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Assessment of Noise from Telecommunication Masts Diesel Generators and Adherence to Regulatory Standards in Jalingo, Taraba State

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Abstract
The important role in information flow by the telecommunication services in the 21st century with rise in population and high demand, has led to the emergence of several telecommunication companies across Nigeria, aiming to serve the same population. Jalingo has experienced proliferation of telecommunication masts, which has led to violation of telecommunication regulations by telecomm service providers resulting to several human issues. This study aimed to assess the noise from telecommunication mast diesel generators and adherences to regulatory standards in Jalingo, Taraba State, Nigeria. Four telecomm service providers were identified to include MTN, Airtel, Globacom and Etisalat with a joint capacity of 60 telecommunication masts. The result of the ambient noise level of diesel generators installed at telecommunication base stations shows a clear violation of NASREA noise permissible level for both day and night with an average mean reading of 66.995db at 5m during the day, 62.958db at 10m during the day and 68.2117db and 63.7367db at 5m and 10m during the night. The result of the noise reading shows the noise is louder at close proximity and also varies during day and night hour, indicating a higher impact on public health at a given time and distance. The study further recommends the alternative use of power source (solar energy) and regulatory bodies should enforce and penalize defaulters.
Keywords*: Telecommunication Mast, Noise, generators, Jalingo*

1. Introduction

1.1. Background to the Study

Emerging trends in socio-economic growth show a high premium being placed on Information and Communication Technologies (ICT) by homes, organizations and nations (Adeyinka et al., 2009). Telecommunication is the primary means of transmitting information, resulting to installation of mast around residential and office areas to ensure effective functioning (Magaji et al., 2019, Bello, 2010; Donkeh et al., 2017). All of the mobile phone sites in a network are interlinked by cable or microwave beam, enabling phone calls to be passed from one cell to another automatically (Musa et al., 2016). The continuous demand for mobile phones and their related services has consequently resulted in the proliferation of masts and towers across cities (Støttrup-Andersen et al., 2017; Winkelmann and Duch, 2019). Mast is one of the fundamental telecommunication infrastructure needed for fast and efficient deployment of telecommunication services in any nation (Onuoha,

2016). In Nigeria, some of the telecommunication base stations are mounted or installed in a home of residence, schools, clinics, etc. which is not supposed to be (Obi and Muoneke, 2018).

The mobile telecommunication industry in Nigeria is still undergoing extraordinary changes brought about by the introduction of new technology (Alenoghena et al., 2014; Joseph, 2013). Cities and communities with little or no literacy on the essence and consequences of sitting telecommunication masts embraced the sitting of the mast which becomes freelance; so long it satisfies the operators and if they can pay for the site (Akindele and Adeniji, 2014). Paschal and Melvin (2016) examined the noise impacts of positioning telecommunication base station within residential area in Ntueka, Nigeria and discovered that the mean noise level of the surveyed residence is higher than NASREA noise permissible level which is capable of causing great discomfort, fatigue, headache, serious annoyance, sleep disturbance and speech interference.

Adam et al., (2020) assessed the noise from diesel generators used in telecommunication base stations in Kano metropolis Nigeria and discovered all the stations did not comply with NASREA noise permissible level. Oyinloye and Babalola (2016) investigated the vulnerability of resident living near mobile phone mast stations in Akure, Nigeria and found that the resident living at close proximity to telecommunication mast witness high level of sleep disturbance, among other health effects like depression, miscarriage, heart attack etc.

There are four major telecommunication providers in Nigeria with a subscription base of over 143.05 million people, namely MTN, Airtel, Globacom and Etisalat. MTN lead the subscriber's preference with 61.21 million subscribers (42.8%), Globacom followed with 21.0%, whilst Airtel has 20.5% and Etisalat has 22.3 million (15.7 percent) (Nigeria Bureau of Statistic, 2015). Ever since the launch of mobile phone service in Nigeria in the early 2001, the sector had witnessed an impressive increase of customer subscribers from 2.27 million in 2002, when the first mobile permit was issued, to 143.05 million at the end of the first quarter of 2015 (Nigeria Bureau of Statistic, 2015).

