

# Residence near electrical transformer rooms and risk of childhood leukaemia: an Italian population-based case-control study

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## Introduction

Some epidemiologic evidence indicates an association between magnetic field (MF) exposure and childhood leukaemia (CL) (Kheifets *et al*, 2008). We carried out a population-based case-control study in order to evaluate the risk of CL in children living near electrical transformer rooms, as source of MF exposure (Huss *et al*, 2013; Zaryabova *et al*, 2013).

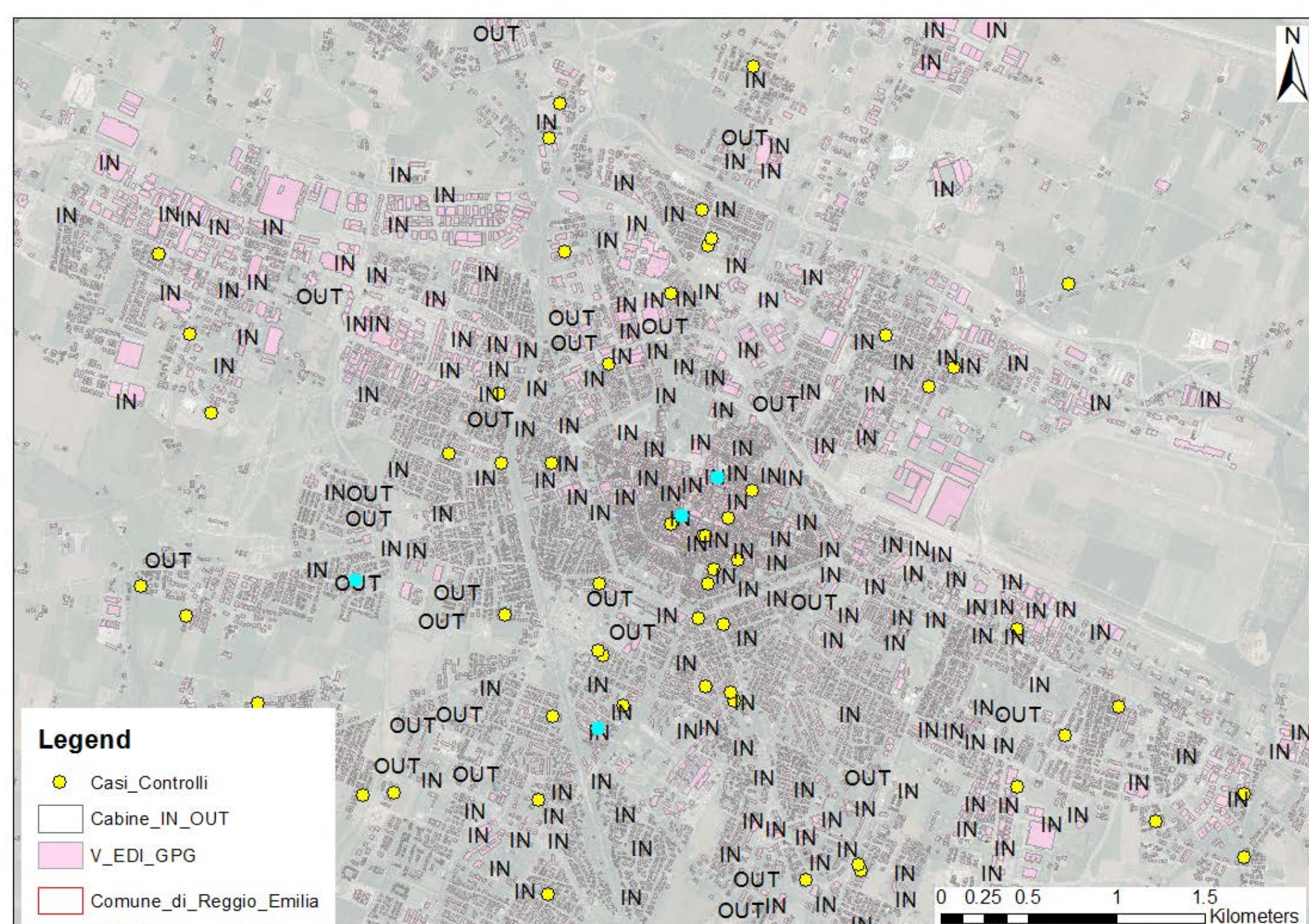
## Methods

We identified all CL cases diagnosed from 1998 to 2011 in the Modena and Reggio-Emilia provinces (1,2 million inhabitants) through the Italian National Childhood Cancer Register. For each case, we randomly selected four population controls matched by age, sex, province of residence, and calendar year. Using a Geographical Information System, we geocoded children's address of residence at the time of diagnosis. We also identified and geocoded indoor electrical transformers operating in the 1998-2011 period. We computed the odds ratio (OR) and its 95% confidence interval (CI) of CL according to decreasing distance between the children's residence to the nearest transformer, using a conditional logistic regression model also adjusted for exposure to benzene from motorized vehicular traffic.

