

GM was highest among bogger operators 0.53 mg/m<sup>3</sup> (GSD=0.27) and the least among truck operators 0.29 (GSD=0.37). While for open pit, the highest GM was found among quality controllers 0.39 mg/m<sup>3</sup> (GSD=0.18) and the least among in truck operators 0.13 mg/m<sup>3</sup> (GSD=0.15). Respiratory symptoms were phlegm (49.1%), Breathlessness (42.9%), cough (37.5%), wheezing (18.8%) and chest tightness (10.7%). Prevalence of airflow obstruction (FEV1/FVC<0.75) was 7.7% among non smoking miners.

**Discussion** Despite the fact that levels of respirable dust exposure were below recommended occupational exposure limits, prevalence of respiratory symptoms was still high among gold miners. There is a need to conduct further studies on quarts.

## 52 EFFECTIVENESS OF PARTICIPATORY ERGONOMIC INTERVENTIONS AND A MUSCULOSKELETAL DISORDER PREVENTION PROGRAM ON THE REDUCTION OF MUSCULOSKELETAL RISK-FACTORS IN CORE-SHACK OPERATIONS

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**Introduction** Workplace musculoskeletal disorders (WMSDs) give rise to approximately 44% of compensation claims each year within the Canadian mining sector. Despite the immensity of reported WMSDs little research has been conducted within said population. The purpose of this study is to examine the effectiveness of physical ergonomic interventions and a participatory MSD prevention program on the reduction of MSD risk-factors within core-shack operators. Anecdotal evidence suggests that the awkward postures, excessive force requirements, and repetitive material handling found within core-shack operations may be placing workers at a greater risk for MSD development; however, no previous research has been conducted.

**Methods** Amalgamation of observational based MSD screening tools and direct joint-angle measurements via a mobile movement analysis and motion capture system (NOTCH) will be used. Siemens Classic Jack human modelling software will be utilised to provide ergonomic assessments within a simulated environment. Resultant data will be used to develop targeted physical ergonomic interventions to mitigate MSD risk-factors within at-risk tasks. The Occupational Health and Safety Council of Ontario (OHSCO) MSD Prevention Toolbox 3C and New South Wales Mine Safety and Advisory Committee MSD Prevention Guide will be used as a reference for the development of a participatory MSD Prevention Program.

**Result** It is anticipated that the implementation of targeted workplace ergonomic interventions in conjunction with a participatory MSD prevention program will provide a comprehensive approach to MSD risk factor identification and prevention strategies. Moreover, it is expected that the intervention components will increase communication and decision latitude within core-shack operations.

**Discussion** The prevalence of musculoskeletal injuries with the Canadian mining industry is of particular concern. The dissemination of this study will be shared with participating mines so improvements can be made to aide in worker health and safety and prevention of musculoskeletal injuries.

## 40 PROMOTING HEALTHY LIFESTYLES IN AN OPEN PIT COAL MINE

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**Introduction** Open pit coal mines face different occupational risks, however little attention has been placed on the importance of promoting in the labour and social sphere of workers healthy lifestyles. In an open coal mine in Colombia and with the goal to prevent general and occupational diseases and overall to improve quality of life, was developed a participatory and integrated program focused in promoting healthy lifestyles.

**Methods** A company team spent nearly six months in the first half of 2013 in developing the program. The team comprised members of the Occupational Health Committee, leaders from the trade union and representatives from various operational and administrative areas. The final outcome of this preparatory work was the model guiding this program, which has three main central and transverse pillars: physical activity, healthy nutrition, and related education. Physical activity is the model's most important bulwark.

**Result** The program was finally implemented in 2015 in all the settlements of region where the workers reside reaching an adherent level of 1818 people, demonstrating its widespread acceptance amongst employees and their families. In 2017 there are more than 3000 participants and at the end of 2016, despite the short period since implementation, overweight and obesity levels had fallen by 3.75% and triglyceride levels had dropped by 6.9% (cholesterol was unchanged). Program adherence has remained steady at 70% since the start of the pilot test as well as throughout the year and a half of the program itself.

**Discussion** Considering that other similar initiatives reach maximums of 45%–50%, this program's adherence is quite successful. Throughout 2015 and 2016, there were more than 100,200 hours of activities with 91 710 participant attendances. The program has strengthened ties amongst the participants and communities involved, which has been reflected in interactions on social networks showing various activities held at different locations.

## 582 HEALTH AND SAFETY TRAINING ON LEAD EXPOSURE FOR ARTISANAL AND SMALL-SCALE GOLD MINERS IN ZAMFARA STATE, NIGERIA

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**Introduction** Artisanal and small-scale gold mining (ASGM) has long been practiced in Nigeria. Mining often involves both occupational and community health and safety hazards that not only affect miners, but also their families and communities. In Zamfara, Nigeria where the gold bearing deposits contain unusually problematic concentrations of lead these are overwhelmed by the enormous effects of lead poisoning. In 2010, unregulated small-scale miners in Zamfara state, gave rise to an epidemic of childhood lead poisoning, with at least four hundred children under the age of five dying within a six-month period (a number that rose to over 700 by 2013). It was found out that a lack of training in Health and safety and support to the ASGM sector, and the need for the miners

to make a living, even in a precarious environment contributed to this incidence.

