Association of Occupation with Respiratory Symptoms and Lung Function in 174,900 individuals from 20 countries: the PURE study

Ali Moinuddin[1,2], Salim Yusuf[1-3], Sumathy Rangarajan[1], Maha Mushtaha[1], Shofiqul Islam[1,2], MyLinh Duong[1-3]

1. Population Health Research Institute, Hamilton, Canada. 2. Department of Health, Evidence, & Impact, McMaster University, Hamilton, Canada. 3. Department of Medicine, McMaster University, Hamilton, Canada

Background

- From 2000-2016, there were 1.9 million deaths from work-related diseases and injuries. Chronic obstructive pulmonary disease (COPD) accounts for a quarter of workplace deaths. [1]
- Most data on the respiratory effects of occupation come from high-income countries (HIC).
- The International Standard Classification of Occupations (ISCO-08) is structured by skill functions, closely related to formal education, nature of work, and training. [2]

OBJECTIVE:
To examine the association between occupation with respiratory symptoms and lung function across diverse populations from HIC, and low to middle-income countries (LMIC).

Methods

- Utilized baseline data from the Prospective Urban Rural Epidemiology (PURE) study.
- 174,900 adults aged 35-70 years enrolled from 20 HIC & LMIC.
- Occupation was classified and coded using ISCO-08 major groups (additional Homemaker group also collected).
- Respiratory symptoms of **dyspnea** with usual activity and **cough** experienced for more than 2 weeks in the past 6 months were recorded using a standardized questionnaire.
- The forced vital capacity (**FVC**), forced expiratory volume in 1 second (**FEV1**), and **FEV1/FVC** ratio were measured using standardized ERS/ATS spirometry methodology.
- Analysis conducted using multilevel mixed effect models to estimate the odd ratios (OR) and mean difference (MD, beta coefficients); adjusting for demographic, socioeconomic, lifestyle, & health factors.
- The reference group was Professionals (ISCO-08 Group 2)

Results

Self-reported population groups matched to ISCO-08 groups, including Homemakers group.

Group 1 Managers (N=5,691)	Group 2 Professionals (N=14,621)	Group 3 Associate Professionals (N=9,167)	Group 4 Clerks (N=10,406)	Group 5 Sales & Services (N=10,783)	Group 6 Agriculture (N=10,716)	Group 7 Skilled Trades (N=8,404)	Group 8 Operators & Assemblers (N=14,734)	Group 9 Elementary Occupations (N=37,406)	Group 10 Armed Forces (N=1,790)	Group 11 Homemakers (N=51,182)

Symptoms

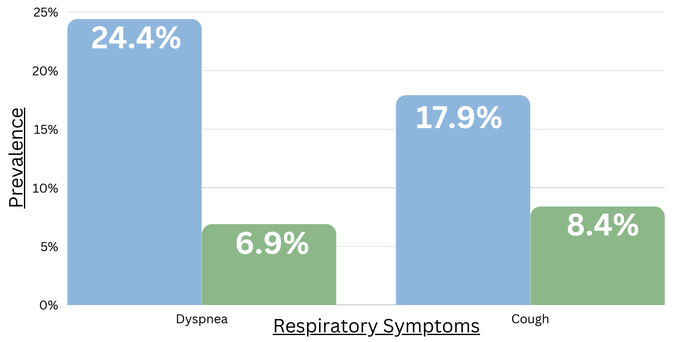

Figure 1: Baseline prevalence of respiratory symptoms. n= 174,600 (dyspnea), n=174,570 (cough). Overall cohort (blue), Professionals (green).

Dyspnea

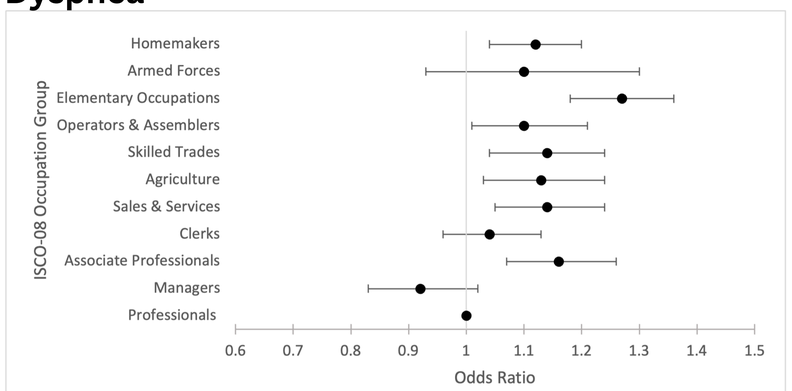

Figure 2: Forest plot of adjusted Odds Ratios for the association of occupation groups with dyspnea. n= 127,166.