## Electric transformer rooms characterization

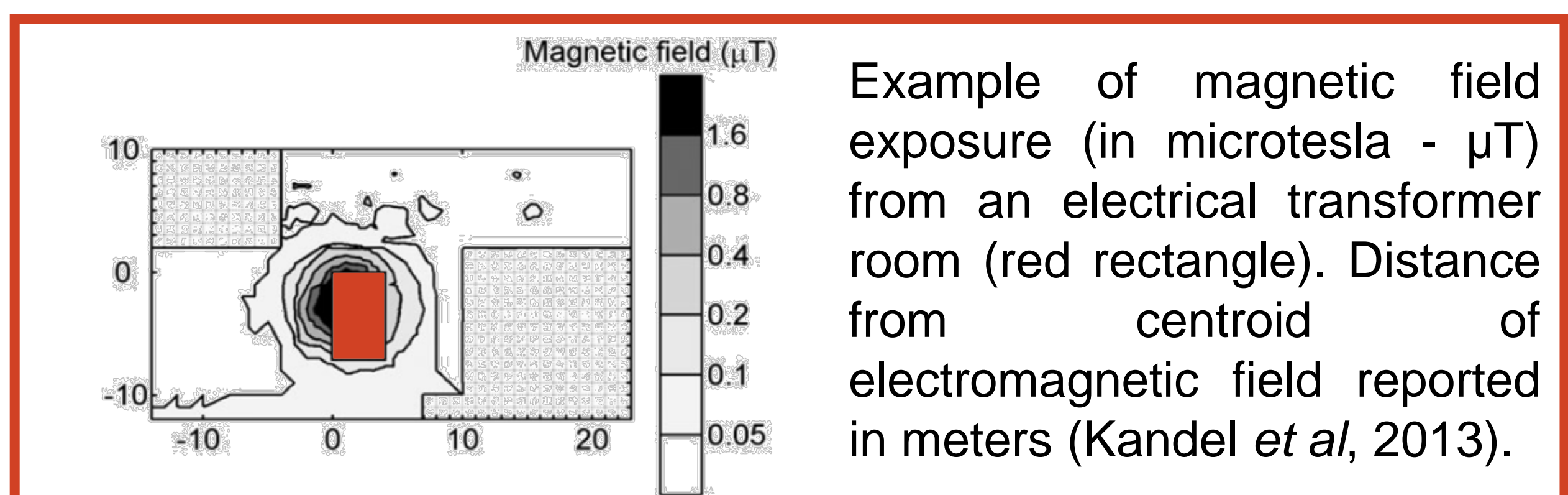


## Georeferencing of subjects and transformers rooms



## Results

We included in the study 116 CL cases and 464 controls, 246 of which (48 cases and 198 controls) were residing less than 200 m from a transformer. Compared to children residing beyond 200 m, we found an excess CL risk for children living respectively at 50-200 m (OR 1.2, 95% CI 0.7-2.1), at 50-20 m (OR 1.8, 95% CI 0.6-4.9) and less than 20 m (OR 2.1, 95% CI 0.4-12.1) from the nearest transformer. Such increased risk was markedly higher in the 5-14 age group, as compared to the younger group.



	All children			Children aged 5-14 years		
Distance (m)	Case/Controls	OR	95% CI	Case/Controls	OR	95% CI
>200	68/266	1.0	-	34/135	1.0	-
200-50	39/167	1.2	0.7-2.1	21/93	1.6	0.7-3.5
50-20	7/25	1.8	0.6-4.9	4/14	3.0	0.8-11.8
<20	2/6	2.1	0.4-12.1	2/2	5.7	0.7-43.8

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

## Conclusions

This is the first study investigating the possible association between MF exposure from indoor transformers and CL risk. Although our results are statistically imprecise due to low number of study subjects and should be interpreted with caution due to possible exposure misclassification and residual confounding, they suggest that living near electrical transformers may increase CL risk. This may be particularly true for children aged 5-14, who could be exposed for a longer induction period to these low-dose MF levels.

## References

Huss *et al*, (2013) J Expo Sci Environ Epidemiol 23: 554 – 558  
Kandel *et al*, (2013) Radiat Prot Dosimetry 157: 619 – 622  
Kheifets *et al*, (2008) Radiat Prot Dosimetry 132: 139 – 147  
Zaryabova *et al*, (2013) Electromagn Biol Med 32: 209 – 217

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