**Objectives** The objectives of this study are:

- To provide capacity building to help this group of workers learn concepts for improving work conditions and understand the risks in mining;
- To provide awareness on various approaches of workplace health and safety promotion as regards mining.

**Methods** One hundred and seventy four(74) participants were randomly selected for this training.

**Modules**

- Hazard identification and risk assessment.
- First aid
- Mercury Exposure and related risks
- lead exposure and related risks
- Safer mining practice
- Personal Hygiene
- Personal protective equipment (PPE) used in mining

**Results** The Health and safety knowledge of the ASGM workers were increased. The capacity building process enabled the workers to recognise risks associated with mining and therefore know how to implement safety measures by using PPE and by learning about safety improvement concepts.

**Discussion** Our findings suggest that positive attitudes toward promoting safe working conditions and practices can be fostered among the ASGM workers.

### 630 STATUS OF REGULATIONS ON HEALTH AND SAFETY IN MINING IN KENYA SINCE ENACTMENT OF THE OCCUPATIONAL HEALTH AND SAFETY ACT,2007

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**Introduction** Large and small scale Mining in Kenya has been in practice for close to 100 years. This includes mining of minerals like soda ash, gold, flourspar, gemstones, quarrying. As an occupation with varied risks, regulation has been used in many countries to ensure the health, safety and welfare of workers is taken care of. There have been various regulations governing some aspects of mining in Kenya including health and safety. Such laws were enacted as early as 1940 for the Mining Act CAP 306 and 1951 for the Factories Act CAP 514 whose purpose was to make provision for health, safety and welfare of persons employed in factories and other places.

**Methods** A systematic review was conducted after setting the research questions. Online databases and sources were identified to conduct the review. The articles under review were limited to law provisions on health and safety in mining in Kenya. Online sources used include Kenya law reports database, the Extractives Baraza, the Ministry of Labour Website and Ministry of Mining Website.

**Results** Laws and Regulations that touch on health and safety in mines which were enacted before the Occupational Health and Safety Act,2007 have since been repealed. The Mining Act of 2016 replaced Mining Act CAP 306 where small scale mining has been recognised as a legal activity. However, there are no specific regulations on the health and safety provisions for this group of workers. Kenya has not ratified a number of International Labour Organisation(ILO) conventions on health and safety.

**Conclusion** Kenya has taken notable steps in ensuring mining industry has regulations that govern its operations. Having artisanal and small scale mines recognised as a legal activity are indicative of these steps among others. The findings also indicate the need to have rules that are specific to the industry.

### 819 ASSESSMENT OF THE IMPACT OF MINING ON THE ENVIRONMENT AND HEALTH IN DRC (DEMOCRATIC REPUBLIC OF CONGO)

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**Introduction** DRC is endowed with enormous mining potential, the exploitation of which promises great hope of economic development. However, the various activities carried out during several years of operation have led to negative environmental and social impacts. The exploitation of mineral deposits has had deleterious effects on the biophysical, socio-economic and health aspects of the surrounding populations.

**Methods** Systematic and impartial assessment of mining activities was conducted in terms of environmental impacts, waste management, implementation of environmental control mitigation measures, and emergency plan, according to national regulations and requirements of The World Bank. Field study required visits to the sites in the Provinces of Katanga, Kasai Oriental and Kasai Occidental, collection of samples of water and soil, collection of health data, and interviews with key personnel including representatives of mining companies, miners and surrounding populations.

**Result** Samples of surface water, groundwater and soil were collected and analysed along with surveys on occupational health and safety issues including noise and observations carried out by the group of experts on the basis of literature in the field. The contaminants that were above the standard included Silver, Arsenic, Copper, Molybdenum, Chromium, Zinc, Manganese, Mercury, Potassium and Sulphur, Nitrites and Nitrates, and suspended organic matter. Resulting population displacements had quite disruptive social effects and serious risks of impoverishment on aboriginal families and residents and damage to the environment.

**Discussion** Issues of waste management, liquid effluents, especially acid mine drainage, and the enormous excavation holes were quite noticeable. The analysis revealed exceedance of the current standards of DRC, WHO or Quebec, concerning the quality of surface and ground water, and soil quality. This mission laid the groundwork for an awareness of the dangers that threaten the environment in general, and especially the populations living in the vicinity of explored mining sites along with mitigation measures.

### 907 OVERCOMING THE LEGACY OF OCCUPATIONAL LUNG DISEASES IN MINeworkERS IN SOUTHERN AFRICA – HEALTH SERVICES AND COMPENSATION

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