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IMPACT OF ENVIRONMENTAL POLLUTION (DUMPSITE AND VEHICLE EXHAUST) ON THE GREEN VEGETABLE (*AMARANTHUS HYBRIDUS*), JUTE-EWEDU (*CORCHORUS OLITORIUS*) AND SPINACH (*AMARANTHUS OLERACEA*) PLANTED IN ALIMOSHO LOCAL GOVERNMENT AREA, LAGOS STATE, NIGERIA

Joshua A. Gidigbi[1+]
Abdulrasaq B. Abubakar[2]
Martins E. Aisuedion[3]
Henry L. Barnabas[4]

[1]*Department of Chemistry, Modibbo Adama University, Adamawa State, Nigeria.*
Email: gidigbijoshua@gmail.com Tel: +234805-350-3986
[2]*Science Laboratory Department, Federal College of Horticulture, Dadinkowa, Gombe State, Nigeria.*
Email: abdulmb2000@yahoo.com Tel: +234803-615-4179
[3]*Engineering Materials Development Institute, Akure, Ondo State, Nigeria.*
Email: martinehis@yahoo.com Tel: +234802-855-7971
[4]*Gamma Irradiation Facility, Nigeria Atomic Energy Commission, Abuja, Nigeria.*
Email: henrylingweb@gmail.com Tel: +234806-410-24


(+ Corresponding author)

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ABSTRACT

This study assessed the effect of the dumpsite and vehicle exhaust on green leaf vegetable *(Amaranthus hybridus)*, Jute-ewedu (*Corchorus olitorius*), *and* spinach (*Amaranthus oleracea*) by examining the heavy metal distribution in three vegetables from Ipaja farm (farm near a dumpsite), and Ikola farm (farm close to the tarred road) and compared with the concentration of heavy metals from Shasha farm (a secluded farm) and World Health Organisation/ Food and Agriculture Organisation (WHO/FAO) standard. The leaves of these vegetables were air-dried, digested, and analysed for the presence of Arsenic (As), Magnesium (Mn), Copper (Cu), Zinc (Zn), Lead (Pb) and Cadmium (Cd) using Atomic Absorption Spectrophotometry. The heavy metals values at Shasha farm were within the permissible range set by WHO/FAO. However, at the Ipaja farm, Lead and Cadmium were beyond the WHO/FAO permissive range in green-leaf (2.311±0.003mg/kg, 0.201±0.013 mg/kg), while only Lead in Jute-ewedu (2.011±0.003 mg/kg) and Spinach (2.011±0.003mg/kg). At the Ikola farm, Arsenic, Lead and Cadmium were beyond the WHO/FAO acceptable value in green vegetable (0.329±0.012 mg/kg, 4.122±0.007 mg/kg, 2.941±0.0011 mg/kg), while only Lead and Cadmium in Jute-ewedu (3.241±0.007mg/kg, 2.391±0.005 mg/kg), and Spinach (3.69±0.015mg/kg, 2.32±0.004 mg/kg). The increase in the metal concentration from the Ipaja farm suggests the feasibility of metal mobility from the dumpsite to the nearer farm. Also, vehicular exhaustion may contribute to the increase of Cadmium and Lead present in the vegetables planted along the tarred road. Government should dissuade citizens from creating improper dumpsites and ensure vegetable farms are cited away from the main road.

Contribution/Originality: The study contributed to the existing literatures on the feasibility of consuming toxic mineral elements in vegetables due to common unhygienic environmental practices such as improper disposal of waste, and pragmatic approach to resolve the challenge.

1. INTRODUCTION

Environmental pollution is a global epidemic which is much pronounced in developing countries such as Nigeria [1]. This is as a result of mishandling of both domestic and industrial anthropogenic activities including municipal wastes which are mostly disposed indiscriminately both in water bodies and on the soil [1, 2]. Factors such as poor regulation, weak legislation, and ignorance of environmental pollution have been attributed as the promoting factors aiding the environmental pollution in Nigeria [3]. According to Salawu, et al. [4] environmental pollution occurs when waste from the processing of resources is poorly handled and wrongly disposed of. In addition, Sarkiyayi and Samaila [5] reiterated that small-scale industries involving cable coating, battery, diesel generator sets, and emissions from vehicles also contribute to environmental pollution. The severe consequence of this pollution thus varies from illness and in most fatal cases, resulted to death [1, 6].

