Appendix

A. Full Conditionals

The full conditionals of $\boldsymbol{\sigma}$, $\boldsymbol{\omega}$, and $\boldsymbol{z}_i$ are

1. $[\boldsymbol{\beta}_1, \omega_{11}|\text{ others}] \propto \prod_{i=1}^{m}\left\{(1-P_{i1})^{S_{i1}}P_{i1}^{K_{i1}}\right\}$
2. $[\boldsymbol{\beta}_2, \omega_{12}, \omega_{22}|\text{ others}] \propto \prod_{i=1}^{m}\left[(1-P_{i2})^{S_{i2}}P_{i2}^{K_{i2}}\left\{(1-P_{i2})^{N_{ik_3}}(1-P_{i3})+P_{i3}\right\}\right]$
3. $[\boldsymbol{\beta}_3, \omega_{13}, \omega_{23}, \omega_{23}|\text{ others}] \propto \prod_{i=1}^{m}\left[(1-P_{i3})^{K_{i2}}\left\{(1-P_{i2})^{N_{ik_3}}(1-P_{i3})+P_{i3}\right\}\right]$
4. $[z_{i1}|\text{ others}] \propto (1-P_{i1})^{S_{i1}}P_{i1}^{K_{i1}}(1-P_{i2})^{S_{i2}}P_{i2}^{K_{i2}}\left\{(1-P_{i2})^{N_{ik_3}}(1-P_{i3})+P_{i3}\right\}\exp(-\frac{z_{i1}^2}{2})$
5. $[z_{i2}|\text{ others}] \propto (1-P_{i2})^{S_{i2}}P_{i2}^{K_{i2}}\left\{(1-P_{i2})^{N_{ik_3}}(1-P_{i3})+P_{i3}\right\}\exp(-\frac{z_{i2}^2}{2})$
6. $[z_{i3}|\text{ others}] \propto (1-P_{i2})^{K_{i2}}\left\{(1-P_{i2})^{N_{ik_3}}(1-P_{i3})+P_{i3}\right\}\exp(-\frac{z_{i3}^2}{2})$

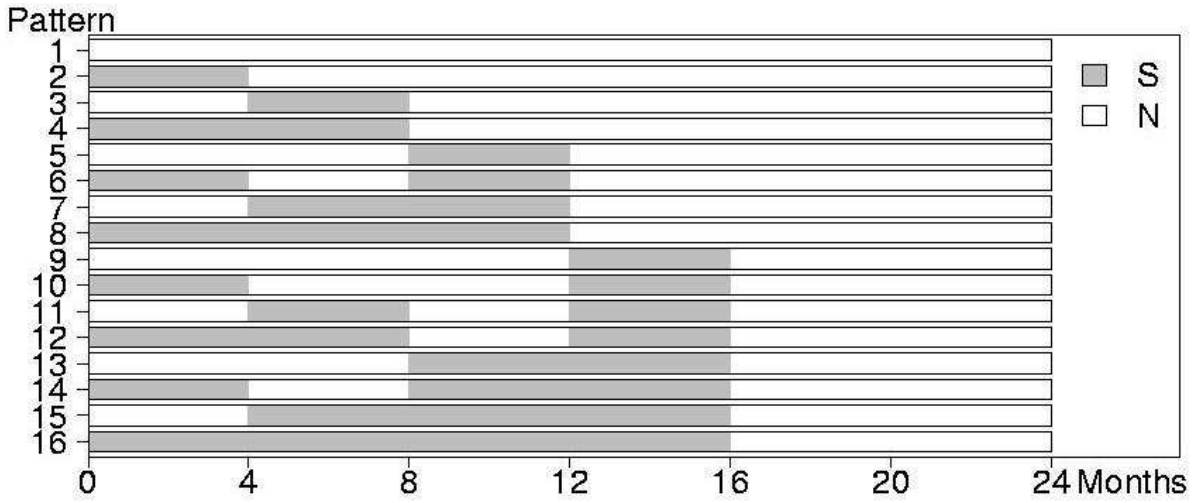

Figure 1: All possible smoking patterns of permanent cessation in two years.

