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# Assessment of Heavy Metal Polluted Soil due to Motor Vehicle Dismantling Activities in Uwelu Spare parts Market, Egor L.G.A., Edo State, Nigeria

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## Abstract

*Soil and motor vehicles plays very important roles in the lives and existence of human. This study was designed to assess the pollution level of the soil at Uwelu spare parts Market, Benin City due to motor vehicle dismantling activities. A set of soil samples were collected from the top soil (0 – 20cm) at the motor vehicle dismantling site, using the grid sampling method and other samples were also collected from Uwelu secondary school which served as a control site. The heavy metal pollution level of the soil was assessed using single pollution index (SPI), geo-accumulation index ($I_{geo}$), average pollution index (API), pollution load index (PLI) and heavy metal mobility factor ($M_F$). The particle size of the polluted and the control site soil were classified as sandy loam. The organic matter content in the polluted soil is very high (40.30g/kg) compared to soil from the control site (6.10g/kg). The mobility factors for lead ($Pb^{2+}$) ion (35.89mg/kg) is highest, followed by nickel ($Ni^{2+}$)ion(33.03mg/kg) and cadmium ($Cd^{2+}$)ion (32.62mg/kg) respectively. The SPI assessment, revealed that the soil were strongly polluted with $Cd^{2+}$ (17.86mg/kg), $Ni^{2+}$ (4.31 mg/kg), and $Pb^{2+}$ (42.75mg/kg) ions compared to geochemical background value (GBV) obtained from the control site. However, when the SPI was determined with respect to the tolerable level (TL) from National Environmental Standard and Regulations Enforcement Agency(NESREA), we observed that the pollution level of $Ni^{2+}$ ion (1.28mg/kg) in the soil was moderate while $Cd^{2+}$ (17.64mg/kg) and $Pb^{2+}$ (8.72mg/kg) ions strongly polluted the soil. Geo-accumulation index revealed that $Ni^{2+}$ ion moderately polluted the soil while $Cd^{2+}$ and $Pb^{2+}$ ions extremely polluted the soil. Pollution level assessment of the joint effect of the pollutants ($Cd^{2+}$, $Ni^{2+}$, and $Pb^{2+}$ ions) revealed that there was a very high level of pollution base on API assessment while PLI assessment confirmed that the site was deteriorated.*

**Keywords:** Assessment, Dismantling, Geochemical, Heavy metals, Pollution level, Vehicle

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## INTRODUCTION

Soil play a principal role in biochemical, elements cycling, plants support, infrastructure and recreational activities transformations, by extension, it has always been vital to humans and their health (Ballabio *et al.,* 2015;Ungrureanu*et al.,* 2016 Muhammad *et al.,* 2018). Motor vehicles play very important roles in human lives and its existence, despite the wastes emanating from them. However, when these motor vehicles become unserviceable, they constitute nuisance to the owner and the environment thereby contributing to insecurity of the neighborhoods. One of the ways by which these unserviceable vehicles can be done away with is to dispose them off to motor spare parts dealers who in turn dismantle, recycle and resell them to consumers. In the process of dismantling, the environments where the activity takes place are polluted with hazardous waste products and unusable parts from the vehicles (Menkiti *et al.,* 2017). These hazardous materials such as heavy metals, hydrocarbons, battery waste fluids etc., are released or leached into the soil where they are deposited. The effects of pollution on soil are quite alarming and can cause huge disturbances in the ecological balance and health of living creatures on earth (Singh and Prasad, 2015; Uddin *et al.,* 2017). The heavy metals deposited may be retained, exchange or precipitate or coprecipitate as sulfides, carbonate and/or Fe or Mn oxides or hydroxides by soil components (Aydinalp and Katkat, 2004).The presence of heavy metals in the soil beyond acceptable limits calls for concern because of the harmful effects of toxic metals on humans, animals and plants. The environmental problems with heavy metals are that they are elements that are non-degradable and exposures to toxic heavy metals like Pb, Ni and Cd have been reported to cause blood and bone disorders, kidney damage, decreased mental capacity and neurological damage (Sherene, 2010;Adedosu*et al.,* 2013).Transport of heavy metals in soils is a potential threat for groundwater contamination and thus for human health (Finžgar *et al.,* 2007, Addis and Abebaw, 2017). The most important factors which affect the solubility and mobility of heavy metals in soil are pH, sorbent nature, presence and concentration of organic and inorganic ligands (including humic and fulvic acids), root exudates, nutrients and redox reactions, both biotic and abiotic (Violante *et al.,* 2010; Leita *et al.,* 2013; Gushit *et al.,* 2018).Bioavailability refers to the physical, chemical and biological interactions that determine the exposure of organisms to chemicals associated with soils (Eugenio *et al.,* 2018). The bioavailability and the mobility of heavy metals depend on the speciation of heavy metals, and the interactions of the complexing ligands (Santanu *et al.,* 2018). A crucial step for pollution assessment of soil is to establish the expected natural background concentration levels, from which various approaches can be used to quantify anthropogenic inputs (Ololade, 2014).