The emissions and noise from generating set used to power the base stations as a result of poor power supply in the country is a source of noise pollution and health-related implications (Daramola, 2013, Sarnat et al., 2011). Apart from the heat, vibration and noise accompanying generator operations, carbon dioxide (CO2), nitrogen oxides (NOx), sulphur dioxide (SO2), carbon monoxide (CO), and particulate matter are also released (Mbamali et al., 2012) and have detrimental consequences such as the destruction of the ozone layer, global warming and incidence of acid rain (Sivasakthival and Siva, 2011). This rapid growth in the erection of mast in recent years has been accompanied by public concern over the issue of health and safety risk. (Akindele and Adeniji, 2014).

2. Material and methods

2.1. Study area

Jalingo is the capital city of Taraba State with an estimated projected population of 176,068 at 2.83% annual growth rate (Oruonye and Abass, 2011). It is located between latitude 8^0 77'N to 9^0 01N North of the Equator and longitude 11^0 09'E TO 11^0 30'E east of the Greenwich Meridian. The area covers 195.061km^2 and comprises of 10 wards namely Barade, Kachalla Sembe, Kona, Maji Dadi, Sarkin Dawaki, Sintali A, Sintali B, Turaki A, and Turaki B wards. Jalingo is bounded

by Lau LGA to the north, Yorro LGA to the east, Ardo-Kola to the south and west.

