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SURVEY OF NOISE DISTRIBUTION LEVEL IN IDAH LOCAL GOVERNMENT AREA, KOGI STATE NIGERIA

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Abstract
The proliferation of noise sources in cities has adverse health impact. This study investigated the noise distribution and its health effect on the people in Idah. The methodology is through the use of Global positioning system (GPS) to obtain the survey areas on a global map; by establishing the latitude and longitude of the areas. Okenya, Ibro-Junction, Edeh-Alaba, Edeh-Adejoh, and Ofiji are the five (5) clusters investigated. Digital sound level meter ST9604 was used to obtain the noise distribution level in decibel. This was done by facing the noise level meter towards the sources of noise in the cluster locations. The average noise value in decibel (dBA) obtained were 58dBA, 62dBA, 56dBA, 57dBA and 64dBA respectively. In all, 26 locations were surveyed. Ten out of which recorded noise level well above 60dBA which is 38.6% and 100% of the entire survey area recorded noise level of 50dBA and above. According to WHO and NESREA, noise level beyond 55dBA is detrimental to human health and are associated with the following health risk; hearing impairment, dizziness, mental disorder, sleep disturbance, brain tumor, speech interference, serious annoyance, unproductiveness as a result of lack of concentration in workplace and general fatigue. In conclusion, the people living in the study area are affected by adverse noise effect like insomnia and mental disorderliness.

Keywords: Sound level meter, distribution, GPS, WHO, clusters.

Introduction

Idah is a town in Kogi state on the eastern bank of River Niger in the middle belt region of Nigeria. It is the headquarters of the Igala kingdom and one of the largest towns in the state which is located on latitude 7°06'N & longitude 6° 45'E on the global map.

The population of Idah according to 2006 census is 79,815 and majority of the population rely on personal effort for their power need. Electricity supply in Idah is structured in such a way that there is a day ON and a day OFF but it can only come that way during the bill collection week and may be when a sheriff is in town. There can be no supply for days and the population always rely on diesel or petrol generator for electricity supply.

The activities of the town and the consequent noise pollution effect is the focus of this study.

In the past decades, some researchers have focused on the level of environmental noise people are exposed to and some others have focused on the noise generated around GSM mast. The work of Nte, et al., (2009) indicated high level of deviation in the negative sense from permissible standard by WHO.

Husain et al., (2017) revealed that majority of people in the research locations are not comfortable living close to the mast, citing risk of radiation, emission, environmental noise pollution among others. Standfeld et al., (2000) posited that noise is detrimental to health in several respects, such as, hearing impairment, sleep disturbance, cardiovascular effects, psychiatric symptoms and fetal development.

Other studies on telecommunication mast and environmental noise include:
Adeniyi and Oyeleye (2016), Akintonwa et al., (2009), Bolaji and Idowu (2012), Cohen and Weinsten (2007), Farahnaz et al (2016), Green (2006), Husain and Bele (2014), Kahya (2007), Micheal et al., (2013), Navarro et al., (2003), Enyinna and Idonije (2016), Tolulope (2019), Wolf and Wolf (2004), Zamanian et al., (2010), Zamanian et al., (2013).
While existing studies have established that the study areas are at risk of the health challenge associated with noise, it remained unclear why there are no commensurate efforts targeted in curbing the effect of environmental noise even when action and reaction are equal but opposite).
This present research tries to survey the noise effect in Idah town and recommend ways of mitigating the effects on the health of the population of the study areas.

Methodology

The global positioning system (GPS Map 76S) was used to obtain the latitude and longitude of the survey area in order to establish the exact locations on the world map. Okenya, Ibro-junction, Edeh-Alaba, Edeh-Adejoh and Ofiji are the five (5) clusters investigated in this study.
Digital sound level meter (SLM) ST9604 was used to obtain the noise distribution level in decibel. This was done by facing the noise level meter towards the sources of noise in the cluster locations. The transducer (which is the microphone of the SLM) collected the acoustic signals (sound) and converted it to electrical signal.
This signal is amplified and converted to energy in decibel which is displayed on the screen of the SLM and then recorded.

