According to [1], caesarean section rate in Italy is well above the recommended threshold of 10%. Moreover, there is substantial variation in the use of caesarean section across hospitals.

The two following questions are related:

1. Can inter-hospital variability be explained by differential mother-level characteristics? ("case-mix" argument)
2. Is there a role for hospital-level variables in determining caesarean section rate?

Using official birth-event abstracts from twenty Sardinian hospitals (2010-2011), we modeled caesarean section in low-risk women ($n = 16,663$) in order to:

1. Separate the contribution of mother-level and hospital-level variables on decision of undertaking a caesarean section
2. Cluster the hospitals into groups sharing the same impact on caesarean section rate

A two-level logistic regression is used to link the binary outcome for mother $i$ to both mother-level ($x$) and hospital-level ($h$) variables

$$Y_i | p_i \sim Bern(p_i)$$  

$$\log \left( \frac{p_i}{1-p_i} \right) = \sum_{l=1}^{L} \beta_l x_{il} + h_j(i)$$

$$i = 1, \ldots, n \quad j = 1, \ldots, 20.$$  

Normal priors are placed on mother-level coefficients

$$(\beta_0, \ldots, \beta_L | \mu, \sigma^2) \sim MVN(\mu, \sigma^2 I).$$

A flexible non-parametric model is assumed for the hospital effects, via Dirichlet Process (DP) prior

$$h_j | P \sim DP, \quad P | \alpha P_0 \sim DP(\alpha P_0).$$

The model belongs to a class of Bayesian models extensively discussed in [2].

The optimal partition under (4) has ten groups. The first five account for more than 90% of all low-risk deliveries. Clusters 5 and 7 are singleton corresponding to the lowest and highest hospital effect, respectively.

Note that hospital 5 has one of the lowest intervention rates (27%) and hospital 7 the highest (64%). In general the association between the rates and effects is strong ($r = 0.85$).

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**REFERENCES**

