Socioeconomic disadvantage and risk of low birth weight

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SEE Australia Births Study

- Analysis of Low Birth Weight, Small for Gestational Age and Preterm Births.
- Study Population: singleton live births in NSW 1994 – 2004
- Spatial Unit: Postal Areas 2001 boundaries (589).
- Exclusions:
  - Indeterminant sex
  - Gestational age unkown
  - Postal area outside NSW
  - Stillbirths
  - Multiple births

Adverse Birth Outcomes

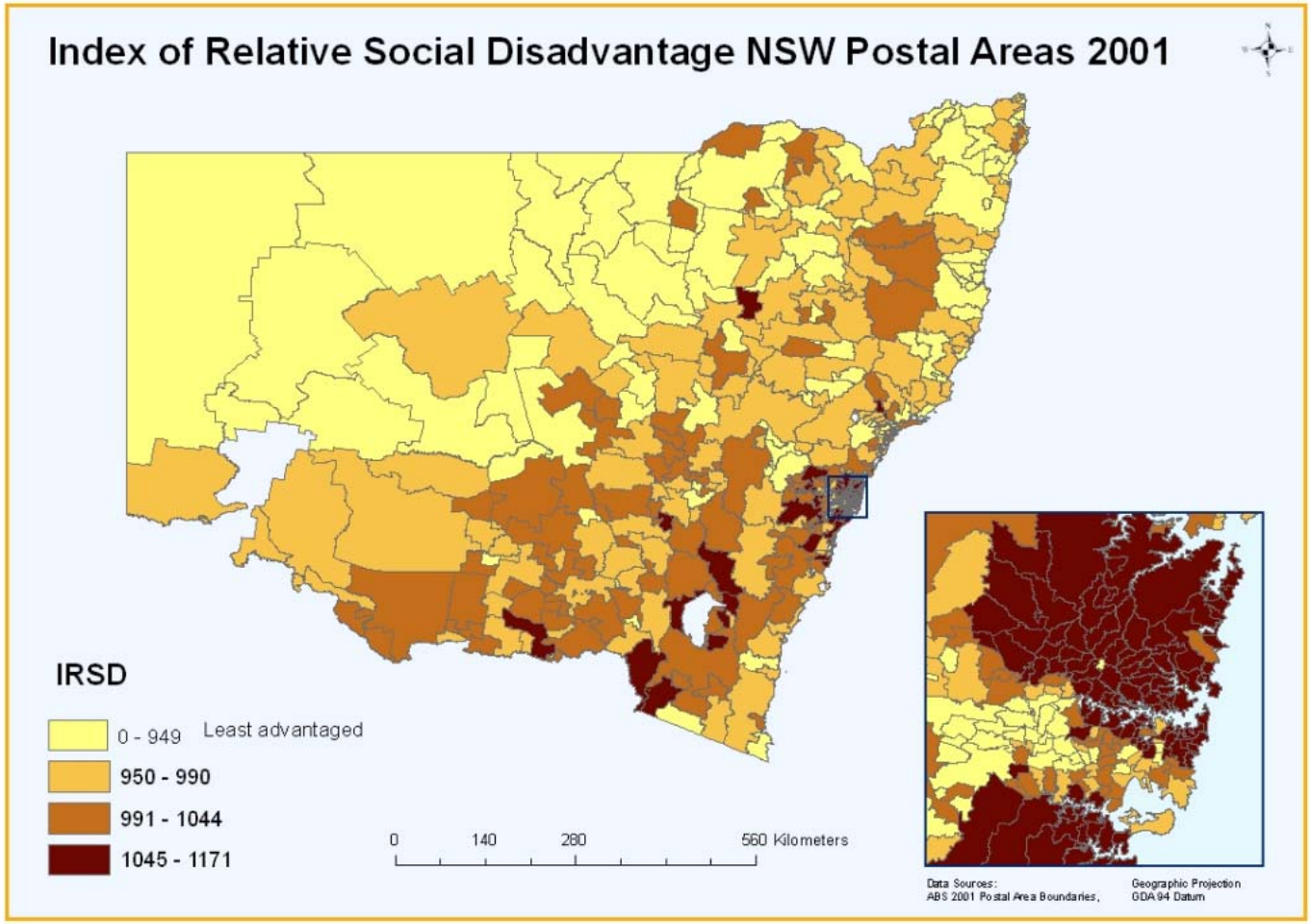
- Total births in Study = 944,659 cases
- Low Birth Weight (<2,500g) = 57,110 cases
- Preterm Births (<37 weeks) = 63,997 cases
- Small for Gestational Age (≤10th percentile) = 92,914 cases

