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## ABSTRACT

### ASSESSMENT OF HUMAN HEALTH RISK IN GROUNDWATER TUBE WELL AT RURAL AND AGRICULTURE AREAS IN SABAH: A STUDY CASE AT INANAM AND KOTA BELUD DISTRICT, SABAH

Lack of treated water system despite high population density resides in Sabah has increase human dependency to groundwater sources. However, the presence of contaminants such as nitrate naturally and anthropogenically in groundwater tube well could pose severe health implications to human such as methemoglobinemia and cancerous diseases. The objective of this study case was to quantify the nitrate concentration in groundwater well at two different location, namely Inanam and Kota Belud. From that, the potential human health risk exposure of nitrate in groundwater wells was calculated and compared between rural and agriculture areas. Six tube wells were selected at six primary schools of Inanam and Kota Belud and involved one-hundred eighty respondents aged from 7 to 12 years old. The groundwater samples were analyzed using Cadmium Reduction method of HACH DR2800 Spectrophotometer and human health risk exposure were assessed using Chronic Daily Intake (CDI) and Hazard Index (HI) after set of information of respondents were obtained by questionnaires. Result obtained were showing mean±S.D of nitrate levels in unfiltered and filtered groundwater of agriculture (0.79±0.33 mg/L; 0.33±0.29 mg/L) and rural (0.50±0.12mg/L; 0.53±0.10 mg/L) areas were within the acceptable value limit set by NDQWS of Malaysia (10 mg/L). The statistical analysis of Kruskal-Wallis and one-way ANOVA test implied there were significant differences of nitrate levels between two areas (KW  $\chi^2 = 18.575$ , df = 1, p = 0.000, p < 0.05) (F(1,52) = 10.812, p = 0.002, p < 0.05). Moreover, the mean±S.D of CDI for agriculture and rural areas were 0.0064±0.0056 mg/kg/day and 0.0140±0.0096 mg/kg/day respectively and HI were less than 1. The insignificant differences of potential human health risk were noted in terms of gender and age of respondents between two areas. This specified that the human health risk of respondents involved in this study were in acceptable range and not exposed to severe health risks.