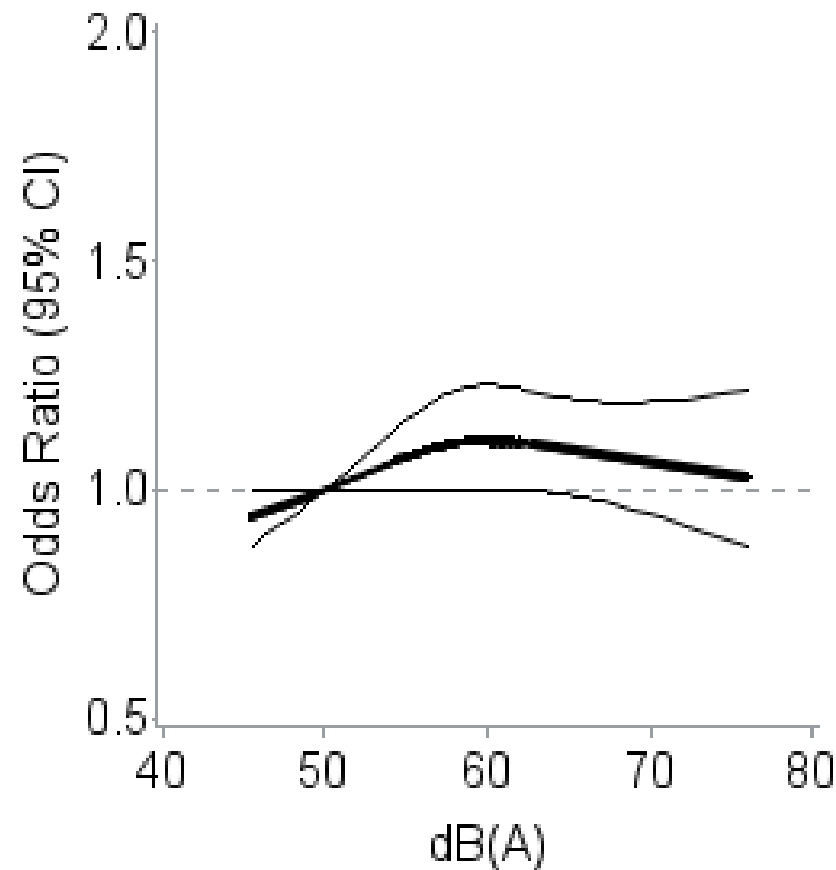
Results (1)

Table 1 Prevalence of preeclampsia, per 1,000 women

	Preeclampsia		
	Any (N=9,680)	Severe (N =2,988)	Mild (N = 6,692)
LA_{eq24h}, dB(A)			
<50.0	27.9 (19.8-36.1)	4.4 (1.2-7.7)	23.5 (16.0-31.0)
50.0-54.9	32.9 (31.4-34.5)	9.2 (8.4-10.0)	23.7 (22.4-25.0)
55.0-59.9	36.8 (35.8-37.8)	11.4 (10.8-12.0)	25.4 (24.6-26.3)
60.0-64.9	36.4 (35.1-37.8)	11.8 (11.0-12.6)	24.6 (23.5-25.7)
≥65.0	37.9 (34.4-41.3)	12.6 (10.6-14.7)	25.2 (22.4-28.0)

