PART III: TRANSPORT, SPATIAL INTERACTION, AND DEVELOPMENT

ANALYSIS OF POLLUTION FROM AIRCRAFTS NOISE AROUND MAIDUGURI INTERNATIONAL AIRPORT, BORNO STATE, NIGERIA

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Abstract

Noise is the largest burden placed on surrounding areas and residents by airports after the safety issues associated with aircraft crashes and other types of accidents. A loud noise causes annoyance and its high frequency can cause health and psychological challenges. This study examines the aircraft noise pollution on residents of Maiduguri international airport, Borno State, Nigeria. Quantitative research approach was used in collecting data from 363 respondents through questionnaire administration. The study found among other things that aircraft noise causes sleep disturbance, rest disturbance, emotional anxiety and learning disturbance to residents of the area. The study further revealed that the noise level for the day-evening-nighttime depends on distance from the airport and the time of the day. Also, some of the menace associated with aircraft noise as identified by the study include noise pollution, disturbance to sleep, interference to speech and other forms of communication, lack of comfort, temporary hearing loss, reduced opportunity for privacy, vibration, and annoyance. The study therefore recommends that that installation of the sound insulation in buildings will be a useful technique for reducing the negative impacts of aircraft noise and will enhance the quality of urban life of residents. Government through urban development board should ensure proper land use planning which is universally accepted technique for minimizing the negative impacts of airport noise in areas adjacent to airports.

Keywords: Airport Noise, Environmental Pollution, Landuse Planning, Rental Value, Residential Property

Introduction

Civil aviation has become a central part of human life, with a constant increase in global demand for both cargo and passenger flights (IATA, 2013). At the same time, a steady migration flow to cities can be observed, resulting in a high urban population density and urban sprawl (Jik Lee, & Griffin, 2013, Stanfeld, Matheson, 2011). Consequently, even though most major airports have originally been located with some distance to residential neighborhoods, population growth in metropolitan areas have engulfed these distant facilities leaving an increasing number of people with no choice but to live with aircraft noise.

Therefore, aircraft landing and taking off generates substantial noise in long, low-altitude flight corridors (Berglund, Lindvall, & Schwela, 1999) thereby contributing to noise pollution, which has been on the increase globally over the past decades and is now regarded as a major environmental problem (Suleiman & Yusuf, 2013; Xie, Kang, Tompsett, 2011). It is estimated that world noise levels double every 10 years, and, in the United States alone, unacceptable noise (as perceived by people) has increased by nearly 40 percent since 1970 (Blomberg & Morris, 1999). It is further estimated that some 80 million people in Europe are exposed to unacceptable levels of continuous outdoor transport noise. The most common human effects associated with this aircraft noise are annoyance, speech and learning interference, and sleep disturbance, physiological stress, and reduction in the opportunity for privacy. In turn, these effects disrupt normal daily activities, such as conversation, television viewing, schoolwork, productivity, outdoor recreation and living, and family activities of the properties located near the airports, and this tend to have severe impacts on the housing stock and housing market at large (Cohen & Coughlin, 2008, Palamuleni, 2015).

According to Tomset and Shaw (2014), sound is an environmental factor, and it is relevant to look at human exposure to and effects of noise. The exposure depends on the emission of sound, how the sound is received by the human body and the setting for the emission and perception of sound. The effects of noise exposure consist of what is heard or felt, of auditory and non-auditory effects (Mai, 2001). A sound wave is a physical disturbance of molecules within a medium – air, water or solid – that can be detected by a listener. Sound waves result from a vibrating object, a sound source. These different waves combine and reach the listener via numerous direct and indirect pathways. The listener's inner ear contains organs that vibrate in response to these molecular disturbances, converting the vibrations into changing electrical potentials that are sensed by the brain – allowing the phenomenon of hearing to occur. The physical qualities of sounds can be described by quantitative values (Tzivian et al 2015)

One way to describe the sound environment is to measure the maximum sound level, such as a passing automobile or bus, in decibels (dB). Because the ear's pattern of response is more logarithmic in nature, decibels are measured on the log scale. The perception of noise doubles in loudness for every 10 dB increase in sound level. Therefore, an 80 dB is perceived to be four times louder than a 60 dB sound (Uyeno, Hamilton & Biggs, 2013). This study therefore seeks to assess the effects of aircraft noise pollution on the residents of the Maiduguri International Airport, Borno State, Nigeria.