- Number of Smoking Mothers = 174,854 cases

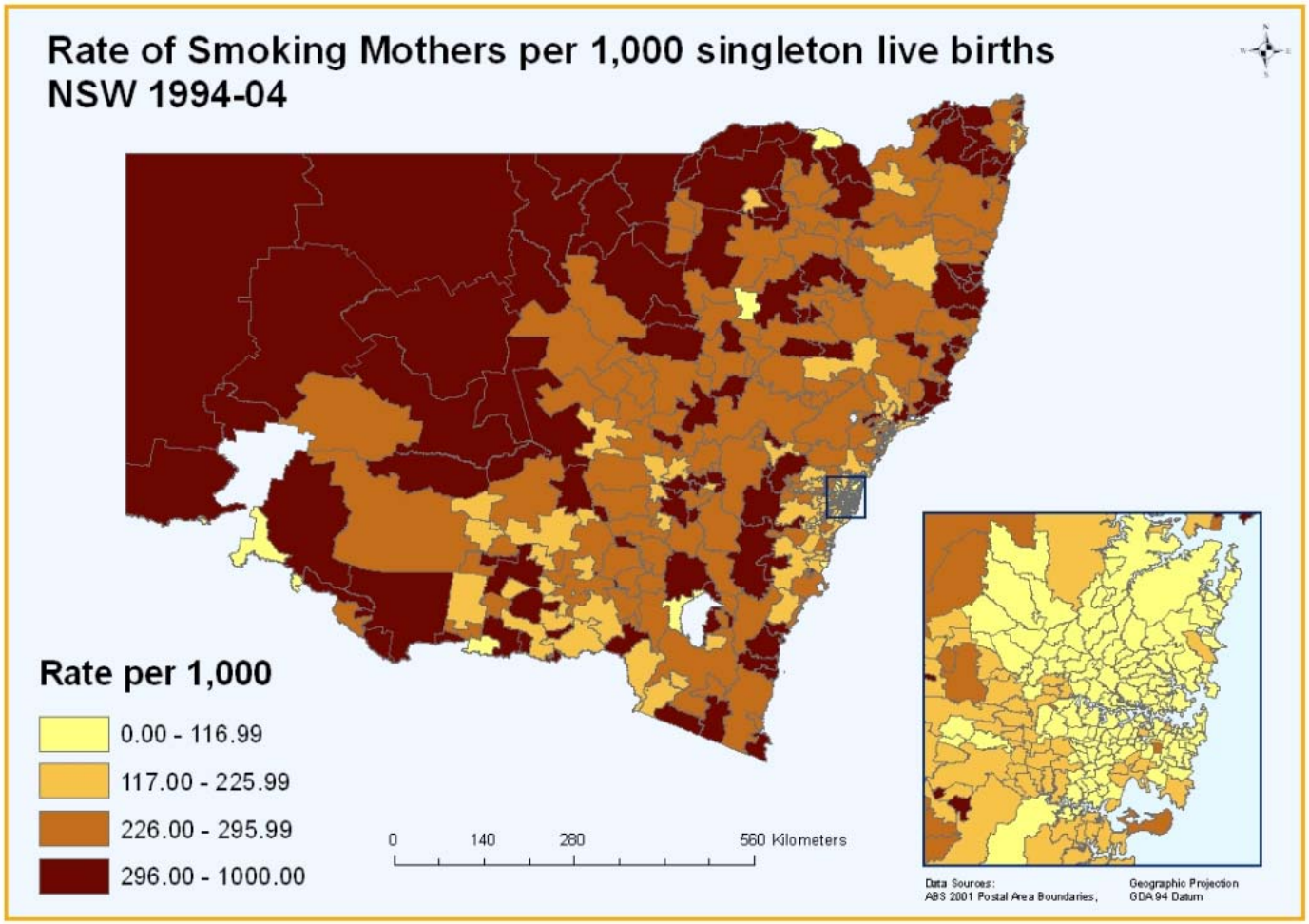
Conditional Autoregressive (CAR) Model

- All adverse birth outcomes modelled using a CAR model in WinBUGS
- Models run with:
  - No covariates
  - Index of Relative Social Disadvantage
  - Remoteness (ARIA+)
  - Smoking Mothers

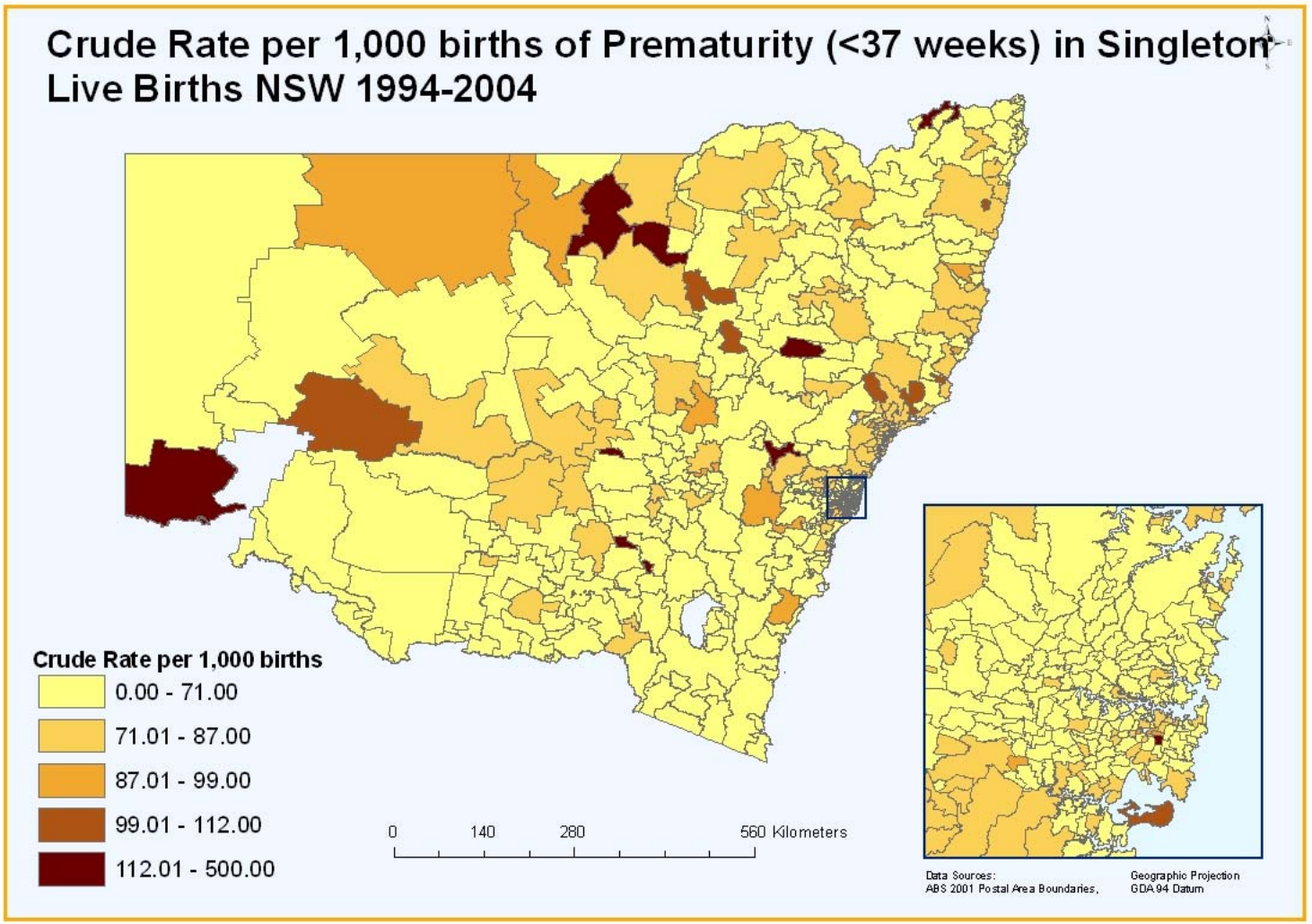
Index of Relative Social Disadvantage NSW Postal Areas 2001



