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Urban Air Pollutants: The Bane of Informal Enterprises in Ibadan, Nigeria

Abolade, Olajoke
Ladoke Akintola University of Technology Ogbomoso Nigeria
Department of Urban and Regional Planning
oabolade@lautech.edu.ng

Adeboyejo, A.T
Ladoke Akintola University of Technology Ogbomoso Nigeria
Department of Urban and Regional Planning
adeboyejo@lautech.edu.ng

Abstract

Environmental Pollution is one of the most intractable problems confronting cities of the world. Its continuous discharge poses threat to the components of ecosystem. Consequently, the need to harness all the sources of these pollutants and provide measures to ameliorate the same becomes pertinent. Against this background, the paper provides empirical evidence on the contributions of Urban Informal Enterprises Emissions to air quality in Ibadan cosmopolitan region. It measures varying levels of concentration of three gaseous pollutants: CO, H_2S, and CH_4 generated by twenty (20) UIEs in fifty two (52) locations within four randomly selected LGAs in Ibadan. The gaseous pollutants were measured using Tetra personal multigas monitor. The spatial patterns of the concentration were mapped. The results show that CO,and H_2S generated from most of UIEs were significantly high and above the permissible recommended (FEPA and USEPA) level. The study concludes that location of urban informal enterprises in spaces that are incompatible to other land uses should be strictly discouraged. This can be achieved through implementation legal tools in planning practice and formulations of new policies that will accommodate and regulate the operations of UIEs with negative impact on the environment. This will promote sustainable and liveable environment.

Key Words: Environment, Pollution, Emission, Urban Informal Enterprises, and Quality

Introduction

The unprecedented growth and development of urban informal enterprises especially in the last two decades is not a new phenomenon. The sector is gaining more attention because of progressive emasculation of the formal economy (Habitat, 1996 htpp.www.geocities .com/transport) and the resultant inability of formal sector to absorb job seekers most especially in third world countries like Nigeria and other African countries. This is consequent on the problem of bad economy coupled with bad governance and political instability that has been on the startling rate in most the third world countries (Onyebuke, 2000). Therefore the inadequate provision of jobs in the formal sector of the economy as well as poor skills in the large part of labour force has substantially spurred the growth of informal sector (World Employment Report 1998-1999).

The proliferation of urban informal enterprises has been a mixed blessing to mankind, especially because of its potential in job creation to the unemployed, however, it is an unrecognized malady because it operational and behavioural attributes poses threat to the operators and environment through indiscriminate disposal waste and handling of the same. The operational procedures and behavioural attributes of operators towards environmental sustainability have not been given adequate attention it deserves. This becomes essential because most of the operational procedures associated with the sector generate waste either in form gaseous, liquid semisolids or solid state. These waste are often discharged mostly as untreated or partially treated before final disposal into either drains, bare lands, or released as gaseous pollutants or particulate matter into the environment. This poses negative consequences on the components of the environment. According to Nwaka (2005) the environmental negativities associated the informal enterprises constitute a major threat to the health and wellbeing of urban of urban life.

Waste disposal especially from informal enterprises is now one of the most conspicuous environmental problems of Africa urban areas (Onyechere, (2011). Concerted effort from governments through enactment of related environmental laws towards waste management or pollution abatement technique have not or comprehensively taking into cognizance waste and pollutants emanating from this local but important source of pollution. The efforts from all tiers of government have placed emphasis on waste indiscriminately disposed to the environment mostly from industries. This menace has necessitated enactment of laws to monitor, control and enforce sanity to the environment. It also motivated several researchers to investigate on this subject because its observed to contribution to environmental degradation. Therefore, the environmental and health impacts of Urban Informal Enterprises remain significant. Waste products from most of these enterprises are discharge directly into the ambient environment. For instance, waste generated inform of gaseous substances are released into the ambient air without passing through the stack, duct, or chimney. It accumulates in the atmosphere without breaking down into less harmful components in soil water and air. Consequently, the pollutants constitute threat to the atmospheric components at local and regional scale because of its capacity to disperse at a long distance. It also contributes to green house gasses and constitute nuisance to the atmospheric air, climate change and human health (Leune et all 1995).

The environmental impact of these activities remains elusive because it is usually carried with short period of time irregularly. However it becomes imperative to carry out measurement so as to determine some of the pollutants that constitute risk to the environment. Deliberately or otherwise these urban informal enterprises through the processes of their operations particularly those that involve use of heavy machines with gasoline fuel as well as toxic raw materials releases pollutants which are toxic and poisonous both to the environment and human health. These pollutants include Sulphur dioxide (So2), Carbon Dioxide (CO), Methane (CH4) Nitrogen dioxide (NO2) among others. According to Lewatas (2007) these

gases have impact on human health by causing cancer, respiratory, reproductive as well as cardiovascular damages in man.

Studies on contributions of Urban Informal enterprises to urban economy are extensive (Sethuraman, 1976, Perera, et al 1996, Harts, 1973 Oni 1999, Okeke, 2000 Yakson 2000 Ijaiya, 2002, Menyah 2009, Onyechere 2011). Similarly, most studies on pollution have focused on emission from industries, and residential waste (Afon 2005, Adedibu 1993, Sonibare , 2009 Akeredolu et al 2006) . All these and others have failed to address the level and varying negative consequences of the urban informal enterprises on the environment Few studies Perera and Amin (1996) Lubell (1991) Mubvani (1992) have been concerned with the environment and management nexus and consequently conducted studies on incorporating informal enterprises as a strategy for environmental management. The need to ascertain the possibility of eventual saturation of the sector and to determine the rate of its accompanying degradation on the environment becomes crucial. Onyechere (2011) maintained that there is need not only to figure out which subsector degrades the environment most but to determine which component is most degraded vis- a vis land, water, and air. This is one of the major preoccupations of this research.

