

in excessive amounts to extract gold from crushed ore in ASGM. Through pollution of the air, water and nutrients, the mercury causes adverse health effects in miners and their families. However, ASGM can be performed without the use of mercury. This has been practiced for many years in a region in the Philippines with the gravity-borax method (GBM). With this method, the gold-containing ore concentrate is produced using a launder and a washing pan. As the last step, borax salt is added and the mixture blow-torched. The exposure to borax dust or fumes is limited and is not suspected of posing a health risk to the miner or the environment. The result is cleaner gold and no mercury spill. In order to spread the use of the GBM method, two intervention projects have been conducted in the Philippines. In combination with a civil society strategy, miners from the region using GMB have educated miners from other areas in the use of the GBM method. The success rate varied from area to area. In areas with a miners' organisation and back-up from the civil society, the miners were encouraged to shift method and the change was sustained. The intervention program is now introduced in Uganda and Mozambique with the help from miners using the GBM method. In Uganda, the activities are focused on the spread of information about the mercury-free method locally and regionally. In Mozambique, the core of the project is to determine the extent of ASGM and to introduce the GBM method.

1637e WHEN MINING SURROUNDS THE COMMUNITY: WORK, WELL-BEING, AND ENVIRONMENTAL MONITORING IN SMALL SCALE MINING IN THE PHILIPPINES

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This research on small scale gold mining (SSGM) in Benguet, Philippines draws from three different but complementary data sources in order to analyse work, well-being and environmental pollution in SSGM. The data sources were- 1. workplace inspection to assess working conditions, hazards, and work practices of miners coupled with interviews and focus-group discussions; 2. health assessment and laboratory examinations among indigenous miners; and 3. environmental monitoring of mercury in water samples across all 13 municipalities of Benguet. The work analysis showed accident risks from use of explosives, poor visibility in tunnels, exposure to dust during tunnelling, and chemical exposures to mercury and cyanide without protective equipment and proper ventilation. The workplace inspection of the underground tunnels showed safety infarctions including unsteady trenches, insufficient slopes, possibility of collapse of trenches, and the risk of subsidence. The sub-sample population of 89 SSGM reported prevalent health problems- hypertension (62%), hypertensive cardiovascular disease (14%), and dermatitis (4%) Health injuries were secondary to blasting and stone crushing. Another data from a sub-population of 34 miners showed major causes for hospitalisation were trauma, ulcers, kidney and cardiac diseases. Low back pain was common and associated with heavy lifting ($p=0.001$). Reticulocyte count was associated with total lifetime mining hours ($p=0.033$). The mental status examination showed most deficits in repeat phrase and recent memory. For the environmental monitoring

of mercury in 90 surface water and 40 drinking water samples, a considerable percentage exceeded the maximum contaminant level (MCL) of both the Philippine guideline (0.001 mg/L for drinking sources, 0.002 mg/L for surface waters), and EPA (0.002 mg/L), above which levels can cause risk to health. All the three different but complementary data sources show the need for an occupational and environmental agenda addressing the health-safety aspects and technical-social issues in mining.

1637f LEGISLATION AND BEST PRACTICES IN SMALL-SCALE MINING IN THE PHILIPPINES

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This study analyses the small-scale mining activities and the best practices for mercury-free gold mining. The data were based on literature, national laws and modules for small-scale mining, as well as interviews of major stakeholders in small scale mining in the Philippines. Currently, there are two national legislations on small-scale mining and an executive order to compliment these national laws, Presidential Decree 1899, which allowed for small-scale mining in the Philippines, and Republic Act 7076, which introduced guidelines for local miners on artisanal mining. Executive Order 79 prohibits the use of mercury in small-scale mining, however it goes against other legislative acts in place regulating the use of mercury for industrialization. Furthermore, the Order states that small-scale mining is not allowed outside the 'Minahang Bayan (*People's Mining*)', which was established to regulate small-scale mining. This is inconsistent with President Decree 1899 which allows for mining activities. There are thousands of illegal small-scale mining, as they cannot adhere to the administrative requirements set by the local government units. Hence, there is a need to revise and amend the existing laws to serve and benefit the local Filipino miners. Among the best practices in the approach to mercury-free mining in the Philippines showed the need for a participatory approach among major stakeholders such as the small scale miners, local government, and civil society-advocacy groups, the need for technical knowledge of shifting to mercury-free mining, respect for culture of the indigenous miners, and capacitating strategies to maintain the mercury-free technology in mining. There are also corollary programs aimed to promote mining revenue, compliance among miners for increased awareness, and to decrease hazards and conflicts. Hence, there is a need for the following- a ground-to-top reformulation of the law to cater to the needs of the miners and a harmonisation of national laws with international guidelines.

1636 MINING OCCUPATIONAL SAFETY AND HEALTH: HAZARDS AND GOOD PRACTICES IN FORMAL AND INFORMAL MINING

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