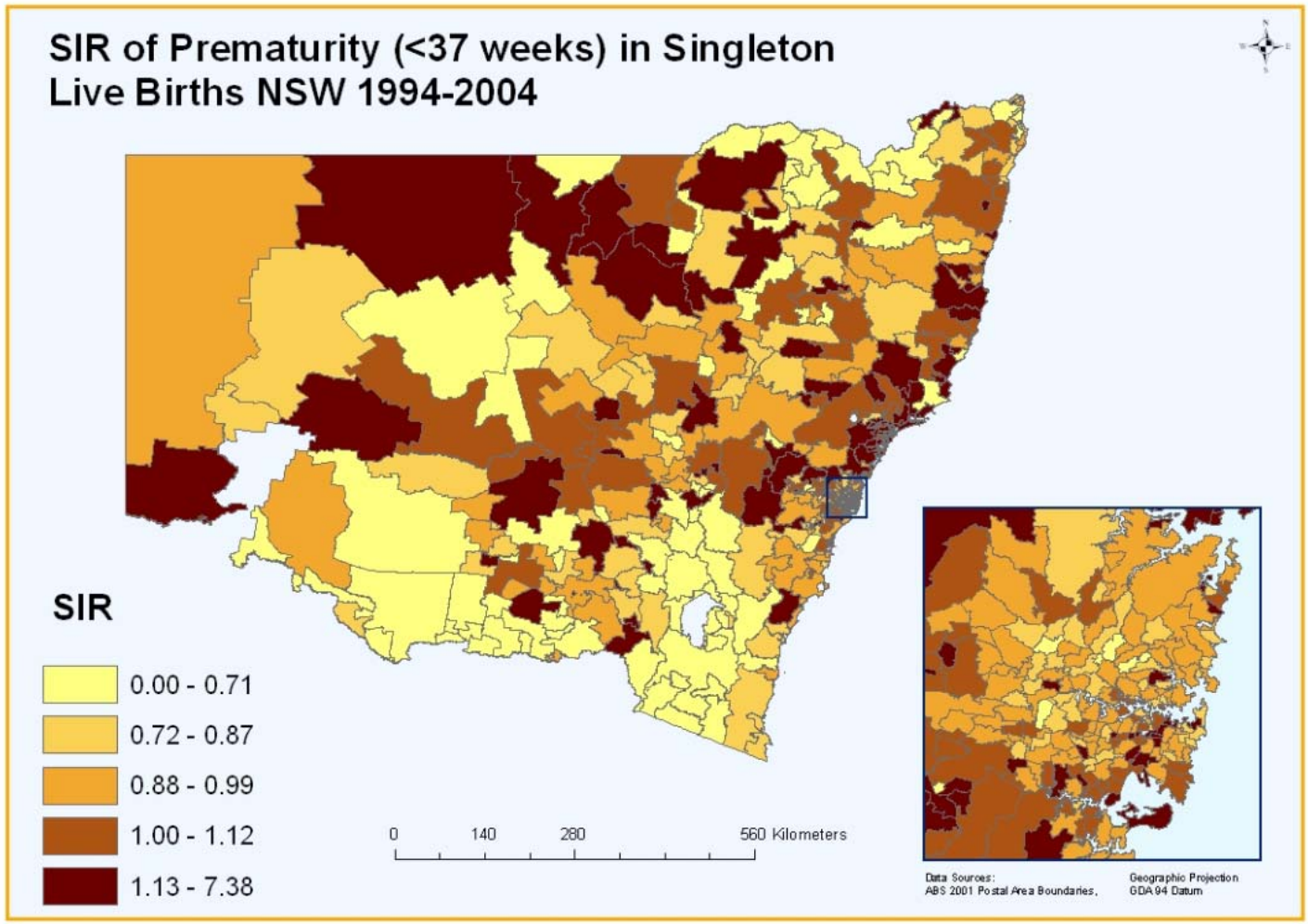
Rate of Smoking Mothers per 1,000 singleton live births



