



Research Professor John S. Preisser, Ph.D., who is interested in correlated categorical data, spends a lot of time thinking about teeth. According to Preisser, "Dental researchers collect a large amount of data, often with complex correlational structures. When you or I sit in the dental chair to have our teeth examined, the dentist examines and records detailed health-related information on every surface of every tooth." As a biostatistician deeply involved as a collaborator in dental

Research, Dr. Preisser often considers whether a research question is best addressed with such detailed data, or whether data aggregated at the patient level will suffice. A common measure of dental caries, for example, is a patient-level count variable given by the number of decayed, missing or filled surfaces. "The interesting thing is that you tend to see a significant number of zero counts, corresponding to people with excellent oral health, mixed in with high caries counts from people with poor oral health" says the professor. "Because of positive intra-subject correlation, the aggregate data reveal variation in excess of what one would expect with Poisson or Binomial distributions, and that presents special challenges for the biostatistician." Zero-inflated Poisson regression models provide one approach to this problem, as illustrated in the figure. It shows a mixture of a binary distribution corresponding to whether or not people have a zero count (or "excess zero") with a Poisson distribution (shaded region) for a count variable (that may also include zeros). The combination or mixture of these distributions provides a more realistic description of caries data than the Poisson distribution (shaded region) alone. According to Preisser, "While zero-inflated models have been around for awhile, they recently have received renewed interest among dental researchers. Particularly, the zero-inflated negative binomial regression model is now generally viewed as better in accounting for high caries counts that may be encountered in clinical examinations, in addition to the large number of zeros. My colleagues and I are particularly interested in obtaining clinically meaningful interpretations in caries research based on data analyses using these complex statistical models." The photograph shows John Preisser (left, in photo) with his research colleague, John W. Stamm, DDS, professor in the department of dental ecology, and dean emeritus of the School of Dentistry.

