

Contributions of Urban Informal Enterprises to Noise Pollution in Ibadan, Nigeria

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Abstracts

Against the background of incessant widespread of informal enterprises and its appalling environmental negativities, this paper examines the contributions of urban informal enterprises to noise pollution in Ibadan. It measures varying levels of noise generated by twenty (20) UIEs in fifty two(52) locations within four randomly selected LGAs in Ibadan.Noise measurement for different UIEs was taken with an Extech 407355 Personal Noise Dosimeter. A sampling period of 15 to 30 minutes and sometimes throughout the operation time was employed for each of the sampled UIEs. The result reveals that noise levels for all the sampled UIEs varied with categories of UIEs and space. The noise levels recorded was observed to breach the sleep disturbance limits of 45dB as set by WHO and the World Bank's limit of 55dB. This ranges between 73.63 dB and 77.95dB.The study recommends that equipment with lower noise level within desirable limit should be employed for operation and such equipment must be properly maintained. Acoustic zoning can also be employed to increase distance from the source and the receiver this will irrefutably enhance a liveable environment.

Key Words: Noise, Urban, Informal Enterprises, Pollution

Introduction

The sporadic emergence and haphazard growth pattern of informal enterprises is a universal phenomenon in cities of the world and not only peculiarity of the third world cities. It has, for instance, been estimated that 20 million workers operate in the informal sector in European Union and that in OECD countries the informal sector accounts for approximately 15 percent of the GDP (Karl, 2000). Therefore, informal sectors have been taking a larger percentage in the employment provision. This was also remarked by Fideler and Webster (1996), and Obadan et al (1996), that urban informal enterprises is a major provider of employment and income to the unemployed. It is equally evident that the proportion of urban informal sector employment is highest in Africa; this is followed by Asia, South East Asian (Onyechere 2011). In South Asian cities, the work force in urban informal enterprises is around 50-60% (Rukmana, 2007). However, despite the contribution of the sector to job creation and to the boosting of the nation's economy, the associated negativities in terms of pollution of different forms are appalling. This pollution ranges from land, water, air as well as noise depending on the operational procedures, waste materials disposed and equipment's employed for the activities. Although people's response to noise as a component of pollutant has remained subjective issue (Ford, 2006), nevertheless the need to pay adequate attention to the subject becomes pertinent.

Noise pollution falls within the scope of environmental pollution and specifically a pollution type that causes deterioration to quality of environment and likewise hazardous to human health (Rao 1995). According to Khitoliya (2004) the generation of unreasonable noise within the environment is regarded as a form of pollutant because it lowers the quality of life, it contaminate the environment and consequently becomes nuisance to the extent that it affects the health of a person, their activities and mental abilities. In lieu of this, Weinhold, (2010) observed that noise pollution has been a source of concern to doctors' psychologist and economists.

Noise generation is associated with most human activities including urban informal enterprises. Noise from commercial and trading activities and other categories of urban informal enterprises is significant among various sources of noise pollution. Uchegbu (1998) remarked that during the processes of carrying out business activity, operators of informal enterprises generate noise in their areas of operation most especially from hawkers, record selling and the likes. This is accompanied with various impacts like psychological effects, loss of hearing, sleeplessness, nervousness, hypertension and other related health challenge depending on its magnitude (). In the same vain, Turk et all (1978) noted that noise can cause interference with communication, loss of hearing and also affect health and behavior of people. Khitoliya (2004) also recognized three levels of noise impact to include performance, physiology and psychology. Consequently, it becomes essential to undertake noise measurement for this type of economic activities by determining noise level generated and compare various urban informal activities at different locations that contribute to noise pollution as well as its impact vis a vis wellbeing of residents.

Noise measurement is an important diagnostic tool in noise control technology because its accurate measurement gives a purposeful act of comparing noises under different conditions for assessment of adverse impacts as well as adopting suitable controls techniques for noise reduction (Rao, 1995). To this end Onyechere (2011) maintained that there is need not only to fathom which of this urban informal subsector degrades the environment most but to determine which component is most degraded with respect to land, water, air and the sociocultural environment. This is the major concern of this paper especially in a developing African city like Ibadan.

The choice of Ibadan city as the study area is justified because it was recognized as one of the megacities in Nigeria birth by urbanization. It is also the fifth largest city in Nigeria

by population after Kano, Lagos, Kaduna and Katsina (Population and Housing Census 2006) and third largest in terms of spatial extent in Africa after Cairo and Johannesburg (Udo, 1994). It is the most populous state capital in South Western Nigeria. It is a pre-colonial urban centre where urbanism as a way of life predates European colonization of the country. These characteristics of the city have attracted numerous informal operators who seek employment to sustain their livelihood. The rapid population increase in the city is also enhanced by its commercial function. This has undeniably encouraged the proliferation of urban informal enterprises with its accompanied contribution to environmental pollution especially from noise. This is the major thrust of this paper.

