histological subtype, increased risks and positive exposure response-relationships were apparent only for squamous cell carcinoma and small cell lung cancer.

Conclusions Our pooled analysis suggests that occupational exposure to PAH is associated with a modest increase in the risk of lung cancer, after adjustment for tobacco smoking and exposure to other occupational lung carcinogens.

Oral Presentation

Risk Assessment

0373 ASSESSING CANCER HAZARDS THROUGH EVIDENCE INTEGRATION - WHY IS IT IMPORTANT?

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Hazard identification involves the qualitative evaluation of scientific evidence on the association between environmental and occupational exposures and human cancer. Important policy decisions to reduce exposure to carcinogens in the workplace have resulted from hazard assessments conducted by authoritative bodies worldwide. Occupational cancer hazards have been successfully identified using published guidelines that integrate published evidence from studies with observational epidemiologic as well as experimental designs. This talk will describe methods for prioritising and integrating evidence across disciplines for hazard assessment and highlight examples where this has been important for protecting the health of workers.

Oral Presentation

Pesticides

0374 MULTI-CRITERIA DECISION ANALYSIS (MCDA) COMPARING AGRICULTURAL PRODUCTION METHODS: PROTOCOL FOR ANALYSING BRITISH COLUMBIA (BC) BLUEBERRIES AND ECUADOR BANANAS

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Background Expansion of agro-industrial approaches has raised concerns over occupational and environmental exposures, for example through intensive agrochemical use. Agricultural production decisions are influenced by assumptions regarding unit-specific criteria of 'productive efficiency' (revenues and yields), with limited attention to the association between costs and consequences and broader health determinants (sustainability and health effects). This study applies a population health

perspective to investigate the occupational and environmental consequences of production options by incorporating a *comprehensive* range of criteria. Specifically we investigate, in partnership with producers: what is the "best" agricultural production method for producing bananas in Ecuador and blueberries in BC?

Methods Two MCDAs per jurisdiction (Ecuador and BC) are used to calculate aggregate scores to rank production methods (agro-industrial, agro-ecological, and mixed-methods). The first MCDA is an 'actual' model, representing real-world decisions (constrained producer choices). The second MCDA is a 'preference' model representing no constraints (producer preferences). Additionally, discrete choice modelling is used to simulate hypothetical scenarios of components (e.g. policy instruments) that would sway producers towards their preferences, with sensitivity analyses to consider the implications.

Results If agro-industrial production is *not* the highest rank, a case can be made for more sustainable agriculture. The sensitivity of how decisions could move towards sustainable solutions that produce less health consequences and policies to facilitate such pursuit are assessed.

Conclusions As producers express greater concern for sustainability and certification that recognise that "good practices" are applied, MCDA suggests a way that evidence can be collected and analysed to support decision-making, transparently and comprehensively.

Oral Presentation

Policy/Impact

0375 EPIDEMIOLOGIC EVIDENCE FOR RISK ASSESSMENT – HOW SUCCESSFUL HAVE WE BEEN?

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Studies of workers have played a central role in identifying human carcinogens. For more than a third of the approximately 100 agents classified as carcinogenic (Group 1) by IARC with sufficient evidence in humans, the critical evidence was provided by occupational epidemiologic studies. Data from occupational studies has also contributed important evidence to identifying over 300 possibly or probably carcinogenic agents. Nevertheless, the contribution of occupational epidemiology could be improved. Beyond clear reporting of methods and results, the greatest need is for quantitative assessment of exposure and analysis of exposure-response relations. The political context of carcinogen assessment imposes barriers of a different kind. Actions by actors with vested interests to intimidate scientists, stifle debate and derail risk assessment are well documented. Recent evaluations of the herbicide glyphosate will be discussed as a case example.

Poster Presentation

Respiratory

0376 IF THE MASK FITS: AN ASSESSMENT OF FACIAL DIMENSIONS AND MASK EFFECTIVENESS

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Certain respiratory protective equipment (RPE) must fit tightly to the face of the wearer to provide effective protection, yet it is still unclear to what extent facial features affect mask performance. This study aimed to assess how facial dimensions affect the efficacy of a given RPE.