Materials and Method

Maiduguri, a city in Northeastern Nigeria, is located between latitudes 11°04'N and 11°44'N; and longitudes 13°04'E and 13°44'E. It covers a complete land space of 543 km2, which makes it the biggest city in the Northeast Nigeria (Jimme, Bashir & Adebayo, 2016). Maiduguri metropolis covers four (4) Local Government Areas namely: Maiduguri Metropolitan, Jare, Konduga, and parts of Mafa Local Government Areas. The area is in the huge open landmass that is flat or slightly undulating, evolved on younger sedimentary rocks of the Chad formation. This exceptionally flat terrain is sloping closer to the Lake Chad and has an elevation ranging from three hundred metres and six hundred metres above sea level (Jimme, Bashir & Adebayo, 2016; Emoh, Yusoff, Zahari & Ismail, 2015). Maiduguri lies on, and at the lowest parts of the Bama Ridge which runs in a Northwest/Southeast route from the Nigeria-Niger boundary to the Cameroun Mountains along the Southeast. The topographic panorama to its Northeast and Southwest is undifferentiated and flat. The place is drained by River Ngadda and its tributary the NgaddaBul (Iyawa, Waziri, Jimme & Sambo, 2020).

Maiduguri is situated within the Sudan Savannah vegetation of Nigeria and is characterized by scanty annual precipitation (650 mm), excessive evaporation and high-water shortage (Dami, Adesina & Garba, 2014). Precipitation is peaked in August with the rains falling mostly in July, August, and September. There are four (4) recognized seasons in the area and this consist of the Rainy Season, (June to September) Harvest Season (September to November), Harmattan or Cool Season (December to February) and Hot Season (March to May) (Dami, Adesina & Garba, 2014). The rainfall pattern for the thirty years (1981-2010) suggests wonderful dry (beneath averages) and wet (above averages) phases (Iyawa, Waziri, Jimme & Sambo, 2020).

The month-to-month temperature is above 20°C however, daily extremes could reach 47°C in April. Daily temperature might also exceed 40°C. The weather of the place is influenced by the Northeast trade winds and the South West monsoons originating from the Sahara and the Atlantic Ocean. The soil of Maiduguri and environs can be categorised into sands of Aeolian origin and the seashore ridge sediments, vertisol or lagoonal clay and fluvisol and clay soil of alluvial deposits. There also are the brown and reddish brown, regosols, hydromorphic and alluvial soils which can be favourable for agricultural activities of many types (Iyawa, Waziri, Jimme & Sambo, 2020). It has a population of 1.275 million humans according to 2006 census (NPC, 2008) with an annual growth rate of approximately 3.5% and a density of 1145 people consistent with km^2 which makes it the maximum densely populated city in Northeastern Nigeria. The projected population of Maiduguri Metropolis for the 12 months 2021 stood at 2,722,986 (NPC, 2008).

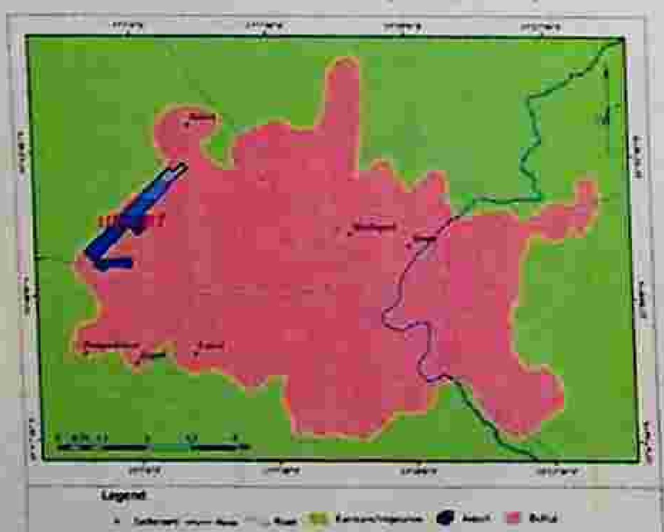

Figure 1: Maiduguri showing the Study Area

Source: National Centre for Remote Sensing, Jos, (2022)

Maiduguri International Airport is located 6 kilometres west of the city of Maiduguri with reference coordinates latitude 11° 52′ 54″N, longitude 13° 08′ 30″E and a reference temperature of 35°C. the airport is an important edifice serving both socio-economic and humanitarian purpose of the Northeast, it is indeed an aviation hub which share boarder with three African countries, namely Niger republic to the North, Chad republic to the East, and Cameroon Republic to the East. Maiduguri international airport is located 6 kilometres west of the city with reference coordinates on latitude 11° 52′ 54″N, longitude 13° 08′ 30″E and a temperature of 35°C. The airport is an important edifice serving both socio-economic and humanitarian purposes of the Northeast, it is indeed an aviation hub which is bordered by three west African countries of Niger Republic to the North, Chad Republic to the East, and Cameroon Republic to the East.

The airport came to be because of the royal Airforce flying into Maiduguri for political reason. The airport is located about 10 kilometres from the suburbs of Maiduguri metropolis, the then national carrier (Nigerian Airways) was the first to commence operations followed by indigenous airlines such as GAS air and Harka airline that were engaged in airlifting of pilgrims for Hajj operation to Saudi Arabia. The main terminal building of the airport now boarded the Nigerian Airforce Base.