Literature Review

The informal sector consists of very small scale economic activities. This accounts for substantial and increasing share of urban employment in most developing countries where a large majority of the urban poor depend on such activities for their livelihood. A survey of the informal manufacturing sector in Nigeria revealed that most of such enterprises appear profitable to their owners but generate little employment through firm growth. Similarly, studies in developing countries (Hart 1970, Freudy 1990, Cross 1994, Sethuraman 1997), have shown that informal labour force range from 20%-70% informal employment. This represents half to the three - quarters of non-agriculture employment. In many of these countries, the informal sector provides more employment opportunities than formal sector. It was established further that they are very small under-capitalized and have minimal transaction with larger formal sector companies (CBN/NISER/FOS 2003). Although, the sector has played a positive role in employment creation nevertheless, the incessant widespread coupled with unguided and indigenous mode of operation will undoubtedly contribute to environmental pollution most especially from noise is noteworthy.

Noise pollution is an unrecognized silent environmental menace whose occurrence emanate mostly as a by- product of urbanization and industrialization. It is one of the major problems that limits quality of urban life and its implication on human health has not been given adequate attention it deserved compared to other type of pollution. Attention on noise pollution and its impacts on environment have been carried out by some researchers (Ugwanyi et al 2004, Khitoliya 2004, Rao 1995, Stanfield et all 2005,among others). Although, most of these studies have focused on road traffic as the most predominant and generalized sources in urban areas that are poorly planned, but on the contrary, Braj and Jain (1995) remarked that commercial areas have the highest noise levels, followed by industrial and residential areas.

Noise has been defined as unpleasant and unwanted sound (Khytoliya, 2004), or any sound which by reason of intensity interferes with speech, hearing or otherwise annoying. Similarly, noise pollution is defined as the release of unwanted disturbing or harmful sound that impairs or interferes with hearing causes stress, impairs concentration and work efficiency or accidents (..). According to Uchegbu (1998) noise pollution is an undesirable sound from various human activities with adverse effects on human beings and their environment including land structures, domestic animals, wildlife and the ecological systems. There are several sources of noise eventhough, most studies paid emphasis on noise mainly from roads (vehicular movement), industry and especially from airports (Stanfield et al 2005, Van Praagarsma 2005). The sources of noise are varied according to daily activities. These include natural (thunder, volcanic eruption, wind movement, sea tide etc), industrial (generator sets, engine, plant operations etc), domestic (movement of utensils, cutting, grinding etc), agricultural (tractor, milling machine, livestock, etc), transportation and commercial (aero planes, automobiles, vendors and hawkers, tertiary services, commercial shops, cottage small scale industry). All these sources produce different levels of sound which

transform to noise. This was supported by Ebeniro and Abumere (1999) that environment noise is an unwanted signal which in most cases is sound. To determine some of the levels of sound, their permissible limits and impacts, agencies. Government both in developed country and developing country established some agencies and parastatal (WHO, EPA, FEPA) to monitor the impacts of various activities on the environment.

The impacts of noise impacts on environment has become unjustifiable interferences and imposition upon human health, comfort and qualitative of human life (Gorai and Pal 2006). According to Procter (1981) noise pollution does not affect human beings alone it also affect the environment in which those individuals live. This undoubtedly reduces the value of the properties in the area. The level of impacts on human health is dependent on duration of exposure and noise level produced. For instance WHO recommends that any unprotected exposure greater than 100dB should be limited to 4hours and frequency four times per year. A continuous noise exposure level of 85dB can result in hearing damage as well as other various negative impacts on human health. Consequently, the degree of risk is affected by intensity, frequency as well as duration and pattern of exposure and individual susceptibility to hearing impairment (CCOH, 2009). The resultant adverse health effects of noise pollution are numerous pervasive medically and socially significant thus the need for appropriate control measures.

The control of noise pollution most especially in developing countries like Nigeria requires the efforts of all the three tier of Government, professionals and citizens especially those that generate noise pollution like urban informal enterprises. Consequently, The Federal Government of Nigeria established agencies both at Federal and State level to improve the quality of the environment and to free it from pollutant and other environmental hazards. For instance Federal Environmental Protection Agencies (FEPA) was saddled with the responsibility protect, restore, and preserve the ecosystem. To achieve this laudable goal, the agency has computed guidelines and standard for industrial effluents, gaseous emissions hazardous waste s as well as permissible noise levels. The permissible sound levels and its duration has been computed and presented in Table1. Similarly, World Bank also computed guide lines for community noise (Table 2). *(For the purpose of this paper the two guide lines (i.e. Federal Environmental Protection Agencies and World Bank standard) were used as basis of comparison for various noise level measured for urban informal enterprises.)* The formulation of standards and its implementation is the responsibility of these government bodies while the onus lies on the citizenry to be willing to implement control strategies so as to achieve a peaceful and liveable environment.

