AN EXAMPLE OF EXTRA-POISSON VARIATION SUGGESTING AN UNDER-SPECIFIED MODEL.

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INTRODUCTION

There is now an extensive literature on environmental tobacco smoke (ETS). Several meta-analyses of this literature have combined risk estimates for lung cancer from different studies weighted by the quality and size of the study. Thus, in their meta-analysis, Letzel et al. (1988) give various scenarios which use different figures from Hirayama's study, depending on whether the husband's or wife's age was used to adjust the wife's cumulative mortality. Since Hirayama's study constitutes about 20% of all lung cancer deaths in the ETS literature, it is important to use the correct relative risk from Hirayama in constructing global estimates. Here, it is shown that a proper analysis of Hirayama's study leads to a non-significant association between ETS and the risk of death from lung cancer in non-smoking wives.

Hirayama (1981) reports an age standardised risk ratio of 1.90 for lung cancer among non-smoking women married to heavy smokers and finds a highly significant trend ($P < 0.001$) between the amount smoked by husbands and the lung cancer mortality of their non-smoking wives. He also interprets this association as arising from a causal relationship between husband's smoking and wife's lung cancer:

> These results indicate the possible importance of passive or indirect smoking as one of the causal factors of lung cancer.
> (Hirayama, 1981)

THE STUDY

Dr. Hirayama's study links deaths from all causes occurring in the period 1966–1981 to a questionnaire given in late 1965 to approximately 250,000 Japanese adults. Almost all those over age 40 in 29 Health Center Districts in 6 Japanese prefectures who were 'generally healthy' (Hirayama, 1978) were interviewed. At that time, each respondent was asked for his or her current smoking status. Although not originally designed as a study of the association between passive smoking and health, Dr. Hirayama subsequently linked the mortality of wives who were classified as non-smokers with their husband's smoking status and, if he was a smoker, with the amount smoked.

Hirayama's smoking classification is based on only one question at the time of the survey as to whether the respondent smoked, and, if so, smoked daily. The respondent was also asked whether he/she smoked occasionally, was an exsmoker, a non-smoker or an 'obscure' smoker. The age at which smoking started was recorded where appropriate. Husband's smoking status in 1965 was treated as an index of wife's ETS exposure. No direct measure of ETS exposure was made. In the following, ETS refers to this surrogate for passive smoking, i.e. the self-reported classification of a husband's smoking in 1965 when his wife was reported to be a