This study is designed to assess the level and geochemical form of Pb, Ni and Cd, their bioavailability and pollution level using geo-accumulation index($I_{geo)}$, single pollution index (SPI), pollution load index (PLI) and average pollution index (API)in the soil from Uwelu spare parts Market due to motor vehicle dismantling activities.

## MATERIALS AND METHODS

### Study Area

The study area for this research was a motor vehicle dismantling site located in Uwelu spare parts market, Benin City (Lat 6°23′N, long 5°35′E) in Egor local Government area of Edo State (Fig 1).

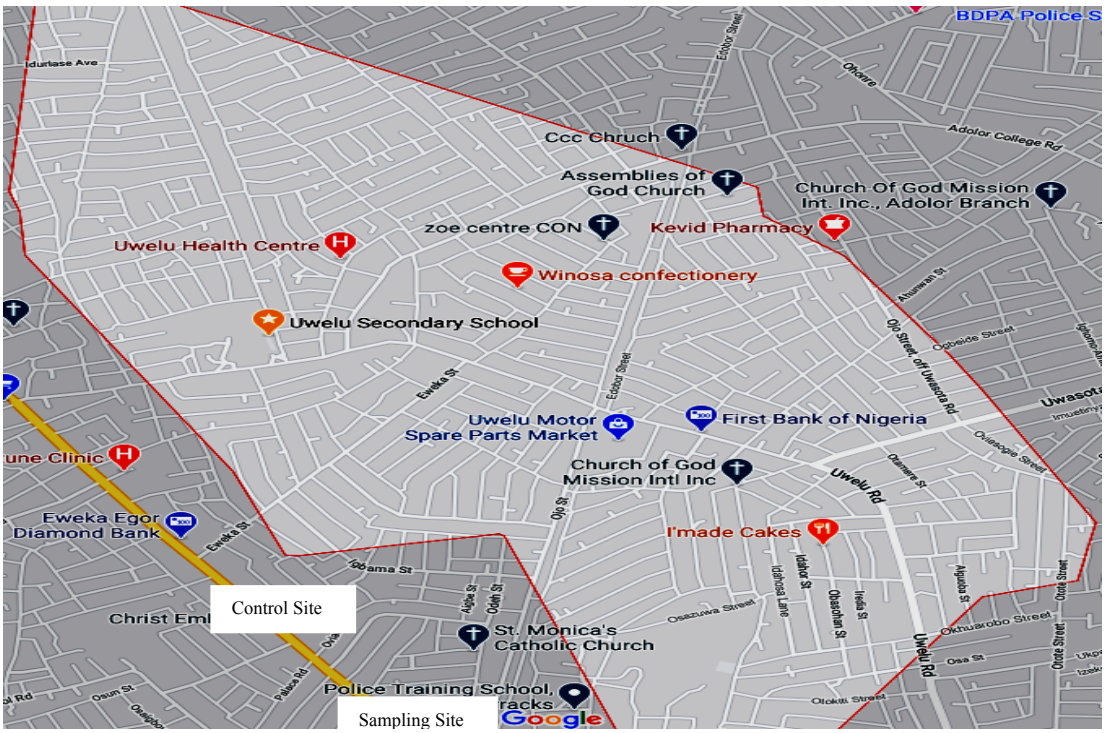


**Figure 1:** Map of Uwelu Community Adapted from Google maps (Google, n.d)

## Soil Sample Collection and Processing

A set of thirty-nine (39) samples out of a possible forty-nine (49) sampling points were collected from the top soil (0 – 20cm) at the motor vehicle dismantling site using the grid method of sampling, with the use of soil auger, on a land area of approximately 450m$^2$ (30m x 15m). Another set of forty-nine (49) soil sample was also collected from Uwelu secondary school to serve as a control. After removing the debris, the soil samples were air-dried at ambient temperature, ground and sieved into coarse and fine texture with a mesh size ≤ 2mm particle size and a composite sample was formed. The residual moisture was removed by heating at 105±5$^o$C for 3 hours in an oven.

## Physicochemical Characterisation of the Polluted Soil

The polluted soil obtained from the motor vehicle dismantling activity site and the control site soil samples were physico chemically characterised to determine the particle size, pH, available phosphorus, total nitrogen, total organic matters, cation exchange capacity and estimatedcation exchange capacity using standard methods (NCR-13, 1998). The heavy metal in the polluted soil and the control site soil were fractioned into five operationally defined pools namely exchangeable fraction, carbonate fraction, Fe/Mn oxide fraction, organic fraction and residual fraction (in triplicates) using sequential extraction procedure of Tessier *et al*. (1979). The heavy metals content in each soil sample fractions were determined using the atomic absorption spectrophotometer (AAS) VGP 210 model – Buck Scientific Equipment Inc., in the analytical laboratory (instrument room) of the Department of Chemistry, University of Benin, Benin City Nigeria.

