

Accepted Manuscript

Health risk assessment of the workers exposed to the heavy metals in e-waste recycling sites of Chandigarh and Ludhiana, Punjab, India

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PII: S0045-6535(18)30555-1

DOI: 10.1016/j.chemosphere.2018.03.138

Reference: CHEM 21082

To appear in: *Chemosphere*

Received Date: 04 February 2018

Revised Date: 19 March 2018

Accepted Date: 20 March 2018

Please cite this article as: Manmohit Singh, Parteek Singh Thind, Siby John, Health risk assessment of the workers exposed to the heavy metals in e-waste recycling sites of Chandigarh and Ludhiana, Punjab, India, *Chemosphere* (2018), doi: 10.1016/j.chemosphere.2018.03.138

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1 **Health risk assessment of the workers exposed to the heavy**
2 **metals in e-waste recycling sites of Chandigarh and**
3 **Ludhiana, Punjab, India**

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7 **Abstract**

8 Investigations were made to analyze the effects of heavy metals on the adults and children
9 working in informal e-waste recycling sectors of Chandigarh and Ludhiana, Punjab, India. Soil
10 samples of the ground where recycling was being done, dust from the platform where recycling
11 activities were done and dermal samples of workers were collected to estimate the presence of
12 heavy metals (As, Cu, Co, Cd, Cr, Ni, Fe, Zn, Pb, Ba) in them. High concentration of Ba, Cu, Pb
13 and Zn was observed in the soil and dust samples. Cr, Pb and Zn were observed in high
14 concentrations in dermal samples. These heavy metals could cause serious health effects.
15 Therefore, human health risk assessment was also done using carcinogenic (cancer risk potency
16 factor) and non-carcinogenic (health hazard index) health risk assessment. Carcinogenic hazards
17 were not reported in children however, hazard index, for soil and dust contamination for some
18 heavy metals, was found significant (Soil samples: As = 1.69, Cr = 1.38, Cu = 4.5 and Pb = 5.82
19 and dust samples: Pb = 2.97). Carcinogenic hazards were reported in adults from Cr
20 contamination in soil samples (3.4E-03).

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