Subject: Multilevel modelling (ML)
Posted by Dsisso on Tue, 22 Apr 2014 18:34:11 GMT
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Hello everbody,
I'm working on vaccine doses received by under-5 children. Precisely, each children may receive either one, two or three doses of this vaccine (DTP-1, 2 and 3 report cumulative numbers -children who received 3 doses are included in dose 2 which are also included in dose 1). In my best understanding, this outcome may be considered as a count on which I can apply Poisson or Negative binomial ML modelling techniques according to the distribution pattern (equivalence of mean and variance or not. The problem is that a colleague (statistician) has suggested to preferentially analysis this outcome as ordered or unordered multinomial categories rather than a count. This seems very intriguing. Finally, I am wondering about the most appropriate choice in this situation.
Many thanks for your valuable assistance.

Subject: Re: Multilevel modelling (ML)
Posted by Bridgette-DHS on Tue, 29 Apr 2014 14:25:17 GMT
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Following is a response from DHS Specialist, Tom Pullum:

Although the number of DPT doses can take the values 0, 1, 2, 3, I would not treat the number of doses as a count variable. The assumptions required for a poisson distribution or a negative binomial distribution are definitely not satisfied.

Treating the four possible values with a multinomial logit would be possible. The responses are indeed ordered; the ordered logit is a subspecies of multinomial logit. There is a test of whether the assumptions of the ordered logit are satisfied. If you use Stata, say, and the ologit command, a test statistic will be produced and you should only proceed if it indicates that the assumptions are satisfied.

You can read about these various assumptions in, for example, the text on statistical methods for categorical data by Alan Agresti or the text by Daniel Powers and Yu Xie.

If the assumptions for the ordered logit are not satisfied, you can always fall back on the multinomial logit, but it produces many coefficents and they would be hard to interpret. Frankly, I think you will get almost everything you can from this outcome if you just dichotomize it, depending on the data set you are using, as either 0 vs 1,2,3 OR as 0,1,2 vs 3. In most settings I have looked at, children usually get either no DPT doses or all DPT does. Be sure that you are looking a children who are old enough to have received all three.

Subject: Re: Multilevel modelling (ML)

Posted by Dsisso on Tue, 29 Apr 2014 16:26:43 GMT

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Many thanks for your very helpful reply. It seems that either a binomial approach using 1,2 vs 3 doses or a multinominal approach would be appropriate for my reseach question.
Thank you again

Subject: Re: Multilevel modelling (ML)
Posted by Bridgette-DHS on Wed, 30 Apr 2014 14:28:25 GMT

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Comment from Tom Pullum:

Don't forget the 0 category (no doses)! Did you mean to say 0,1,2 vs 3 doses?

Subject: Re: Multilevel modelling (ML)
Posted by Dsisso on Wed, 30 Apr 2014 14:34:20 GMT

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In fact, our research question focuses on vaccine-service utilization and DTP doses completion(at least one dose) rather than access (0 dose)