Table 1: Nigerians Standard Noise Levels

Duration per Day, hour	Permissible Exposure Limit dB
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.25 or less	115

Source: FEPA (1991)

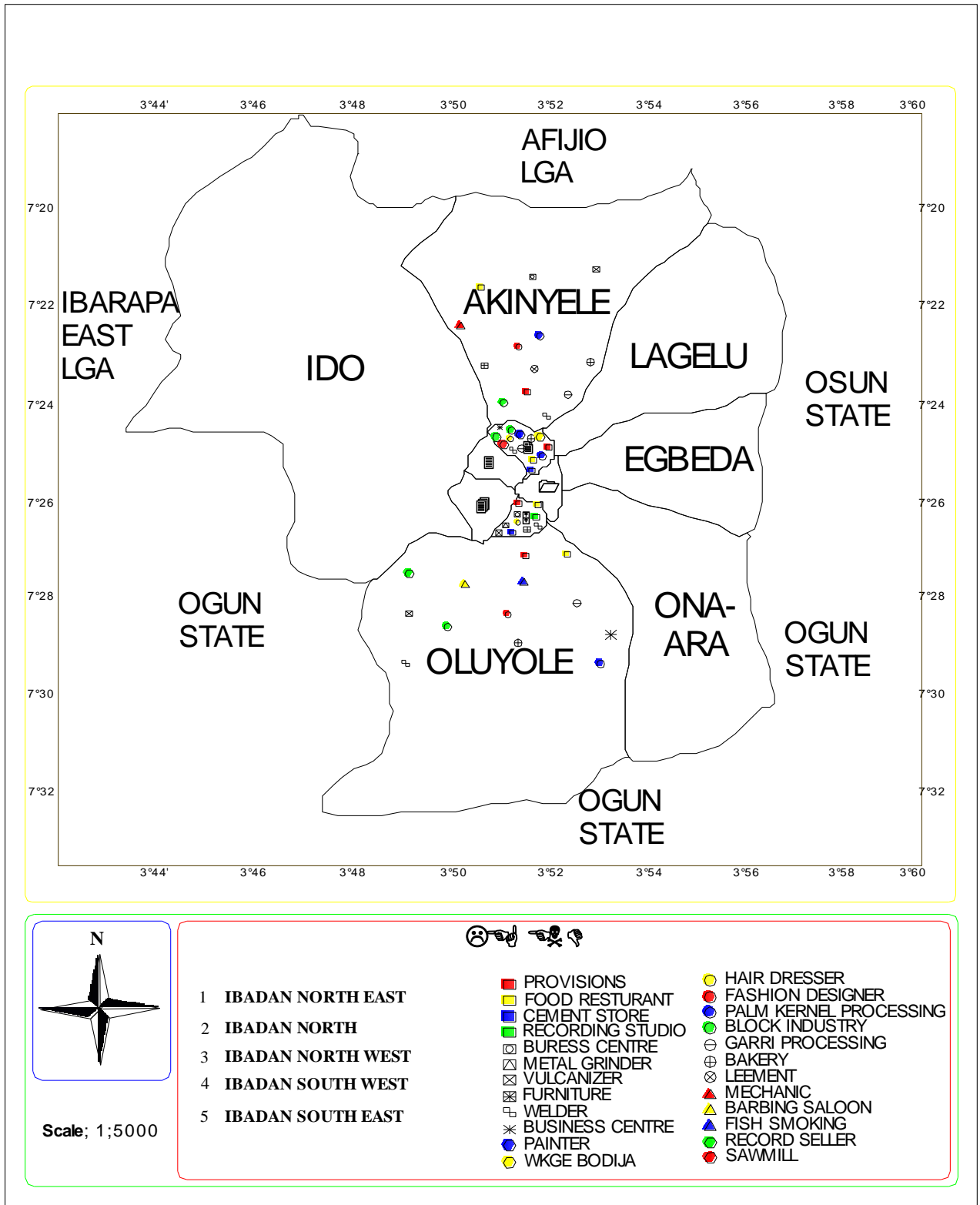
Table 2: Guidelines Values for Community Noise

Environments	Critical Health Effect(s)	Level dB
Outdoor Living Area	Serious Annoyance ,daytime and evening	55
	Moderate Annoyance ,daytime and evening	50
Dwelling Indoors	Moderate Annoyance ,daytime and evening	35
Inside Bedroom	Sleep Disturbance Night Time	30
Outside Bedrooms	Sleep Disturbance, Window Open Outdoor	45

