

Thesis Title      The effects of exposure to the emission of motor vehicles on blood lead levels and pulmonary functions among employees working on the expressways.

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#### ABSTRACT

This cross-sectional study was conducted in July-September 1994 among 1155 employees of the Expressway and Rapid Transit Authority of Thailand (ERTA) in order to assess the effects of exposure to the emission of motor vehicles on blood lead levels and on their pulmonary functions.

Information on their work activities, duration of work, place of work and demographic characteristics were obtained through the use of interview administered questionnaires. Concentrations in their blood were measured by atomic absorption spectrophotometry and the lung function tests performed by spirometry showed that the distribution of blood lead levels among employees working on express-ways were extremely skewed with the median of blood lead levels is 3.00  $\mu\text{g}/\text{dl}$  (ranging from 0 to

52.8  $\mu\text{g}/\text{dl}$ ). The distribution of values of forced vital capacity in this population was also skewed, FVC median was 86% (ranging from 41 to 167).

Analysis of 1155 blood samples indicated significant differences of lead levels between various groups with different activities, work places, and sexes. The life styles which include smoking cigarette and drinking alcohol habits also had higher blood lead levels than nonsmokers and nondrinkers among people with blood lead levels under 6  $\mu\text{g}/\text{dl}$ . However, their duration of employment and duration of working hours showed little impact on the lead concentration in their blood, which was not as anticipated in the hypothesis.

The highest blood lead medians were found among machine drivers 3.5  $\mu\text{g}/\text{dl}$  (range 0.8 - 52.8) and truck or car drivers, (3.5  $\mu\text{g}/\text{dl}$ , range 0 - 38.8). These results were affected by extreme blood lead levels. The lowest blood lead median was observed in the group with rescue operation i.e. 2.2  $\mu\text{g}/\text{dl}$  ( range 0.7 - 4.8).

The prevalence of high blood lead levels was 0.26% (PbBs > 40  $\mu\text{g}/\text{dl}$ ) while 95.5% of workers had low blood lead levels (PbBs  $\leq$  10  $\mu\text{g}/\text{dl}$ ) and 4.06% with moderate blood lead levels (10 < PbBs  $\leq$  40  $\mu\text{g}/\text{dl}$ ).

In respect of the work places, persons working at cashier booths were found with the highest median of blood lead, 3.4  $\mu\text{g}/\text{dl}$  (range 0.6 - 12.9), as compared to 2.6  $\mu\text{g}/\text{dl}$  among people working on express-ways or 2.9  $\mu\text{g}/\text{dl}$  among the white-collars.

Multiple regression analysis with the forward selection revealed that different activities have different effects on the lead concentration levels after adjusting for the multiple factors entered into the model such as age, sex, marital status, smoking, drinking,

workplace, forced vital capacity and duration of working hours or number of years since employed in the job. The work places had effects on blood lead levels were expressways and cashier booths. The persons who were cashiers, Technicians, and machine drivers were really associated with elevated blood lead concentrations by working conditions.