Oyeku and Eludoyin [7] revealed that in Nigeria, numerous tons of refuse is left uncollected on the major streets each passing day. This is also supported by Gidigbi, et al. [8] who reported heaps of refuse in some state capitals of Nigeria. Land pollution has been synonymous with Lagos Metropolis, Nigeria due to the overpopulation and urbanisation Adesuyi, et al. [9]. Olasunkanmi [10] revealed that despite the availability of the urbane option of waste disposal as provided by Lagos State Waste Management Authority (LAWMA) and its private waste management allies, illegal garbage dumpsites are still prevalent. Unfortunately, the scarcity of quality land for vegetable plantation in Lagos, Nigeria has left many of these peasant vegetable farmers with no option but to utilise land near dumpsites and along the main tarred road as they are less contended with and are very economical to lease. On the other hand, vegetables are herbaceous plants that are edible and fresh [11, 12]. They are any portion of a plant that is utilised and eatable by humans as a whole meal or a part of a savoury meal. Sobukola, et al. [13] explained that leafy vegetables are widely used with other foods for culinary purposes, especially for increasing the quality of soups and for their nutritional value. Vegetable has been reported to be of many benefits to the human being. For instance, vegetable aids in the maintenance of health and prevention of diseases [12]; play a biochemical role and anti-oxidative effects [14], major supplies of vitamin and essential mineral elements [2], vitamins are useful in invigorating skin, teeth, vision, hair, and mucous membranes. The fact that vegetable is cheap and readily available gives hope for the common man to source the required daily nutrient by consuming the vegetable. Therefore, in Lagos, Nigeria green vegetable*s (Amaranthus hybridus)* and spinach (*Amaranthus oleracea*) are usually patronised by the larger populace due to their acclaimed health benefits, while Jute-ewedu (*Corchorus olitorius)* is a popular choice of vegetable when it comes to weaning of a child. Unfortunately, with these numerous benefits of vegetables, previous studies [2, 15] had affirmed that leafy vegetables have the potential of accumulating very high concentrations of metals and other toxic chemicals from contaminated soil and transfer such into the food chain. These heavy metals are non-biodegradable and are persistent environmental contaminants that are deposited on the surfaces and then absorbed into the tissues of vegetables [5]. Consuming such contaminated vegetables has been associated with damage of the brain and kidney [6], gastrointestinal disorders and pneumonia [16], behavioural disorders and stunted growth in children [17], and could be neurotoxic, carcinogenic, mutagenic, or teratogenic [9]. Furthermore, studies have shown the presence of these toxic elements in vegetables. For instance, Sarkiyayi and Samaila [5] reported heavy metals presence in lettuce and spinach in Jimeta, Yola, Nigeria. Also, Adesuyi, et al. [9] reported the presence of Cadmium (Cd) and Lead (Pb) in the Spinach vegetable assessed near the industrial area in Lagos, Nigeria.

In densely populated areas like Shasha, Ipaja, and Ikola, which are home to mostly middle-class and lower-class income earners in the Lagos state of Nigeria, it is imperative to assess the effect of environmental pollution (dumpsite and vehicle exhaust) on the vegetable planted to avert major public health breakdown as many vegetables sold in the areas are from the farms that are either near dumpsites or along the tarred road.

2. MATERIALS AND METHODS

2.1. Study Area

Alimosho Local Government is the largest Local Government Area in Lagos State, Nigeria [18]. Due to its proximity to the State capital-Ikeja, Alimosho is a home for teeming civil servants and private sector workers in Ikeja, the state capital. Alimosho is one of the fastest-growing local government with more than 2 million people [19]. The temperature in the area ranges from 27°C to 36°C with a mean value of 29°C [20]. Typical of a Nigerian city, it has two seasons; the rainy and dry seasons. The rainy season starts from March to October while the dry season lasts from November to February.

Figure 1. Map of local government Areas of Lagos State showing Alimosho Local Government Area (Sample Area) adapted from Ayedun, et al. [21].

Figure 1 illustrates the map of Lagos State, Nigeria showing the study area (Alimosho Local Government Area) and sample locations.

Table 1. Geolocation of the sample areas.

S/N	Sample Area	Latitude (N)	Longitude(E)
1	Shasha	6° 34' 31″	3° 17' 48″
2	Ipaja	6° 36' 33″	3° 15' 36″
3	Ikola	6° 37' 28″	3° 14' 34″

Note: S/N means Serial Number, N means North, E means East.