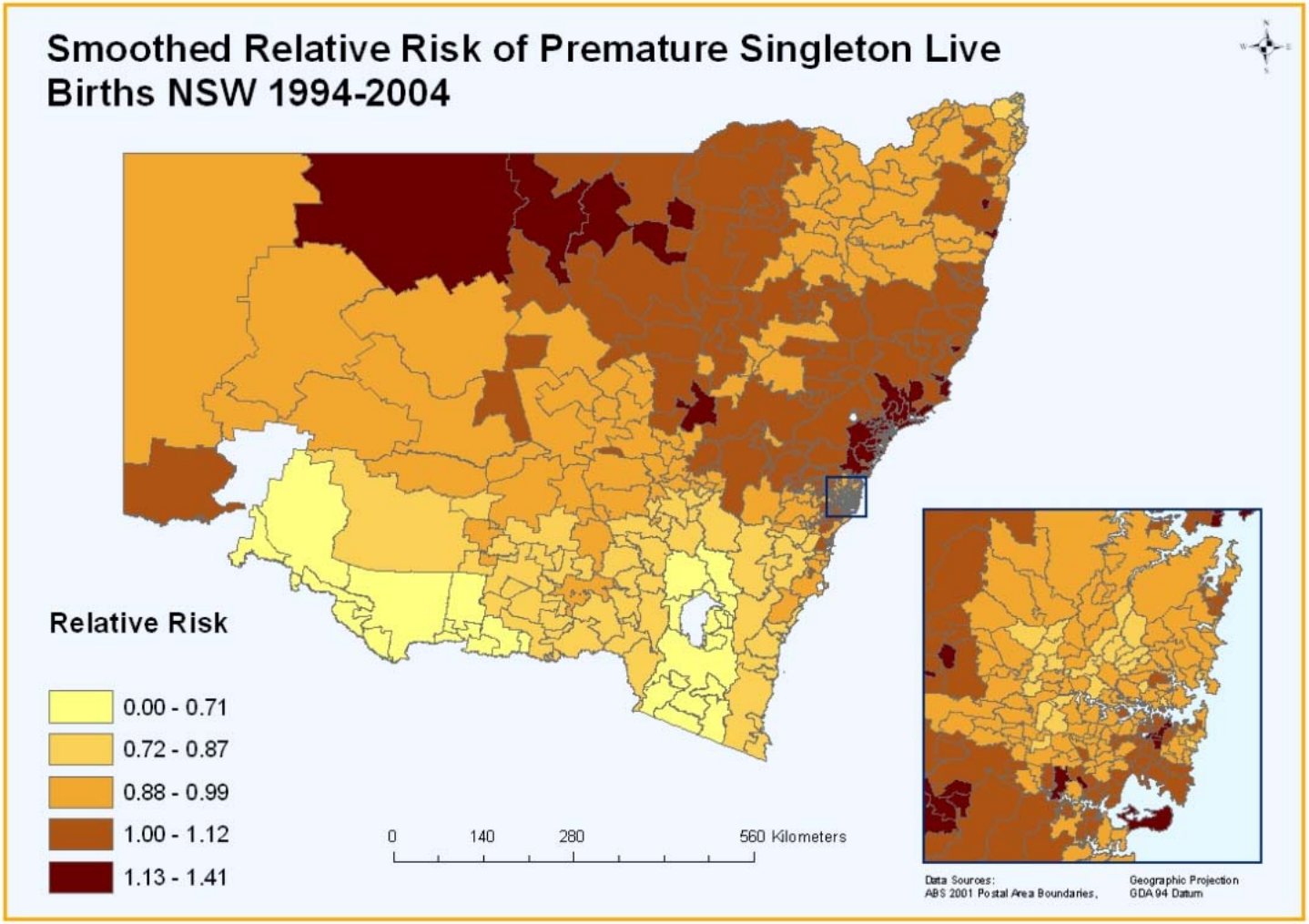
Rate per 1,000 preterm births NSW 1994-04