**Assessment of Heavy metal Pollution Level in Soil**

The heavy metal pollution level was assessed using single pollution index (SPI), geo-accumulation index ($I_{geo}$),average pollution index (API), pollution load index (PLI) and heavy metal mobility factor ($M_F$)in the soil at Uwelu spare parts Market due to motor vehicle dismantling activities.

**Single Pollution Index (SPI)**

Single pollution index (SPI) of each metal is a useful means of quantifying the degree of pollution relative to either average crustal composition of respective metal or to the measured background values from geologically similar and uncontaminated area. It is expressed as the proportion of the concentration of the heavy metal ($C_m$) in the soil to the tolerance level of standards organization in the country or baseline or geochemical background concentration of the heavy metal($C_B$).The chemical composition of the heavy metal in non-affected soil at the control site is used as background value (Uzoije and Nwigwe, 2018):

$$SPI = {C_m}/{C_B} \text{ (with reference to control site) ----------(1a) or}$$

$$SPI = {C_m}/{T_L} \text{ (with reference to NESREA standard) ---------- (1b)}$$

Where $T_L$ is tolerance level or maximum allowable concentration (MAC) which is based on standards for soil quality as specified by the National Environmental Standard and Regulations Enforcement Agency (NESREA) Nigeria (Rabe*et al.,* 2018; Uzoije and Nwigwe, 2018;Proshad*et al.,* 2019). The level of pollution using SPI can be predicted using: SPI<1 = unpolluted or low level of pollution, 1≤SPI≥ 3 = moderate polluted, 3≤SPI = strongly polluted (Weissmannová and Pavlovský, 2017).

**Average Pollution index (API)**

Average pollution index (API)assesses pollution level by considering the joint effect of all the polluting metals in soil or water. The API is obtained by calculating the ratios of the average metal concentration with the geochemical background value or permissible/tolerable level. It is obtained using equation(2a, 2b and 2c) (Adedosu *et al.,* 2013;Uzoije and Nwigwe, 2018):

$$API = \frac{1}{n}(PI_1 + PI_2 + PI_3 + \ldots\ldots + PI_n) \text{ ---------- (2a)}$$

$$API = \frac{1}{n}\left(\frac{C_{m1}}{C_{B1}} + \frac{C_{m2}}{C_{B2}} + \frac{C_{m3}}{C_{B3}} + \ldots\ldots + \frac{C_{mn}}{C_{Bn}}\right) \text{ (with reference to control site)------- (2b)}$$

$$API = \frac{1}{n}\left(\frac{C_{m1}}{TL_1} + \frac{C_{m1}}{TL_2} + \frac{C_{m1}}{TL_3} + \ldots\ldots + \frac{C_{mn}}{TL_n}\right) \text{ (with reference to NESREA standard) ------(2c)}$$

