UNIVERSITI TEKNOLOGI MARA

HEAVY METALS CONCENTRATION IN WELL WATER IN FLOODED AND NON-FLOODED AREA IN KELANTAN AND ITS POTENTIAL HEALTH RISK

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Declaration by Student

Project entitled "Heavy Metal Concentration in Well Water in Flooded and Non-Flooded Area and Its Physical Health Risks" is a presentation of my original research work. Whenever contributions of others are involved, every effort is made to indicate this clearly, with due reference to literature, and acknowledgement of collaborative research and discussions. The project was done under the guidance of Project Supervisor Assoc. Prof Dr Hazilia Bt Hussain. It has been submitted to the Faculty of Health Sciences in partial fulfillment of the requirement for the Degree of Bachelor in Environmental Health and Safety (Hons).

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ABSTRACT

Heavy Metal Concentration in Well Water in Flooded and Non-Flooded Area and Its Potential Health Risks

by

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Groundwater is utilized for domestic, agriculture and industrial purpose in many parts of the world. Large numbers of pollutants that discharged into the water caused by human activities like agriculture and domestic discharge. One of the most important environmental issues today is groundwater contamination by heavy metal as they are toxic even at low concentrations. Therefore, a study was conducted in Kampung Belukar and Kampung Padang Raja, Kelantan to study the concentrations of heavy metal in well water in flooded area and non-flooded area and its potential health risk assessment among residents. A total of 60 wells were selected as representative wells of the two study areas. 30 samples were collected in Kampung Belukar and another 30 samples were collected in Kampung Padang Raja from the different houses in November 2015. The physical parameters like temperature, pH, turbidity and dissolved oxygen were measured on site. The collected samples were kept in an ice box and then transferred to the chiller (4 °C) until delivery to Environmental Health Laboratory at UiTM Puncak Alam.The samples was analyzed using by Atomic Absorption Spectrophotometer. The results showed that six of heavy metals were detected in one or more water sample analysed in this study. The concentrations of four heavy metals (Fe, Cd, Pb and Mn) were detected to be higher than the allowed National Drinking Water Quality Standard limits (0.3, 0.003, 0.01 and 0.1) in both study areas. The other two heavy metals Cu and Zn in both study areas were within the allowed (NDWQS) limits (1.0 and 3.0 mg/L). Results also showed that the 60 wells in this study are different from each other at 95% confidence level in terms of heavy metal content. There was a significant difference ($p<0.05$) in copper, lead and manganese between Kampung Belukar and Kampung Padang Raja. So the null hypothesis was rejected. Meanwhile, the HQ values of all the six metals (Fe, Cu, Zn, Cd, Pb, Mn) ranging from 0.000 to 0.970 were less than 1, indicating acceptable risk for non-carcinogenic adverse health effect. There was no significant association between health symptoms with presence of heavy metals between two study areas ($p<0.05$). Thus null hypothesis was rejected. Further study is recommended to find the association between health symptoms and heavy metal concentration. It is also advisable to check the physiological condition of respondents to obtain a better result on health impacts. In conclusion, heavy metals like Fe, Cu, Cd, Pb and Mn was detected in every sampling point in both study areas except Zn which was only detected in some sampling points. Only two heavy metals i.e. Cu and Zn were below than standard while the remaining heavy metals, Fe, Cd, Pb and Mn contravened to the standards.

Keywords: Groundwater, Drinking Water, Human Health Risks, Heavy Metals, AAS