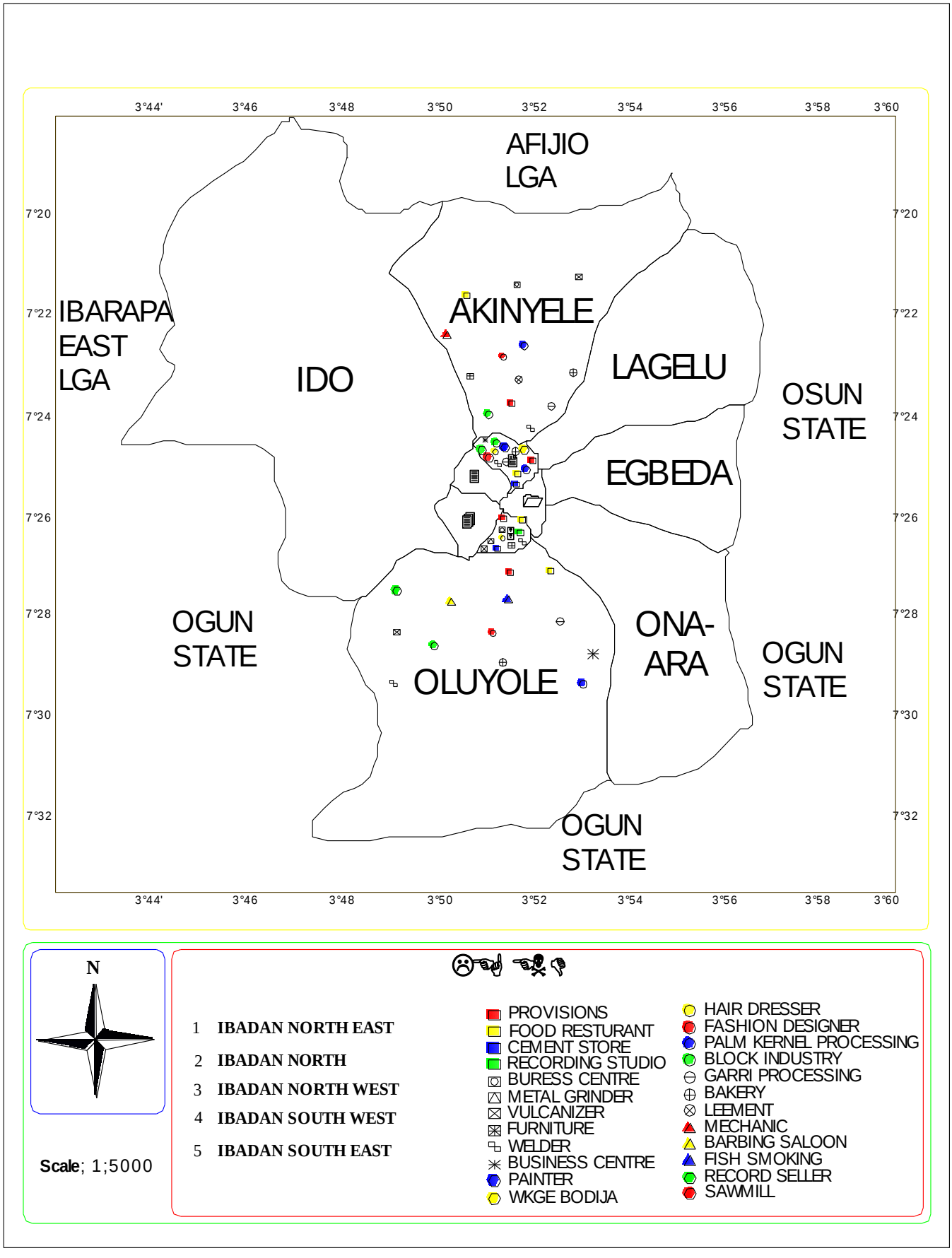
The uniqueness of this paper lies on the fact that previous studies have not being able to quantify the amount and magnitude of potential environmental impact of this activities especially the pollutant generated. These have not been investigated empirically through actual measurement using various measuring instruments. This monumental shortfall particularly its implication on the environment, calls for a comprehensive and empirical investigation in a city like Ibadan which is the home of several informal enterprises. Such findings will provide insight for policy formulation and incorporation of relevant legislation to safeguard the environment and also to promote land use regulation. This is the major concern of this paper.

Materials and Methods

The study utilized primary data. The primary data adopted was actual measurement of gaseous pollutants emitted during the operational procedures of selected urban informal enterprises in the study area. This comprises of three gaseous pollutants: Carbon (II) Oxide (CO) Hydrogen Sulphide (H_2S) and Methane (CH_4). The pollutants were measured using Tetra Personal Multi gas Monitor.in ambient environment from four randomly selected LGAs. Global Position System (GPS) was used to determine the sampling locations as presented in figure 1. A total of fifteen locations representing five urban informal enterprises in category of commercial /petty trading, tertiary services and cottage industry in each of the four selected local government areas totaling sixty locations were considered for sampling. This was considered adequate because of the exorbitant price of survey equipment as well as uncooperative attitudes of operators since majority of the operators were hostile to taking measurement and samples from their workshops. This was premised on fear of insecurity of business due to African culture. However, a total of fifty two (52) locations were successfully sampled. This represents 86.7% of the sample size.