Source: World Health Organization

Materials and Methods

The paper adopted primary data from actual measurement of noise pollutants emitted during the operational procedures of selected urban informal enterprises in the study area. The sampling locations were randomly selected from four LGAs within the Ibadan cosmopolitan region. The selected LGAs represent two within the metropolis and two from suburban Ibadan Less city. Global Position System (GPS) was used to determine the sampling locations as presented in Figure 1. A total of fifteen locations representing at least 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. Two days of the week (i.e. a working day and weekend) was used to monitor noise generated from these activities. This is premised on the fact that most operations relating to UIEs were carried out during the weekday while fewer or none are operated during the weekend. This however justifies the selection of the days. Noise measurement for different UIEs was taken with an Extech 407355 Personal Noise Dosimeter. The instrument is designed to test noise exposure in accordance with OSHA, MSHA, DOD, ACGIH and ISO standard. The dimension of the dosimeter is 4.2(L) by 2.4(W) by 1.3(H),106(L) by 60(W) by 34(H)mm weighing about 12.302(356g) with batteries. Calibration of 50dB was performed before each use at different locations. The instrument was placed close to the point of noise level generation. Other sound reflecting sources were avoided to get the actual noise generated. A sampling period of 15 to 30 minutes and sometimes throughout the operation time of the engine concerned was determined for each of the sampled UIEs.



SOURCE: AUTHOR'S FIELD WORK, 2012

Figure 1: Sampling Location for Urban Informal Enterprises

Plate 1: Extech 407355 Personal Noise Dosimeter



4. Results and Discussion Findings

As summarized in Table 3, the minimum noise levels obtained during the week day from the sampled urban informal enterprises range from 65.1 to 81.2 dB while weekend measured noise levels ranged 50.0-69.1dB. During the same period the weekday and weekend maximum noise level measured ranged between 74.5 to 90.4 and 51.2 to72.5 dB respectively. Comparing the obtained maximum and minimum noise levels during the weekday and weekend for all the monitored urban informal enterprises with disturbance limit of 45dB and the World Bank limit of 55 dB showed that all the urban enterprises sampled in all locations breached the acceptable standard, because the noise generated exceeded maximum allowable limit. As observed from the Figure 2, there is a significant variance from the noise level during the weekday and weekend for all the sampled urban informal enterprises. This suggests that apart from other sources of noise pollution on the sampling area; all the enterprises sampled generate a higher level of noise most especially during the operation period. On the other hand, considering the result of noise level during the weekend shows that virtually all the enterprises recorded noise level-value that is above allowable standard of WHO (45dB) and WB (55dB) only two of the enterprises falls within and below the allowable exposure levels.

Figure 2: Noise Levels Measured for Urban Informal Enterprises in Akinyele Local Government