Table 1: The means, standard errors and 95% coverage probabilities of the parameter estimates from 100 simulated datasets with sample size $10,000$ using Bayesian framework

True	$\beta_{1,0}$	$\beta_{1,1}$	$\beta_{2,0}$	$\beta_{2,1}$	$\beta_{3,0}$	$\beta_{3,1}$	σ_{11}	σ_{12}	σ_{13}	σ_{22}	σ_{23}	σ_{33}
Parameters	.186	−1.217	−1.031	1.217	.405	−2.603	.090	−.010	−.120	.160	.050	.250
EST	.187	−1.217	−1.027	1.213	.416	−2.626	.091	−.009	−.120	.167	.056	.293
SE	.013	.020	.037	.037	.029	.068	.010	.011	.017	.022	.043	.071
Coverage probability	.940	.910	.920	.960	.970	.950	.970	.980	.950	.990	.970	.920

The estimates (EST) represent the average of the posterior means.
The standard errors (SE) represent square root of the average of the variances.

Table 2: The posterior means (PM), standard deviations (SD) and 95% credible intervals (CI) of the parameters from (2), (5) and (6) with one covariate in the ATBC dataset

Models	Parameters	PM	SD	95% CI	
				lower	upper
P_{i1}	Intercept	−4.335	.023	−4.379	−4.292
	Insomnia	−.064	.037	−.136	.009
P_{i2}	Intercept	−.553	.222	−.959	−.106
	Insomnia	−.033	.119	−.271	.198
P_{i3}	Intercept	2.492	.211	2.107	2.933
	Insomnia*	−.291	.136	−.563	−.031
$\boldsymbol{\sigma}$	σ_{11}	1.060	.047	.971	1.156
	σ_{12}	−.054	.117	−.307	.154
	σ_{13}	−1.865	.180	−2.245	−1.539
	σ_{22}	.926	.165	.642	1.287
	σ_{23}	.712	.388	.056	1.559
	σ_{33}	3.809	.833	2.453	5.700
$\boldsymbol{\rho}$	ρ_{12}	−.052	.115	−.295	.162
	ρ_{13}	−.936	.032	−.987	−.864
	ρ_{23}	.363	.154	.038	.632

NOTE: * represents statistical significance.

