

Supplementary material to *Bayesian graphical models for regression on multiple datasets with different variables* (C. H. Jackson <sup>1</sup>, N. G. Best and S. Richardson <sup>2</sup>).

Table 2: Associations of birth outcomes (posterior mean and 95% credible interval) with NO<sub>2</sub> and SO<sub>2</sub> exposure. Units of exposure defined by the interquartile range of background pollution concentrations across England and Wales: 14.5  $\mu\text{g}/\text{m}^3$  for NO<sub>2</sub> and 1.9  $\mu\text{g}/\text{m}^3$  for SO<sub>2</sub>. All models adjusted for ethnicity and smoking unless stated otherwise.

	Odds ratio (NO <sub>2</sub> )	Odds ratio (SO <sub>2</sub> )
<b>Low birth weight</b>		
Register (unadjusted for ethnicity and smoking)	1.15 (1.07, 1.23)	1.00 (0.97, 1.04)
MCS	0.94 (0.79, 1.13)	1.03 (0.94, 1.12)
Combined	0.98 (0.91, 1.04)	1.02 (0.98, 1.05)
Register	0.97 (0.90, 1.03)	1.01 (0.98, 1.05)
Combined (ignoring selection)	1.00 (0.94, 1.06)	1.02 (0.98, 1.06)
MCS (unadjusted for ethnicity and smoking)	1.08 (0.92, 1.29)	1.04 (0.95, 1.13)
Combined (no ecological data in imputation)	1.03 (0.96, 1.10)	1.01 (0.97, 1.04)
Combined (no ecological data or NO <sub>2</sub> in imputation)	1.12 (1.05, 1.19)	1.00 (0.97, 1.04)
Combined (confounders imputed in MCS)	0.98 (0.91, 1.04)	1.02 (0.99, 1.06)
Combined (no cut)	0.82 (0.76, 0.88)	1.04 (1.00, 1.08)
Combined (adjusting for season of birth)	0.97 (0.91, 1.04)	1.02 (0.99, 1.05)
<b>Low full term birth weight</b>		
MCS	0.92 (0.72, 1.16)	1.04 (0.92, 1.18)
<b>Preterm birth</b>		
MCS	0.97 (0.82, 1.14)	1.01 (0.93, 1.09)
<b>Continuous birth weight (g)</b>		
Combined	NO <sub>2</sub> -31.2 (-39.6, -22.8)	SO <sub>2</sub> 1.1 (-3.6, 5.8)

<sup>1</sup>MRC Biostatistics Unit, Cambridge

<sup>2</sup>Imperial College London

Table 3: Odds ratios of low birth weight or preterm birth, or change in continuous birth weight, associated with ethnicity and smoking (posterior mean and 95% credible interval)

	Ethnicity (baseline: White)			
	Smoking	South Asian	Black	Other
<b>Low birth weight</b>				
MCS	1.97 (1.68, 2.30)	2.76 (2.12, 3.58)	1.78 (1.26, 2.48)	1.63 (1.14, 2.29)
Combined	1.93 (1.79, 2.09)	2.60 (2.30, 2.91)	1.78 (1.50, 2.10)	1.55 (1.28, 1.84)
Register	1.94 (1.77, 2.12)	2.94 (2.58, 3.35)	1.99 (1.63, 2.42)	1.61 (1.29, 1.97)
Combined (ignoring selection)	1.93 (1.79, 2.10)	2.69 (2.40, 3.00)	1.81 (1.52, 2.12)	1.57 (1.30, 1.87)
MCS (unadjusted for ethnicity and smoking)				
Combined (no ecological data in imputation)	1.83 (1.69, 1.97)	2.21 (1.93, 2.52)	1.57 (1.30, 1.90)	1.49 (1.25, 1.75)
Combined (no ecological data or NO <sub>2</sub> in imputation)	1.21 (1.12, 1.30)	1.25 (1.13, 1.39)	1.05 (0.94, 1.16)	1.10 (0.96, 1.25)
Combined (confounders imputed in MCS)	1.92 (1.78, 2.08)	2.58 (2.29, 2.91)	1.77 (1.48, 2.11)	1.54 (1.26, 1.85)
Combined (no cut)	8.98 (7.93, 10.27)	11.68 (10.01, 13.65)	3.38 (2.63, 4.35)	2.22 (1.60, 2.97)
Combined (adjusting for season of birth)	1.93 (1.79, 2.09)	2.60 (2.32, 2.92)	1.79 (1.50, 2.10)	1.56 (1.28, 1.86)
<b>Low full term birth weight</b>				
MCS	2.78 (2.16, 3.54)	6.27 (4.48, 8.79)	2.90 (1.79, 4.52)	2.40 (1.39, 3.85)
<b>Preterm birth</b>				
MCS	1.28 (1.11, 1.48)	1.21 (0.92, 1.58)	1.32 (0.93, 1.81)	1.08 (0.74, 1.55)
<b>Continuous birth weight (g)</b>				
Combined	-72.0 (-83.8, -60.1)	-167.8 (-187.8, -148.5)	-81.5 (-106.6, -56.7)	-70.8 (-96.5, -45.1)