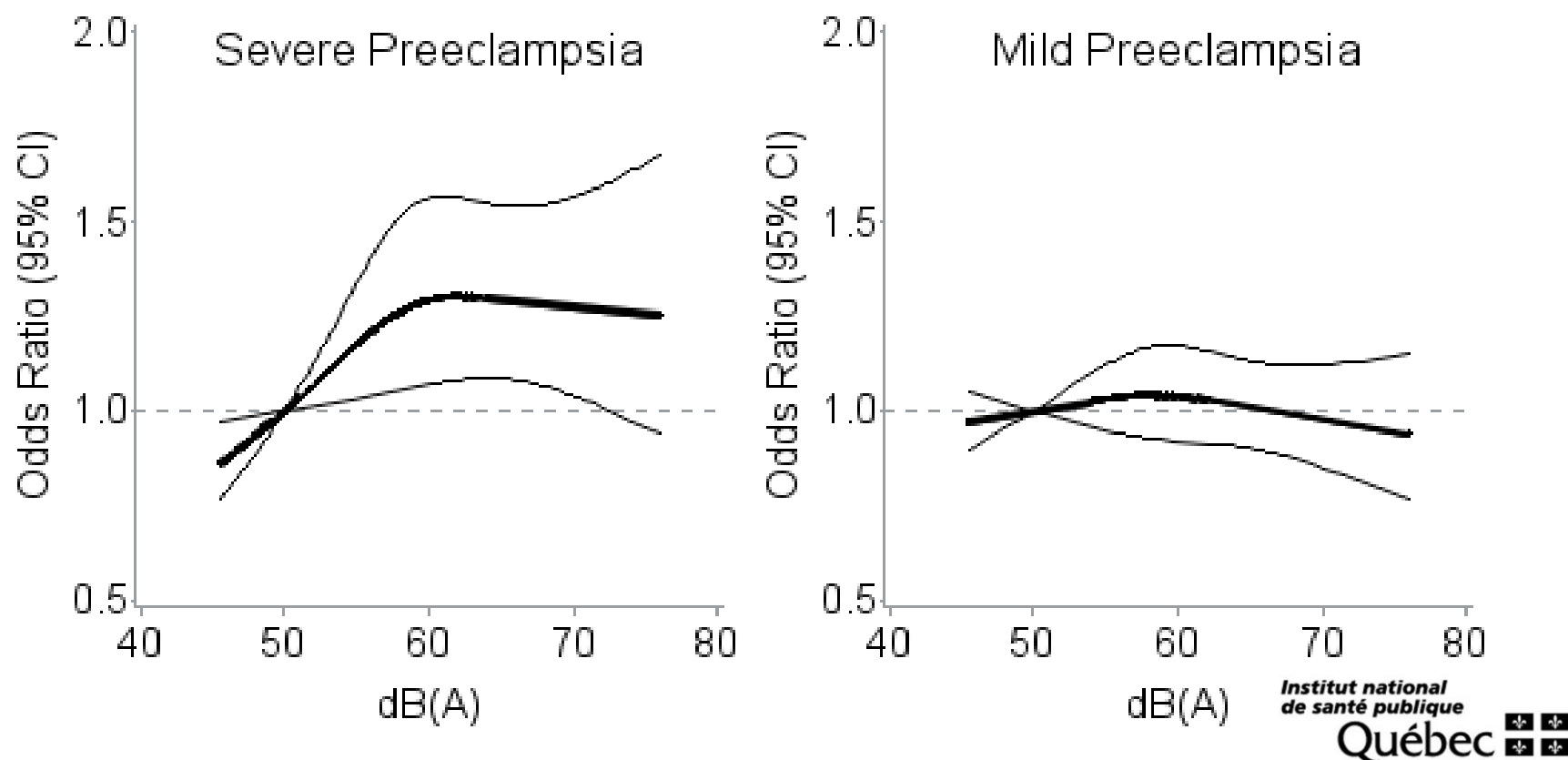
Results (2)

Figure 1 Association between noise and preeclampsia



Results (3)

Figure 2 Association between noise and severity of preeclampsia



Key messages



Environmental noise pollution may be a risk factor for preeclampsia, particularly severe preeclampsia.

Associations are not explained by traffic pollution, neighbourhood walkability, or other maternal characteristics, although residual confounding may remain.

Findings align with evidence that noise pollution is a risk factor for cardiovascular disease in adults.

Limits



Noise exposure may be misclassified.

We cannot rule out the possibility that noise is a marker for other characteristics linked with preeclampsia.

We could not account for factors such as diet, sleep quality, ethnicity or body mass index.

Potential for self-selection bias: healthy women annoyed by noise may move to quieter neighbourhoods if they can afford to.

Implications for risk factor surveillance



In light of rising urban noise, these results suggest that vulnerable populations, including pregnant women, could benefit of residential noise reduction policies.

Administrative data may be an invaluable source of information for testing the relationship between novel environmental risk factors and health outcomes.

Acknowledgements



Canadian Institutes for Health Research (MOP-142277)

Fonds de Recherche du Québec – Santé (34695)

Noise data were formatted by Sophie Goudreau

Nitrogen dioxide data were indexed to DMTI Spatial Inc. postal codes, provided by CANUE (Canadian Urban Environmental Health Research Consortium)

Nitrogen dioxide data used by CANUE were provided by Dr. Perry Hystad, Oregon State University

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