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Attributable fraction of work accidents related to occupational noise exposure in a Southeastern city of Brazil

(Fração atribuível de acidentes do trabalho decorrentes da exposição ao ruído ocupacional em cidade do Sudeste do Brasil)

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JUSTIFICATIVE

Originally, attributable fraction is estimated in relation to a homogeneous exposure. In this study, the authors choose to estimate it as the result of the existence of three noise exposure levels in the study population (low, medium and high), which was done by generalizing the traditional estimator of attributable fraction to a situation with different exposure levels (not dichotomous).

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OBJECTIVE

Estimate the attributable fraction of work accidents related to occupational noise exposure in Piracicaba, a medium-sized city in Southeast Brazil, from data of hospitalar-based case-control study.

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METHOD

Hospitalar-based case-control study

1:1.37 case-control ratio, unmatched

Case inclusion criteria (600 cases):

- ✓ workers, from 15 to 60 years-old;
- ✓ residing in Piracicaba;
- ✓ emergency treatment for a typical work accident at the Emergency Department of the Piracicaba Orthopedics and Trauma Center (COT);
- ✓ signing consent form.

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Controls selection criteria (822 controls):

- ✓ belonging to the workforce (not unemployed);
- ✓ residing in Piracicaba;
- ✓ treatment at the COT for any reason other than a work accident (or accompanying a patient receiving emergency treatment there);
- ✓ signing consent form.

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Study protocol:

- ✓ **Demographics:** sex, age, schooling years;
- ✓ **Occupational:** type of work, work shift, daily working hours, mean overtime hours and occupation;
- ✓ **Noise exposure:** intensity, exposure time, presence in the time of work injury, annoyance;
- ✓ **Hearing:** presence of impairment, tinnitus, dizziness.

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Answer:

“What is the normal intensity of noise in your workplace?”

a) None

b) Low

c) Medium

d) High

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Multiple logistic model adjust

Variable	β estimative	p-value	OR (95%CI)
Age	-0.0059	0.3197	0.994 (0.983-1.006)
Self reported low-intensity noise at work	0.2856	0.1089	1.331 (0.938-1.887)
Self reported medium-intensity noise at work	**0.4888**	**0.0037**	**1.630 (1.172-2.268)**
Worker reports high-intensity noise at work	**0.8303**	**<0.0001**	**2.294 (1.513-3.479)**
Technicians	-0.0466	0.9288	0.954 (0.343-2.653)
Managers	-0.1337	0.8635	0.875 (0.191-4.013)
White-collar	0.4107	0.4025	1.508 (0.576-3.945)
Agriculture	0.2177	0.7434	1.243 (0.338-4.579)
Maintenance	0.8777	0.0686	2.405 (0.935-6.187)
Blue-collar	**0.9747**	**0.0287**	**2.650 (1.107-6.348)**
Service providers	0.6261	0.1668	1.870 (0.770-4.544)
Schooling (years)	**-0.0894**	**<0.0001**	**0.922 (0.889-0.956)**

χ^2 Likelihood ratio = 98,6564, 12 degrees of freedom, p-value<0,0001

ANALYSIS

Cases exposed at:

Medium-intensity noise: 43.34% (260/600)

High-intensity noise: 17.17% (103/600)

Controls exposed at:

Medium-intensity noise: 38.08% (313/822)

High-intensity noise: 9.61% (79/822)

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$$\widehat{AF} = \sum_i \left(\frac{P_i (RR_i - 1)}{P_i (RR_i - 1) + 1} \right) \quad (1)$$

$$L_{1-\alpha/2} = \left[1 - \left(1 - \widehat{AF}\right) \exp\left\{ z_{1-\alpha/2} \sqrt{\frac{\sum_i n_i}{n n_0} + \frac{\sum_i m_i}{m m_0}} \right\} \right] \quad (2)$$

$$U_{1-\alpha/2} = \left[1 - \frac{1 - \widehat{AF}}{\exp\left\{ z_{1-\alpha/2} \sqrt{\frac{\sum_i n_i}{n n_0} + \frac{\sum_i m_i}{m m_0}} \right\}} \right] \quad (3)$$

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RESULTS

Estimative:

The attributable fraction of work accidents in Piracicaba related to medium and high-intensity occupational noise exposure was 0.3041 (95%CI: 0.2341-0.3676).

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CONCLUSION

The study estimated that 30.4% of work accidents were attributable to occupational noise exposure in Piracicaba in 2004. This means that nearly one-third of work accidents in that city would be averted if workers' exposure to noise were eliminated, assuming that this is one of the causal factors of work accidents.

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Thanks!