pH play an important role in clarification process and disinfection of drinking water. For effective disinfection with chlorine, the pH should be preferably be less than eight, however, lower pH water (< 7) is more likely to be corrosive. Failure to minimize corrosion can result in the contamination of drinking water and adverse effect on its taste and appearance. The pH value of both dug well and borehole in the study area ranges between 6.8mg/l to 6.9mg/l. This means that the values are within the WHO and NSDWQ guideline of 6.5-8.5mg/1 which is suitable for domestic uses. Also the result of laboratory analysis from table 3 indicated that fluoride ranges between 1.44mg/l to 1.48mg/l for the samples obtained from borehole (KT1, KT3, KT5, KT7, and KT8) and between 1.46 to 1.50mg/l for the samples obtained from dug wells (KT2, KT4 and KT6). This shows that all the samples have higher concentration of fluoride above the maximum permissible limit of 1.0mg/l (NSDWQ, 2008 and WHO). This indicates that the water is not good for drinking or domestic uses.

Furthermore, the result revealed that majority of the samples points value range from 11.8mg/l - 11.2mg/l for both Dug well and Borehole. The results indicated that nitrate levels at all samples are above the maximum permissible level of 10mg/l making it unfit for consumption. High Concentration of nitrate (NO_3) in drinking water leads to blue baby syndrome in infants under three (3) months.

The results from table 3 indicated that there are traces of nitrite (NO_2) dictated in all the samples. It ranged between 2.14mg/l to 2.16mg/l for Borehole (KT1, KT3, KT5, KT7, and KT8) and 2.34mg/l to 2.36mg/l for Dug well (KT2, KT4, and KT6). Nitrite (NO_2) concentration in both sample are above the NSDWQ maximum permissible limit of 0.1mg/l as such the water is not good for human consumption and domestic purposes.

The result from the four (4) samples points (Borehole KT1, KT3, KT5, KT7 and KT8) shows a high concentration of total hardness of 131mg/1 to 136mg/l which is above the permissive standard limit of 100mg/1 by NSDWQ and this makes the water not suitable for human consumption and domestic purposes while the samples from three dug wells (KT2, KT4, KT6) shows low concentration of total hardness ranging between 68mg/l to 72mg/l which is within the permissible standard limit, with this result one will said that the water in this sample point is suitable for human use.

Also the result from table 3 indicated that zinc ranges between 0.60-0.71mg/l from the both sample which is below the permissible limit of 3.00mg/l. Low zinc in water serves as Co-factor in enzymes activities in the body (WHO, 2011). This result showed that the water is safe for consumption.

The results from table 3 show that there is low concentration of Magnesium Hardness in ground water in the study area. This is due to the fact that the of values of magnesium Hardness of ground water in the sample points ranges between 10mg/l to 68mg/l for both dug wells and boreholes. The permissible limit is 50mg/l. Magnesium Hardness is useful to the nervous balance of the body but at high concentration predisposes the body to the formation of kidney or bladder stone and irritation of the Urinary passage.

Table 3 revealed that there is dictated copper in all the eight samples but were all below the acceptance limit of 1.00mg/l recommended by NSDWQ. The concentration ranges from 0.22mg/l to 0.29mg/l. This indicates that the water quality is suitable for human consumption or domestic purposes.

Table 3 shows that the value of calcium hardness is between 58mgl – 68mgl which makes the water suitable for consumption. Calcium Hardness is important for

human nutrition and a major component in the formation of bone as well as maintaining integrity of the muscles of the body.

The laboratory analysis of iron total from table 3 revealed that shows that all samples values fell below the (NSDWQ and WHO) maximum permissible limit of 0.30mg/l. The result ranges between 0.02mg/l to 0.04mg/l for borehole and between 0.06mg/l to 0.07mg/l for dug well. The result shows that the water is suitable for human consumption and domestic purposes. The Iron total has no any adverse health effect on human but it imparts bitter taste to water when it is in high concentration.

The presence of total dissolved solids in water may affect its taste. The result of total dissolve solid from table 3 showed concentration of TDS that range from 144mg/l - 159mg/l in all the samples. The maximum recommended permissive limit of NSDWQ is 500mg/l. This result showed that the values fell below the NSDWQ standard limit of water quality as such the water is suitable for human consumption and domestic uses.

Alkalinity in the water may be due to hydroxide, carbonates and bicarbonates. The results showed that all the samples indicated a least concentration of alkalinity below the standard limit of 200mg/l as set by NSDWQ which ranges between 52mg/l to 62mg/l for borehole and 48mg/l to 52mg/l for dug wells which is suitable for human consumption and domestic purposes among Household. Alkalinity of water quality is buffer to maintain constant pH, a buffer solution is a solution which acts by controlling acidity and alkalinity in a solution.

Conductivity is a parameter in water affected by the presence of dissolved ions. Organic compounds do not conduct electric current very well and hence their contribution to conductivity is very low. Significant changes in the conductivity could then be an indicator that a discharge or some pollutant has entered in water. From

table 3 the results of the laboratory analysis revealed that conductivity ranged between 313µs/cm-317µs/cm for Borehole which is below the acceptance standard limit of 1000µs/cm and it ranged between 290µs/cm-294µs/cm for dug well which is below the acceptance standard limit of 1000µs/cm. The water is good for domestic purposes. High concentration of electrical concentration is having no effect on health status.

The results from table 3 revealed that lead was not detected in all samples. This show that the water quality in the study area is safe for drinking as far as lead is concern. High lead concentration cause toxic to human, an accumulation of this metal causes brain damage, affect the red blood cell chemistry and delay mental and physical development in children (WHO, 2006).

Also the results from the above table revealed that there is zero concentration of chloride in all the sample points (0.0mg/l to 0.0mg/l). This show that is far below the acceptance standard limit of NSDWQ and WHO 0.2mg/l to 0.25mg/l. The water quality from the all samples in the study area is safe and good for human consumption and domestic purposes.

The results from table 3 of magnesium ion shows that all the samples points from both dug wells and boreholes recorded values that range between 3.34mg/l to 19.6mg/l, which are below the acceptance standard level limit of NSDWQ 40mg/l, this means that quality of the water in all samples is safe for human consumption and domestic uses among Households.

From table 3, the results of the laboratory analysis indicated that all the eight samples recorded zero values of Mn (II) which is far below the standard accepted level limit of 0.2mg/l. The quality of water in all the samples points are good and safe for human consumption or domestic purposes.

Conclusion and Recommendations

The assessment of the quality of groundwater in Kaltungo urban area showed that the water is physically potable, but some chemical parameters were found to be above the standard limit for all and some of the sample points as sets by NSDWQ. These include: fluoride, Nitrate, Nitrite and Total Hardness. Lead was not detected in all samples in the study area, this show that the water quality in the study area is safe for drinking as far as lead is concern. Also there is samples least concentration of alkalinity in all the water collected for laboratory analysis in the sample point. Also the turbidity of the water in all the sample collected in the study area fell within the standard limits of NSDWQ. Based on the findings from the study, the following recommendations were made:

I. Government should make proper planning of houses to avoid contamination of ground water from septic tanks and pit latrines.

II. Proper sansitasisation campaigns to the semi urban dwellers on the dangers of ground water contamination.

III. An increased evaluation of domestic water quality should be advocated. Water quality laboratory should be established in the local government area headquarter to make examination of essential parameters of the water a routine exercise. This monitoring will help in having a resource inventory of water quality data.

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