

SAWA PGD Fellow : Bhintuna Shrestha

Institution : NEC

Title : *Assessment on Pharmaceutical Wastewater Management Practices and Livelihood Impacts inside Kathmandu Valley*

Email : dreamsnme@gmail.com

Background

Concerns of traces of pharmaceutical compounds in surface water and drinking water were reported as early as 1980; however the issue started emerging as a widespread environmental and public concern only after the 1990s. Different disposal practices including industrial wastewater disposal are identified because of the presence of drugs into water systems. Even though individual concentrations of any drug might be low, combined concentrations from drugs sharing a common mechanism of action could be substantial. Among the pharmaceutical manufacturers with their industrial establishments located around Kathmandu, only a few of them have established Environmental Management System (EMS). However, many of the industries disregard the environmental and public health regulations and discharge their effluents in higher concentration than those set by the concerned authorities. Furthermore, the effluents are discharged into surface water bodies which are used by the people in the vicinity and on the downstream for various uses directly and/or indirectly onto land or into small channels leading to nearby rivers. This necessitates the compliance of environmental and public health standards by the pharmaceutical industries and also education and awareness of the people using water from the sources known to carry pharmaceutical wastes and increasing dependence on consumer goods.

Research Objectives

The study was carried out to document and analyze the state of pharmaceutical factories' wastewater disposal practices, their compliance with management regulations and probable health impacts resulting from poor management practices. The study also intended to analyze wastewater and groundwater samples to understand potential linkage between water pollution and disposal practices.

Research Methodologies

The methodologies involved explorative survey, desk study, site observation, key informant interview and semi-structured interview at household levels and physico-chemical water quality analyses. Key informant interviews of five pharmaceutical factories were carried out at managerial and waste management practitioner level. Water analysis included samples from five pharmaceutical factories (including production and deep boring) and eighteen groundwater samples from household level. Production varied at factories studied, thus it limited water quality parameters into pH, chloride, BOD, COD and TSS.

Research Findings

Data analysis from key informant interview and semi structures interview showed haphazard and rampant disposal of pharmaceutical effluents and non-water pollutants within the factories studied. Disposal of industrial effluents without treatment is one among many factors causing increasing water quality degradation. Liquid effluents were either disposed in soak pits, or treated and recycled for washing and gardening purposes or were collected in soak pits and drained into local sewerage. Different by-product disposal practices like soil burial, open burning, dilution and selling to waste collectors were observed. Only one company was treating their effluent from non-penicillin section with alum and caustic dosing. However, water analysis of wastewater before and after treatment has shown significant efficiency of the method applied.

Different reasons for not adopting treatment plants in the factories were also sought. Interviews at managerial level showed that treatment plants in pharmaceutical manufacturing factories' infrastructure were considered needless and not included in priority list. Similarly, legal flexibility of concerned authorities to control activities of proper effluents disposal was also found as a reason for haphazard disposal and management of by-products generated from such factories. Apart from perception on water quality degradation, perceptions regarding probable livelihood impacts were carried out among local residents. It revealed some cases of water pollution: accidental spill of hazardous effluent into paddy fields nearby the factory and air pollution from open burning of plastics and other solid waste. Though affected residents were compensated for the accidental spill of hazardous effluent, soil quality degradation at the accidental site was also perceived.

Water quality analysis of wastewater samples showed effluents being heavily polluted with chemical materials. The COD and BOD concentrations from an expired drugs soak pit were 766 times and 300 times respectively higher than what is permissible under Government of Nepal Standard. Along with higher values of BOD and COD, higher concentrations of total suspended solids of

wastewater from production units were also observed. It indicated effluents with high pollutants loads. It further depicts urgent and serious need of regular monitoring of such wastewater before disposing them into nearby river or other sites. However, adoption of simple pH maintenance treatment with caustic and alum dosing techniques have shown clear pollutants load declination. The links between higher BOD, COD, Chlorine and TSS levels that appear in some ground water samples should be followed up by analysis of pharmaceutical residues in groundwater to determine probable livelihood impacts.

Groundwater samples analysis from household nearby pharmaceutical manufacturers premise also indicated some deviations in values from what is permissible in National Drinking Water Quality Standard. Deviations were observed close to four pharmaceutical factories for their higher BOD and COD values. High chlorine concentrations were also observed at household samples near companies with the expired drugs soak pit and even with treatment plant.

Conclusions

Pharmaceutical wastewater disposal and management needs the attention of the concerned authorities. Absence of regulations concerning pharmaceuticals in disposed water in the country has left these factories to dispose their effluents in the cheapest way feasible. Ironically, even though many legislative working on the pollution prevention, environment standards enforcement and monitoring, and ensuring EIA at the time of commencement of development projects, there still posses the implementation gaps. The existing laws and order have provided their major priority to the production rather than the security in safeguarding the environment and controlling pollution under which they are working. Thus, these regulatory provisions have let pharmaceutical manufacturing industries to discard their waste and effluents in the cheapest way feasible.

Recommendations

Awareness on the adverse impacts and the complication from the pharmaceutical effluents must be spread to regulate these factories. Thus, the study finds the need for strict prohibition of disposing expired drugs in soak pits, urgent need of further assessing the linkage of presence of drugs in waterways and their impacts, and formulation of strict guidelines and regulations for disposal of pharmaceutical effluents.