Cough

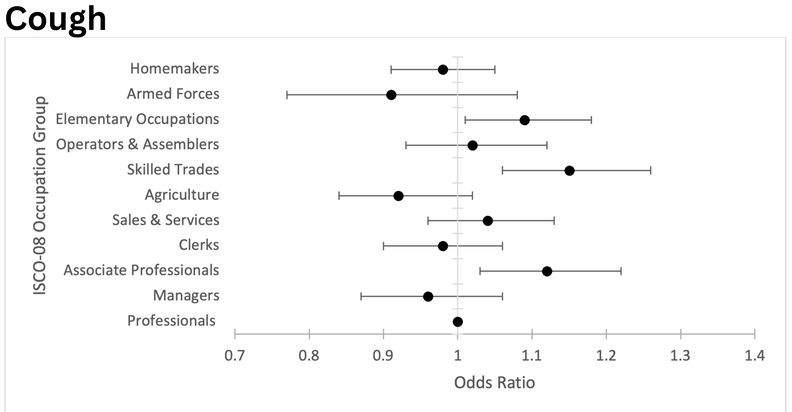

Figure 3: Forest plot of adjusted Odds Ratios for the association of occupation groups with cough. n= 127,162

Lung Function

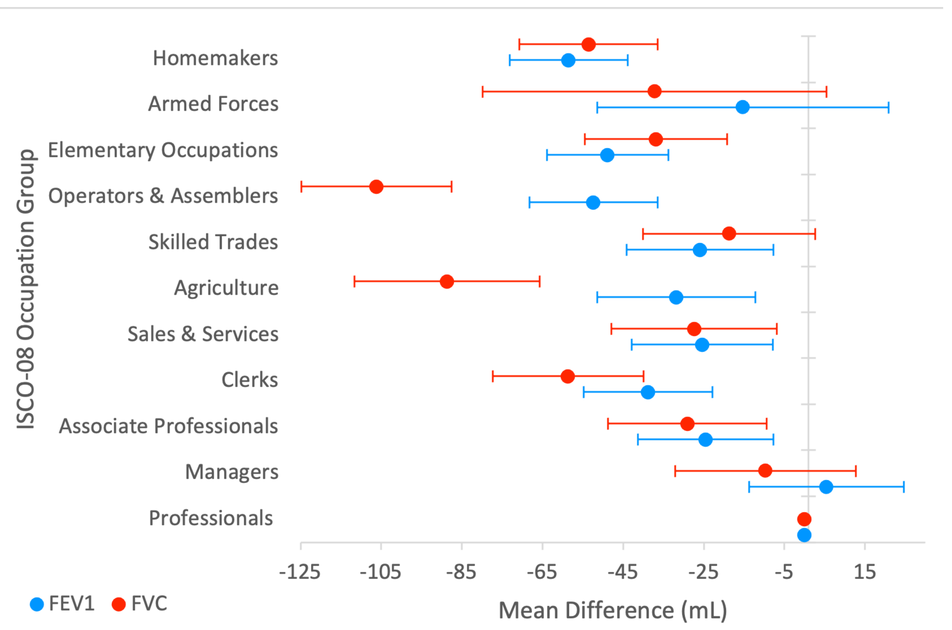

Figure 4: Adjusted MD for the association of lung function and occupation, compared to the Professionals group. FEV1 (blue) n=108,913. FVC (red) n=107,359; non-significant (black point estimate).

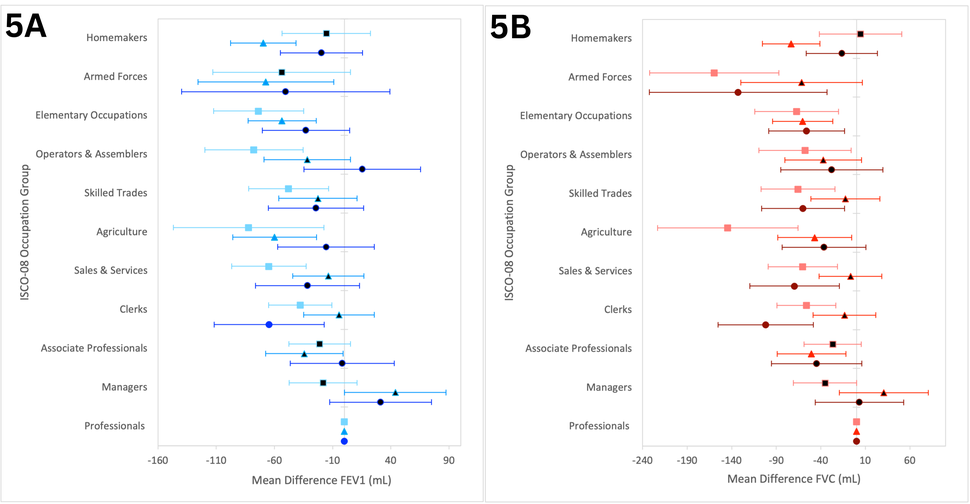

Figure 5: Adjusted MD for the association of lung function and occupation, compared to Professionals, stratified by country income level. FEV1 (5a, blue), FVC (5b, red). LIC (circle), MIC (triangle), HIC (square); non-significant (black point estimate).

-0.39% Lower FEV1/FVC in Elementary Occupations → **Airway obstruction**

Conclusions

- First study to examine association between ISCO-08 groups with respiratory symptoms and lung function
- Significant finding of airflow obstruction among Elementary workers
- Varying symptom + lung function significance between ISCO-08 groups may reflect different pathophysiological mechanisms impacted by different respirable exposures
- Limitations: Non-causal conclusions; self-reported symptoms & occupation are subject to recall bias

References:
1. Pega F, Náfrádi B, Momen NC, et al.. Global, regional, and national burdens of ischemic heart disease and stroke attributable to exposure to long working hours for 194 countries, 2000–2016: A systematic analysis from the WHO/ILO Joint Estimates of the Work-related Burden of Disease and Injur. Environment International. 2021;154:106595. doi:10.1016/j.envint.2021.106595.
2. International Standard Classification of Occupations.pdf. ISCO-08 Volume 1. https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_172572.pdf