Tetra is a potable multi gas detector designed to be carried or worn by individuals working in hazardous environments. The monitor is 122 by 128 by 57mm as shown in plate 1 (43/4 x 5 x 2 ½ inches). The measuring instrument weighs about 498g comprising rechargeable internal batteries chip and four sensors with operating temperature -20 to 55^{o}C.The monitor was calibrated in March 2007 with calibration test and test certificate BASEEFAO3AATEX 0193. This was calibrated to 70ISO 9000 standard of reliability and repeatability because mixtures have been prepared in accordance with ISO9001: 2008 for the fixed measurement. The Auto- zero at start up calibration is required and this was carried out during the study. The instrument was positioned at the point of discharge for each selected

urban informal enterprises particularly those that emit gaseous pollutants for short term weighted average (TWA) i.e. 15-30 minutes. The instantaneous read out concentrations of the monitored gases were displayed on the screen with unit of measurement as part per million (ppm). The short term limit was employed for this study to capture the actual concentration of pollutant emitted by the various categories of urban informal enterprises before any diffusion process takes place in the air. This duration is acceptable since the instrument is designed to capture short term weighted average. Again the method has been employed by Sonibare (2009). However, the instrument can also display gas level exposure for long term weighted average (TWA) or 8 hrs. The highest reading since the monitor was turned on was recorded.



SOURCE: AUTHOR'S FIELD WORK, 2012

Result and Discussion

Carbon monoxide is a poisonous gaseous pollutant that is released into the air when substances are burnt**.** It is highly injurious to human health when inhaled and also results to ozone layer depletion when accumulated in the air. It is mostly derived through combustion of fuels and other sources like fluorometallurgical processes, Kraft pulp, and other related process that uses biofuels. In line with this, the operational procedure of majority of urban informal enterprises involves use of biofuels. These emit a larger concentration of Carbon (II) Oxide however; the level of emission varies with different activity and locations thus giving rise to different concentration. The values of overall average of various categories of urban informal enterprises sampled in the selected local government area considered for survey as summarized in Table1 reveals a very high concentration. These range from 12.90 mg/m^3 and 27.02 mg/m^3 as against the permissible ambient air quality of 5.0mg/m^3.

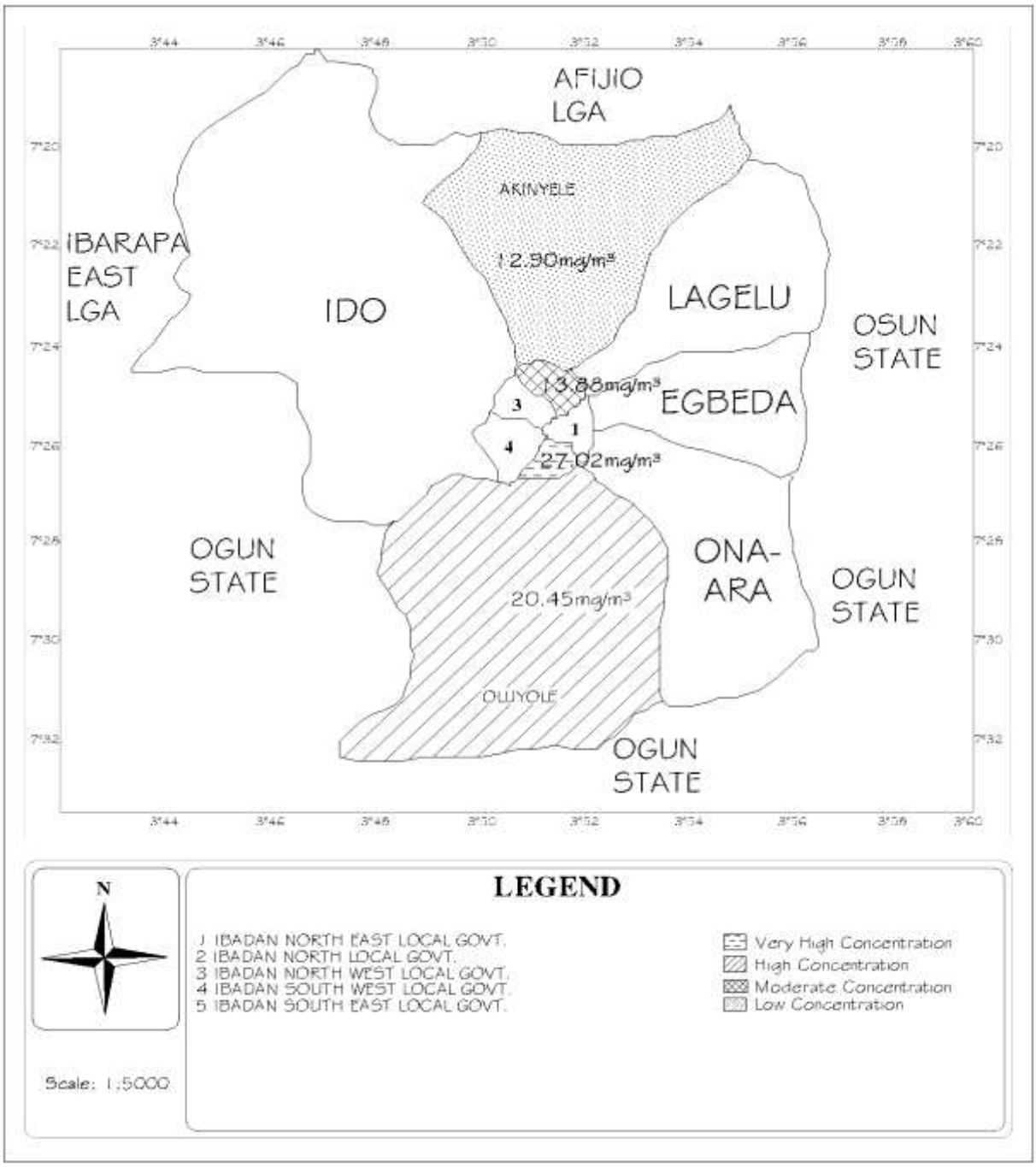
Comparing the level of concentration as illustrated in Figure 2 it is observed that all the local government recorded very high concentration although it varied spatially. Ibadan South East was observed to record very high concentration of CO (27.02 mg/m3). This is followed by Oluyole local government (18.01mg/m_3), Ibadan North moderate concentration (13.88mg/m_3) and Akinyele LGA low concentration (12.90mg/m_3). It is interesting to observe that Oluyole being one of the peri urban local governments also recorded a very high concentration of CO because the massive development and establishment of many formal institution and industries which attracted several categories of urban informal enterprises. This consequently increases its associated environmental implication most especially when there are no formal guidelines to control and monitor their activities. Coupled with this is the population increase particularly within the city brought about by spatial expansion and encroachment of the metropolis into suburbs. Again the high concentration of pollutants in the entire sampling points confirms the perception of residents that the procedures involved in the operation of majority of UIE particularly with the use of generator generates pollutants Abolade, (2012). It is therefore suggested that further development that may likely generate this pollutant should be discourage or mitigating measure should be put in place especially as regards the operational procedures used by the enterprises.

