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**Classification of Births by Birth Weight and Gestational Age: An Application
of Multivariate Mixture Models**

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Abstract

Multivariate Gaussian mixture models with covariates are used to study the birth weight by gestational age distribution of several ethnically diverse populations. The results suggest that birth cohorts are heterogeneous and composed of at least two sub-populations. One sub-population accounting for the majority of births has a higher mean birth weight and gestational age but small variance. The other sub-population has a lower mean birth weight and gestational but very large variances. As a result of the large variances this sub-

population accounts for most premature, intrauterine growth retarded, and, post-term infants, i.e. all of the births traditionally considered to be compromised. The model also suggests that a number of compromised births occur within the normal birth weight and gestational age range. These births have been largely overlooked in the birth outcomes literature because of the difficulties of distinguishing them from normal births. An analysis of the effects of maternal age (>19 years) indicate that birth weight increases and gestational age declines with maternal age among normal births. The effects on compromised births varies among ethnic groups. These models provide a statistical method for detailed study of the birth weight by gestational age distribution that is not possible with conventional methods.

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