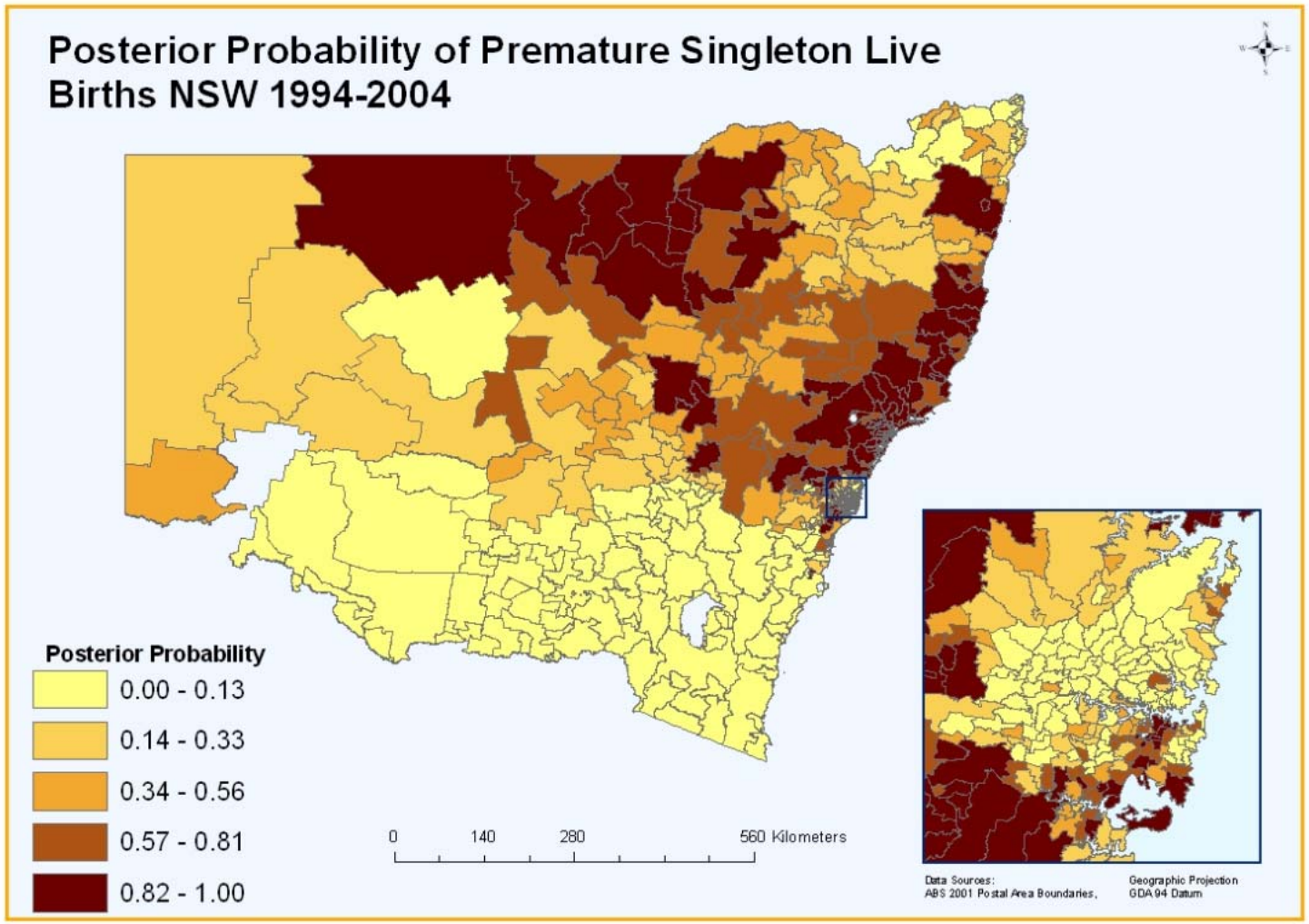
SIR of Preterm Births in NSW 1994-04



Smoothed Relative Risk – Preterm births



Posterior Probability for Preterm Births