Table 1 presents the Geo-Informatics System (GIS) location of the farms where the samples of vegetable were procured

2.2. Sample Area and Sample Preparation

In line with the procedure according to the method described by Adu, et al. [1]; Sakiyo, et al. [22]; Adotey, et al. [23], three (3) batches of 100 g vegetables sample: green vegetable *(Amaranthus hybridus)*, Jute-ewedu (*Corchorus olitorius)* and spinach (*Amaranthus oleracea*) were bought from the Shasha farm (secluded farm), Ipaja farm (near dumpsite) and ikola (along the tarred road) all in Alimosho Local government area of Lagos State, Nigeria. The three (3) batches were purchased from Monday till Friday at 6:00 am GMT+1 on April 11-15, 2022. The vegetables sample were conveyed from different farms via polyethylene bags with allocation for contact with air to maintain the freshness. The vegetables sample were washed with ordinary water, subsequently with distilled water to remove mud, sliced into smaller sizes, and air-dried. The dry samples were mechanically grounded into powder with a mortar and pestle. The 5.6 mm mesh size was used to screen the vegetable samples in order to obtain uniform size. The dry samples were further heated in an oven at 105^{0}C for one hour to remove the remaining moisture in the samples [14]. The dry samples were thereafter, stored in air-tight containers.

2.3. Sample Digestion

The samples were digested according to the method described by Olasoji, et al. [24] and Ebabhi, et al. [14]. Two grams (2g) of each of the dried vegetable sample was introduced into a digestion tube and 40 mL of a mixture containing ratio of 3:1 of concentrated Nitric acid (HNO_3) and Perchloric acid ($HClO_4$) was added to the sample. Subsequently, the sample was heated on a digester at 120^{0}C for two (2) hours until a transparent solution was formed. The reduction of the sample solution to 5 mL indicated the completion of the digestion process. Thereafter, the sample was allowed to cool and subsequently dilute with 0.1M of Nitric acid (HNO_3). The sample solution was successively filtered into a volumetric flask using Whatman filter No 1 and the volume was made up to 25 mL mark with 0.1M of Nitric acid (HNO_3). The digested samples were taken for elemental analysis. The elemental analysis was done as described by Doherty, et al. [25] using Atomic Absorption Spectrophotometry machine (AAS Buck Scientific 210 VGP). The metals analysed for were Arsenic (As), Magnesium (Mn), Copper (Cu), Zinc (Zn), Lead (Pb), Cadmium (Cd) as they are the heavy metals previously reported in leafy vegetables from other literatures.

2.4. Statistical Analysis

The one-way variance analysis was used to resolve the variation in concentration of the triplicates vegetables sample (Standard Error Mean- SEM) at significant level of 5% (P= 0.05).

3. RESULTS AND DISCUSSION

3.1. Result and Discussion of Heavy Analysis of Green Leaf Vegetable (Amaranthus Hybridus) From the Three Farms

3.1.1. Results Description

The heavy metals analysis results of green leaf vegetable (*Amaranthus hybridus)* from the Shasha, Ipaja, and Ikola farms were compared and presented in Table 2.

Table 2. Result of heavy metals analysis of Green vegetable (*Amaranthus hybridus*).

Heavy metal	**Concentration of metals (mg/kg)**			
	Shasha (secluded farm)	**Ipaja (near dumpsite)**	**Ikola (Along the roadside)**	**Maximum value allowed by WHO/FAO** [14, 24, 26]
Arsenic (As)	BDL	0.127±0.005	0.329±0.012	0.200
Manganese (Mn)	0.890±0.021	1.220±0.017	1.911±0.005	200.001
Copper (Cu)	0.112±0.001	0.331±0.003	0.214±0.002	73.300
Zinc (Zn)	1.332±0.001	2.232±0.001	2.138±0.003	99.400
Lead (Pb)	BDL	2.311±0.003	4.122±0.007	0.300
Nickel (Ni)	0.011±0.006	0.159±0.015	0.096±0.003	067.900
Cadmium (Cd)	BDL	0.201±0.013	2.941±0.0011	0.200

Note: Values depict mean ±SEM of triplicate determination. BDL – Below Detection Limit, SEM- Standard Error Mean of the triplicates sample.