Similarly, there is spatial variation in the concentration of Carbon (II) Oxide emitted by various categories of urban informal enterprises in all the four sampled local government either for weekday and weekend. This is dependent on many factors among which are age of machine, type of fuel, concentration of activities that generate the pollutants, among other factors. For instance comparison of Carbon (11) Oxide during the weekday and weekend as summarized in the table reveals that the concentration is higher during the weekday than weekend. In Ibadan South East, the concentration ranged between 14.9mg/m^3 and 305.9mg/m^3 during the weekday and 1.1mg/m^3 and 3.4mg/m^3 for weekend. This shows a wide disparity in concentration and level of its significance. The trend in variation for weekday and weekend was also observed for Akinyele LGA (4.6 mg/m^3 and 49.2mg/m^3 for weekday, and 4.6mg/m^3 and 11.5mg/m^3 for weekend), Ibadan North LGA (19.5mg/m^3 and 36.6mg/m^3 for weekend and 1.1mg/m^3 and 9.2 mg /m^3 for weekend) and Oluyole LGA (4.6mg/m^3 and 137 mg/m^3 for weekend and 3.4 mg/m^3 and 20.2mg/m^3). Again, the variance in concentration with different activity is significant. For example in Ibadan South East the concentration of Carbon (II) Oxide emitted by metal grinding was very high (305.9mg/m^3). It was observed during the survey that old machines consumes more fuel and have tendency to generate more smoke than the newer ones, nevertheless types of fuel affect concentration of pollutant that will be emitted. It is worthwhile to report that some activities (e.g. furniture) recorded zero concentration either for weekday and weekend. This did not imply that furniture does not use machine that generate Carbon (II) Oxide but some operation can be performed using manual labour or direct skill without necessarily using machine.

Table 1: Spatial Variation in concentration of Carbon (II) Oxide (CO)

S/N	Sampl Areas	Samps	C0(ppm mg/m^3)							
			WKD	WKED	WKD	WKED	WKD	WKED	WKD	WKED
			Ibadan South East		Akinyele		Ibadan North		Oluyole	
1	SP1	Provision Store	13(14.9)	3(3.4)	29(33.3)	0(0)	32(36.6)	8(9.2)	4(4.6)	0(0)
2	SP2	Food Rest	28(32.0)	0(0)	29(33.2)	4(4.6)	17(19.5)	0(0)	20.5(23.5)	3(3.4)
3	Sp3	Fish Smoking	Nil	Nil	Nil	Nil	Nil	Nil	20(22.9)	5(5.7)
4	SP4	Cement Store	32(36.6)	0(0)	29(33.2)	0(0)	32(36.6)	4(4.6)	Nil	Nil
5	SP5	Recorded Studio	39(44.7)	0(0)	10(11.5)	0(0)	29(33.)	0(0)	10(11.5)	3(3.4)
6	SP6	Business Center	26(29.8)	1(1.1)	4(4.6)	10(11.5)	27(30.9)	0(0)	4(4.6)	0(0)
7	SP7	Mechanic	Nil	Nil	29(33.2)	0(0)	20(22.9)	1(1.1)	Nil	Nil
8	SP8	Painting	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
9	SP9	Sawmill	Nil	Nil	Nil	Nil	23(26.3)	7(8.0)	Nil	Nil
10	SP10	Fashion designing	Nil	Nil	4(4.6)	0(0)	Nil	Nil	107(122.5)	10(11.5)
11	SP11	Metal Grinding	440(305.9)	4(2.8)	Nil	Nil	Nil	Nil	Nil	Nil
12	Sp12	Vulcanizing	39 (27.1)	0(0)	43(49.2)	4(4.6)	Nil	Nil	20.2(23.1)	0(0)
13	SP13	Furniture	0(0)	0(0)	20.5(23.5)	0(0)	Nil	Nil	10(11.5)	4(4.6)
14	Sp14	Welding	15(19.2)	0(0)	4(4.6)	0(0)	23(26.3)	0(0)	5(5.7)	0(0)
15	Sp15	Barbing Saloon	Nil	Nil	Nil	Nil	Nil	Nil	120(137.4)	22.0(20.2)
16	Sp16	Hair Dressing	20(22.9)	0(0)	Nil	Nil	27(30.9)	0(0)	Nil	Nil
17	Sp17	Cassava processing	Nil	Nil	20.5(23.5)	0(0)	24(27.5)	0(0)	20(22.9	10(11.5
18	Sp18	Block Industry	Nil	Nil	21(24.0)	0(0)	25(28.6)	0(0)	26(29.8)	0(0)
19	Sp19	Palm Kernel	Nil	Nil	31(35.5)	0(0)	21(24.0)	0(0)	40.6 (46.5)	4(4.6)
20	Sp20	Bakery	Nil	Nil	Nil	Nil	17(19.5)	3(3.4)	36 (41.2)	0(0)
21	Overall Average (OVA)		65.2 (53.3)	0.8 (0.73)	19.5 (24.2)	1.42 (1.59)	22.6 (25.9)	1.64 (1.86)	31.66 (36.26)	4.36 (4.64)
			33 (27.02)		10.46 (12.90)		12.12 (13.88)		18.01 (20.45)	