We tested a single RPE (3M 8835+) on participants (n=262) who consistently wear RPE at work. Three facial dimensions were measured to limit the demands placed on test participants: face length, face width, and jaw width. Mask test and facial measurements were conducted by the same researcher using the HSE standardised face fit testing protocol. The participants represented 22 different industries, the majority (90%) of whom were male. Fit factor (FF), representing the ratio of the exposure concentration outside to inside a mask, used to assess mask fit, with FF >100 constituting a successful fit.

Although 94.7% (n=248) of the study population achieved a successful fit, there was considerable variation among test results: FF median=415; Interquartile Range (IQR)=294–604. FF was log-transformed for regression analyses, which identified FF increases of 11.9% (p<0.05) and 18.3% (p<0.005) per 10% increase in the ratio of face length to jaw width and face width to jaw width, respectively.

These results help understand the impact face shape can have on the effective seal achieved by RPE and could help inform mask design to maximise impacts for respiratory health. Further analysis of the data may expand on the impact of face shape on RPE seal during the specific face fit test exercises.

Poster Presentation

Methodology

0378 OCCUPATIONAL PM_{2.5} EXPOSURES AND PULMONARY FUNCTION DECLINE: AN APPLICATION OF THE PARAMETRIC G-FORMULA IN A US ALUMINIUM INDUSTRY COHORT

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Workers in the aluminium industry are widely exposed to particulate matter (PM) during several stages in the manufacturing process at exposure concentrations several orders of magnitude higher than environmental standards. In this study we investigate the

relationship between occupational exposures to fine particulate matter (with an aerodynamic diameter less than 2.5 µm PM_{2.5}) in a cohort of aluminium workers, while adjusting for the time varying confounding by underlying health status, characteristic of the healthy worker survivor effect. To address this time-varying confounding, we applied the parametric g-formula to longitudinal pulmonary function data from 5271 actively employed aluminium workers in the United States followed between 1996 and 2013. We adjusted for time-varying health status using a composite risk score based on health insurance claims. We simulated values for forced expiratory volume in one second (FEV₁) between ages 18 and 63, under hypothetical interventions on exposures to PM_{2.5}; we then compared the trajectory of FEV₁ decline with age under each intervention to the observed natural course (that was actually observed). Under a hypothetical intervention limit for annual average daily exposures to PM_{2.5} of 175 µg/m³ (corresponding to the 25th percentile of observed exposures), the average FEV₁ at age 63 was 37.1 mL higher (95% confidence interval (CI): 1.8, 72.4) than that actually observed, corresponding to 1.2% of the average predicted FEV₁. Our results suggest that occupational PM_{2.5} exposure in the aluminium industry accelerates FEV₁ decline. Regulatory measures may mitigate loss of pulmonary function over time in the industry.

Oral Presentation

Cancer

0379 CALCULATING THE CURRENT BURDEN OF OCCUPATIONAL CANCERS IN CANADIAN WOMEN

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Objective To estimate the attributable fraction (AF) and number of annual incident cancers among women due to occupational exposures, as part of the Canadian Burden of Occupational Cancer study.

Methods Attributable fractions, calculated with Levin's equation, used estimates of proportions of workers ever exposed (PrE) 10–50 years before diagnosis, and point/range estimates of the exposure-cancer association from the epidemiologic literature. Numbers of attributable cancers were calculated by applying AFs to 2011 Canadian Cancer Registry data. Historical exposure was derived from CAREX Canada estimates of prevalence and level of exposure. PrE was estimated from the Canadian census, labour force survey and survival probabilities. Analyses focused on 12 carcinogens with ≥5000 exposed women.

Results The highest AF among women was for mesothelioma (AF=40%); 1.6% of lung and 2.6% of ovarian cancers were also attributed to asbestos. The largest number of attributable cancers was due to shift work, a probable cause of breast