At the Shasha farm (secluded farm), Zinc has the highest concentration (1.331±0.001mg/kg), followed by copper with 0.112±0.001mg/kg, Manganese with 0.890±0.021mg/kg, and Nickel with 0.011±0.006mg/kg, while Arsenic, Lead, and Cadmium were below detection limit Atomic Absorption Spectrophotometry (AAS).

At the Ipaja farm (farm near dumpsite), Lead has the highest concentration with 2.311±0.003mg/kg, followed by Zinc with 2.232±0.001mg/kg, Manganese with 1.220±0.017mg/kg, Copper (0.331±0.003mg/kg), Cadmium

(0.201±0.013 mg/kg), Nickel (0.159±0.015mg/kg) and Arsenic with 0.127±0.005mg/kg respectively. The higher concentration of lead in dumpsite maybe due to the deposit of used batteries, fertilizer and any chemical product that has lead as a component.

At the Ikola farm (farm along the tarred road), lead has a highest concentration with 4.122±0.007mg/kg, followed by Cadmium (2.941±0.0011mg/kg), followed by Zinc (2.138±0.003mg/kg), Manganese (1.911±0.005mg/kg), arsenic with 0.329±0.012mg/kg, followed by copper (0.214±0.002) and Nickel with 0.096±0.003mg/kg.

3.1.2. Discussion of the Results

Discussing the results of the heavy metals analysis of green vegetable (*Amaranthus hybridus)* in Table 2, and compared with other literatures. At the Shasha farm, the value of zinc in this study (1.331±0.001mg/kg) is slightly higher than the value reported by Olasoji, et al. [24], which reported 0.100±0.03 mg/kg zinc concentration in green vegetable (*Amaranthus hybridus)* from farm. Also, Adu, et al. [1] reported 0.034 ±0.002 mg/kg for zinc concentration in green vegetable (*Amaranthus hybridus)*. The difference in the zinc concentration may be as a result of soil alkalinity. The copper value in this study (0.112±0.001mg/kg) is significantly lesser than the value reported for green vegetable both in Owode farm (0.193±0.02mg/kg), and Araromi farm (0.350±0.04mg/kg) in Akure [24]. Manganese content was reported for *Amaranthus. Dubius (82 mg/100 g)* by Odhav, et al. [27] is significantly higher than the manganese value in this study(0.890±0.021mg/kg). The wide variation maybe due to the level of maturity as the minerals content of the vegetable can be influenced due to their stage of maturity. The value of Nickel in this study (0.011±0.006mg/kg) is higher than 0.05± 0.21mg/kg reported by Ebabhi, et al. [14]. Arsenic and Cadmium were both below the detection limit. The elements were within the permissive range of WHO/FAO.

At Ipaja farm, the value of lead in this study (2.311±0.003mg/kg) is significantly lesser than the 2.98 mg/kg reported for *Amaranthus spinosus* in an industrial area of Lagos State [9].

The 2.94±0.04 µg/g of Zinc concentration reported for *Telfairia occidentalis* (Ugwu) [14] is statistically higher than the value of zinc reported for this study(2.232±0.001mg/kg). Olasoji, et al. [24] reported 2.220±0.01mg/kg of manganese in *green vegetable (Amaranthus hybridus)*which is significantly higher than the value in this study (1.220±0.017mg/kg). Copper in this study has higher value (0.331±0.003mg/kg) compare to Lettuce (0.126mg/kg) from dumpsite at Ngurore, Adamawa state [22].

The Arsenic (0.127±0.005mg/kg) in this study is lesser than 0.552 mg/kg reported for Brassica oleracea , but the cadmium (0.201±0.013 mg/kg) values is higher 0.010 mg/kg [28]. Arsenic, Lead were beyond the recommended limit by World Health Organisation, therefore, it has a grave consequence on the health of the consumer, as Onakpa, et al. [6] reported that ingestion of Cadmium and Lead have been associated with tremor , diarrhoea , convulsion, and paralysis.

At the Ikola farm, the lead content in this study (4.122±0.007mg/kg), is lesser compared to range (68 to 152 mg/kg) given for amaranthus viridis, while the cadmium content is within the range given (0.5 – 4.9 mg/kg) for same plant [29]. Arsenic, Lead, and Cadmium exceeded the limit given by Food and Agricultural organisation standard. Atayese, et al. [29] revealed that lead and cadmium had been a major pollutants to the vegetable plant along the tarred road. Accumulation of these toxic elements has been associated with brain damage and kidney failure [29].