Source: Author's Field Survey (2012)



Source:Authors' Field Work

FIG 2: Spatial Variation In Concentration Of Carbon Mono-Oxide

Hydrogen Sulphide is derived majorly from biological decay of sewage and refuse. This destroys fabrics and other materials including building surfaces. Comparing the value of the overall average of hydrogen Sulphide for all the sampled local government reveals a higher concentration as against the USEPA air quality index and ambient air quality standard. For instance in Akinyele LGA the concentration of Hydrogen Sulphide (H_2S) for both weekday and weekend, reveals that concentration ranges between 1.4 and 2.8mg/m^3 for weekday and between 1.4 and 2.8mg/m^3 for weekend. These values are similar for both days sampled except with a slight difference observed for vulcanizing that recorded a higher value

(2.8mg/m^3) for weekend while other activities recorded a higher value or same for weekday. It was obviously noted that the concentration of Hydrogen Sulphide doubled for provision store, sawmill and cement store (i.e. 2.8mg/m^3) compared to other informal enterprises that just recorded half (1.4mg/m^3) of the concentration. The factor responsible for this high concentration is biological decomposition of waste mostly generated by all these informal enterprises while higher concentration recorded for the three urban informal enterprises could be due to the indiscriminate method of waste disposal observed for proliferation of UIEs in the surrounding neighborhood

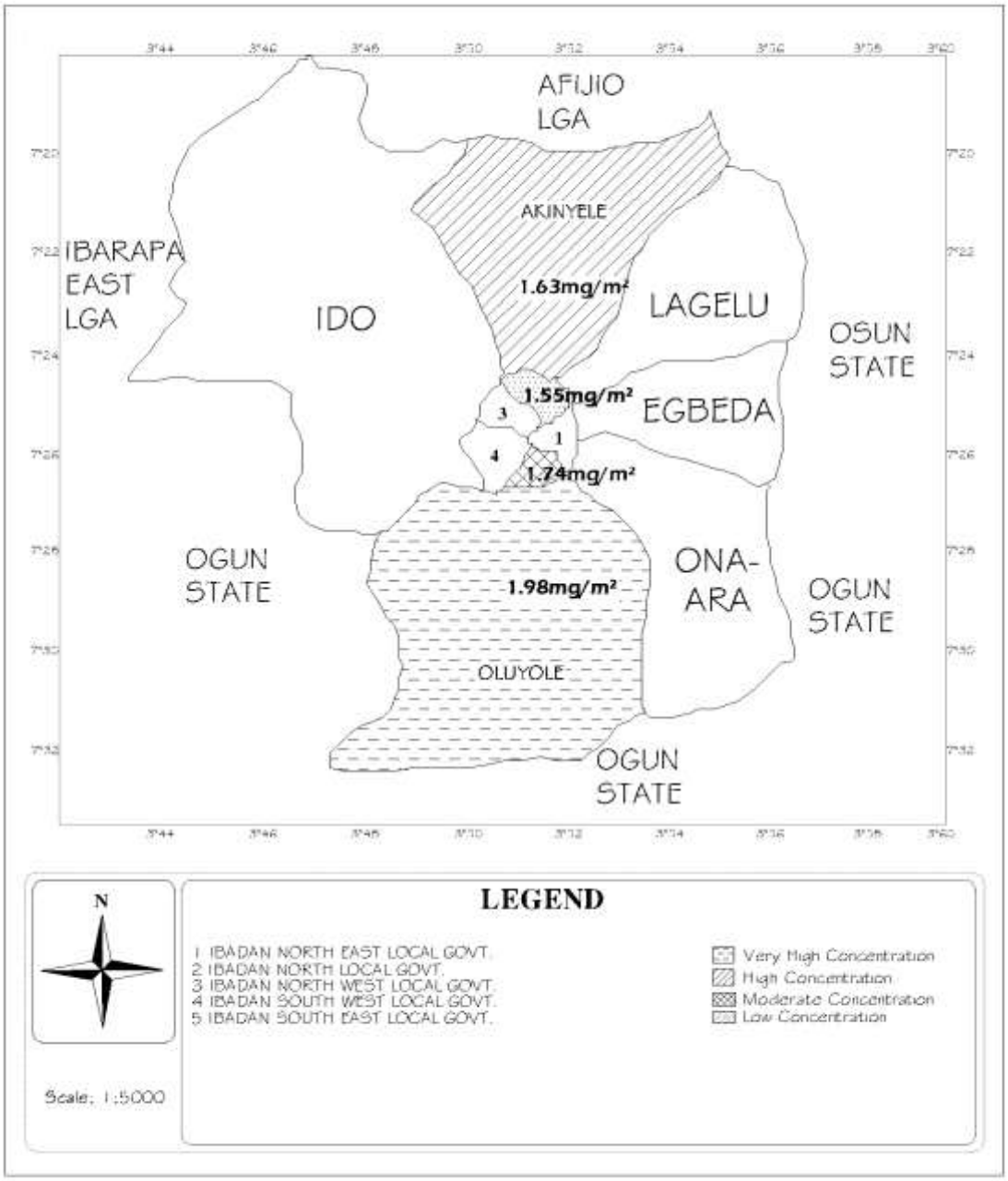
The result of the concentration of hydrogen Sulphide (H_2S) for Ibadan South East is very high (4.2mg/m^3) for food restaurant during the weekday. This slightly decreased to 2.8 mg/m^3 during the weekend. Same pattern of recorded was observed for provision store for weekday (2.8 mg/m^3) and weekend (1.4 mg/m^3), cement store recorded 2.2 mg/m^3 for weekday and 1.8 mg/m^3 for weekend. All these show a decreasing trend in concentration from weekday to weekend mainly because there are lesser or non-activity for weekend. These observed concentrations are very high when compared with the permissible tolerance limits of 0.008mg/m^3. On the contrary, same values of concentration were observed for metal grinding and vulcanizing each with concentration of 2.8mg/m^3 for both weekday and weekend.

