

**Title:**

**Association between exposure to air pollution during pregnancy and false positives  
in fetal heart rate monitoring**

Authors:

Seiichi Morokuma<sup>a</sup>, Takehiro Michikawa<sup>b</sup>, Shin Yamazaki<sup>b</sup>, Hiroshi Nitta<sup>b</sup>, Kiyoko  
Kato<sup>a</sup>

<sup>a</sup>Department of Obstetrics and Gynaecology, Kyushu University Hospital, Kyushu  
University, 3-1-1 Maidashi, Higashi-ku, Fukuoka 812-8582, Japan

<sup>b</sup>Environmental Epidemiology Section, Centre for Health and Environmental Risk  
Research, National Institute for Environmental Studies, 16-2 Onogawa, Tsukuba,  
Ibaraki 305-8506, Japan

**Supplementary figure.**

**The equation for multilevel logistic regression.**

$$\log\left(\frac{p_{ij}}{1-p_{ij}}\right) = \beta_0 + \sum_{k=1}^r (\beta_k X_{ijk}) + u_i$$

$\frac{p_{ij}}{1-p_{ij}}$  is the odds of abnormal fetal heart rate for participant j in hospital i

$\beta_0$  is the intercept.

$\beta_k$  is regression coefficients corresponding to each co-variate.

$X_{ijk}$  is an individual value of co-variates.

$u_i$  is a hospital-level random effect.