3.2. Result and Discussion of Heavy Metals Analysis of Jute-Ewedu Vegetable (Corchorus Olitorius)

3.2.1. Result Description

The heavy metals analysis results of Jute-Ewedu vegetable (*Corchorus olitorius)* from the Shasha, Ipaja, and Ikola farms were compared and presented in Table 3.

Table 3. Result of heavy metals analysis in Jute-Ewedu vegetable (*Corchorus olitorius*).

Heavy Metal	Concentration of metals (mg/kg)			
	Shasha (secluded farm)	Ipaja (near dumpsite)	Ikola (Along the road side)	Maximum value allowed by WHO/FAO [14, 24, 26]
Arsenic (As)	BDL	0.129±0.02	0.157±0.02	0.200
Manganese (Mn)	1.290±0.021	1.731±0.015	1.810±0.009	200.001
Copper (Cu)	0.109±0.001	0.199 ±0.001	0.211±0.004	73.300
Zinc (Zn)	1.232±0.001	2.232±0.001	2.138±0.003	99.400
Lead (Pb)	BDL	2.011±0.003	3.241±0.007	0.300
Nickel (Ni)	BDL	0.129±0.02	0.157±0.02	0.200
Cadmium (Cd)	1.290±0.021	1.731±0.015	1.810±0.009	0.200

Note: Values depict mean ±SEM of triplicate determination. BDL- Below Detection Limit of AAS, SEM- Standard Error Mean.

At Shasha farm, Manganese has the highest concentration with 1.290±0.021mg/kg, followed by Zinc (1.232±0.001mg/kg), Copper (0.109±0.001mg/kg) and Nickel (0.032±0.002mg/kg) respectively. Arsenic; Lead and Cadmium were below the detection limit of the Atomic Absorption Spectrophotometry (AAS).

At the Ipaja farm, Zinc has the highest concentration of 2.232±0.001 mg/kg in the Jute vegetable, followed by Lead (2.311±0.003mg/kg), Manganese (1.731±0.015mg/kg), Copper (0.199 ± 0.001mg/kg), Arsenic (0.129±0.02mg/kg) Nickel (0.122±0.011 mg/kg), and Cadmium (0.112±0.012mg/kg) respectively.

At the Ikola farm, Lead has the highest concentration with 3.241±0.007 mg/kg, followed by Cadmium (2.391±0.005mg/kg), Zinc (2.138±0.003 mg/kg) and Manganese (1.810±0.009mg/kg) respectively. Lead(Pb) and Cadmium(Cd) as results of exhaust from vehicles significantly exceed the daily tolerable intake approved by WHO/FAO in the vegetable.

3.2.2. Discussion of the Result

According to result of the heavy metals analysis of Jute-ewedu vegetable Table 3. At the Shasha farm, The manganese (1.290±0.021 mg/kg) in this study is lesser compared to akpulu (*Ficus apensis*) which was reported to be 11.53µg/mL [30]. The zinc content (1.232±0.001mg/kg) reported for this study lesser compared to the zinc content(8.00µg/g) reported for *Telfairia occidentalis* [2], while the copper content (4.29±0.63µg/g) reported for *Corchorus olitorius* is higher than the value of copper (0.109±0.001mg/kg) reported in this study [14]. The variation in value maybe due to the stage of maturity of the vegetable used for analysis. Ebabhi, et al. [14] reported 0.62±0.71 µg/g Nickel concentration for *Corchorus olitorius*, this value is higher than Nickel value for this study (0.032±0.002mg/kg). Arsenic; Cadmium and Lead were below detection limit. The Jute vegetable from Shasha farm is safe to eat and elements were still within safe range acceptable by World Health Organisation.