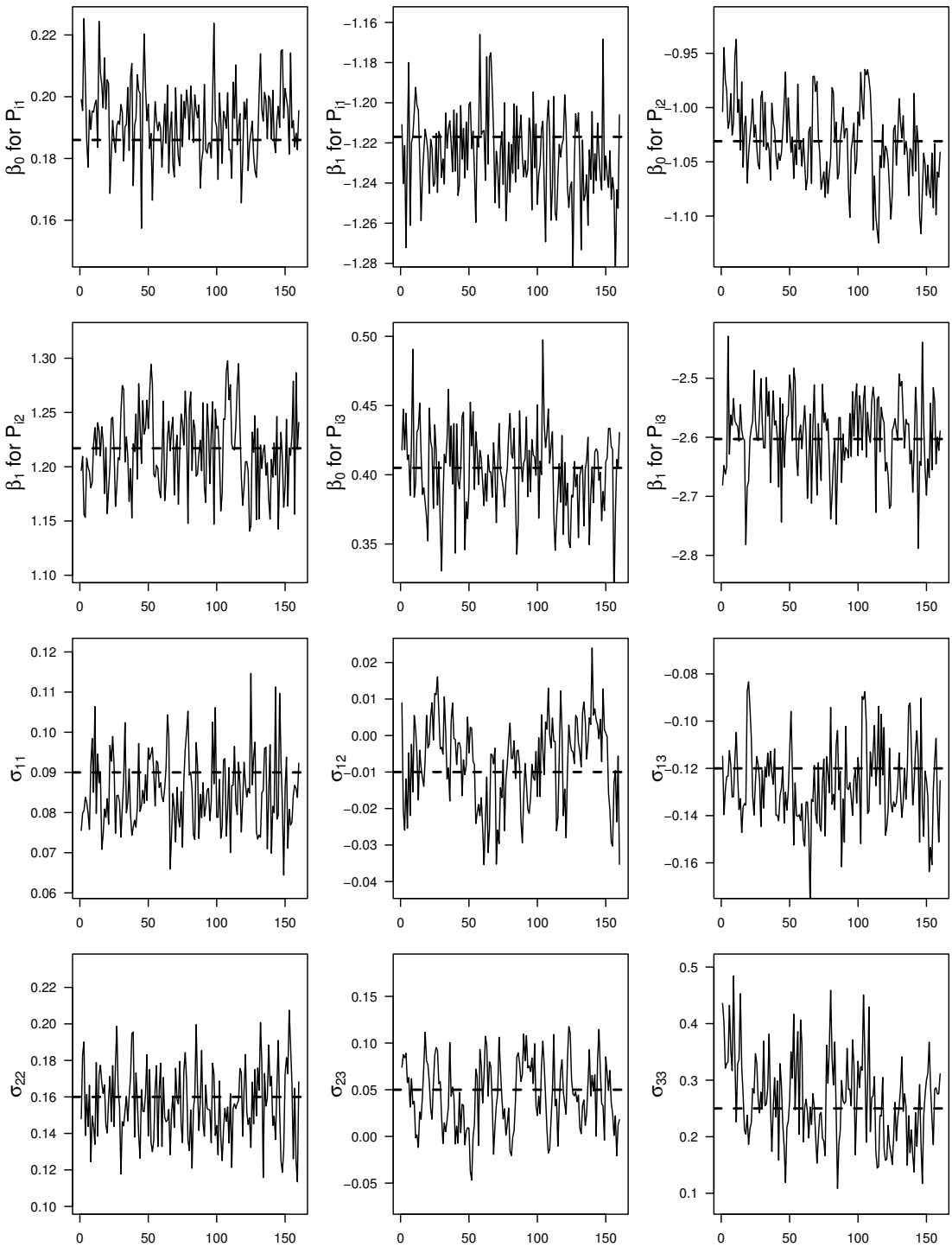

Figure 2: MCMC histories for twelve parameters of interest from the **first** chain in one simulated dataset. The horizontal dash lines denote the true parameter values.

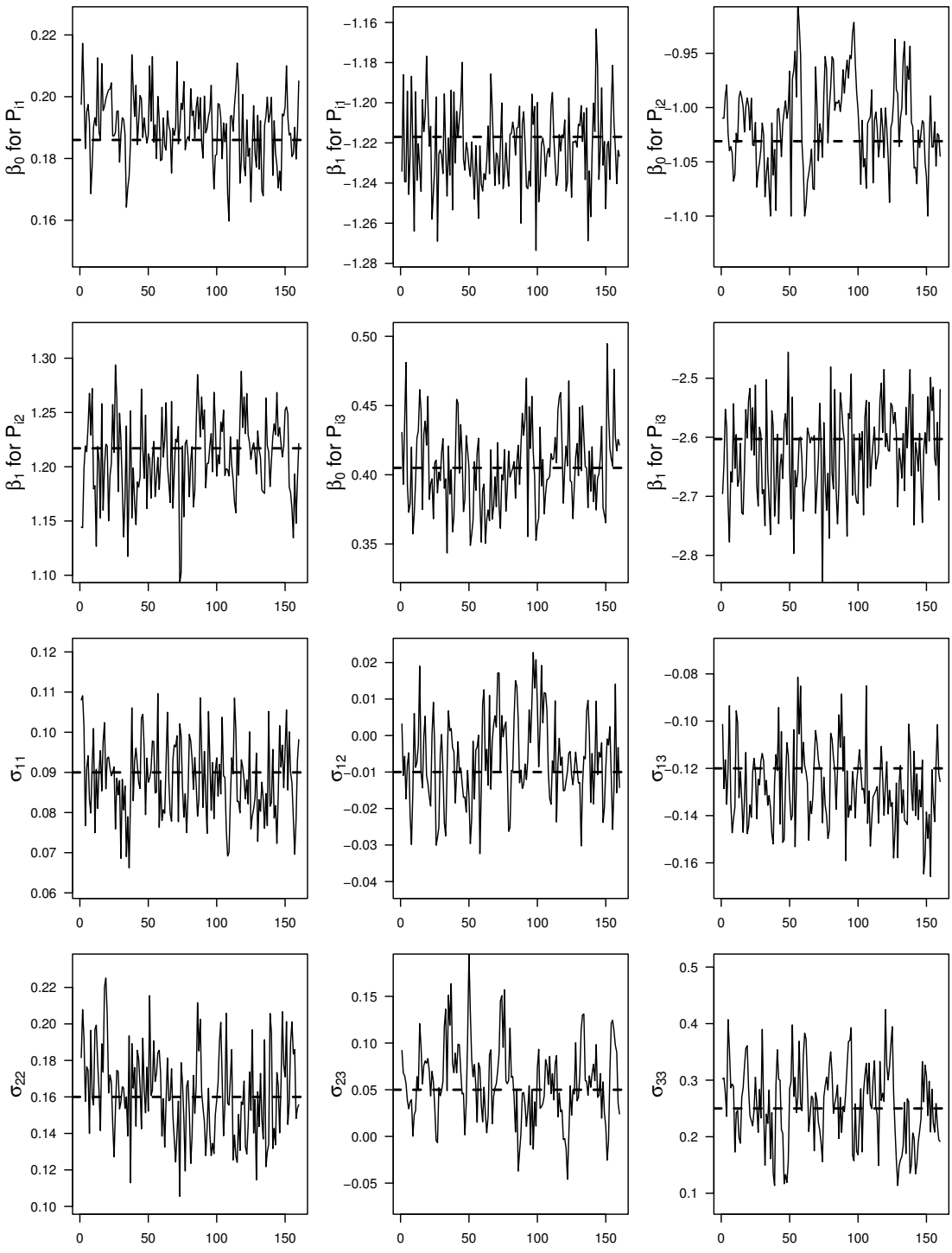

Figure 3: MCMC histories for twelve parameters of interest from the **second** chain in one simulated dataset. The horizontal dash lines denote the true parameter values.