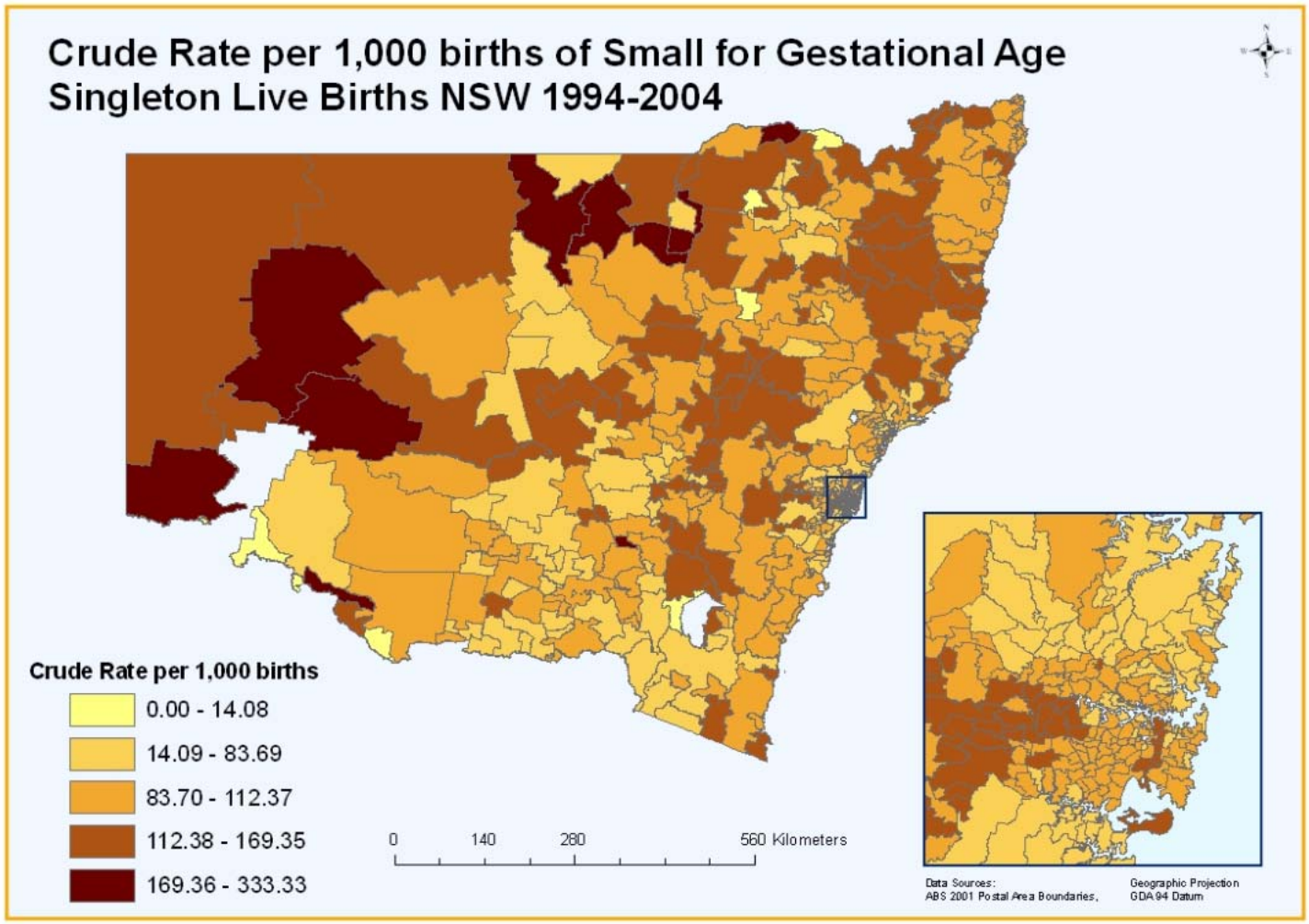


CAR model of Preterm Births

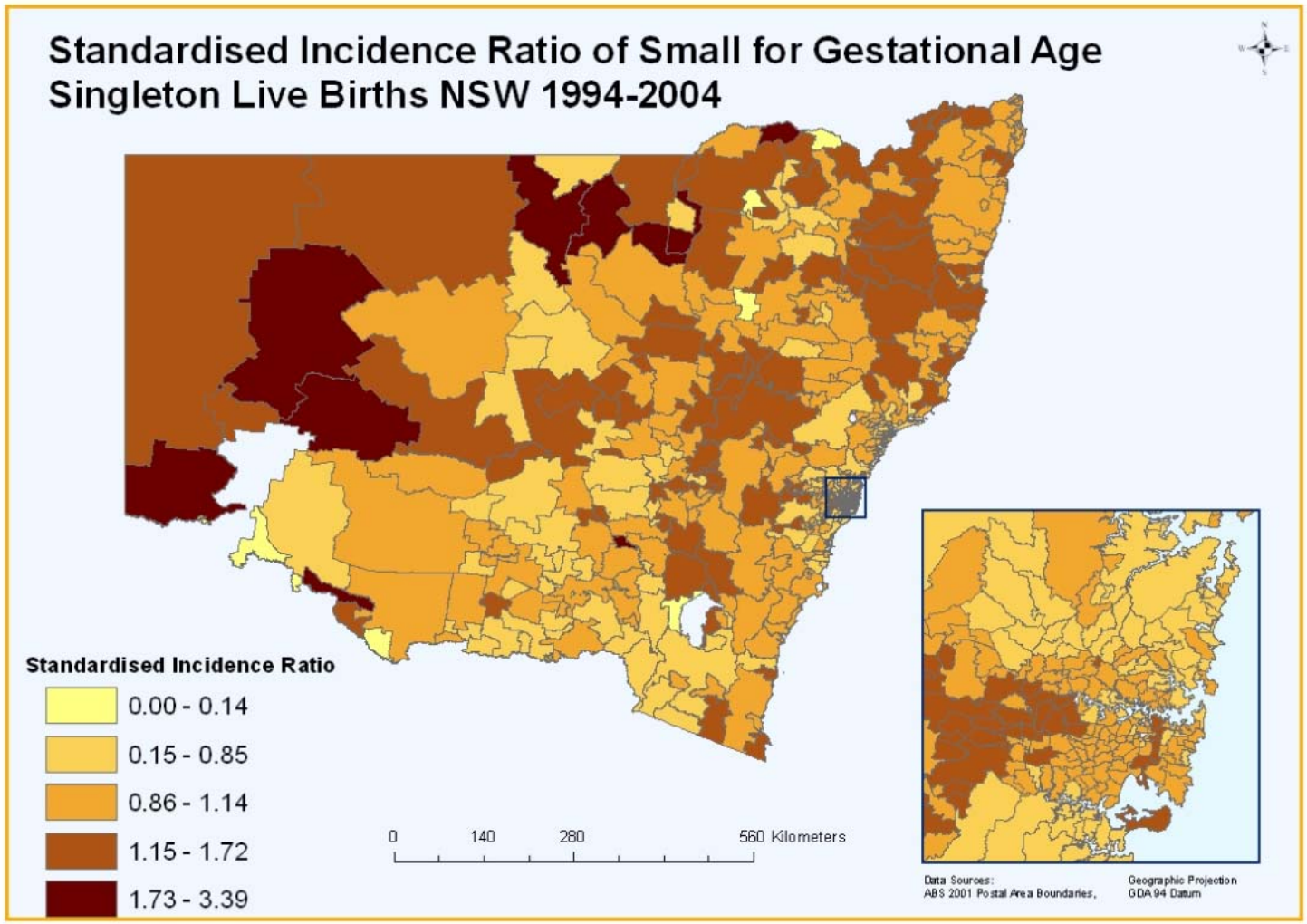
Table 2. Associations between IRSD, ARIA-plus, Smoking Rate and Pre-term Births (<37 weeks)

