

**ASSESSMENT OF HEAVY METALS CONCENTRATION IN WELL WATER IN
SURULERE LOCAL GOVERNMENT AREA OF LAGOS STATE**¹OLUMIDE-ADU, MOSUNMOLA OMOLEWA²CHUKWU, ENOCH CHIDIEBERE^{1&2} Department of Chemistry Education, School of Science Education, Federal College of
Education (Technical) Akoka, Lagos**Abstract**

This study examined the level of heavy metals concentration in the well water of Surulere local government area. The concentration was determined using an absorption spectrophotometer. The concentration of Lead (Pb), Cadmium (Cd) and Zinc (Zn) was determined using an atomic absorption spectrometer. The heavy metals [lead, Cadmium and Zinc] concentration of well water from the sampling site was found below the world health organization's (WHO) recommended limit. The concentration of Cd was below the detection limit in some areas. It was recommended that the general public should be educated and enlightened on the health hazard involved in the consumption of contaminated water and there should be consistent monitoring of groundwater bodies in Lagos state.

Keywords: *Heavy metals, atomic absorption spectrophotometer, Concentration, Well water.*

INTRODUCTION

Water is one of the essentials that support all forms of plant and animal life, Valoon and Duffy (2005), WHO (2011). It is utilized for domestic purposes, agriculture production, industrial activities, and many other uses. NIS, (2008).

Water covers over 75% of the earth's surface area. It is naturally obtained from the principal natural resources namely surface water (such as freshwater, lakes, rivers, etc.) and groundwater such as (borehole water and well water). Water has unique chemical properties due to its polarity and hydrogen bond which means it can dissolve, absorb or suspend many different compounds. Thus, in this nature, the water is not pure as it acquires contaminants from its surroundings and those arising from humans and animals as well as other biological activities.

It has been found that natural and human activities are contaminating the environment and its resources, as they are releasing more than what the environment can deal with.

These human activities contribute to environmental pollution through the everyday manufacturing of goods to meet the demands of the large population. Although heavy metals are naturally occurring elements that are found throughout the earth's crust, they are also considered trace elements because of their presence in the trace ratio in various environmental metrics. The most common heavy metals include lead (Pb), nickel (Ni), Chromium (Cr), cadmium (Cd), arsenic (As), mercury (Hg), zinc (Zn), and copper (Cu). The presence of heavy metals in natural water as a major cause of pollution has received considerable attention in recent years due to its potential risk to human health, WHO

(2011), UNICEF and WHO (2012).

Although some heavy metals are vital micronutrients as they are required by the body to perform physiological functions of living tissue and regulate biochemical processes but their high concentration in the food chain can result in toxicity and negative environmental impact and endanger the ecosystem and its users.

Heavy metals can emanate from both natural and anthropogenic processes and activities. Some important anthropogenic sources that contribute to the heavy metal contamination in the environment include automobile exhaust which releases lead, smelting which releases arsenic, and copper, insecticides which release arsenic, and the burning of fossil fuels which releases nickel, vanadium, mercury, selenium, and tin.

In recent years, it has occurred that these heavy metals do not undergo microbial or chemical degradation, and consequently their total concentration last for a long time after being released into the environment.

These heavy metals are usually transported by runoff from industries, and municipal and urban areas, most of which end up accumulating in the soil and sediment of water bodies. Orosom, et al (2016).

The urban area of Lagos state is the largest and most populous city in Nigeria and the fastest-growing megacity in the world. It is known for its significant contribution to the economy of Nigeria. It contains the largest manufacturing sector and employs 45% of skilled power in the economy.

Surulere is a residential and commercial local government area located in the mainland of Lagos state. Over the past decade, Surulere has become overly polluted from the operation of industries, and other anthropogenic activities such as vehicle combustion, leaded gasoline, and paints, sewage sludge, pesticide, and disposal of heavy metals waste.

This has led to the accumulation of heavy metals in the water bodies, thereby increasing the level of concentration in the environment more than the natural and international guidelines.

Surulere is a residential and commercial area in Lagos. Industrial activities in Surulere play a major role in the disposal of heavy metals waste in the environment as well as other anthropogenic activities such as automobile exhaust, industrial waste runoff into water bodies, septic and sewage tank leakage, and improper sewage disposal.

