

READERS' OPINION AND DISCUSSION

## Can studies where subjects have different follow up times be analyzed through binomial regression?

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In "Leprosy reactions: the effect of gender and household contacts" [Mastrangelo et al. (2011)], the authors used a binomial regression model to estimate the adjusted risk difference, which is a valid statistical approach for the analysis of binomial probabilities (Cheung 2007). The study population was composed by leprosy patients who were treated from 1998-2005 and the "prevalence" of the reaction episodes was estimated by dividing the number of new cases in the study period by the total number of patients in this period. The authors used this value to estimate the probability of the reaction episodes.

However, censoring occurred because not all of the patients could be observed during a period that covered the same amount of time. We aimed for the most optimistic scenario, which meant that all patients were able to return for follow-up during the study period. In addition, we introduced censoring at the end of the follow-up period in 2009, as patients who were diagnosed in 2005 were not observed for the same length of time and did not have the same chance to develop a reaction as those patients who were diagnosed in 1995. In other words, the patient follow-up was required to observe a reaction (Kaplan & Meier 1958). Consequently, the "prevalence" that is presented in the current study does not refer to the probability of the reaction, which cannot be statistically analysed.

### REFERENCES

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- Mastrangelo G, Silva Neto J, Silva GV, Scoizzato L, Fadda E, Dal-lapicola M, Folleto AL, Cegolon L 2011. Leprosy reactions: the effect of gender and household contacts. *Mem Inst Oswaldo Cruz* 106: 92-96.

### REPLY

The medical histories of 324 multibacillary leprosy patients who were diagnosed from 1998-2005 in an endemic area of North-Eastern Brazil were reviewed in August 2009 and 112 cases (29 women and 83 men) of leprosy reactions were identified. The ratio of the cases with reactions to the total number of patients was fitted using binomial regression. The risk difference (RD) was estimated with a semi-robust estimation of variance as a measure of the effect. In female patients, the number of household contacts was a significant predictor of leprosy reactions (crude RD = 0.06, 95% CI = 0.01-0.12) (Mastrangelo et al. 2011).

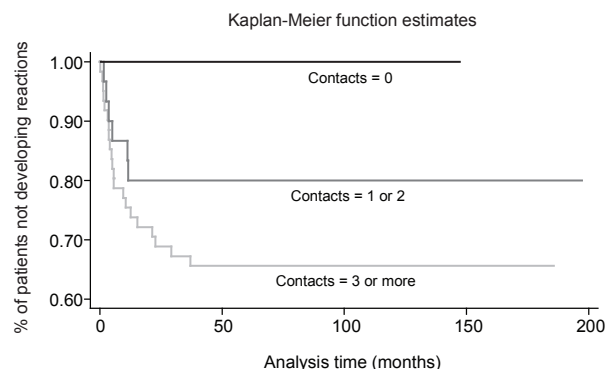
However, a reader has suggested that patients who were diagnosed in 2005 were not observed for the same length of time and did not have the same chance to develop a reaction as those patients who were diagnosed in 1998. Therefore, the reader questioned the validity of our statistical analysis.

The censoring times, which were measured from the initiating event (onset of disease) to the failure event (the reversal reaction or the end of follow-up), are shown in the Table broken down by number of household contacts (categorised as 0, 1-2 or 3 and more) in female leprosy patients. The Table shows that the medians decreased with an increasing number of household contacts as the probability of reactions increased. These differences were statistically significant (p = 0.027) using the Kruskal-Wallis equality-of-populations rank test.

In the Figure, the results for the female leprosy patients are shown using the Kaplan-Meier estimates of the "survival" function over time.

TABLE  
Patients, reactions, and censoring times  
by number of household contacts

Household contacts	Number		Censoring times (months)	
	Patients	Reactions	Median	25th-75th percentiles
0	6	0	116.5	75.4-124.4
1-2	30	6	120.0	75.9-152.1
3 and more	62	21	82.5	10.6-117.1



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The Figure shows that reactions occurred in a four-year period after diagnosis and tended to increase over time (p-trend of the log rank test = 0.044) with an increasing number of contacts.

These findings do not support the view that in leprosy patients with no or few household contacts the lack of reactional cases could be attributed to censoring.

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