Covariate	RR	95% Credible Interval		Fraction
No covariate				0.98
IRSD				
>10.44 (least disadvantaged)	Reference			0.98
9.91-10.44	1.05	0.98	1.13	
9.50-9.90	1.12	1.03	1.21	
<9.50 (most disadvantaged)	1.14	1.05	1.24	
ARIA-plus				
<0.20 (cities)	Reference			0.98
0.20-2.40 (inner region)	0.98	0.91	1.05	
2.40-5.92 (outer region)	0.94	0.85	1.03	
5.92-10.53 (remote)	1.05	0.89	1.21	
>10.53 (very remote)	1.07	0.84	1.36	
Smoking rate				
<116	Reference			0.98
117-225	1.08	1.01	1.17	
226-295	1.16	1.07	1.28	
>295	1.21	1.11	1.35	

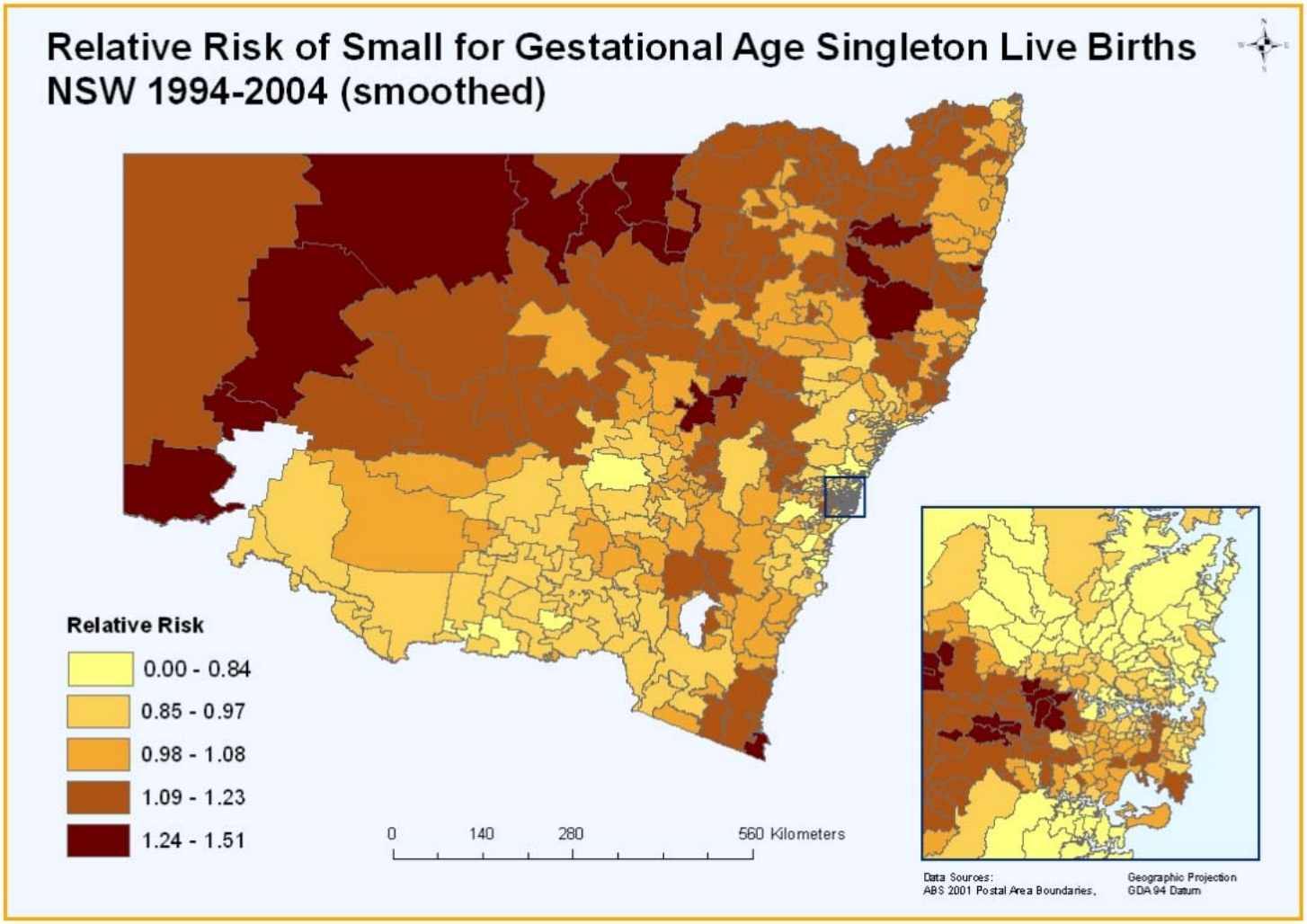
Rate per 1,000 births for SGA NSW 1994-04



