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Physicochemical and bacteriological analyses of water samples from hand dug wells in Lafia metropolis, Nasarawa State, Nigeria

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This study investigated the physicochemical parameters and bacteriological quality in hand dug wells in Lafia metropolis of Nasarawa State. A total of five selected hand dug wells samples were analyzed using standard methods. The observed physicochemical parameters were temperature, pH, electrical conductivity, total hardness, total dissolved solid (TDS), total suspended solid (TSS), total solid (TS), nitrate NO_3^- , phosphate PO_4^{3-} and chloride (Cl^-). The results of the physicochemical parameters ranged as follows: Temperature (28-30°C), pH (4.71-6.85), conductivity (28-825 $\mu\text{s}/\text{cm}$), total hardness (45-78 mg/L), TDS (18-550 mg/L), TSS (0-490 mg/L), Cl^- (10.77-79.85 mg/L), NO_3^- (143.66-656.44 mg/L) and PO_4^{3-} (0.271-7.4 mg/L). NO_3^- in water exceeds the WHO standard for drinking water, parameters such as total hardness, total dissolved solid, total suspended solid, total solid, chloride, and electrical conductivity had some sample exceeding the WHO standard while others were below the WHO standard. The bacteriological analysis carried out on the water shows that, none of the samples complied with bacteriological standards as total aerobic counts, generally exceeded permissible limit of 100 CFU/ml for coliform count and 1.0×10^2 CFU/ml for bacteria and pathogen count such as *Escherichia coli*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Staphylococcus* spp., *Serratia marcescens*, *Proteus* spp. and *Micrococcus* spp. counts were very high.

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