

# Health risk assessment of operators of HEMMs exposed to whole body vibration in Indian mines

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The operators of the Heavy Earth Moving Machineries (HEMM) are exposed to Whole Body Vibration (WBV) during the daily course of their operations. Studies conducted in India and abroad showed high prevalence of Musculoskeletal Disorder (MSD) among them.

**Objective:** The present study was designed to evaluate the vibration magnitude and characteristics of the HEMMs. Further, risk analysis using the guidelines of ISO 2631-1:1997 was carried out to determine the probable adverse health impact to the operators.

**Methods:** Total 117 HEMMs in seven different opencast mines were studied. WBV exposure was evaluated through measurement of the RMS acceleration in three basicentric axes and corresponding daily exposure durations according to guidelines in ISO 2631-1:1997.

**Results:** The dominant axis of vibration for most of the dumpers was Z. Dozers and loaders had X while excavators and shovels had both X and Z as the dominant axis of vibration. The health risk of the operators due to daily exposure to vibration (1.4 to 7.5 hours) was evaluated in combination with their respective acceleration magnitudes (0.21 to 1.82 ms<sup>-2</sup>). 55% and 21% of the HEMMs showed moderate and high health risk due to vibration exposure respectively. Rest 24% showed minimal/no risk to their operators.

**Conclusions:** Based on the observations it is proposed that a large scale epidemiological study should be conducted on the operators of these machines used in Indian mines on the prevalence of MSD. It will be more appropriate to relate the affected body part with the direction and intensity of vibration along dominant axis.

**Keywords:** whole body vibration; mine hazards; ISO 2631-1:1997; occupational health; musculoskeletal disorder.