Exposure to high voltage power lines and risk of childhood leukaemia: an Italian population-based case-control study

Federica Violi[1], Carlotta Malagoli[1], Tommaso Filippini[1], Sara Fabbi[2], Sergio Teggi[2], Elena Ballotti[3], Paolo Zanichelli[3], Maurizio Poli[3], Maurizio Bruni[4], Daniela Sesti[4], Barbara Notari[4], Marco Vinceti[1,5]

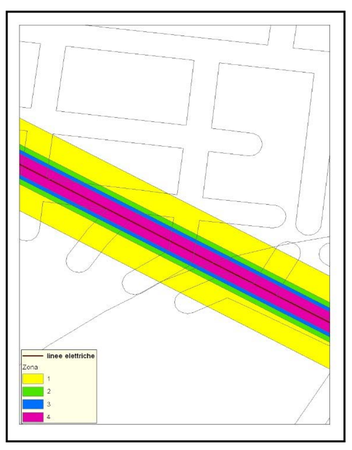
Introduction

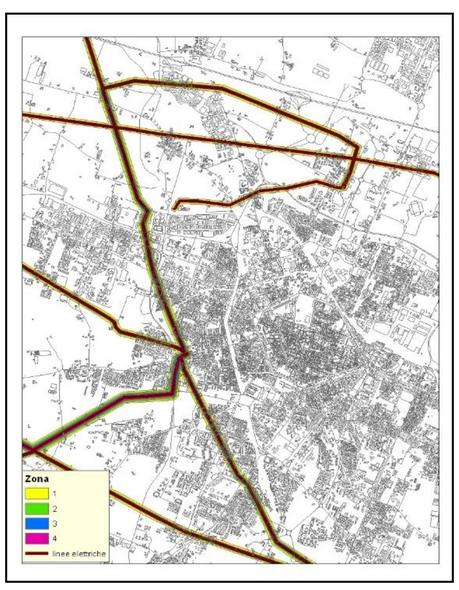
Exposure to high-voltage power lines has been implicated in the aetiology of childhood leukemia, possibly in relation to electromagnetic fields and other factors such as emitted corona ions (Henshaw 2002, Schüz et al, 2016). Previous epidemiologic findings suggested a positive association between proximity to high-voltage power lines and childhood leukaemia (CL) though contrasting results are still reported, possibly biased by exposure misclassification relying on different assessment methods across studies and by unmeasured confounders (Amoon et al, 2018; Crespi et al, 2016; Pedersen et al, 2014).

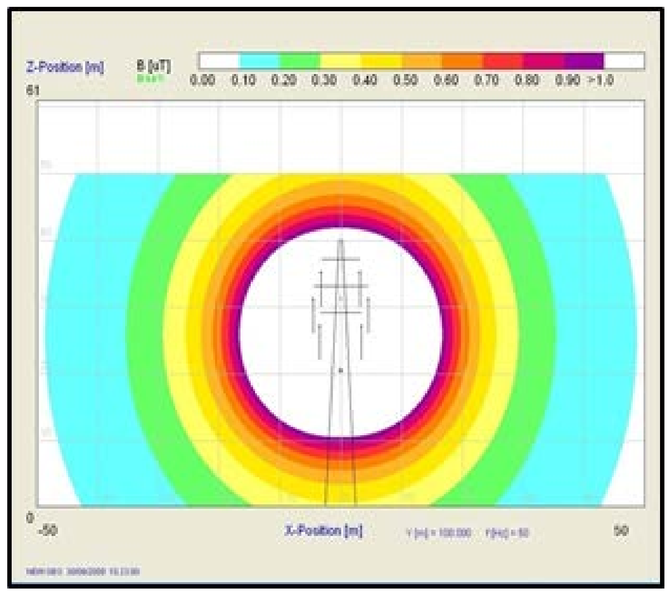
Methods

We further studied this relation in the Modena and Reggio Emilia provinces (Northern Italy), and through a modelling exposure assessment we identified the corridors along high-voltage power lines with magnetic field intensity in the 0.1-<0.2, 0.2-<0.4, and >0.4 μT ranges. We identified the 132 cases of newly-diagnosed CL within these provinces from 1998 to 2013, and we extracted four age-, sex-, province of residence- and calendar year-matched controls for each case. We computed the odds ratio (OR) and its 95% confidence interval (CI) of CL in a conditional logistic regression analysis according to the distance between address at the time of diagnosis of the case and the nearest high-voltage power line, and in addition to the residential magnetic field intensity.

Georeferencing of subjects and high voltage power lines







Results

OR of CL was 0.6 (95% CI 0.3-1.6), 1.2 (95% CI 0.4-3.7), 0.5 (95% CI 0.1-4.2) and 7.3 (95% CI 0.7-81.5) for children living respectively 200-400 m, 100-200 m, 50-100 m and less than 50 m from the nearest high-voltage power line compared to those residing further than 400 m in multivariable analysis, adjusting for outdoor benzene exposure and birth defects. OR of CL associated with overall residence in the area with exposure > 0.1 μT was 8.0 (95% CI 0.7-88.2).

	All children		
Distance (m)	**Case/ Controls**	**OR**	**95% CI**
>400	111/433	1.0	-
200-400	12/58	0.6	0.3-1.6
100-200	5/26	1.2	0.4-3.7
50-100	2/9	0.5	0.1-4.2
<50	2/2	7.3	0.7-81.5

Odds Ratio (OR) and 95% confidence interval (CI) from conditional logistic regression model (matched for sex, age and province of residence),, further adjusted benzene exposure from motorized traffic and birth defects.

Conclusions

Though the number of exposed children in this study was too low to allow firm conclusions, yielding in imprecise estimates, our results suggest an excess risk of leukaemia among children living close to electric power lines or exposed to higher magnetic fields intensity.

References

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Dr. Federica Violi, Department of Biomedical, Metabolic and Neural Sciences, Section of Public Health - University of Modena and Reggio Emilia, Via Campi, 287 – 41125 Modena. *federica.violi@unimore.it*

Affiliations: [1]Environmental, Genetic and Nutritional Epidemiology Research Center (CREAGEN), Department of Biomedical, Metabolic and Neural Sciences, University of Modena and Reggio Emilia, Modena, Italy; [2]Department of Engineering "Enzo Ferrari", University of Modena and Reggio Emilia, Modena, Italy; [3]ARPAE - Emilia Romagna Agency for Environmental Protection and Energy, Reggio Emilia section, Reggio Emilia, Italy; [4]ARPAE - Emilia Romagna Agency for Environmental Protection and Energy, Modena section, Modena, Italy; [5]Department of Epidemiology, Boston University School of Public Health, Boston, USA