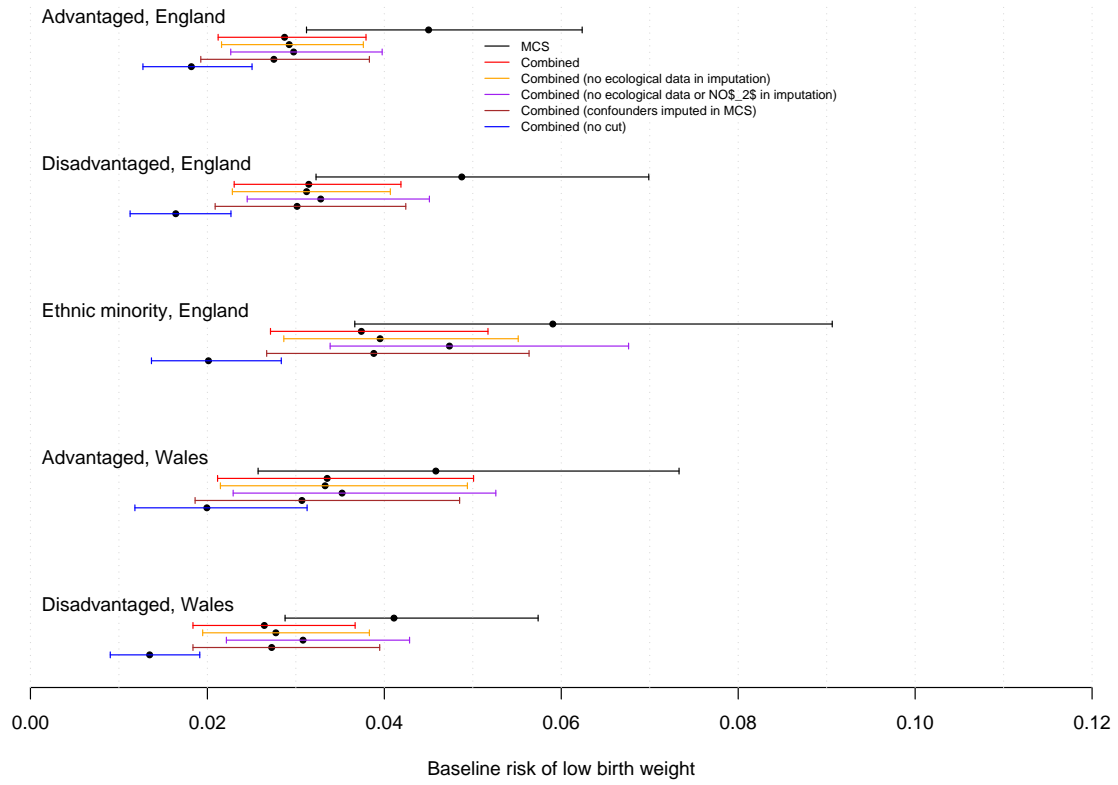


Figure 5: Baseline probability  $\text{expit}(\mu_s)$  of low birth weight within each MCS sampling stratum  $s = 1, \dots, 5$ .

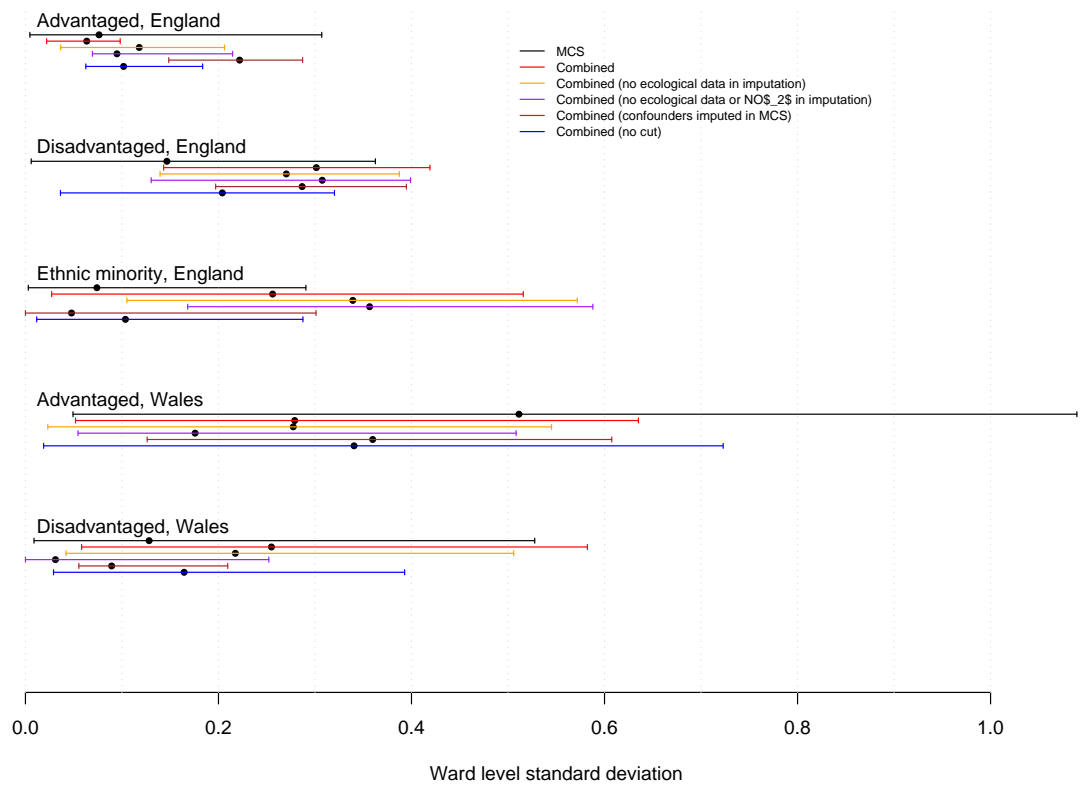


Figure 6: Ward-level standard deviation  $\sigma_s$  of logit baseline risk of low birth weight, representing the extend of ward-level clustering within each MCS sampling stratum  $s = 1, \dots, 5$ .