At Ipaja farm, the zinc value (0.021 ± 0.002mg/kg) reported for *Cochorus olitoris* [1] at Iba market is lesser than the value reported in this study (2.232±0.001 mg/kg), while 2.140 ± .006 Zinc value reported by Olasoji, et al. [24] for the green vegetable *(Amaranthus hybridus)* is closed to the value of Zinc in this study. Also, the value of Lead recorded in this study (2.311±0.003mg/kg), is lesser than 4.81±0.01µg/g reported in *Corchorus olitorius* [14]. The difference maybe due to soil alkalinity. The concentration of Manganese (1.731±0.015mg/kg) in this study is in line with manganese (1.713±0.04 mg/kg) reported for green vegetable *(Amaranthus hybridus)*from Odopetu market of Ondo State, Nigeria [24]. The value of Copper (0.199 ± 0.001mg/kg) in this study is significantly lesser when compared with the copper value derived from waterleaf (11.00 mg/kg) [31]. While concentration of Arsenic (0.129±0.02mg/kg) reported in this study is significantly higher than the 0.06±0.04µg/g reported for *Corchorus olitorius*, but the concentration of cadmium (0.122±0.011) higher than the pumpkin vegetable value (0.010±0.01mg/kg) reported by Olasoji, et al. [24] and s lesser than the value reported in Jute vegetable 0.023mg/kg by Adu, et al. [1]. The value for Nickel in this study is corresponded to the value (1.22±0.62µg/g) reported for Ewedu by Olasoji, et al. [24].

The high concentration of Lead (3.241±0.007 mg/kg) and Cadmium (2.391±0.005mg/kg) at the Ikola farm, may be connected to vehicle exhaust as Adu, et al. [1] explained that farms that are near the tarred road are likely to have increased in Lead and Cadmium in their soil content.

3.3. Results and Discussion of Heavy Metals Analysis of Spinach Vegetable (Amaranthus Oleracea)

3.3.1. Result Description

The heavy metals analysis results of Spinach vegetable (*Amaranthus oleracea)* from the Shasha, Ipaja and Ikola farms were compared and presented in Table 4.

At the Shasha farm, Zinc has the highest concentration in Spinach with 1.392±0.001mg/kg, followed by Manganese (0.890±0.021mg/kg), Copper (0.115±0.001mg/kg), and Nickel (0.029±0.001mg/kg) subsequently. Arsenic, Lead and Cadmium were below detection limits. All elements in this farm were within the permissive daily intake given by WHO/FAO.

At the Ipaja farm, Lead has the highest concentration of 2.011±0.003 mg/kg, followed by Cadmium (1.582±0.001mg/kg), Manganese (1.220±0.017mg/kg), Copper (0.199 ±0.002mg/kg), Arsenic (0.059±0.012mg/kg), Nickel (0.057±0.012mg/kg) and Cadmium (0.017±0.06mg/kg) respectively. All elements except Lead are in a range acceptable by WHO/FAO.

Along the Ikola farm, Lead has the highest concentration in Spinach (3.69±0.015mg/kg), followed by Cadmium (2.32±0.004mg/kg), Zinc (2.038±0.001mg/kg), Manganese (1.911±0.005mg/kg), Copper (0.232±0.010mg/kg), Arsenic (0.062±0.002mg/kg) and Nickel (0.039±0.006mg/kg) respectively.

Table 4. Result of heavy metals analysis in Spinach (*Amaranthus oleracea)*.

Heavy Metal	Concentration of metals (mg/kg)			
	Shasha (secluded farm)	Ipaja (near the dumpsite)	Ikola (Along the road side)	Maximum value allowed by WHO/FAO [14, 24, 26]
Arsenic (As)	BDL	0.059±0.012	0.062±0.002	0.200
Manganese (Mn)	1.190±0.002	1.220±0.017	1.911±0.005	200.001
Copper (Cu)	0.115±0.001	0.199 ±0.002	0.232±0.010	73.300
Zinc (Zn)	1.392±0.001	1.582±0.001	2.038±0.001	99.400
Lead (Pb)	BDL	2.011±0.003	3.69±0.015	0.300
Nickel (Ni)	0.029±0.001	0.057±0.012	0.039±0.006	67.900
Cadmium (Cd)	BDL	0.017±0.06	2.32±0.004	0.200

Note: Values depict mean ± SEM of the triplicate determination BDL- Below Detection Limit of AAS.

