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Epidemiology

Micro-epidemiology of the healthy worker effect?

D Heederik

Commentary on the paper by Bakirci *et al* (see page 126)

Bakirci and colleagues[1] describe a high turnover of the workforce in cotton spinning mills and try to analyse if the high turnover is health driven. These observations actually relate to one of the driving forces underlying the so called ''healthy worker effect''. The healthy worker effect was probably first described by William Ogle in an appendix of the Registrar General's report on mortality in England and Wales.[2] It refers to the observation that the working population is healthier than the general population. Ogle identified two kinds of selection responsible: one working at the time of hire, and the other working at the time of employment. The first selectively attracts or rejects new workers depending on physical demands of the job and health selection, by for instance occupational physicians. The second forces people to leave industry because their health is too much impaired for the job they are in. Several respiratory morbidity studies have focused on selection out of the workforce. This Turkish study is relevant because workers were followed intensively: after 1, 3, 6, and 12 months of employment, and after they had left the industry. At first sight the results seem straightforward. A regression model indicated that those who left the industry had work related lower respiratory symptoms before they left, suggesting that they left because of their symptoms. However, only a few left because of health problems according to the post-leaving survey, and baseline data indicate complete absence of respiratory disease. Surprisingly, cross-shift decliners in FEV_1 had a lower likelihood of leaving than non-decliners, since there was a negative borderline statistically significant association with leaving the industry.

Other determinants of leaving the industry could not be identified. Average endotoxin exposure levels were low in this population—around a few hundred EU/m^3—but for some job titles the levels are around a few thousand EU/m^3 (personal communication). The latter are exposure levels at which we expect to see relationships with acute lung function change and respiratory symptoms. The statistical modelling seems problematic because the model contains several correlating (proxy) exposure variables (job title, dust and endotoxin level) and intermediary variables (symptoms, and cross-shift and cross-week lung function change). Therefore colinearity and over-correction may have occurred, leading to biased or uninterpretable regression coefficients.

Somewhat puzzling are the observations on atopy. Atopy did not seem a predictor of leaving the industry. Earlier studies have shown that cotton dust exposure and atopy interact with acute lung function changes,[3] suggesting that exposed atopics are more at risk for developing respiratory effects. The question remains what more detailed explanatory models with interactions between exposure and atopy might have yielded. The atopy prevalence among these cotton workers is untypically low for most western countries, and this either reflects a rural background of this population, or the other force underlying the healthy workers effect: self-selection. We know that the atopic status may change over time, possibly also under influence of environmental factors such as a high endotoxin exposure.[4 5] It would have been interesting to have information about the atopic status among leavers at the time they left the industry, to see whether there was any exposure related reversal.

Most striking is the high labour turnover in this study. Although this study did not convincingly show that there is health driven selection in or out of the workforce, this high turnover rate is a relevant observation in itself. We need to know to what extent workers who leave rapidly differ from those who remain in industry to be able to interpret study findings correctly.

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