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MULTIVARIATE STATISTICAL ASSESSMENT OF TRACE METALS IN UNDERGROUND WATER CONSUMED IN CRUDE OIL AND NON-CRUDE OIL PRODUCING COMMUNITIES OF AKWA IBOM STATE, NIGERIA

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ABSTRACT

The study evaluated trace metals concentration and pollution of the underground water samples consumed in crude oil producing and non-producing sites of Akwa Ibom State, Nigeria. Multivariate statistical approaches were used to evaluate sources of the trace metal concentration in water samples assessed**.** Results obtained indicated three four components as a major source of trace metal load in the underground water from crude oil producing community tested with Eigen value greater than one and significant total variance of 97.11%. The first factor explained the total variance of 48.22 % with positive loading for Iron, Lead, and Cadmium. Also, the principal component analysis of the underground water from the non-producing locations revealed four factors with Eigen Value greater than one and with a significant total variance of 96.67%.The first factor explained the total variance of 45.48 % with positive loading for Zn, Cu, Cr, and Cobalt. The study revealed that anthropogenic activities contributed to trace metal load in underground water samples tested from both study locations. The study revealed that lithogenic Iron content affected the underground water sources obtained from the crude oil producing and non-producing locations of Akwa Ibom State, Nigeria. The level of trace metal such as lead, cadmium, Vanadium, and Nickel was also significantly higher in the underground water samples consumed from the crude oil producing sites. This showed that the underground water samples from the crude oil production site as well as non-crude oil producing sites are not totally free from metal pollution. It is therefore not quite safe and suitable for human consumption since the underground water obtained is not treated to prevent trace metal infiltration.

KEYWORDS: PCA-Principal Component Analysis; Cluster Analysis; Underground Water; Trace Metal; Correlation Coefficient matrix