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The effect of numbers of noise events on people's reactions to noise: an analysis of existing survey data

J M Fields

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Abstract

The effect of the number of noise events on noise annoyance has been examined in an analysis of data from large-scale social surveys. The relative impact of noise level and number on human reactions is measured by the decibel equivalent number effect (k) expressed as the number of decibels which have an effect equivalent to that of a tenfold increase in number of events. Values of k differ between surveys but none is significantly greater (p greater than 0.05) than the value of k = 10 which is implicit in Leq or Ldn. The mean of the existing data provide a best estimate of k = 5. Although there are some surveys in which annoyance decreases as numbers of events increase above about 150 a day, the available evidence is not strong enough to reject the conventional assumption that reactions are related to the logarithm of the number of events. The conventional assumption that the effects of number and peak noise level are additive cannot be rejected with these data. Differences between the surveys' estimates of the effect of number of events remained large even when equivalent questionnaire items and definitions of noise events could be used. The most likely explanations for inconsistent estimates are (1) errors in specifying the values of noise parameters, (2) the effects of unmeasured acoustical and area characteristics which are correlated with noise level or number, and (3) large sampling errors which are due to community differences in response to noise. Multipoint annoyance scales give more reliable estimates than do dichotomous "very annoyed" measures. It is concluded that significant improvements in the knowledge about the effects of numbers of noise events will only occur if surveys include large numbers of study areas, a requirement which can only be met if economical noise measurement techniques are developed which have known levels of precision.