Conversely, the concentration of H_2S recorded for all the activities in Oluyole LGA during weekend is the same (1.4mg/m^3). However when this value is compared with concentration during the weekday all the fourteen categories of urban informal enterprises sampled in this study reveals same concentration but higher compared to the value recorded for weekend. These range from 1.4 mg/$m^3$and 7.0 mg/m^3. Comparison of this with tolerance limit for ambient air reveals that the concentration is higher. The underlying factor responsible for this high value is because virtually all urban informal enterprises do not have a proper way or an engineered system of disposing their waste. These wastes after undergoing the process of biological decomposition often generate offensive odour that produces hydrogen Sulphide and when inhaled and may cause ill health to the body system. The illustration in Figure 3 reveals that there is very high concentration of hydrogen Sulphide in Oluyole LGA (1.98mg/m3), the concentration reduces slightly in Ibadan South East (1.74mg/m^3), Akinyele LGA (1.63mg/m3) and Ibadan North (1.55mg/m^3). Comparison of the overall average in all the local government areas reveals that the overall average in each LGAs is high when compared with ambient air quality standard but the level of concentration varied probably because the intensity in land use or meteorological factor which often determine the concentration of pollutant in the air as well as the attitude to which pollutants are carried. Again the concentration of the pollution is also dependent on emission time, weather in the daytime or in the night. The concentration of pollution in the night particularly if operation is carried out in the night is high because the dispersion rate is low compared to day time when the turbulent wind is gusty. Consequently operational activity that involves emission of pollutants should be discouraged in the night.

Table 2: Spatial Variation in Concentration of Hydrogen Sulphide

S/N	Sampl Areas	Samps	H_2S(ppm,mg/^{3})							
			WKD	WKED	WKD	WKED	WKD	WKED	WKD	WKED
			Ibadan South East		Akinyele		Ibadan North		Oluyole	
1	SP_1	Provision Store	2(2.8)	1(1.4)	1(1.4)	1(1.4)	2(2.8)	1(1.4)	1(1.4)	1(1.4)
2	SP_2	Food Rest	3(4.2)	2(2.8)	1(1.4)	1(1.4)	1(1.4)	1(1.4)	1(1.4)	1(1.4)
3	Sp_3	Fish Smoking	Nil	Nil	Nil	Nil	Nil	Nil	1.3(1.8)	1(1.4)
4	SP_4	Cement Store	1.6(2.2)	1.3(1.8)	1(1.4)	1(1.4)	2(2.8)	1(1.4)	Nil	Nil
5	SP_5	Recorded Studio	0(0)	0(0)	1(1.4)	1(1.4)	1(1.4)	1(1.4)	2(2.8)	1(1.4)
6	SP_6	Business Center	0(0)	0(0)	1(1.4)	1(1.4)	1(1.4)	1(1.4)	1(1.4)	1(1.4)
7	SP_7	Mechanic	Nil	Nil	1(1.4)	1(1.4)	1(1.4)	0(0)	Nil	Nil
8	SP_8	Painting	Nil	Nil	Nil	Nil	1(1.4)	1(1.4)	Nil	Nil
9	SP_9	Sawmill	Nil	Nil	Nil	Nil	2(2.8)	1(1.4)	Nil	Nil
10	SP_{10}	Fashion designing	Nil	Nil	1(1.4)	1(1.4)	Nil	Nil	2(2.8)	1(1.4)
11	SP_{11}	Metal Grinding	2(2.8)	2(2.8)	Nil	Nil	Nil	Nil	Nil	Nil
12	Sp_{12}	Vulcanizing	2(2.8)	2(2.8)	1.3(1.8)	2(2.8)	Nil	Nil	1.2(1..7)	1(1.4)
13	SP_{13}	Furniture	1(1.4)	1(1.4)	2(2.8)	1(1.4)	Nil	Nil	1(1.4)	1(1.4)
14	Sp_{14}	Welding	1(1.4)	1(1.4)	1(1.4)	1(1.4)	1(1.4)	1(1.4)	1(1.4)	1(1.4)
15	Sp_{15}	Barbing Saloon	Nil	Nil	Nil	Nil	Nil	Nil	1(1.4)	1(1.4)
16	Sp_{16}	Hair Dressing	1(1.4)	1(1.4)	Nil	Nil	1(1.4)	1(1.4)	Nil	Nil
17	Sp_{17}	Cassava processing	Nil	Nil	2(2.8)	1(1.4)	1(1.4)	1(1.4)	1(1.4)	1(1.4)
18	Sp_{18}	Block Industry	Nil	Nil	1(1.4)	1(1.4)	1(1.4)	1(1.4)	5(7.0)	1(1.4)
19	Sp_{19}	Palm Kernel	Nil	Nil	2(2.8)	1(1.4)	1(1.4)	1(1.4)	2(2.8)	1(1.4)
20	Sp_{20}	Bakery	Nil	Nil	Nil	Nil	1(1.4)	0(0)	5(7.0)	1(1.4)
21	Overall Average (OVA)		1.36 (1.9)	1.13 (1.58)	1.25 1.75	1.07 (1.5)	1.21 (1.7)	0.86 (1.4)	1.82 (2.55)	1.0 (1.4)
			1.25 (1.74)		1.16 (1.63)		1.04 (1.55)		1.41 (1.98)	