Results

The result of noise level in all the five (5) study areas, are presented in table 1 – 5. The mean noise level of the five study areas are also compared as indicated in a bar chart of figure 1. Table 6 shows the WHO noise health index.

Table 1: Noise level distribution in Okenya.

S/N	Locations	Coordinate		Distance from mast (m)	Sound level distribution (dB)
		Latitude	Longitude		
1.	House 1	$7^0$08.671/	$6^0$47.219/	1.00	68.70
2.	House 2	$7^0$06.647/	$6^0$47.265/	7.40	65.00
3.	House 3	$7^0$8.643/	$6^0$47.276/	11.84	60.90
4.	House 4	$7^0$08.648/	$6^0$47.271/	7.20	58.40
5.	House 5	$7^0$08.654/	$6^0$47.260/	10.60	55.60
6.	House 6	$7^0$08.654/	$6^0$47.261/	13.30	50.20
Mean Noise level = 58.0 dBA					

Table 2: Noise level distribution in Ibro Junction.

S/N	Locations	Coordinate		Distance from mast (m)	Sound level distribution (dB)
		Latitude	Longitude		
1.	House 1	$7^0$07.491/	$6^0$44.933/	1.00	69.70
2.	House 2	$7^0$07.840/	$6^0$44.950/	7.10	63.50
3.	House 3	$7^0$07.494/	$6^0$44.944/	7.60	62.30
4.	House 4	$7^0$07.496/	$6^0$44.937/	2.50	62.00
5.	House 5	$7^0$07.493/	$6^0$44.935/	5.10	59.70
Mean Noise level = 62.0 dBA					

Table 3: Noise level distribution in Ede-Alaba.

S/N	Locations	Coordinate		Distance from mast (m)	Sound level distribution (dB)
		Latitude	Longitude		
1.	House 1	$7^0$06.127/	$6^0$44.680/	1.00	63.40
2.	House 2	$7^0$06.144/	$6^0$44.680/	9.10	58.00
3.	House 3	$7^0$06.123/	$6^0$44.674/	11.70	55.80
4.	House 4	$7^0$06.123/	$6^0$44.695/	13.70	54.30
Mean Noise level = 56.0 dBA					

Table 4: Noise level distribution in Ede-Adejoh.

S/N	Locations	Coordinate		Distance from mast (m)	Sound level distribution (dB)
		Latitude	Longitude		
1.	House 1	$7^0$06.016/	$6^0$44.813/	1.00	64.40
2.	House 2	$7^0$06.013/	$6^0$44.810/	12.80	60.30
3.	House 3	$7^0$06.015/	$6^0$44.811/	17.50	55.30
4.	House 4	$7^0$06.019/	$6^0$44.799/	19.30	55.00
5.	House 5	$7^0$06.024/	$6^0$44.806/	11.20	54.60
6.	House 6	$7^0$06.026/	$6^0$44.816/	10.30	54.60
Mean Noise level = 56.0 dBA					

Table 5: Noise level distribution in Ofiji.

S/N	Locations	Coordinate		Distance from mast (m)	Sound level distribution (dB)
		Latitude	Longitude		
1.	House 1	$7^0$06.588/	$6^0$44.484/	1.00	60.80
2.	House 2	$7^0$06.853/	$6^0$44.780/	11.30	58.00
3.	House 3	$7^0$06.856/	$6^0$44.478/	2.70	56.70
4.	House 4	$7^0$06.855/	$6^0$44.471/	14.20	56.80
5.	House 5	$7^0$06.856/	$6^0$44.492/	3.30	57.20
6.	House 6	$7^0$6.856/	$6^0$44.489/	2.50	57.40
Mean Noise level = 57.0 dBA					

Table 6: Noise health index by WHO (WHO, 2014)

Environment	Critical Health effect	Sound level meter (dBA)	Time (Hours)
Out door living areas	Annoyance	50 – 55	16
Indoor dwellings	Speech intelligibility	35	16
Bed rooms	Sleep disturbance	30	8
School classrooms	Disturbance of communication	35	During class