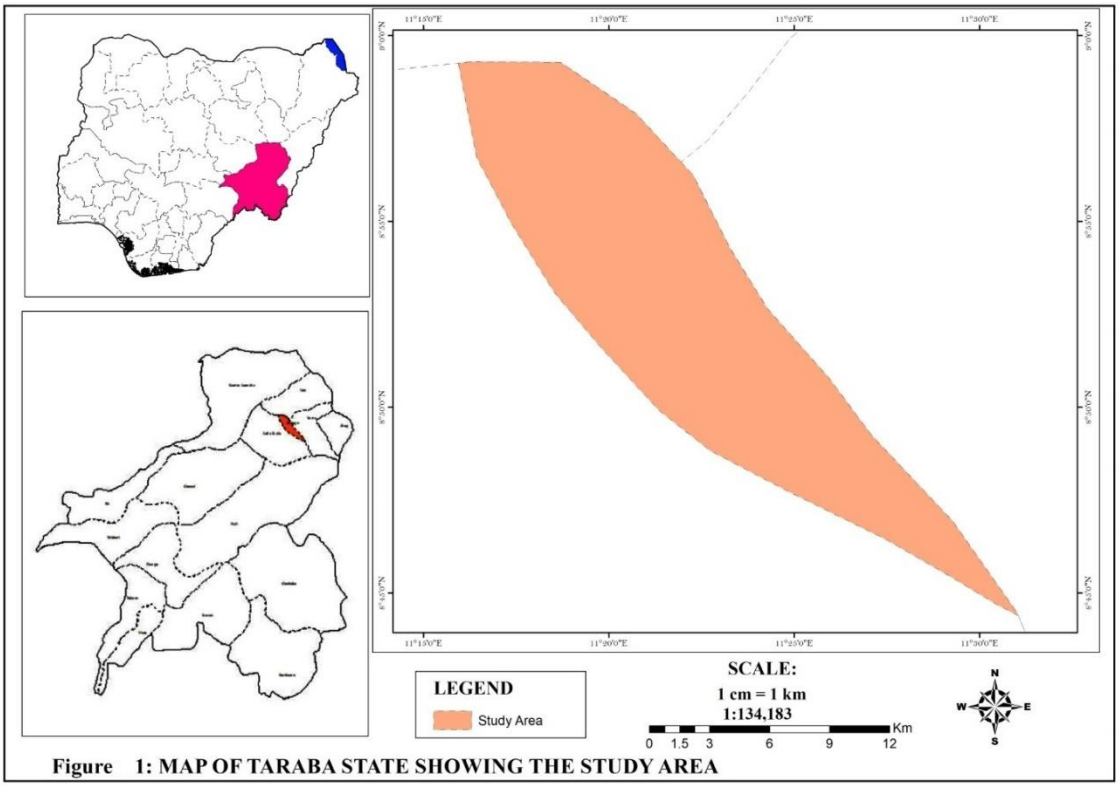

Figure 1: MAP OF TARABA STATE SHOWING THE STUDY AREA

2.2. Methodology

The survey research instruments adopted for the conduct of this research includes: literature reviews and field observation/data collection. The data's collected was used to assess the noise from telecommunication mast diesel generators, adherence to regulatory standards.

The noise pollution data's was obtained using a sound level meter, aided with the use of tape to measure 5m and 10m radius distance from the base transceiver station (BTS) to access the adherence to NASREA noise permissible level. Other secondary sources include journals, books, government policy documents, online articles and newspaper publications.

3. Result and Discussion

The result of noise level measurements carried out around the 60 telecommunication mast stations (generators) in Jalingo, compared with the National Environmental Standards and Regulations Enforcement Agency (NASREA) stipulated limits. Measurements were made at 5m and 10m distance away from point source (generators) during the day and night hours. The measured noise levels of all the 60 base stations generators varies between 52.1 to 77db at 5m and 47 to 68.6db at 10m for both day and night measurements. Mean average analysis of the result was carried out and it shows that the average mean reading for the generators was 66.995db at 5m during the day, 62.9583db at 10m during the day and 68.2117db and 63.7367db at 5m and 10m during the night respectively.

The result clearly showed that the noise experienced at 5m in close proximity to the BTs (Base Stations) generator is louder than experience at 10m (with a mean differences of 4.0367db during the day and 4.475 during the night), which prove the farther the location of houses from the base stations the lesser the impact of the noise on the residents. It further showed that the noise level is louder during the night than in the day (with a mean difference of 1.2167db for 5m during day and night hour and 0.7784db for 10m during the day and night hour) which could be as a result of human activities during the day and the silent night hour due to less activities in the night and this can greatly affect sleeping pattern of residents living at close proximity to telecommunication masts leading to other public health concerns. The measured noise level showed that there is a clear violation of NASREA noise permissible level for all generator sets installed at telecommunication mast stations. The result showed during the day with the exception of BTs generator at 10m at Lassandi Primary School and Water Board Magami and 5 and 10m at Zion Hall, Aguwan Kasa, all the noise level readings for the remaining BTs at both 5 and 10m distance during the day violated the NASREA noise permissible level regulation as seen in Figure 2.