Where $C_{m1}$, $C_{m2}$, $C_{m3}$……., $C_{mn}$ are the average concentrations of the polluting metals; $TL_1$, $TL_2$, $TL_3$…., $TL_n$ are the permissible or tolerable concentrations for each pollution metal which are based on standards for soil quality as specified by the National Environmental Standard and Regulations Enforcement Agency (NESREA) Nigeria; n is the total number of metals. The level of pollution can be predicted using API<1 = low level pollution, 1≤API<3 = moderate level pollution, 3≤ API<6 = considerable level of pollution, API≥6 = very high pollution (Cai*et al.,* 2015; Sonomdagva, 2019).

**Geo-accumulation index ($I_{geo}$)**

Geo-accumulation index is a quantification of the extent of heavy metal pollution associated with the soil from the motor vehicle dismantling site. The $I_{geo}$ value is obtained using equation (3) (Weissmannová and Pavlovský, 2017):

$$I_{geo} = \log_2\left(\frac{C_m}{1.5C_B}\right) \text{ ---------- (3)}$$

Where $C_m$is the concentration of the heavy metal in the polluted soil and$C_B$is the geochemical background value from an unaffected site (control site value).

The level of pollution can be predicted using: $I_{geo} \leq 0$ = uncontaminated, $0 < I_{geo} < 1$=uncontaminated to moderately contaminated,$1 < I_{geo} < 2$ = moderately contaminated, $2 < I_{geo} < 3$= moderately to heavily contaminated, $3 < I_{geo} < 4$= heavily contaminated, $4 < I_{geo} < 5$ = heavily to extremely contaminated, $5 < I_{geo}$ = extremely contaminated (Ololade, 2014).

**Pollution Load Index (PLI)**

Pollution load index assesses the degree of pollution. The PLI represents the number of times by which the metal content in the soil exceeds the average natural background concentration and gives a summative indication of the overall level of heavy metal toxicity in a particular sample. The control samples were taken to represent natural back ground. PLI is able to give an estimate of the metal pollution status and the necessary action that should be taken. The PLI is obtained from the single pollution index of each metal with respect to the natural background value in the soil by usingequation (5) (Ololade, 2014; Rabe*et al.,* 2018):

$$PLI = [PI_1 x\ PI_2 x\ PI_3 x \ldots\ldots x\ PI_n]^{1/n} \text{ ---------- (5)}$$

The Pollution load index is classified as PLI<1 = Soil Perfection; PLI=1 = Baseline level of pollutants; PLI>1 = Deterioration of site, (Uzoije and Nwigwe, 2018).

**Mobility Factor($M_F$)**

The mobility of metals in soil samples may be evaluated on the basis of absolute and relative content of fractions weakly bound to soil component. Relative index of metal mobility was calculated as a mobility factor (MF) on the basis of the following expression (equation 6):

$$MF = \frac{F1 + F2}{F1 + F2 + F3 + F4 + F5} \times 100 \text{ ---------- (6)}$$

Where $F_1$=Exchangeable, $F_2$ =Carbonate, $F_3$ =Fe/Mn Oxide, $F_4$ = Organic and $F_5$ =Residual

The equation is largely the potential mobility of metals in soil (Topcuoglu, 2016).