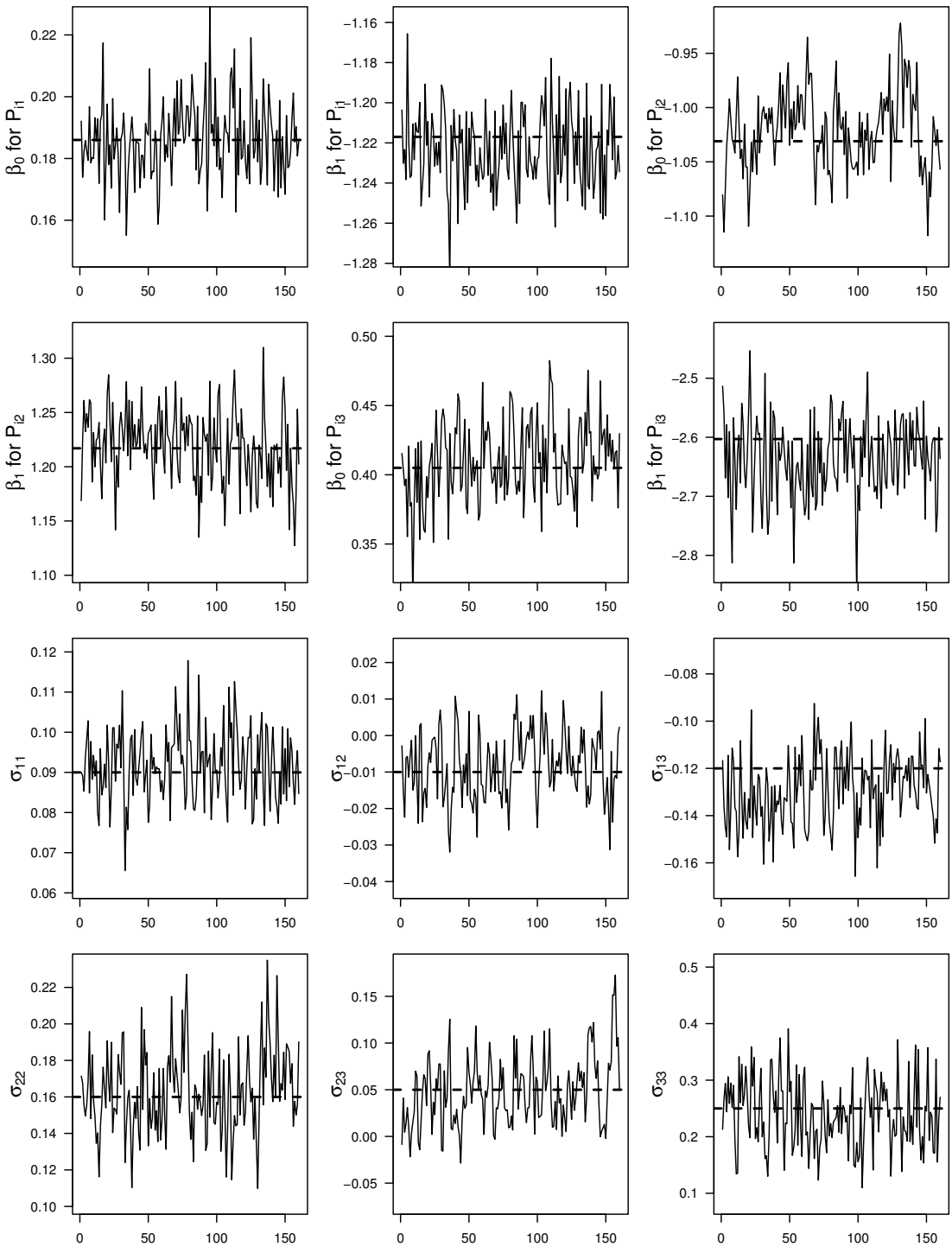

Figure 4: MCMC histories for twelve parameters of interest from the **third** chain in one simulated dataset. The horizontal dash lines denote the true parameter values.