Source: Author's Field work (2012)



Source:Authors' Field Work

FIG 3: Spatial Variation In Concentration Of Hydrogen Sulphide

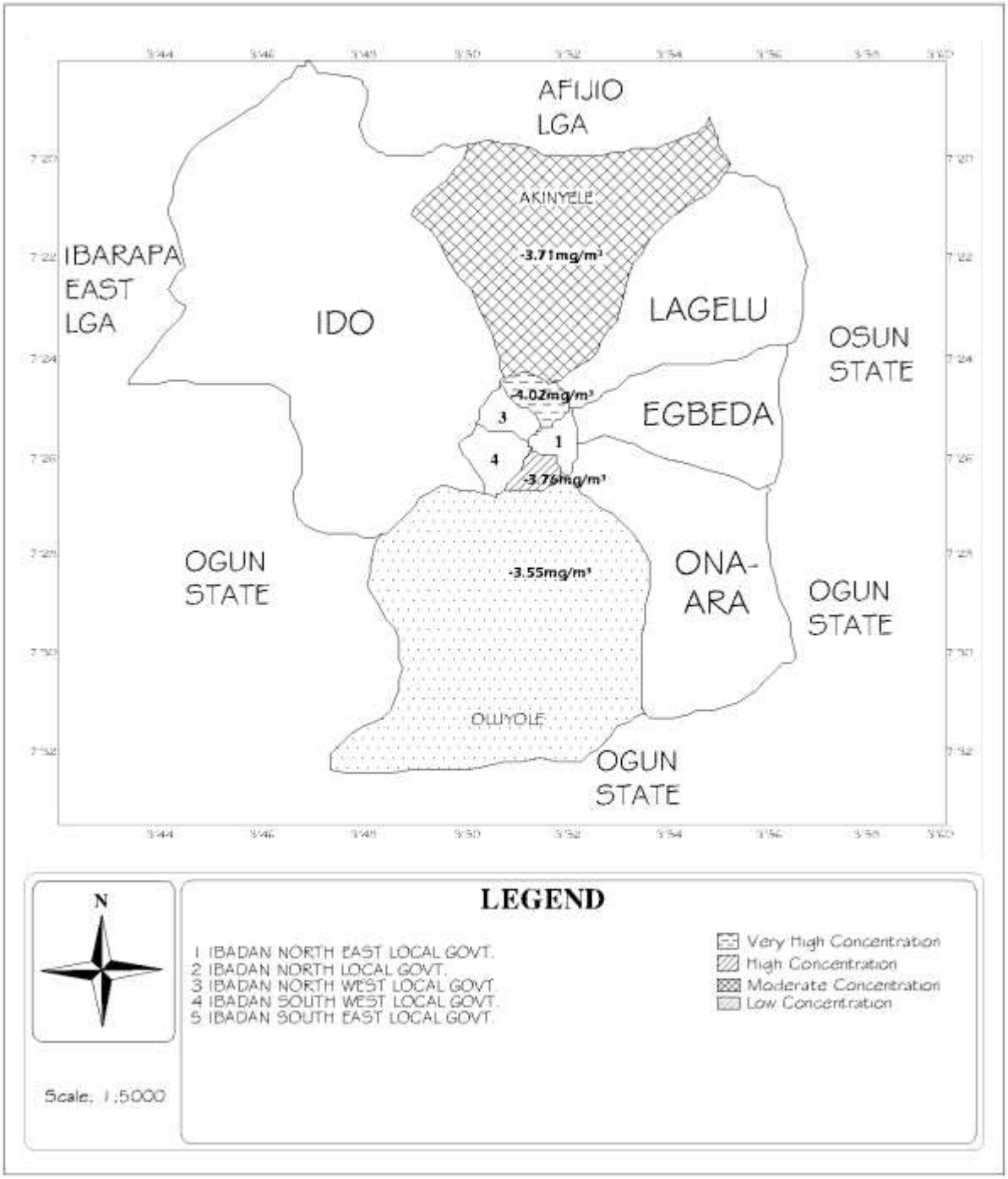
Methane gas is colourless odourless and highly inflammable gas that is used primarily as fuel and for generation of electricity. Its major source in the atmosphere is caused by human activities particularly bacterial decomposition of waste at landfills site. It reacts explosively with halogens and oxidizers, including the ozone. It acts as an asphyxiant in closed spaces, by sucking up oxygen from surrounding air. Its inhalation causes headaches, dizziness, nausea and drowsiness

The observed concentrations of gaseous pollutant at various sampling points are summarized in Table 3. The value for overall average for all the four local government areas is not significant. Similarly, the concentration of methane at all the sampling points is not significant both at weekday and weekend. The concentration varies from - 3.2 mg/m^3 to - 3.9 mg/m^3. These are far below the tolerance limit of ambient air pollutant.