## RESULTS AND DISCUSSION

**Table 1: Physicochemical Properties ofthe Polluted Soil.**

| Parameters | Polluted soil | Control site Soil |
|---|---|---|
| Silt (%) | 7.90 | 6.53 |
| Clay(%) | 11.50 | 11.57 |
| Sand(%) | 80.60 | 81.90 |
| pH | 6.40 | 5.05 |
| $K^+$(cmol/kg) | 0.23 | 0.20 |
| $Ca^{2+}$(cmol/kg) | 2.00 | 0.88 |
| $Mg^{2+}$ (cmol/kg) | 0.26 | 0.24 |
| $Na^+$ (cmol/kg) | 0.15 | 0.13 |
| $H^+$ (cmol/kg) | ND | 0.13 |
| $Al^{3+}$ (cmol/kg) | ND | 0.16 |
| Available Phosphorus (mg/kg) | 16.20 | 7.40 |
| Total Nitrogen (g/kg) | 2.02 | 0.53 |
| Total organic carbon (g/kg) | 40.30 | 6.10 |
| Cation Exchange Capacity (C.E.C,cmol/kg) | 2.64 | 1.61 |
| E.C.E.C (cmol/kg) | 2.64 | 1.71 |

The total organic carbon content in the polluted soil is very high compared to the control site soil, due to hydrocarbon material waste products from motor vehicles, this indicated that the soil adsorption strength was high, this can contribute to a reduction in metal mobility and bioavailability. The value of its CEC is lower than 6 cmol/kg, indicating that the capacity of the polluted soil to hold and exchange cations is very low. According to Hazelton and Murphy,(2007), a soil with a cation exchange rating of below 6 cmol/kg is very low.

At a range of 6.2 – 6.7, the soil pH is classified as slightly acidic and at a range of 3.0-5.6, it is classified as strongly acidic (Flynn, 2015). This implies that the polluted soil was slightly acidic and the control site soil strongly acidic. Li and Thorton, (2001), stated that metal availability is relatively low when pH is below or around 6.5 to 7, this indicated that the availability of metals in this polluted soil will be reduced due to its low pH value of 6.4 (Table 1).

The particle size characterisation revealed that the polluted soil and the control site soil were classified as sandy loam with a moderately coarse general texture. In sandy loam soils, organic matters breakdown faster than in fine-textured soils due to higher amount of oxygen available for their decomposition. However, hydrocarbon organic matter will be difficult to breakdown in this situation, thereby maintaining the high level of organic content. Flynn, (2015) asserted that with the use of Olsen-P soil test interpretation, an available phosphorous range of 10-20mg/kg is classified as moderate and between 5-10mg/kg is classified as low. Following this assertion, it implies that the available phosphorous content of the polluted soil (16.20mg/kg) is moderate while that of the control site soil is low (Table 1).

**Table 2: Geochemical Fractions of Heavy Metalsinthepolluted Soil.**

| Fractions | Polluted soil (mg/kg) | | | Control site Soil (mg/kg) | | |
|---|---|---|---|---|---|---|
| | $Cd^{2+}$ | $Ni^{2+}$ | $Pb^{2+}$ | $Cd^{2+}$ | $Ni^{2+}$ | $Pb^{2+}$ |
| Exchangeable | 12.60 | 15.30 | 13.50 | 0.14 | 0.86 | 0.22 |
| Carbonate | 4.66 | 14.20 | 17.80 | 0.09 | 0.45 | 0.13 |
| Fe/Mn Oxide | 10.50 | 20.60 | 18.50 | 0.48 | 2.00 | 0.32 |
| Organic | 8.75 | 15.00 | 20.60 | 0.10 | 2.86 | 0.37 |
| Residual | 16.40 | 24.20 | 16.80 | 2.15 | 14.50 | 1.00 |
| Total | 52.91 | 89.30 | 87.20 | 2.96 | 20.70 | 2.04 |

The heavy metals in the exchangeable fractions are weakly bound and thus making them mobile and available for plant uptake (or bioavailable).The geochemical carbonate fraction is also mobile and bioavailable to plant depending on the pH of the soil environment. The Iron and manganese oxides are strongly bound and not mobile, thereby making them not easily available to plants, because this fraction is an excellent substrate with large surface area for adsorbing heavy metals. It is only made available by manipulating the redox potential (Abu-Kukati, 2001).The heavy metals in organic bound fraction may be bound through complexation or bioaccumulation. Degradation of these substances by oxidation leads to a release of soluble metals. These fractions of metals, outside redox potential manipulations, are tightly bound, not mobile and are not available to plant for uptake. In the residual fraction, the heavy metals are firmly bonded within crystal structure of the minerals comprising the soil. These fractions are not mobile and not available at any condition for plant uptake (Abu-Kukati, 2001).