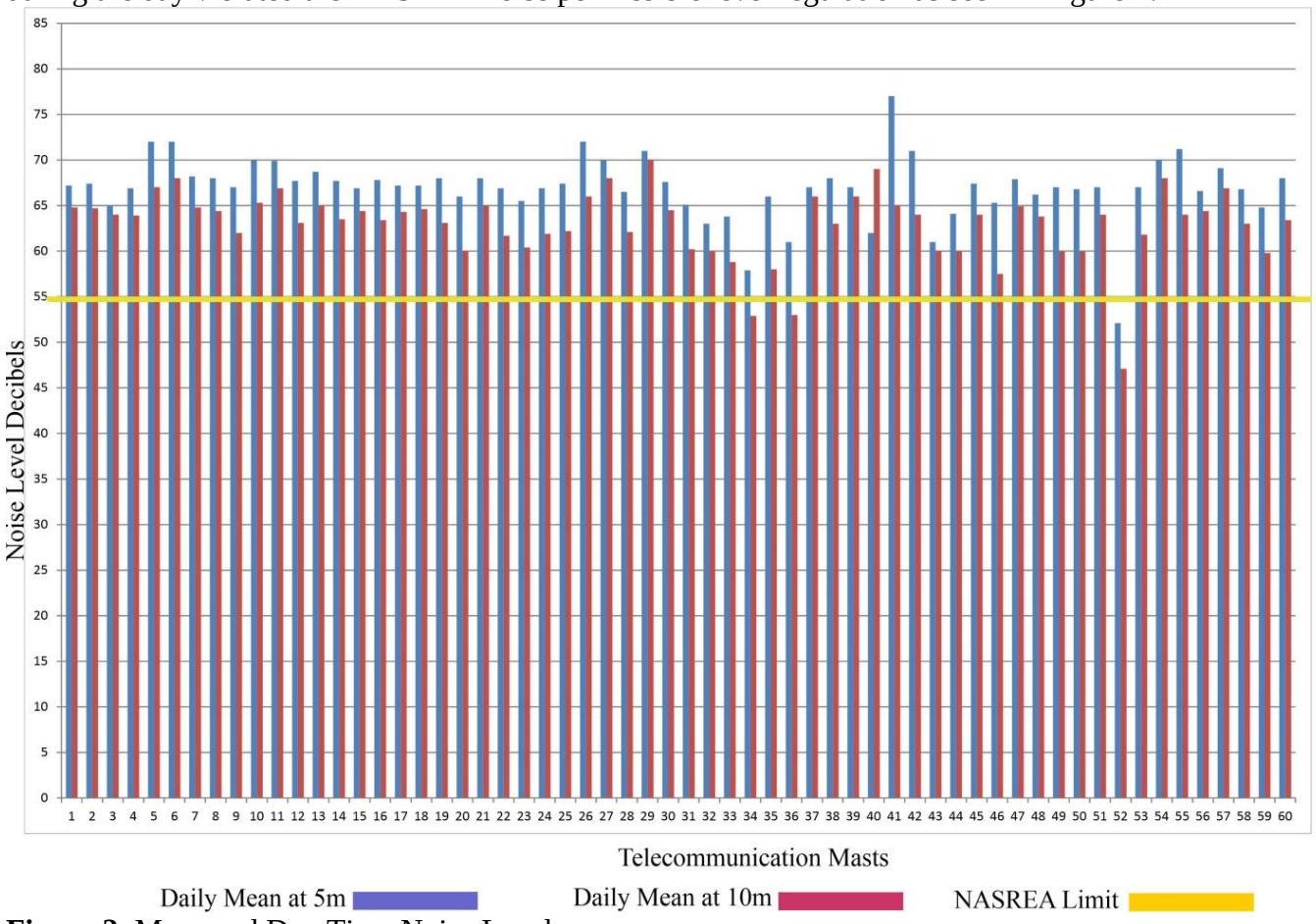

Figure 2: Measured Day Time Noise Level.

The result of noise level readings for all the BTs generators sited within Jalingo varies from one BTS to another and the variation may depend on type of generators used, model, size, maintenance culture and age etc. The noise level measurements for night time showed all BTS generators violated the NASREA noise permissible level as shown in figure 2 and figure 3. This showed that the noise emanating from the BTs generators in Jalingo did not meet up with NASREA noise permissible level regulation and negatively affect the public health of residents within the surrounding of telecommunication masts.