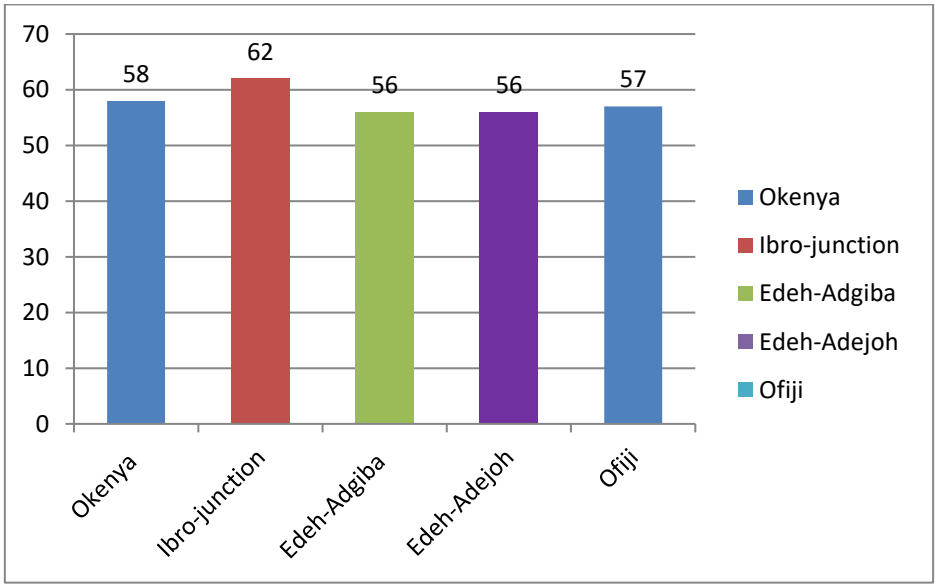


Figure 1: Bar chart comparing mean noise distribution in Okenya, Ibro-junction, Edeh-Alaba, Edeh-Adejoh and Ofiji.

Discussion

The finding of this study clearly shows that for all the cluster areas the noise level distribution is from 50.20 dBA to 69.70 dBA. In Okenya cluster the mean noise level is 58.0 dBA. And for Ibro-junction, Edeh-Alaba, Edeh-Adejoh and Ofiji clusters, the mean noise level are 62.0 dBA, 56.0 dBA, 56.0 dBA and 57.0 dBA respectively as shown in table 1-5 and the bar chart in figure 1 also represent the mean noise distribution. The result clearly indicates high level of noise in all the study areas of which the highest was recorded in Ibro-junction. This high noise level put the residents at risk and the sources of this noise are mainly from diesel and petrol generators, traffic and others. This is in line with Nte et al., (2019) which posited that noise level of 50dBA to 55dBA can cause serious annoyance, 35dBA can lead to speech intelligibility, 30dBA causes sleep disturbance like insomnia & 35dBA can cause disturbance in communication during class, lack of concentration in offices and reduction in job performance as shown in table 6.

Conclusion

The results of the noise level obtained show that the residents and those in their occupational locations are exposed to high level of noise. Which are clearly higher than World Health Organisation (WHO) permissible standards.

Noise level from 30.0 dBA to 55.0 dBA lead to health concern like discomfort, fatigue headache, serious annoyance, sleep disturbance, hearing impairment, dizziness, mental disorder, brain tumor, unproductiveness and speech interference. It was discovered in the course of this study that many cannot sleep at night because of noise pollution and those who managed to sleep cannot get enough sleep (not deep sleep).

Recommendation

- Residents should seek noiseless alternative power sources (e.g solar power system).
- New layouts (or Estates) in area where there is poor electricity supply should include noiseless alternative power supply in the plan.
- Alternative power source like solar power system is cheaper than running diesel/petrol generator and those exposed must consider this alternative.
- Residents should consider buying ecotech noiseless generator.

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