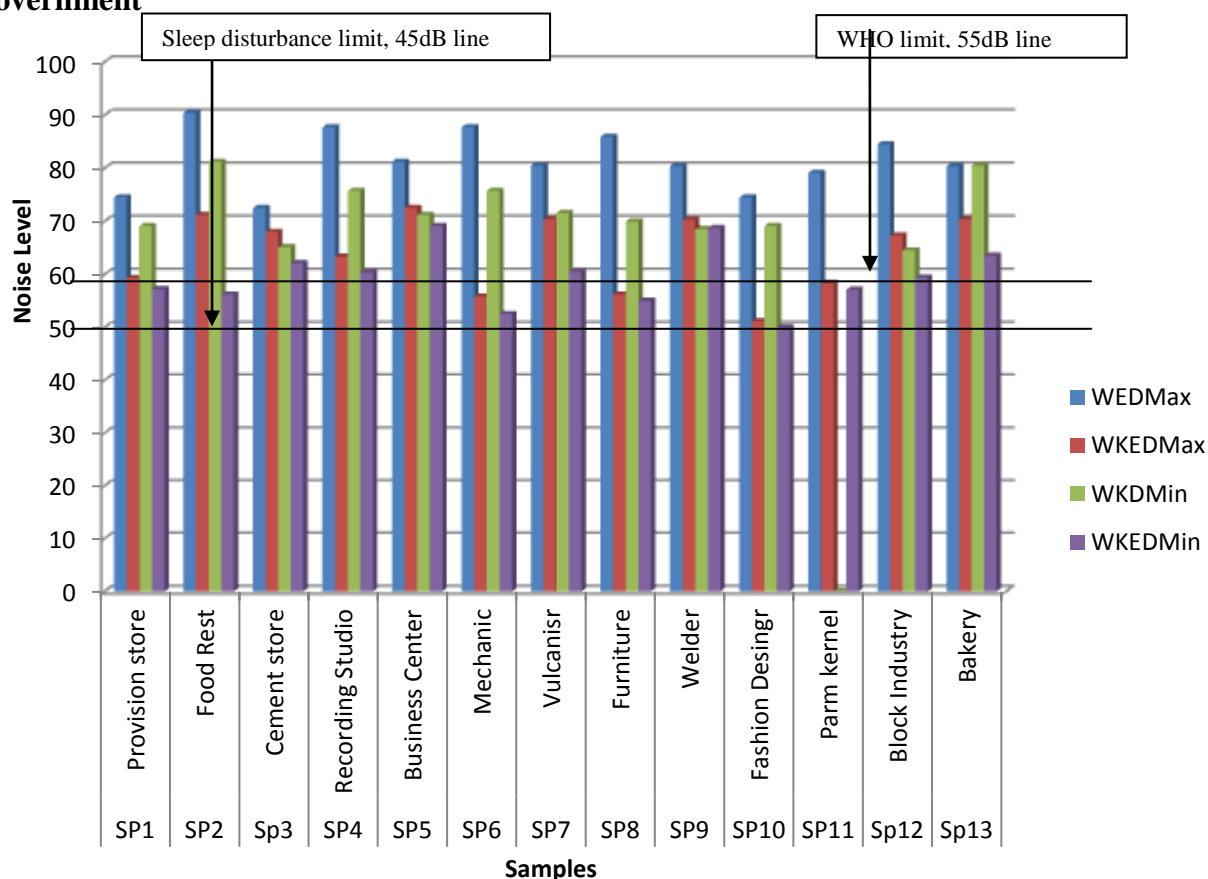


Table3: Noise Levels Measured for Urban Informal Enterprises in Akinyele Local Government Ibadan

S/N	Sampl Areas (AKY)	Samples	Noise Level dB			
			Maximum		Minimum	
			WED	WKED	WKD	WKED
1	SP1	Provision store	74.5	59.3	69.1	57.2
2	SP2	Food Rest	90.4	71.2	81.2	56.2
3	Sp3	Cement store	72.5	68.0	65.1	62.1
4	SP4	Recorded Studio	87.7	63.3	75.7	60.4
5	SP5	Business Center	81.2	72.5	71.2	69.1
6	SP6	Mechanic	87.7	55.8	75.7	52.5
7	SP7	Vulcanizing	80.5	70.4	71.5	60.5
8	SP8	Furniture	85.9	56.2	69.9	55.0
9	SP9	Welding	80.4	70.3	68.5	68.7
10	SP10	Fashion Designing	74.5	51.2	69.1	50.0
11	SP11	Parm kernel	79.1	58.3	68.3	57.1
12	Sp12	Block Industry	84.5	67.3	64.5	59.4
13	Sp14	Bakery	80.4	70.4	80.5	63.5

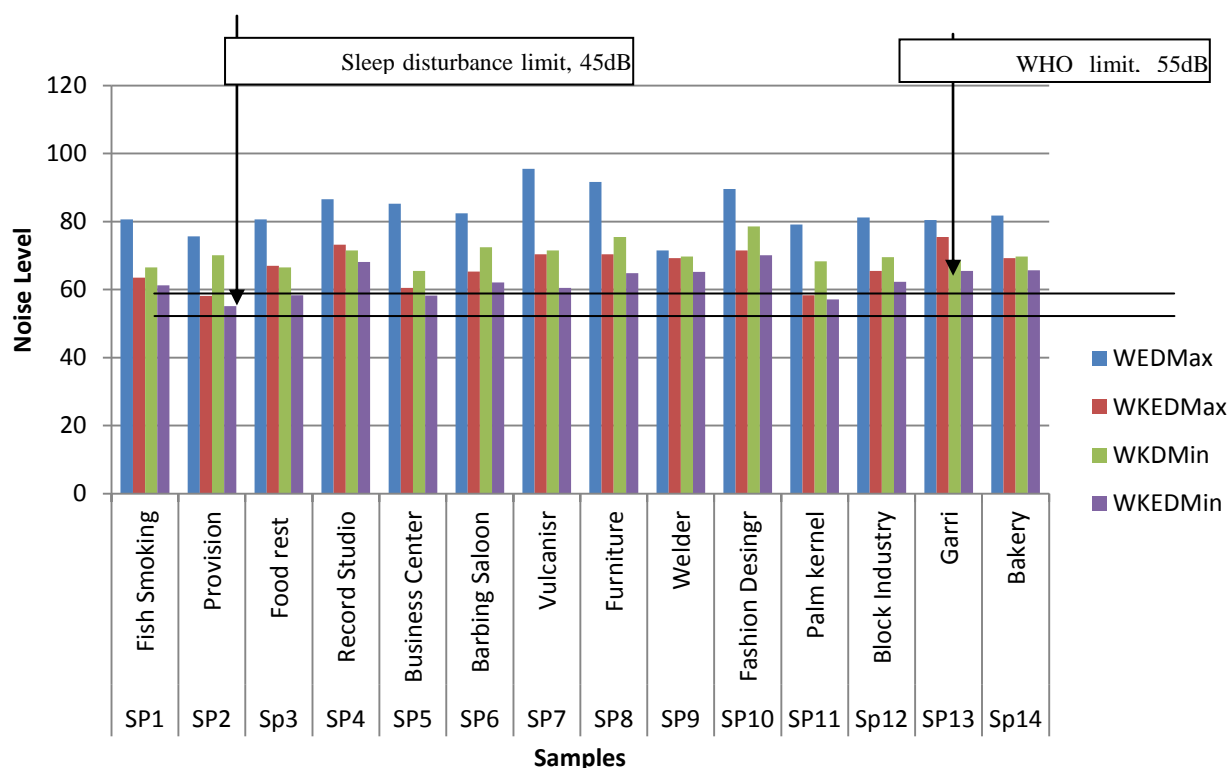
Source: Author's Field Survey (2012)

