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JEMINI (Job Exposure Matrix InterNational) Initiative: a Utopian Possibility for Helping Occupational Exposure Assessment All Around the World?

To the Editor:

Improvements in behavioral, environmental, and occupational risks have largely outpaced the effects of population growth and aging, and globalization.¹ Although workplaces policies have been implemented all around the world, assessment of workplace exposures is still a concern in many countries. It is a critical aspect of risk management in an occupational setting.²

When considering the example of biomechanical factors at work, the current methods suffer from various limitations. Direct measurement of worker exposures and detailed observational assessments are precise, but may misclassify exposures for jobs where exposures vary over a longer time than the period of job observation.³ Furthermore, direct measurement and observation are expensive and time-consuming, potentially limiting their application to large groups of workers. Exposure questionnaires are easier to administer to large populations, but self-reported exposures are probably less precise than observation or direct measurement; more importantly, responses by individuals to exposure questionnaires are potentially subject to recall bias or other information biases, particularly if perceptions of exposures may be altered by health status. Self-

reported methods also require reliable and accurate questionnaires that must be validated in the context.⁴ Therefore, precise assessment of workplace exposures all around the world is still a challenge.

In the absence of individual level exposure data or historical data, job exposure matrices (JEMs) are commonly used in occupational epidemiology research. JEMs allow to estimate participants exposures to chemical and physical risk factors based on job titles, industry information, and population exposure data.^{5,6} A JEM provides a means to convert coded job titles into exposure estimates for epidemiological studies. In addition to their efficiency and the decrease of information bias between cases and noncases, JEMs allow the estimation of more precise exposure data when only rudimentary data are available.⁶

This point raises the possibility of sharing JEMs from different countries and environments in order to better compare study results that are based on exposure estimates from different JEMs, and potentially allow the use of common JEMs. Up until now, few studies have compared general population JEMs across different countries; existing data suggest that some exposure estimates based on industry and job title are comparable between countries, while others are not: Lavoué et al⁷ observed moderate to very good agreement of exposure estimates for several agents when comparing two JEMs. Offermans et al⁸ found low to good agreement between two Dutch JEMs and a Finnish JEM for exposure to asbestos and other carcinogens.

In this context, we have launched the JEMINI (for Job Exposure Matrix InterNational) initiative to explore the possibility of developing international JEMs that could be used across countries.⁹ Beginning with physical (biomechanical) exposures, this open group has started homogenizing job coding systems, and comparing some available JEMs (currently, we are working on JEMs from the USA, Denmark, and France).¹⁰⁻¹² Many steps are necessary to evaluate how this International JEM might be applied elsewhere, and to check its performance in multiple settings. The use of an international JEM would likely require local working groups and data to adapt the potential international JEM for specific applications.¹³

Many limitations exist and should be highlighted. First, success is not guaranteed. We have started in our main field of expertise, which is the assessment of biomechanical exposure at work and we

focused on the most reliable variables of the JEMs. In this area, the differences of level of exposure between countries are possibly lower than others where process will require much more work, without guaranteed success. Second, JEMs require having job situations coded, and coding all jobs is a complex task necessitating international codes. Third, all working conditions could not be incorporated into codes. However, JEMs could still be used as a first-step tool for exposure assessment that allows target prevention on important issues.

In conclusion, though many limitations exist, the development, validation, and application of JEMs at an international level may not only be an important step to provide unified work exposures for epidemiological studies but also a unique opportunity for having a better consideration of occupational determinants all around the world.

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