

Web-based Supplementary Materials for “An  
Empirical Bayesian Method for Multivariate  
Meta-analysis with Applications in Clinical Trials”  
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**Web Supplement A: Simulation for Single  $2 \times 2$  table**

In this section, we conduct simulation studies using Markov chain Monte Carlo (MCMC) methods to verify the results in equations (4) and (5) empirically. We consider one cohort study<sup>?</sup> in a meta-analysis for the risk of type 2 diabetes mellitus (T2DM) after gestational diabetes mellitus (GDM)<sup>?</sup>. Specifically, 14 out of 47 women with GDM and 3 out of 47 women without GDM developed T2DM. We first impose independent Jeffreys prior (i.e.,  $a_1 = b_1 = a_2 = b_2 = 0.5$ ) on  $p_1$  and  $p_2$  (the probabilities of developing type 2 diabetes among women with and without gestational diabetes). We draw 10,000 samples of  $p_1$  and  $p_2$  independently from Beta(14.5, 33.5) and Beta(3.5, 44.5), respectively. Using each pair of samples  $p_1$  and  $p_2$ , we calculate the relative risk  $\theta = p_1/p_2$  and plot the histograms. We then calculate the density function using equation (4) and overlay the density curve on top of the histograms. Next, we assume  $p_1$  and  $p_2$  follow Samarnov prior with  $a_1 = b_1 = a_2 = b_2 = 0.5$  and  $\rho = 0.5$ . The samples are jointly drawn from the distribution specified by equation (2). Figure 1 shows the histograms based on random samples and the overlaid density functions based on equation (5). The empirical results suggested that the density functions of relative risk are correct.

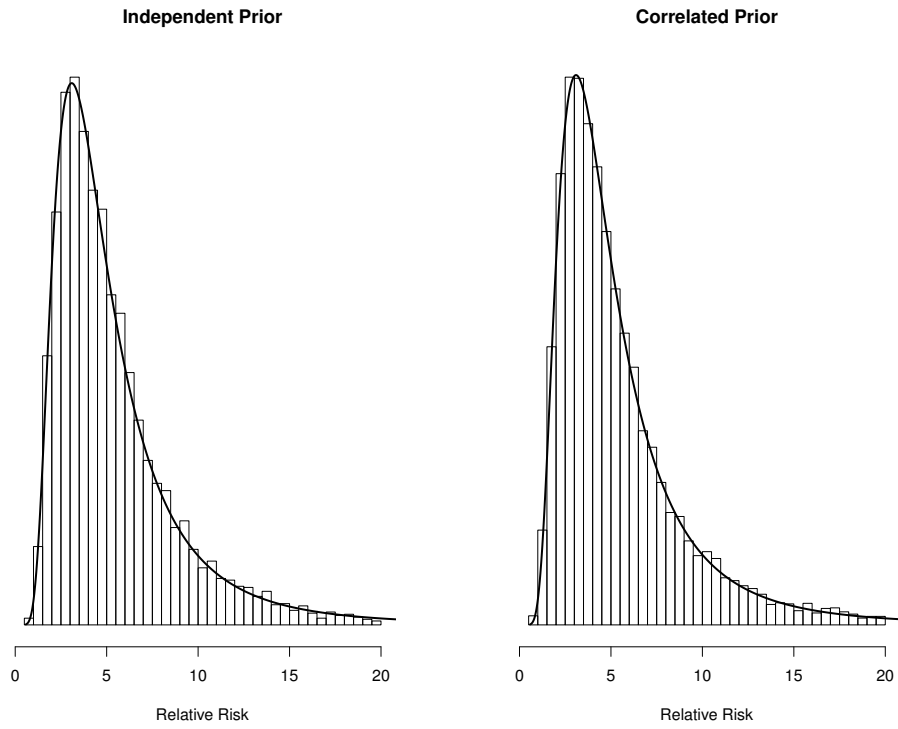


Figure 1: Histograms of 10,000 relative risks samples overlaid with density functions calculated by equations (4) and (5) under independent (left panel) and correlated prior (right panel), respectively.

Table 1: Data from a meta-analysis of 20 studies on the risk of type2 diabetes mellitus (T2DM) after gestational diabetes mellitus (GDM). Last name of the first author and the study year of each study are listed in the first column.

Author	T2DM	GDM	T2DM	no GDM
Feig 2008	2874	21823	6628	637341
Lee H 2008	71	620	22	868
Madarasz 2008	21	68	0	39
Gunderson 2007	43	166	150	2242
Vambergue 2007	53	295	1	111
Lee 2007	405	5470	16	783
Ferraz 2007	6	70	7	108
Krishnaveni 2007	13	35	8	489
Morimitsu 2007	7	23	0	1
Jarvel 2006	23	435	0	435
Albareda 2003	44	696	0	70
Aberg 2002	21	229	1	61
Linne 2002	10	28	0	52
Bian 2000	15	45	1	39
Ko 1999	105	801	7	431
Osei 1998	10	15	0	35
Damm 1994	33	241	0	57
Benjamin 1993	14	47	3	47
O'Sullivan 1991	224	615	18	328
Persson 1991	5	145	0	41