These activities release heavy metals into the environment that accumulate in the soil and water bodies rendering the water contaminated.

This study is carried out to determine the level of heavy metal concentration in groundwater (well water) as a result of land-based activities in the area.

Objectives of the Study

The primary objective of the study is to access the level of heavy metal concentration in well water in Surulere Local Government Area of Lagos State. The researcher attempted to determine the:

- 1 concentration of heavy metals in the groundwater (well water) from the place of study.
- 2 level of contamination of heavy metals in the groundwater
- 3 comparisons of the concentration of heavy metals in the water sample with WHO guidelines.

Research questions

The following research questions were formulated to guide the researcher in the course of carrying out the research work.

- 1 What is the concentration of heavy metals in the well water in Surulere area?
- 2 What is the level of contamination of the heavy metal from the groundwater?
- 3 Are the level of heavy metal concentration in the well water the same with WHO guidelines?

RESEARCH METHODOLOGY

The research design used is an experimental design. It was used to collect quantitative data on the level of concentration of cadmium, lead and zinc in well water and perform statistical analysis on them.

Samples from the well water site in Surulere area were taken in plastic containers. Each water sample was obtained from three selected well water sites. A total of three water samples were collected, one from each well water site area.

A hot plate, desiccator, atomic absorption spectrophotometer, sampling plastic containers, beakers, measuring cylinders, volumetric flask, and water glass was used.

The researcher visited the various well water owners to seek their consent before the samples was collected from the selected well water site.

Method of data analysis

Analytical analysis was used to determine the concentration of Cadmium, Lead and Zinc in the well water from the various sampling site. The data were analyzed to determine the concentration of heavy metals in the well water.

Analysis of Heavy Metals in Well Water Samples from Surulere local Government Area.**Table 1****The level of Heavy Metals Contamination in Well Water in Surulere Area**

Element	Unit	Sample A	Sample B	Sample C
Lead	Mg/l	0.02	0.032	0.008
Cadmium	Mg/l	ND	0.001	ND
Zinc	Mg/l	0.004	0.006	0.001

The low concentration of lead in site A, B, and C shows that the sites are not polluted with Lead. The rest of the site also possesses a low contamination level of Cadmium.

All of the sampling sites were clean with respect to Zinc.

These results express that the well water is not contaminated with these heavy metals.

Table 2.**The Concentration of Heavy Metals in Well Water in Surulere**

Element	NIS- WHO guidelines	Samples		
		A	B	C
Lead (Pb ²⁺)	0.1mg/l(max)	0.02	0.032	0.008
Cadmium (Cd ²⁺)	<0.1mg/l(max)	ND	0.001	ND
Zinc (Zn ²⁺)	<0.1mg/l(max)	0.004	0.006	0.001

ND - Not detected. < - less than. max - maximum A, B, C - selected well water site

The concentration of Heavy metals (Pb, Cd, Zn) in the well water was presented in table 2 and the concentration of these metals was compared with the WHO permissible limit set by WHO.

The average concentration of Lead was found to be 0.02mg/l which was less than the WHO standard values of 0.1 mg/l. The reason for the less value is that the water site is a residential area with absence of factory sites.

The average concentration of Cadmium was found to be 0.001mg/l which was below the WHO permissible limit of <0.1 mg/l.

Also, the average value of Zinc in the well water was 0.004mg/l which was less than the WHO-recommended value.

Summary

In this study, we have attempted to analyze the level of concentration of heavy Metals in Well Water in Surulere Local Government Area.

According to the findings of the project, Surulere area is not contaminated with these heavy metals. All of the heavy meals Lead (Pb), cadmium (Cd), and Zinc (Zn) are below the World Health Organization permissible limit. In some areas, Cadmium concentration was even below the detectable limit which shows that the heavy metals were within the range of World Health Organization (WHO) permissible limits.

Conclusion

In conclusion, the well water in Surulere Local Government Area was not contaminated and therefore suitable for drinking.

Recommendation

Having assessed the concentration of heavy metals in the well water of the Surulere Area, the following recommendation were made:

1. The general public should be educated and enlightened on the health hazard involved in the consumption of contaminated water.
2. There should be consistent monitoring of groundwater bodies in Lagos state
3. Companies located near the residential area should treat their waste because improper waste treatment from industries put the residents in danger.

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