

MODELLING OF FATAL INJURY RATES AMONG MALAYSIAN WORKERS USING POISSON REGRESSION APPROACH

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ABSTRACT

Many safety studies as based on the analysis carried out on injury surveillance data. The injury surveillance data gathered for the analysis include information on number of employees at risk of injury in each of several strata where the strata are defined in terms of a series of important predictor variables. Further insight into the relationship between fatal injury rates and predictor variables may be obtained by the Poisson regression approach. Poisson regression is widely used in analyzing count data. In this study, Poisson regression is used to model the relationship between fatal injury rates and predictor variables which are year (1995-2002), gender, recording system and industry type. Data for the analysis were obtained from PERKESO and Jabatan Perangkaan Malaysia. It is found that the assumption that the data follow Poisson distribution has been violated. After correction for the problem of overdispersion, the predictor variables that are found to be significant in the model are gender, system of recording, industry type, and two interaction effects (interaction between recording system and industry type, and between year and industry type).

Keywords: Poisson regression; overdispersion; interaction

ABSTRAK

Banyak kajian tentang keselamatan dibuat berdasarkan analisis terhadap data hasil pemantauan kecederaan. Data pemantauan ini terdiri daripada maklumat tentang bilangan pekerja yang terdedah kepada risiko kecederaan. Data ini dikumpulkan mengikut beberapa pemboleh ubah penting. Untuk mendapatkan kefahaman yang lebih lanjut tentang hubungan antara kadar kemalangan maut dengan pemboleh ubah penerangan pendekatan regresi Poisson sesuai digunakan. Kaedah regresi Poisson banyak digunakan untuk menganalisis data bilangan. Dalam kajian ini, regresi Poisson digunakan untuk memodelkan hubungan antara kadar kemalangan maut dengan pemboleh ubah penerang yang terdiri daripada tahun (1995-2002), jantina, sistem merekod data dan jenis industri. Data yang dianalisis diperolehi daripada PERKESO dan Jabatan Perangkaan Malaysia. Andaian data bertaburan Poisson tidak dipenuhi. Selepas pembetulan terhadap masalah serakan lampau, pemboleh ubah penerang yang didapati bererti dalam model ialah jantina, sistem rekod data, jenis industri dan dua kesan interaksi (interaksi antara sistem merekod data dan jenis industri, dan interaksi antara tahun dan jenis industri).

Kata kunci: Regresi Poisson; serakan lampau; interaksi

References

- Bailer A.J., Reed L.D. & Stayner L.T. 1997. Modeling fatal injury rates using fatal regressions: a case study of workers in agriculture, forestry and fishing. *Journal of Safety Research* **18**: 177-186.
- Cameron A.C. & Trivedi P.K. 1990. Regression-based tests for overdispersion in Poisson model. *Journal of Econometrics* **46**: 347-364.
- Grogger J. 1990. The deterrent effect of capital punishment: an analysis of daily homicide count. *Journal of American Statistical Association* **85**: 295-238.

- Jabatan Perangkaan Malaysia, 1995-2002. Laporan Penyiasatan Tenaga Buruh Malaysia.
- Kianifard F. & Gallo P.P. 1995. Poisson regression analisis in clinical research. *Journal of Biopharmaceutical Statistics* 5(1): 115-129.
- Miaou S-P. & Lum H. 1993. Modeling vehicle accidents and highway geometric design relationship. *Accid. Analy. Prev.* 25: 689-709.
- Maher M.J. & Summersgill I. 1990. A comprehensive methodology fot fitting predicyive accident models. *Accid. Analy. Prev.* 28(3): 281-296.
- McCullagh P. & Nelder J. 1989. *Generalized Linear Model*. 2nd. Ed. London: Chapman and Hall.
- PERKESO. Laporan Tahunan PERKESO. 1995-2002.

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