The content of heavy metal in the geochemical fraction of the polluted soil were all higher than those of the control site soil, indicating anthropogenic pollution of the polluted soil due to motor vehicle dismantling activities (Table 2).

**Table 3: Exchangeable and Carbonate Fractions of the Heavy Metal in the polluted Soil.**

| | polluted soil (mg/kg) | | | Control site Soil (mg/kg) | | |
|---|---|---|---|---|---|---|
| Fractions | $Cd^{2+}$ | $Ni^{2+}$ | $Pb^{2+}$ | $Cd^{2+}$ | $Ni^{2+}$ | $Pb^{2+}$ |
| Exchangeable | 12.60 | 15.30 | 13.50 | 0.14 | 0.86 | 0.22 |
| Carbonate | 4.66 | 14.20 | 17.80 | 0.09 | 0.45 | 0.13 |
| Total | 17.26 | 19.50 | 21.30 | 0.23 | 1.31 | 0.35 |
| NESREA,(2009) MAC. | 3 | 70 | 10 | 3 | 70 | 10 |

Comparing the sum of the concentration of the heavy metal in the exchangeable and carbonate fractions with the maximum allowable concentration (M.A.C) from(NESREA), it was observed that cadmium and lead content in its mobile and bioavailable forms in the polluted soil exceeded that of NESREA (Table 3),while the nickel content was below the range of the NESREA standards of heavy metals in soil. It was also observed that the polluted soil was most polluted with regard to lead and its content exceeded that of NESREA, (2009) for heavy metal content in soil (Table 4). However, the levels of heavy metal pollutants in the control site soil were all below the NESREA tolerant level.

**Table 4: Percentage of Heavy Metals in Various Geochemical Fractions in Polluted Soil and their Mobility Factor.**

| Fractions | Polluted soil (%) | | | Control site Soil (%) | | |
|---|---|---|---|---|---|---|
| | $Cd^{2+}$ | $Ni^{2+}$ | $Pb^{2+}$ | $Cd^{2+}$ | $Ni^{2+}$ | $Pb^{2+}$ |
| Exchangeable | 23.81 | 17.13 | 15.48 | 4.83 | 4.15 | 10.78 |
| Carbonate | 8.81 | 15.90 | 20.41 | 3.04 | 2.17 | 6.37 |
| Fe/Mn Oxide | 19.85 | 23.07 | 21.22 | 16.21 | 9.66 | 15.69 |
| Organic | 16.54 | 16.80 | 23.62 | 3.38 | 13.82 | 18.84 |
| Residual | 30.99 | 27.10 | 19.27 | 72.64 | 70.05 | 49.02 |
| Mobility factor | 32.62 | 33.03 | 35.89 | 4.87 | 6.32 | 17.15 |

The mobility factors of the heavy metals in the contaminated soil revealed that $Pb^{2+}$ ion was highest, followed by $Ni^{2+}$ and $Cd^{2+}$ ions respectively. However, their lability was low probably due to high organic content whose complex compound with heavy metals are not soluble or not easily decomposable or both (Table 4). Beesley *et al.,* (2010) stated that the lability of heavy metals can be attributed to their high complexation with soluble fractions of soil organic matters.

The mobility and bioavailability of the selected heavy metals in this study were low, the low lability could be as a result of high quantity of organic waste from the motor vehicle dismantling activities at the spare parts market, and this organic waste must have form complexes with the heavy metals which are not dissolvable or decomposable, thus reducing their mobility and bioavailability. However, the mobility factor of the same heavy metals in the control site soil was very low compared to the polluted soil. Topcuoglu (2016), reported that the mobility of the metals declines in the following order: Cd>Pb>Ni.