3.3.2. Discussion of the Results

At the Shasha farm, Zinc content (1.392±0.001mg/kg) in this study is higher compared to Zinc value reported for spinach (0.067±0.002mg/kg) in Yola, by Sarkiyayi and Samaila [5] but lower than the value reported for Shoko vegetable (3.24±1.43µg/g) by Ebabhi, et al. [14]. The activities on the soil maybe a contributing factor to the variation in the value of zinc content. Manganese in this study is lesser than the manganese value (2.220±0.01mg/kg) reported for green vegetable *(Amaranthus hybridus)* from Oba market, Akure [24]. The difference may be as a result of green vegetable *(Amaranthus hybridus)* ability to store more elements in its stem and leaves than spinach Doherty, et al. [25]. Sakiyo, et al. [22] reported the copper value of 0.1233 mg/kg for Spinach in Jimeta, Yola. This value corresponds to the copper value (0.115±0.001mg/kg) recorded for this study. While Sarkiyayi and Samaila [5] did not detect Nickel in a Spinach vegetable conducted in Yola, the 0.029±0.001mg/kg Nickel value reported for this study is within the limit of Nickel value (0.05±0.21µg/g) in Ikorodu area of Lagos State [14]. Arsenic, Lead and Cadmium were below detection limits in Atomic Absorption Spectrophotometry (AAS), this agrees with Sarkiyayi and Samaila [5] spinach analysis reported.

At the Ipaja farm, Sakiyo, et al. [22] reported Lead in a Spinach near dumpsite as 0.1766 mg/kg, this value is lesser than 2.011±0.003 mg/kg recorded in this study, while the lead value (2.98mg/kg) reported for *Amaranthus* *spinosus* is corresponded to the value in the study [9]. Cadmium content (1.582±0.001mg/kg) in this study is higher compared to cadmium value (0.42±0.21μg/g) in *Telfairia occidentalis* [14], *while* 0.02mg/kg of lead was reported for *Ipomea sp.* [9]. The large difference in cadmium content is due to other activities that maybe going on the soil, as Adu, et al. [1] reported that battery deposit, smelting processes and fertilizer influence the amount of cadmium in the soil. The Manganese value (1.220±0.017mg/kg) in this study corresponds to the manganese value recorded in green vegetable *(Amaranthus hybridus)*from Owode farm [24]. The value of Copper (0.199 ±0.002mg/kg) reported in this study is slightly higher than the copper value (0.1383 mg/kg))reported for Spinach near Ngurore dumpsite [22]. The difference may be due to other activities on the soil. Opaluwa, et al. [32] reported arsenic level (0.37mg/kg) in groundnut, which is slightly lesser than Arsenic value (0.059±0.012mg/kg) in this study. Nickel (0.057±0.012mg/kg) value in this study is higher than the value(0.023±.003 mg/kg) reported for Soko vegetable, while Cadmium (0.017±0.06mg/kg) value in this study is in the range(0.019± 0.001 mg/kg) reported by Adu, et al. [1] at Agboju market.

At the Ikola farm, Lead and Cadmium were extremely beyond the WHO/FAO permissible value. According to Atayese, et al. [33], exhaust from the vehicle is a major factor to the high level of Lead and Cadmium in a vegetable along the road.

4. CONCLUSION

This study examined the impact of dumpsites and vehicle exhaust on farms' vegetables close to dumpsite and tarred road respectively in Alimosho Local Government Area, Lagos State. The choice of vegetables was based on high patronage in the study area. Green vegetable *(Amaranthus hybridus)* and spinach (*Amaranthus oleracea*) are usually patronised by larger populace due to their acclaimed health benefits such as essential minerals supplement and improving blood-glucose in the body system, while Jute-ewedu (*Corchorus olitorius)* is a popular choice of vegetable when it comes to weaning of a child due to its slimy nature and vitamin A richness.

The result of the analysis of the heavy metal in Shasha farm was within WHO/FAO limit, while in Ipaja farm, the Lead and Cadmium contents were beyond the WHO/FAO permissive limit in green vegetable, while only Lead in Jute-ewedu and Spinach vegetables. Also at the Ikola farm, Arsenic, Lead, and Cadmium were beyond the WHO/FAO acceptable value in green vegetable, while only Lead and Cadmium in jute-ewedu and Spinach.

People eat vegetables to remain healthy and also as an essential mineral supplement to the body, unfortunately, consuming vegetables from Ipaja farm (farm near dumpsite) and Ikola farm (farm near the tarred road), which are usually a typical instance of the majority of lands used in vegetables' plantation in Lagos State, may lead to slow dying and eventually chronic illness to the consumers including babies and children. Therefore, there is a need for both State and local agencies responsible for food administration to monitor the vegetable food chain, especially the farmland in which such vegetable has been cultivated. Also in the major urban cities in Nigeria, it is imperative to assess the vegetable food chain as it is a meal for all social classes to reduce the mortality rate in the major cities.

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