Oluyole Local Government Area

The measured noise levels for various categories of urban informal enterprises in Oluyole local government area are presented in table 4 and Figure 3. The results of maximum noise levels for weekday and weekend in comparison with sleep disturbance limit of 45 dB as set by the WHO and the world Bank’s limit of 55 dB were breached in all the sampled locations. This ranged between 15.6- 95.5 dB for weekend and 58.1- 73.2 dB for weekend. However, for each of the urban informal enterprises, there is a significant variation in the maximum measured noise levels for weekday and weekend. This implies that the activity has undoubtedly contributed to the noise level during the weekday coupled with other human activities that could have generated some level of noise.

Similarly, during the same period for weekday and weekend minimum noise levels ranged between 65.5-78.5 dB and 55.1-70.1 dB respectively for all the urban informal enterprises and in all the sampling locations, with the exception of provision store. The noise levels measured the exact noise limit for World Bank. Others generate noise levels that were above the standard limit either for World Bank or World health organization. The implication of this is that some of the urban enterprises still operate during the weekend but at a minimal rate. However, comparing the minimum range between the weekday and weekend there is still a significant variance.

Figure 3: Noise Levels Measured for Urban Informal Enterprises in Oluyole Local Government Ibadan



Source: Author’s Field Survey (2012)

Table 4: Noise Levels Measured for Urban Informal Enterprises in Oluyole Local Government Ibadan

S/N	Sampl Areas (OIUY)	Samps	Noise Level dB			
			Maximum		Minimum	
			WED	WKED	WKD	WKED
1	SP ₁	Fish Smoking	80.6	63.5	66.5	61.2
2	SP ₂	Provision	75.6	58.1	70.1	55.1
3	Sp ₃	Food rest	80.6	67.0	66.5	58.3
4	SP ₄	Recorded Studio	86.5	73.2	71.5	68.1
5	SP ₅	Business Center	85.2	60.5	65.5	58.2
6	SP ₆	Barbing Saloon	82.4	65.3	72.4	62.1
7	SP ₇	Vulcanizing	95.5	70.4	71.5	60.5
8	SP ₈	Furniture	91.6	70.4	75.4	64.8
9	SP ₉	Welding	71.5	69.2	69.7	65.2
10	SP ₁₀	Fashion Designing	89.6	71.5	78.5	70.1
11	SP ₁₁	Palm kernel	79.1	58.3	68.3	57.1
12	Sp ₁₂	Block Industry	81.2	65.5	69.5	62.3
13	SP ₁₃	Cassava processing	80.4	75.4	68.5	65.5
14	Sp ₁₄	Bakery	81.7	69.2	69.7	65.7

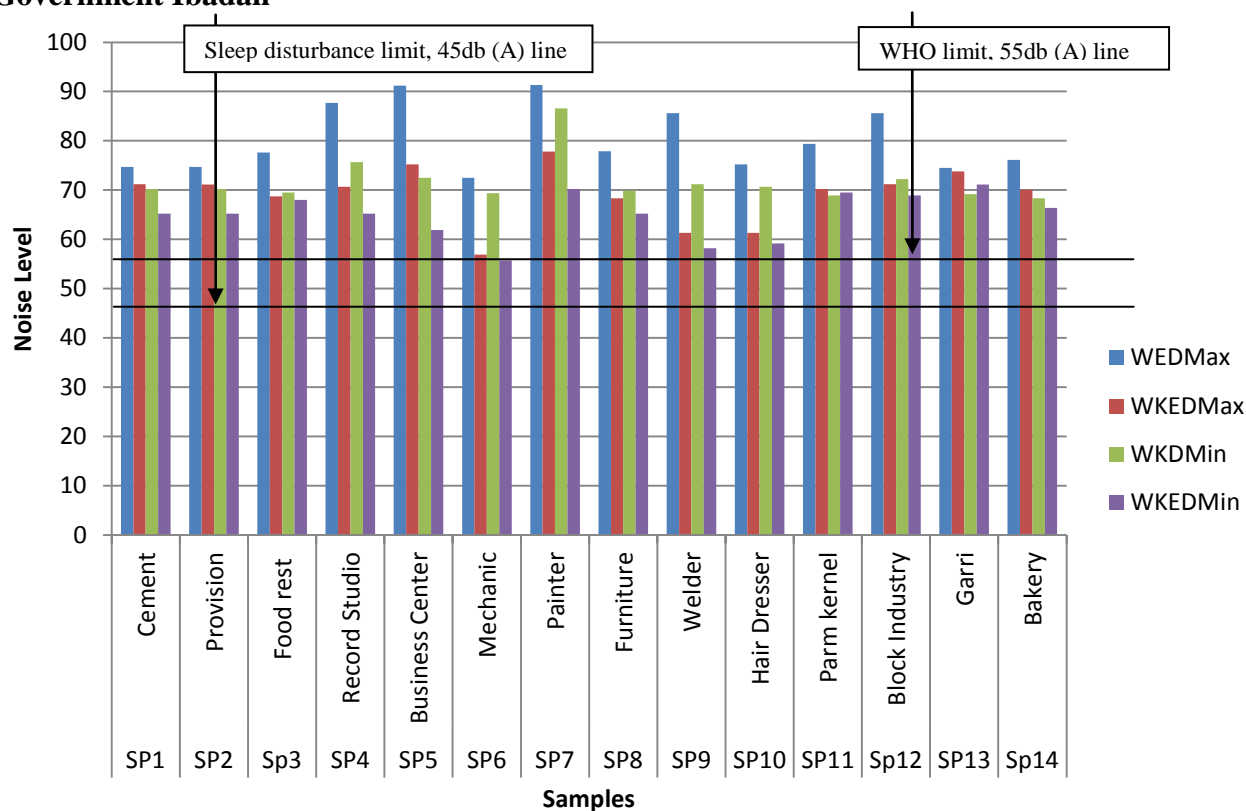
Source: Author's Field Survey (2012)

