

DECLARATION

I, Usman Yusuf Muhammad hereby declared that this thesis was written by me and that it is the record of my research work carried out in Bauchi-Nigeria. This report has not been presented anywhere before in any previous application for higher degree and that citations made therein from published literatures have been duly acknowledged.

YUSUF, Usman Muhammad

.....

Signature and Date

The above declaration is confirmed by:

The Supervisor:

Dr. Abdelatif Mokhtar Ahmed

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Signature and Date

CERTIFICATION

I certify that this Thesis is the original work done by Yusuf Usman Muhammad of the College of Postgraduate Studies, Sudan University of Science and Technology (SUST), Khartoum-Sudan, under my supervision and has been approved for acceptance.

SUPERVISOR:

Dr. Abdelatif Mokhtar Ahmed

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Signature and Date

DEDICATION

This research work is dedicated to my late parents:

Malam Yusuf Muhammad and

Malama A'ishah Yusuf Muhammad of the blessed memory.

May Allah (SWT) shower His Mercy and grant them Jannatul-Firdaws.

Allahumma Agfirhuma wa Arhamhuma.

QUATATION

“And Allah has created every animal from water: of them there are some that creep on their bellies; some that walk on two legs; and some that walk on four. Allah creates what He wills for verily Allah has power over all things.”

Quran: Suratun Nur, Verse 45

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المستخلص

الغرض من هذا البحث هو تقييم نوعية المياه لبعض الآبار المحفورة باليد المختارة والتي تقع بالقرب من مقالب النفايات في أجزاء من العاصمة بوتشي. ستحدد نوعية مصادر المياه مدى ملاءمتها للعمل كمصادر جيدة لمياه الشرب أو غير ذلك. تم جمع عشرين عينة مياه في مايو، وتم تحليلها من أجل الخواص الفيزيائية والكيميائية والميكروبية. تم استخدام الجداول والرسوم البيانية لعرض البيانات. تشير النتيجة التي تم الحصول عليها إلى أن القيمة المتوسطة لكل معلمة كانت ضمن المعايير التي حددها المعيار الصناعي النيجيري في المعيار النيجيري لجودة مياه الشرب. على الرغم من قربها من مقالب القمامة، يبدو أن مصادر المياه التي تم أخذ عينات منها ليست لها أي مشكلة في أي من العوامل الفيزيائية التي تم فحصها. تم تحديد تركيزات تسعة كاتيونات (الصوديوم والكالسيوم والمغنيسيوم والحديد والرصاص والزرنيخ والزنك والنحاس والأمونيوم) وكانت قيمها الوسطية، باستثناء الكالسيوم والمغنيسيوم والأمونيوم، ضمن المستويات المسموح بها من قبل النيجيريين المعيار الصناعي. الكالسيوم له قيمة 167 ملجم / لتر مقابل المستوى الأقصى المسموح به وهو 75 ملجم / لتر بينما يحتوي المغنيسيوم على 77.35 ملجم / لتر مقابل الحد الأقصى المسموح به وهو 20 ملجم / لتر. كانت القيم المتوسطة لهاتين الكاتيونات أعلى من المستويات القصوى المسموح بها لكل منهما. كما تم تحديد تركيزات السبعة أنيونات (كلوريد، فلوريد، نترات، نترات، نترات، سلفات، بيكربونات وفوسفات). كانت القيم المتوسطة للكلوريد والفلورايد والكبريتات ضمن المستويات القصوى المسموح بها. القيم المتوسطة للنترات والنترات هي 50.21 ملجم / لتر و 1.01 ملجم / لتر على التوالي، وهي أعلى من المستويات المسموح بها. القلويات الكلية، والصلابة الكلية، وتركيزات الفوسفات والبيكربونات تعني أيضاً أعلى من المستويات القصوى المسموح بها. القيم المتوسطة للبكتيريا القولونية الكلية والبرازية هي 10.45cfu/100ml و 2.8cfu/100ml على التوالي. في حين أن القيمة المتوسطة لمجموع القولونيات الكلية أعلى قليلاً من الحد الأقصى المسموح به وهو 10cfu/100ml فإن القيمة المتوسطة للبكتيريا القولونية 2.8cfu/100ml مقابل الحد الأقصى المسموح به وهو 0.0cfu/100ml. هناك مؤشر على أن مصادر المياه قيد التحقيق قد تلوثت مؤخراً وقد تسبب أمراضاً تنقلها المياه.

ABSTRACT

The purpose of this research is to assess the water quality of some selected hand-dug wells situated close to refuse dumps in parts of Bauchi metropolis. Quality of the water sources will determine their suitability to serve as good sources of potable water or otherwise. Twenty water samples were collected in May 2018 and were analysed for physical, chemical and microbial parameters. Tables and charts were used for data presentation. Result obtained indicates that each of the physical parameters' mean value was within the standards set by the Nigeria Industrial Standard in the Nigerian Standard for Drinking Water Quality. Despite their proximity to refuse dumps, the water sources sampled appear to have no issues with any of the physical parameters investigated. Nine cations' (Na^+ , Ca^{+2} , Mg^{+2} , Fe^{+2} , Pb^{+2} , Zn^{+2} , Cu^{+2} , As^{+3} and NH_4^+) concentrations were determined and their mean values, with the exception of Calcium and Magnesium, were within the maximum permissible levels set by the Nigeria Industrial Standard. Calcium has mean value of 167.45mg/l against the maximum permissible level (mpl) of 75mg/l while Magnesium has 77.35mg/l against the maximum permissible level of 20mg/l. Mean values for these two cations were higher than their respective maximum permissible levels. Seven anions' (Cl^- , F^- , NO_3^- , NO_2^- , SO_4^{-2} , HCO_3^- and PO_4^-) concentrations were also determined. The mean values of Chloride, Fluoride, Sulphate and Ammonia are within the maximum permissible levels. The mean values for Nitrate and Nitrite were 50.21mg/l and 1.01mg/l respectively which are higher than their respective maximum permissible levels. Total Hardness, Total Alkalinity, Phosphate and Bicarbonate concentrations' mean values were also higher than their respective maximum permissible levels. The mean values for Total and Faecal Coliform were 10.45cfu/100ml and 2.8cfu/100ml respectively. While the mean value for Total Coliform was slightly higher than maximum permissible level of 10cfu/100ml, the mean value for Faecal Coliform of 2.8cfu/100ml against the maximum permissible level of 0.00cfu/100ml is rather high. This is an indication that the water sources under investigation were recently contaminated and may cause water borne diseases.

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