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Ambient PM_{2.5} monitoring from the Gold Mine Tailings to Assess the Human Health Effects in the Community of eMbalenhle, South Africa

Particulate Matter (PM_{2.5}) pollution remains a significant air pollution problem in South Africa and worldwide, posing serious human health effects to exposed communities. This study presents an overview of the human health impacts posed by exposure to PM_{2.5} from Gold Mine Tailings (GMT) in the community of eMbalenhle. PM_{2.5} concentrations were measured at both the GMT (source) and at the community (receptor) in eMbalenhle using the Low-Cost Monitors (Clarity Note-S). The measured PM_{2.5} data was analysed using OpenAir data analysis software. The samples of ambient particulate matter at both the source and receptor were collected with the University of North California (UNC) Particle samplers and were analysed using Computer Controlled Scanning Microscopy (CCSEM) techniques to perform size measurements, chemical composition on individual particles and sources of ambient particulate matter. The Human Health Risk Assessment Model was then applied to estimate the human health impacts of exposure to PM_{2.5} from the GMT on different life-stages in the community of eMbalenhle. The results show the high levels of concentrations at the receptor than the source. The findings further indicate that the community of eMbalenhle was exposed to the PM_{2.5} concentrations exceeding the ambient PM_{2.5} South African National Ambient Air Quality Standards (NAAQS) and the World Health Organisation (WHO) Air Quality Guidelines which were set to protect both the environment and human health. The study concluded that particle dispersion from the source to receptor has a great impact when assessing the human health impacts to PM_{2.5} exposure.

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