**Table 5: Heavy Metal Assessment of Polluted Soil.**

| Parameter | Heavy metal polluted soil Assessment with respect to: | | | | | |
|---|---|---|---|---|---|---|
| | Geochemical background value ($C_B$) | | | NESREA tolerance level ($T_L$) | | |
| | $Cd^{2+}$ | $Ni^{2+}$ | $Pb^{2+}$ | $Cd^{2+}$ | $Ni^{2+}$ | $Pb^{2+}$ |
| SPI | 17.86 | 4.31 | 42.75 | 17.64 | 1.28 | 8.72 |
| $I_{geo}$ | 2.48 | 1.06 | 3.35 | - | - | - |
| API (Joint pollutant effect) | 21.64 | | | 9.21 | | |
| PLI (Joint pollutant effect) | 14.87 | | | 5.82 | | |

The level of heavy metal pollution of the soil from the motor vehicle spare partsd is mantling site was assessed using the SPI, $I_{geo}$, APIand PLI. The SPI revealed that soil from the site where the motor vehicle dismantling activity took place were strongly polluted with $Cd^{2+}$, $Ni^{2+}$ and $Pb^{2+}$ions with respect to geochemical background value (GBV) obtained from the control site. However, when the SPI was determined with respect to the tolerable level (TL) or maximum allowable concentration (MAC) from NESREA, we observed that the pollution level of $Ni^{2+}$ ion in the soil was moderate ($1 \leq SPI \leq 3$ = moderately polluted) while $Cd^{2+}$ and $Pb^{2+}$ ions strongly polluted the soil ($3 \leq SPI$ = strongly polluted, Weissmannová and Pavlovský, 2017). $Pb^{2+}$ ions polluted the soil more strongly than $Cd^{2+}$ ions as indicated in Table 5.Geo-accumulation index revealed that $Ni^{2+}$ ions moderately contaminated the soil ($1 < I_{geo} < 2$ = moderately contaminated),$Cd^{2+}$ions tend to heavily contaminate the soil ($2 < I_{geo} < 3$= moderately to heavily contaminated,) while $Pb^{2+}$ ions heavily contaminated the soil ($3 < I_{geo} < 4$= heavily contaminated, Ololade, 2014). In agreement with SPI, $Pb^{2+}$ ions extremely polluted the soil more than $Cd^{2+}$ionsas shown in Table 5.

Pollution level based on the joint effect of the pollutant ($Cd^{2+}$, $Ni^{2+}$ and $Pb^{2+}$ ions) on the soil was assessed using the API and PLI. Based on the data obtained, from the API and PLI with respect to geochemical background value (GBV) obtained from the control site and the tolerable level (TL) or maximum allowable concentration (MAC) from NESREA, the joint effect of the pollutant caused a very high level of pollution on the soil base on API assessment (API≥6 = very high pollution, Sonomdagva, 2019)and the site was assessed as deteriorated based on PLI assessment (PLI > 1 = Deterioration of site, Uzoije and Nwigwe, 2018).

## CONCLUSION

The soil from the motor vehicle dismantling activity site was polluted with $Cd^{2+}$, $Ni^{2+}$ and $Pb^{2+}$ ions. However, the $Ni^{2+}$ions content in the soil using the bioavailable content was below the tolerable level as stated by NESREA. This was corroborated by the SPI (with respect to tolerable level of NESREA)and geo-accumulation index in which we observed that the level of pollution due to $Ni^{2+}$ ion was moderate. The joint effect of the heavy metal pollutants ($Cd^{2+}$, $Ni^{2+}$ and $Pb^{2+}$ ions) caused a very high level of pollution and the site was in a state of deterioration as predicted from API and PLI assessment respectively.

Sequel to heavy metal pollution of the soil in Uwelu spare parts market where motor vehicle dismantling activities takes place, Materials should be synthesized and developed to help stabilize or eliminate the heavy metals. Awareness programme should be floated to educate the populace and the operators on the implications of heavy metals and organic waste resulting from motor vehicle dismantling activities viz-a-viz educating them on how to store and safely recycle the various parts and waste without polluting the environment. There should be laws restricting motor vehicles dismantling activities to just one spare parts market in a Local Government Area in order to stem indiscriminate pollution of soil in virtually all spare parts markets, as well as imposition of fine on defaulters. This study has revealed that the Uwelu spare parts market motor vehicle dismantling activity site had been heavily polluted and deteriorated.

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