Simultaneous Modelling of Clustered Marginal Counts and Multinomial Proportions with Zero-Inflation with Application to Analysis of Osteoporotic Fractures Data

Osteoporotic fractures are known to be highly recurring. We investigate bone-dependent and bone-independent risk factors of osteoporotic fracture frequency and relative proportions at various body locations using the data from the osteoporotic fracture study conducted by the National Health and Nutrition Examination Survey (NHANES), 2007-2008. We propose a new zero-inflated baseline-category multinomial mixed model to characterize the clustered count responses and multinomial proportions by subject simultaneously while taking account of zero-inflation and randomness of cluster sizes. Our approach gives additional insights into the risk factors of osteoporotic fracture frequency occurring at various body locations.