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A MODEL FOR RESIDENTIAL FATAL FIRE IN HONG KONG

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A nonlinear model which relates area, population density and number of fire stations with the number of residential fatal fires in Hong Kong is introduced. The model can be interpreted as a relationship between the number of fatal fires and response time. Based on the data collected from 17 out of 19 districts in 1984-1988, the four parameters in the model are estimated by the method of least squares with 78 percent variance explained. Statistical inference of the estimates is provided by bootstrap technique. Based on the model, some guidelines for allocating fire stations can be recommended.

1. Introduction. A fire once started should be extinguished as soon as possible or else it will burn out all inflammable material in its reach and cause tremendous damage. In most cities, fire stations (or firehouses) equipped with firemen and apparatuses (together called a fire company) are responsible for extinguishing fires. Response time is the amount of time from the reporting of a fire to the arrival of the first fire company at the fire scene. Response time has three components: dispatching time, turnout time and travel time, among which the travel time can be reduced by scattering the locations of fire stations throughout a region. There are two major categories of fire damages: property and life losses, both of which, by common sense, should be closely related to travel time. To analyze fire protection, it is essential to understand the relationship between those fire damages and travel time. Nevertheless, most existing models, such as those used in Kolesar (1979 a,b), Rider (1979) and Walker (1979), use travel time as their criterion for analysis, but without constructing its relationship with the property and life losses. In this paper, we build a model to relate the number of fire stations with the number of residential fatal fires for Hong Kong and illustrate the use of the model to suggest how to choose among 8 out of 19 districts to allocate fire stations for the minimization of residential fatal fires.

2. The Situation in Hong Kong. Each of the 19 districts in Hong

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