

שם: נילי גרינברג

שם העבודה:

Assessing Individual Asthma Risk in IDF Recruits Using Different Estimates of Air Pollution Exposure

מנחים:

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תקציר:

Background: Asthma prevalence in Israel has doubled in the last two decades. Numerous studies have shown that increase in asthma incidence, as well as decreased lung function, increase in respiratory symptoms and hospitalization rates due to respiratory diseases may be related to urban air pollution by particulate matter, ozone, sulfur dioxide and nitrogen oxides. The economic and social costs of asthma are measured in decreased working productivity, increased hospitalization, as well as morbidity and mortality rates. As a result, studying the association between air pollution and asthma risks in large population cohorts may provide tools for policy makers for assessing asthma risks and reducing pollution to maximize public health benefit.

Previous studies: Epidemiological studies examining the environmental risk factors for asthma but the causes of increased prevalence of the disease has not been definitively established. It is also unclear whether short peak exposures to lung irritants may be responsible for reported association between asthma symptoms and air pollution. If periodic brief exposures to acute episodes (high concentrations) of air pollutants can contribute to the exacerbation or causation of asthma, even if the average exposure levels are relatively low, then many existing sampling protocols and exposure studies do not adequately define these exposures.

Study goal: To evaluate asthma risk among Israel Defense Forces (IDF) recruits by comparing different metrics of individual exposure to environmental air pollutants, including: a) chronic exposure to average levels of pollutants; b) peak (acute) exposures to high levels of environmental air pollutants, as potential predictors for asthma morbidity among IDF recruits, controlled for individual health status and demographic attributes.

Methods: The study population will include about 300,000 young Jewish (18-20 years) males that underwent a health examination as part of their recruitment into the IDF by a uniform and standardized defined method of evaluating recruits by military medical boards. The study population will be drawn from cities with at least one air monitoring station that measures half-hourly levels of several pollutants NO_x , SO_2 , PM (Particulate Matter), and O_3 to enable reasonably accurate exposure assessment. As a proxy for past exposures to air pollution the concentration levels of pollutants will be examined, by assigning air pollutants' concentrations at the place of residences during three years prior to the date of medical examination. In doing so, exposure assessment to airborne air pollutants will be carried out by comparing the two following two models of exposure: a) time weighted average-exposure along 24 hours, over the period of past three years; b) accumulated daily peak exposure to acute air pollution episodes (that is pollution events exceeding local air pollution standards) over the period of past three years.

In the study the GIS methodology will be used to evaluate individual exposure levels of pollutants measured by monitoring stations near the residence of the subject. These values will be used as proxies of personal exposures.

Multiple logistic regression analysis will then be used to test whether air pollutants exposure influences the probability for having asthma as a function of cumulative three years exposure regarding: pollutant estimate (ETWA or DPE), controlled for individual level demographic and socioeconomic factors. In constructing the multivariate model, all predictor

variables whose odds ratio and 95% confidence interval suggested a possible association with asthma will be entered into the model.

Research hypothesis: Because average concentrations of air pollutants take into account central tendencies, not actual exposures, such arithmetic means may misrepresent a health phenomenon that influenced by peak exposures. As we hypothesize, brief but acute exposures to high concentrations of air pollutants are important in the exacerbation or causation of asthma, even if the average exposure is relatively low. As a result, asthma prevalence among the IDF recruits can better be explained by peak levels of pollutants than by time weighted average levels. As a result, individuals that grew up in localities with accumulated high peak concentrations of air pollutants will expectedly exhibit higher prevalence of asthma compared to individuals residing elsewhere. The hypothesis is plausible as it is known the susceptible individuals react already at lower concentrations of air pollutants as compared to the others.

Importance of the study: The study will contribute to the existing body of knowledge as follows: 1) Development of individual assessment method for the environmental exposure of air pollutants in general and the recruits in particular; 2) Building a model for exposure assessment with respect to predicting asthma prevalence in the recruits; 3) Verifying the research hypothesis over the entire population of IDF recruits, as opposed to previously conducted small scale studies involving subsamples of actual population and characterized by limited power and generality.