Exposure assessment 2

81 COMBINING JOB EXPOSURE MATRICES AND EXPOSURE MEASUREMENTS TO ASSESS OCCUPATIONAL EXPOSURE TO BENZENE, LEAD FUME, AND LEAD DUST IN A POPULATION-BASED COHORT IN SHANGHAI, CHINA

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Objectives To better discriminate between job, industry, and time differences in exposure levels within a population cohort of 74 942 Shanghai women, we combined job exposure matrix (JEM) ratings with inspection measurements collected between 1954 and 2000.

Methods Mixed-effects models were used to predict concentrations of benzene (n=63 221 measurements), lead fume (n=20 084), and lead dust (n=5383). The fixed effects included JEM intensity ratings (ordinal: 0–3) and year (b-spline). The random effects included job and industry nested within job, which allowed us to calculate job/industry-specific estimates when there was sufficient data. The predicted concentrations were applied to the cohort when either the job or industry JEM probability rating was high (3 on a 0–3 scale).

Results The average exposure levels were 9-12 times higher in 1965 than in 2000 for the three agents. The ranges of the job/industry group exposure concentrations were 2–7 times wider for the job/industry-specific estimates than for the JEM-specific estimates. Using the probability ratings, we estimated that 15% and 8% of the subjects were exposed to benzene and lead, respectively.

Conclusions Our approach calibrated the JEM to a concentration scale across ratings and time and allowed the job/industry groups' exposure levels to deviate from the JEM estimate when there were sufficient measurements. It also provided a mechanism to estimate exposure when a job/industry group was not represented in the exposure database. As a result, our approach accounted for substantial exposure differences across time and between jobs and industries that would not be accounted for using the JEM alone.