Table 3: Spatial variation in Concentration of Methane

S/N	Sampl Areas	Samps	CH_4 (ppm mg/m^3)							
			WKD	WKED	WKD	WKED	WKD	WKED	WKD	WKED
			Ibadan South East		Akinyele		Ibadan North		Oluyole	
1	SP_1	Provision Store	-6(-3.9)	-6(-3.9)	-5(-3.2)	-5(-3.2)	-5(3.2)	-5(3.2)	-6(-3.9)	-6(-3.9)
2	SP_2	Food Rest	-6(-3.9)	-6(-3.9)	-6(-3.9)	-6(-3.9)	-6(3.9)	-6(3.9)	-5(-3.2)	-5(-3.2)
3	Sp_3	Fish Smoking	Nil	Nil	Nil	Nil	Nil	Nil	-5(-3.2)	-5(-3.2)
4	SP_4	Cement Store	-5(-3.2)	-5(-3.2)	-6(-3.9)	-5(-3.2)	-5(3.2)	-5(3.2)	Nil	Nil
5	SP_5	Recorded Studio	-6(-3.9)	-6(-3.9)	-6(-3.9)	-6(-3.9)	-5(3.2)	-5(3.2)	-6(-3.9)	-6(-3.9)
6	SP_6	Business Center	-5(-3.2)	-5(-3.2)	-5(-3.2)	-6(-3.9)	-6(3.9)	-6(3.9)	-5(-3.2)	-5(-3.2)
7	SP_7	Mechanic	Nil	Nil	-5(-3.2)	-6(-3.9)	-6(3.9)	-6(3.9)	Nil	Nil
8	SP_8	Painting	Nil	Nil	Nil	Nil	-5(3.2)	-6(3.9)	Nil	Nil
9	SP_9	Sawmill	Nil	Nil	Nil	Nil	-6(3.9)	-6(3.9)	Nil	Nil
10	SP_{10}	Fashion designing	-6(-3.9)	-6(-3.9)	-5(-3.2)	-5(-3.2)	Nil	Nil	-6(-3.9)	-6(-3.9)
11	SP_{11}	Metal Grinding	-6(-3.9)	-6(-3.9)	Nil	Nil	Nil	Nil	Nil	Nil
12	Sp_{12}	Vulcanizing	-6(-3.9)	-6(-3.9)	-5(-3.2)	-5(-3.2)	Nil	Nil	-4(-2.6)	-6(-3.9)
13	SP_{13}	Furniture	-6(-3.9)	-6(-3.9)	-5(-3.2)	-6(-3.9)	Nil	Nil	-6(-3.9)	-6(-3.9)
14	Sp_{14}	Welding	-6(-3.9)	-6(-3.9)	-5(-3.2)	-6(-3.9)	-5(3.2)	-6(3.9)	-6(-3.9)	-6(-3.9)
15	Sp_{15}	Barbing Saloon	Nil	Nil	Nil	Nil	Nil	Nil	-6(-3.9)	-6(-3.9)
16	Sp_{16}	Hair Dressing	-6(-3.9)	-6(-3.9)	Nil	Nil	-6(3.9)	-6(3.9)	Nil	Nil
17	Sp_{17}	Cassava processing	Nil	Nil	-6(-3.9)	-6(-3.9)	-6(3.9)	-6(3.9)	-5(-3.2)	-5(-3.2)
18	Sp_{18}	Block Industry	Nil	Nil	-6(-3.9)	-6(-3.9)	-6(3.9)	-6(3.9)	-5(-3.2)	-5(-3.2)
19	Sp_{19}	Palm Kernel	Nil	Nil	-6(-3.9)	-6(-3.9)	-5(3.2)	-6(3.9)	-6(-3.9)	-6(-3.9)
20	Sp_{20}	Bakery	Nil	Nil	Nil	Nil	-6(3.9)	-6(3.9)	-5(-3.2)	-5(-3.2)

Source: Author's Field work (2012)



Source:Authors' Field Work

Fig 4: Spatial variation in concentration of methane

Conclusion and Reccomendation

The paper established that urban informal enterprises do not contribute to job creation to unemployed alone but its associated environmental negativities are also appalling. The emissions of harmful gaseous pollutant like CO, H_2S whose concentration are above permissible level is a proof to its damaging effect on the environment. Therefore, formulation of appropriate policy particularly on the environmental negativities of the subject vis a vis generation of pollutants is highly expedient in ensuring the sustainability of the environment. The legislation should incorporate policies on environmental ethics that will guide behavioural attitude of operators specifically the method of waste disposal, operational procedures most especially the ones that have significant consequences on environment. The locations of UIEs that use gasoline fuel should be controlled, while activities, that generates discharges waste indiscriminately should be monitored by relevant environmental agencies at all tiers of government. This will undoubtedly guide against the use of harmful chemicals, unregulated emission of pollutants and indiscriminate dumping of wastes generated. It is therefore concluded that informal enterprises should be given adequate attention by government. This can be achieved by incorporating urban informal enterprises into the fabric of the city as semi-formal institute and more importantly necessary attention should be given to its environmental effect.

The concept of environmental planning and management should be employed in the management of a sustainable environment. It is the panacea to urban environmental problems. Its attribute as holistic, flexible and interactive approach to sustainable urban planning and management justify its capability for addressing all environmental problems in most urban centers. Effective environmental planning must involve both the operators and environmental managers. This will enhance proper management and alleviate the threat posed into the ambient environment. Proper management of waste emanating from these enterprises through environmental education and awareness particularly to the operators and patrons as well as appropriate management strategies will further enhance environmental sustainability.

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