Noise Level Ibadan North

Table 5 summarized the measured noise levels for urban informal enterprises in Ibadan North Local Government Area. Noise level for fourteen categories of urban informal enterprises at fourteen sampling point in the study area were monitored. The results reveals that measured maximum noise level ranged between 72.5-91.3 dB while minimum noise level ranged between 56.9-77.8 dB. However, the measured minimum noise level ranged between 68.3-86.6 dB and 55.7 – 71.1 dB respectively. It was observed that in, the study area painting recorded the maximum noise level (91.3dB) because the sampling point was mechanic village in Ibadan where automobile repairs are dominated. This is coupled with the fact that most painters uses big generator to power their engine most especially when electric power supply is not available. Other urban informal enterprises also generate high noise level as illustrated in figure 4. These affects communication, disturb sleep of residents and other minor or major effect depending on level of exposure. According to Uchegbu (1998) any measured noise level from 70dBb is categorized low while noise level within and above 80dB is categorized to be very loud. The effect of this on man increases with increase in exposure

On the other hand, comparison of measured minimize level for weekday and weekend shows a significant variance even though virtually all the urban informal enterprises sampled during the weekend measure a moderately high level of noise since majority are either below 70 dB or slightly above the same. This increase could be as a result of noise generated from other human activities in the study area.

Figure 4: Noise Levels Measured for Urban Informal Enterprises in Ibadan North Local Government Ibadan



Source: Author's Field Survey (2012)

Table 5: Noise Levels Measured for Urban Informal Enterprises in Ibadan North Local Government

