

Mercury pollution and its human health risk caused by the Artisanal Small-scale Gold Mining activity in Indonesia

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Artisanal small-gold mining using mercury amalgamation has increased in developing countries even now. Miners sell their gold to shops that are usually located in town, where the mercury gold amalgam is burned to evaporate the mercury without treatment equipment. People living and working near these gold shops are exposed to intermittent and extreme concentrations of mercury vapor. The study presents a human health risk assessment with mercury vapor inhalation and Me-Hg-contaminated fish and rice ingestion, as well as Hg determination environmental media in Bengkulu, Sumatra, Indonesia. Gaseous elemental mercury (GEM) concentrations ranged from 4.10 ng/ m³ (ambient air) to 2 million ng/ m³ (inside gold shops) in atmosphere. Total mercury (T-Hg) concentrations ranged from 5.30 ng/L to 2490 ng/ L, and from 0.34 mg/kg to 25.6 mg/kg in river water and in sediments and soils, respectively. In addition, T-Hg concentration in brown rice was 0.044mg/kg. We used these concentrations to calculate hazard quotients (HQs) by means of a probabilistic risk assessment method. The results indicated that the gold shop workers and gold refining workers may concern the inhalation risk of mercury vapor. Human health risk is also concerned originated from contaminated food intake in each group. Result from the scenario analysis, if they can avoid the fish consumption which harvested from mercury contaminated area, then possibility to reduce the risk concern. However, it is difficult to reduce the risk concern, if the origin of rice is changed from contaminated area to non-contaminated one.

Keywords: Mercury, Artisanal Small-scale Gold Mining Activity, human health risk