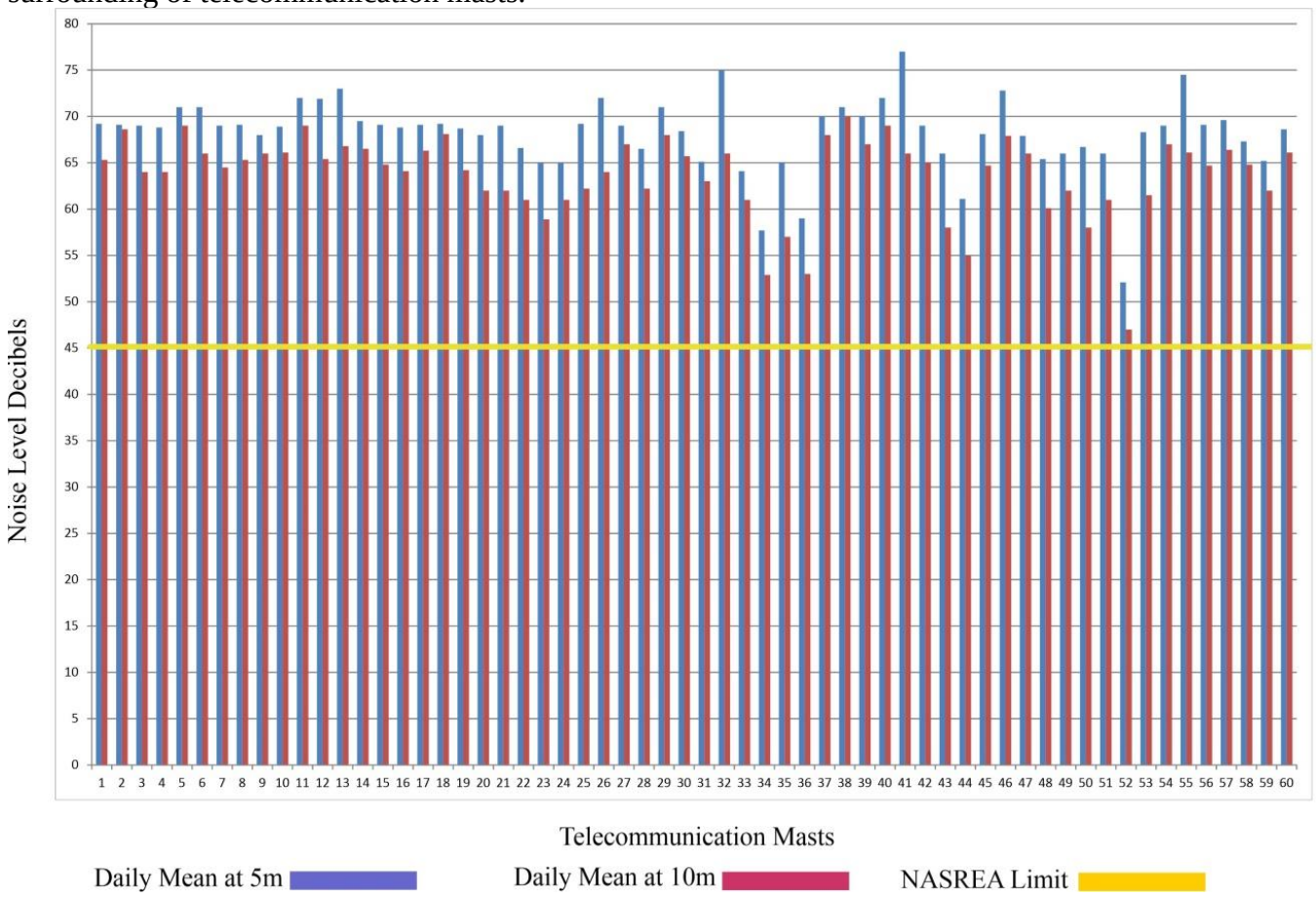

Figure 3: Measured Night Time Noise Level.

4. Summary and Conclusion

The study on assessment of noise from telecommunication mast diesel generators and adherence to NASREA noise permissible level in Jalingo, Taraba State, and study examined 60 BTs diesel generators and identifies 4 services providers to include MTN, Globacom, Etisalat and Airtel.

The mean average analysis of noise level measurement of the 60 generators in telecommunication mast stations showed time of the day and distance affects the noise pollution level of these generators. With an average mean noise level of 62.958db and maximum mean of 68.212db, there was a clear violation of NASREA noise permissible level.

The study proves the violations of NASREA regulations by telecomm service providers, which

turns have negative effect on public health.

The following recommendations are made to tackle and provide solutions to the problems discovered as a result of this research includes;

i. The alternative use of power sources (renewable source of power) that are cost effective and environmentally friendly should be encouraged.
ii. Regulatory authorities responsible like NESREA should strictly enforce the penalties for violating its regulations.

5. Conflict of Interest

The author declares there is no conflict of interest in this study.

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