

410 ESTIMATING THE BURDEN OF OCCUPATIONAL CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) IN THE UK

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Objective As part of a UK Biobank project to investigate the causes of COPD in the UK, initial estimates have been made of the burden of COPD attributed to occupational exposures, based on methods developed to estimate cancer burden, adapted to a prevalence rather than incidence outcome measure.

Methods Particular features of the methods were inflation of the estimates of numbers employed in occupations linked to COPD to account for retired or ex-workers whose exposure has ceased, and estimating attributable fraction (AF) by age, as COPD incidence increases with age. The link between age and duration of exposure, and time from cessation of exposure are accounted for by using unit relative risk (URR) estimates (annual change in COPD risk) or annual lung function decline. Where URRs are not available, risks are estimated by age based on assumptions about the age structure of a particular worker cohort.

Results Using national data of numbers employed in occupations associated with raised COPD risk, matched to appropriate risk estimates and based on Levin's estimator, when mainly industry-based cross-sectional study risks were used, AFs for GB were estimated to be 11% for men and 3% for women. Alternatively using single population-based studies estimating risks by occupation or industry, AFs range from 6%-27% for men and 0%-5% for women. The probable reasons for the variability of the results are discussed, and an example is given of the additional impact of taking age into account in the estimation.

Conclusions There is consistency between these initial estimates of occupational COPD attribution and previous estimates such as those from the American Thoracic Society. When data from the UK Biobank study becomes available, it is planned to further develop the AF by age methods to use with Miettinen's study based estimator.

411 PROSPECTIVE MONITORING OF EXPOSURE AND LUNG FUNCTION AMONG CEMENT PRODUCTION WORKERS - AN INTERNATIONAL STUDY

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Objectives In this longitudinal study we aimed to estimate the longitudinal fall in forced expiratory volume at one second (FEV₁) associated with different levels of thoracic aerosol exposure in cement production workers.

Methods 4998 workers in 24 plants in eight countries were included in the study. Personal measurements of thoracic dust (n = 6942) were performed in 24 plants for 8 job types in 2007, 2009 and 2011. Arithmetic mean (AM) exposure in job types and plants was estimated from mixed models taking year and seasonal variation into account. FEV₁ was measured by spirometry in the same years. The longitudinal change in FEV₁/m² of standing height was analysed in mixed models allowing for age, sex, smoking, allergy, asthma, previous dust exposure, and use of airway protection, using estimated exposures multiplied by observational time.

Results The AM exposure level among non-administration employees varied between job types and plants from 0.14 to 14 mg/m³. A longitudinal loss in FEV₁/m² of 2.9 ml/m²*(yr*mg/m³) (95% Confidence Interval, CI, 2.5–3.2) was estimated, assuming linear relationships. Using exposure stratified in quintiles, losses per (mg/m³)*yr were 5.9 ml (CI 3.0–8.8) in the 0.14–0.61 mg/m³ category (reference), 9.7ml (CI 7.6–12) in the 0.62–1.57 mg/m³ category, 14 ml (CI 12–17) in the 1.58–2.27 mg/m³ category, 18 ml (CI 15–20) in the 2.28–5.40 mg/m³ category and 19 ml (CI 15–22) in the 5.41–14 mg/m³ category.

Conclusions FEV₁ loss increased with exposure indicating that cement aerosol exposure may lead to adverse lung changes. Interpreting the change in the lowest exposure category as the age effect, FEV₁ losses in all other categories are significantly greater. Assuming that the thoracic fraction is 45–50% of total dust, the second lowest exposure level (0.62–1.57 mg/m³) is well below the present occupational exposure limit of 10 mg/m³ of total dust.