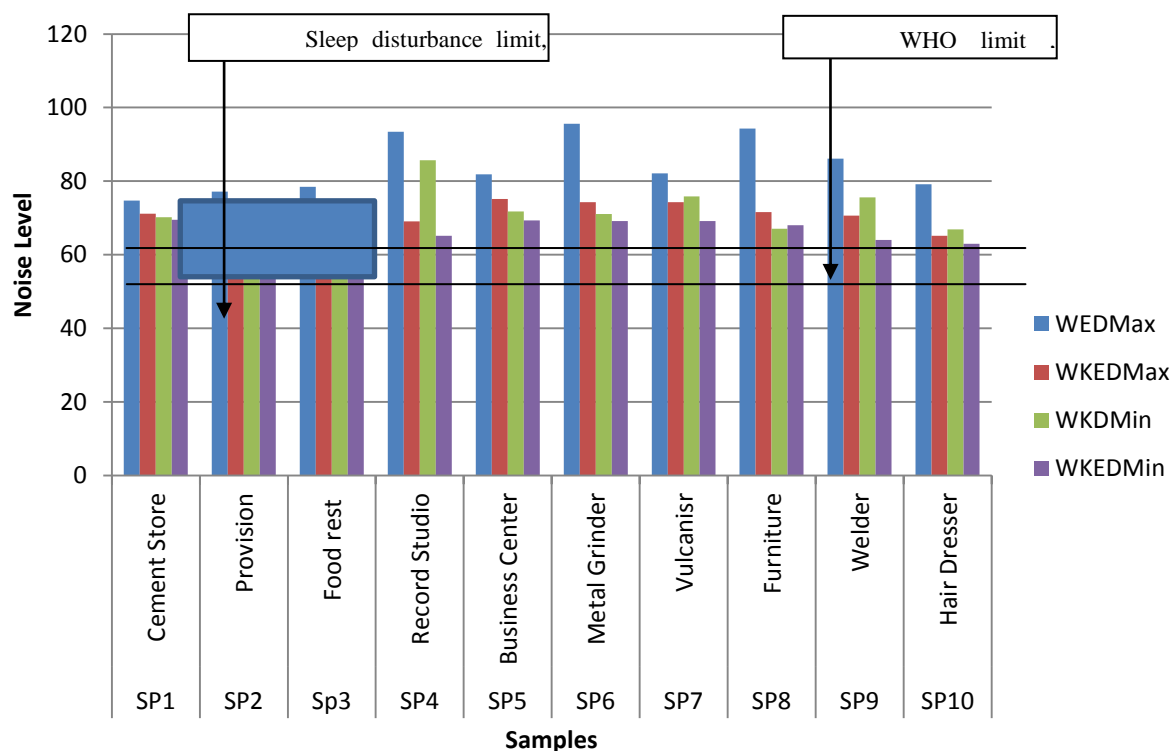
S/N	Sampling Points (IBN)	Samples	Noise Level dB			
			Maximum		Minimum	
			WED	WKED	WKD	WKED
1	SP ₁	Cement	74.7	71.2	70.2	65.2
2	SP ₂	Provision	74.7	71.1	70.2	65.2
3	SP ₃	Food rest	77.6	68.7	69.5	68.0
4	SP ₄	Recorded Studio	87.7	70.7	75.7	65.2
5	SP ₅	Business Center	91.2	75.2	72.5	61.9
6	SP ₆	Mechanic	72.5	56.9	69.4	55.7
7	SP ₇	Painting	91.3	77.8	86.6	70.2
8	SP ₈	Furniture	77.9	68.3	69.9	65.2
9	SP ₉	Welding	85.6	61.3	71.2	58.2
10	SP ₁₀	Hair Dressing	75.2	61.3	70.7	59.2
11	SP ₁₁	Parm kernel	79.4	70.2	68.9	69.5
12	SP ₁₂	Block Industry	85.6	71.2	72.2	68.9
13	SP ₁₃	Cassava processing	74.5	73.8	69.2	71.1
14	SP ₁₄	Bakery	76.1	70.1	68.3	66.4

Source: Author's Field Survey (2012)

Ibadan South East

In Ibadan South East, the weekday/weekend measured maximum noise levels were 74.7 – 95.6 dB, 65.2 and 75.2dB respectively. The minimum noise levels measured range between 66.9 to 85.7dB and 63.0 and 69.5dB. These values as summarized in table 6 and are above the limit of FMENV. An overview of these values as illustrated in figure 5 indicates that both sleep disturbance limit of 45 dB as set by the WHO and the World Bank limit of 55 dB were breached in all the sampling locations because it exceed 70 dB. Only few of the urban informal enterprises measured noise levels slightly below 70 dB, even though the noise is described as moderately loud. These results corroborate residents report that most of the informal enterprises sampled generate noise that disturbs sleep and sometimes causes annoyance. These invariably have impact on socio cultural environment.

Figure 5: Noise Levels Measured for Urban Informal Enterprises in Ibadan South East Local Government Ibadan



Source: Author's Field Survey (2012)

Table 6: Noise Levels Measured for Urban Informal Enterprises in Ibadan South East Local Government Ibadan

S/N	Sampling Points (IBSE)	Samples	Noise Level dB			
			Maximum		Minimum	
			WED	WKED	WKD	WKED
1	SP ₁	Cement Store	74.7	71.2	70.2	69.5
2	SP ₂	Provision	77.2	70.1	69.7	66.2
3	SP ₃	Food rest	78.5	74.3	70.5	69.2
4	SP ₄	Record Studio	93.4	69.1	85.7	65.2
5	SP ₅	BusinessCentr	81.9	75.2	71.8	69.3
6	SP ₆	MetalGrinding	95.6	74.3	71.1	69.2
7	SP ₇	Vulcanizer	82.1	74.3	75.9	69.2
8	SP ₈	Furniture	94.3	71.6	67.1	68
9	SP ₉	Welding	86.1	70.6	75.6	64.0
10	SP ₁₀	Hair Dressing	79.2	65.2	66.9	63.0

Source: Author's Field Survey (2012)

Conclusion and Recommendation

In view of this fact, any credible strategy germane towards economic development in this country must pay due attention to this sector (Sethuraman, 1997). Although attention has been concentrated on creating and improving the regulatory environment, simplifying business registration, property rights, conducive labour law, productivity access to credit, among other policies to formalize the economy, but either few or none of the policies address its implication on the environment especially noise generated by this sector. Evocative programmes on sustainable development, particularly in cities need to focus special attention on the activities of this sector especially on its contribution to noise pollution and other impacts on the environment. This will undoubtedly promote a holistic approach to creating and facilitating conducive, aesthetically pleasing and sustainable environment.

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