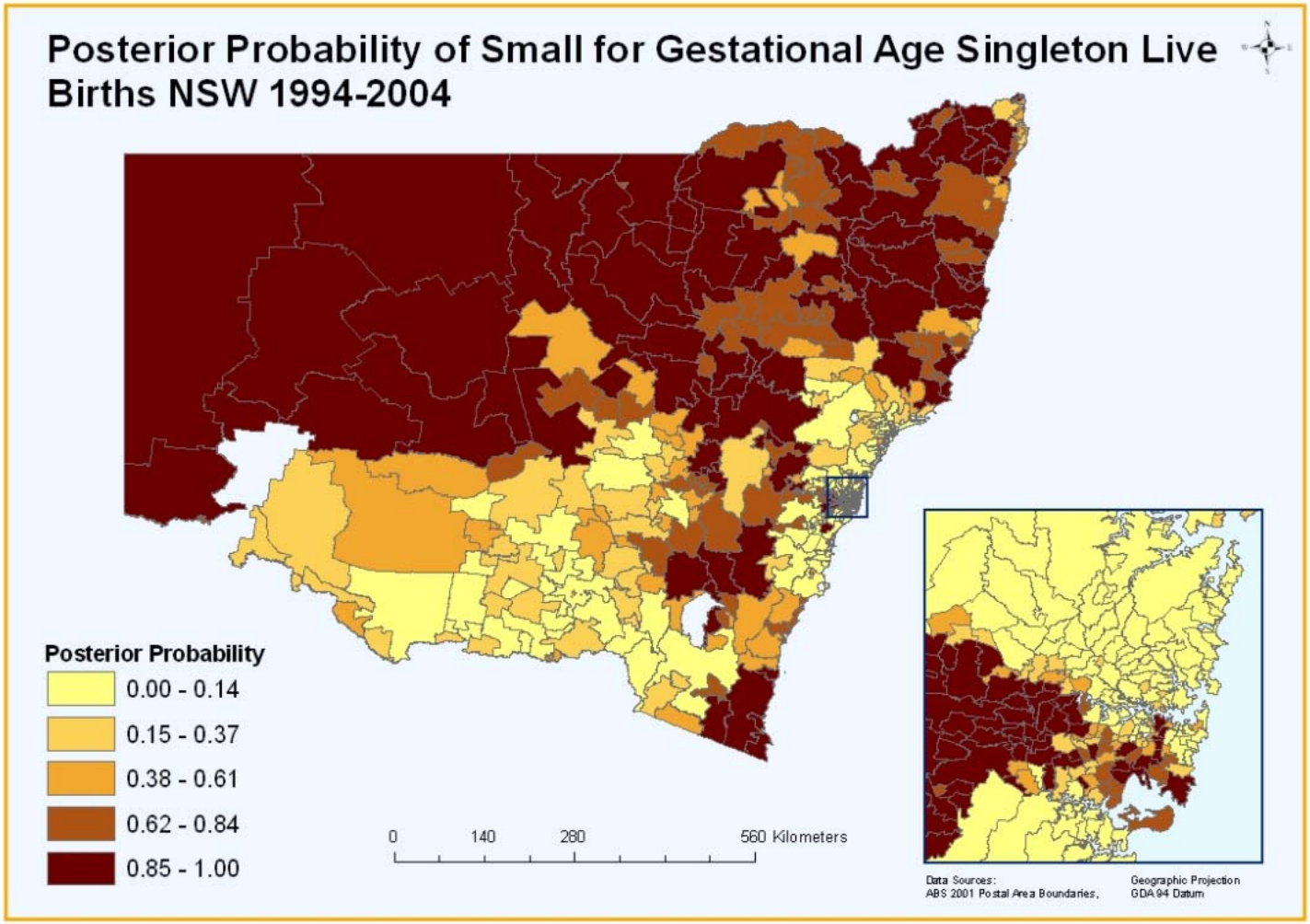
SIR for SGA in NSW 1994-04



Smoothed Relative Risk - SGA



Posterior Probability for SGA



CAR model of Low Birth Weight

Table 1. Associations between IRSD, ARIA-plus, Smoking Rate and Total Low Birth Weight (<2500g)

Covariate	RR	95% Credible Interval		Fraction
No covariate				0.97
IRSD				
>10.44 (least disadvantaged)	Reference			0.95
9.91-10.44	1.10	1.02	1.17	
9.50-9.90	1.18	1.09	1.26	
<9.50 (most disadvantaged)	1.22	1.12	1.31	
ARIA-plus				
<0.20 (cities)	Reference			0.96
0.20-2.40 (inner region)	0.99	0.91	1.07	
2.40-5.92 (outer region)	0.94	0.84	1.06	
5.92-10.53 (remote)	1.11	0.93	1.32	
>10.53 (very remote)	1.27	0.98	1.65	
Smoking rate				
<116	Reference			0.96
117-225	1.10	1.04	1.16	
226-295	1.22	1.14	1.32	
>295	1.29	1.20	1.40	

CAR model of SGA

Table 3. Associations between IRSD, ARIA-plus, Smoking Rate and Small for Gestational Age

Covariate	RR	95% Credible Interval		Fraction
No covariate				0.91
IRSD				
>10.44 (least disadvantaged)	Reference			0.73
9.91-10.44	1.17	1.11	1.23	
9.50-9.90	1.26	1.19	1.33	
<9.50 (most disadvantaged)	1.36	1.28	1.44	
ARIA-plus				
<0.20 (cities)	Reference			0.89
0.20-2.40 (inner region)	0.98	0.89	1.06	
2.40-5.92 (outer region)	0.96	0.84	1.08	
5.92-10.53 (remote)	1.10	0.92	1.31	
>10.53 (very remote)	1.43	1.12	1.83	
Smoking rate				
<116	Reference			0.86
117-225	1.04	0.96	1.13	
226-295	1.15	1.03	1.27	
>295	1.29	1.15	1.43	

- 91% of the variation is spatial and remaining 9% is non-spatial.
- Socio-economic status (IRSD) explains an additional 18% of the variation.
- Smoking explains an additional 5% of the variation.

Multilevel analysis

Even after accounting for individual level factors including maternal diabetes, hypertension in pregnancy, maternal age, smoking, SES and antenatal care independently predict SGA and preterm births

Next Steps

- Multi level analysis
- Gene Environment Interaction

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