During the first republic, the military administration built and commissioned another airport in November 1988 beside the former which is now in operation as the main Maiduguri international airport. The airport is currently surrounded by four residential areas that is: Ngomari, seven hundred and seventy-seven (777) housing estate, Shuwari one thousand (1000) housing estate, all of which are in Dala Lawanti ward of Jare Local Government Area of the State. With seven hundred and seventy-seven (777) housing estates situated directly under the take-off and landing route of the airport. The airport is situated on 98 hectares of land and an average of 3,000 aircrafts and 55,000 passengers use the airport annually making it one of the busiest airports in the Northeastern region of Nigeria (Mai, 2001, Olayinka, 2013). According to International Civil Aviation Organization (2010), the distance between the nearest flight path and houses is 4.35 miles or 7km which follows their standards.

The study uses the quantitative approach and elicits numerical data through survey method that involves questionnaire administration on the households surrounding Maiduguri international airport. The airport is situated at the heart of Dala Lawanti ward, the airport is surrounded by four residential areas and comprised of one (1) administrative ward (Table 2), the sample frame of this study is the total number of tenants in the four residential areas that surround the airport (16,512) (Borno State Government, 2016). Jare Local Government Area has a total population of 86,978 (NPC, 2008), with fifteen (15) wards.

Table 2: Sample frame and sample size

S/N	Area	Population (sample frame)	Sample size
1	Ngomari	7,321	165
2	Seven hundred and seventy-seven (777) Housing Estate	1,723	39
3	One thousand (1000) Housing Estate	2,123	48
4	Shuwari	5,445	123
	Total	16,512	375

Source: Field Survey, 2022

Therefore, target respondents for this study are tenants, landlords and other people residing in the study area. To determine the sample size for this study, Krejcie and Morgan's (1970) Table for determining sample size was adopted. The Table indicates that for population size of 16,512, sample size of 375 should be used as the minimum respondents. Since the population size of the area is 16,512, as shown in Table 2, the sample size of375 was adopted for questionnaire administration.

Instrument for Data Collection

This study also used decibel (sound level) meter and questionnaire as instruments for collecting data. The decibel meter was used to determine the maximum level of noise at a specific time and over a certain distance from the airport. The questionnaire was designed to address the research questions. The questionnaire for this study was designed in consideration of the nature of the respondents, ease of reading and completion period. The design incorporated the use of only close-ended questions. The analysis of the result of the study was done using Statistical Package for Social Sciences (SPSS) version 25. It provides an indication of the average correlation among all of the items that make up a scale. Values range from 0 to 1, with the higher values indicating greater reliability.

The Maximum Noise Level (*Lmax*) measured in dB is an instantaneous peak noise level measured at an observer location during the time period in consideration (Giles-Corti, et al 2016). Wolfe, Malina, Barrett & Waitz (2016) proposed the maximum A-weighted noise level (*LAmax*) occurring over 24 hours period as a critical measure of noise level. Acoustical parameters which were taken into consideration and calculated were maximum sound level (*Lmax*), decibel meter was used in ascertaining the level of noise caused by aircraft during take-off and landing in the study area and Analysis of variance (ANOVA) was used to determine noise level with distance to the airport, noise level and the location of the property and noise level and the time of the day. For analysis, aircraft noise indexes were measured and indicated for day-time (*Ld*, 12hrs: 6am -6pm), evening- time (*Le*, 4hrs : 6pm -11pm), Night- time (*Ln*, 8hrs ; 11pm -6am), and 24 hours of day using the day-evening- night level *Lden*. A penalty of 10 dB(A) for the nighttime with a penalty of 5 dB(A) for evening and 10 dB(A) penalty for night. The additional 10dB (penalty) for night and evening time reflect the fact that people are more sensitive to noise during the night, this is mainly because background noise level is reduced in the evening and at night which causes aircraft events to be more noticeable.

Results and Discussion

Level of noise around Maiduguri International Airport

One way to describe the sound in the environment is to measure the maximum level, such as a passing automobile or bus, in decibels (dB). Because the ear's pattern of response is more logarithmic in nature, decibels are measured on the log scale. The perception of noise doubles in loudness for every 10 dB increase in sound level. Therefore, an 80 dB is perceived to be four times louder than a 60 dB sound (Giles-Corti, et al 2016).

Table 2: Result for level of aircraft noise

S/N	Acoustic Perimeter	Noise level (dB) with distance in Meters (M)				Hours
		777 housing estate (1500m)	Ngomari (2000m)	One thousand housing estate (3000m)	Shuwari (3,000m)	
1	Ld	87	72	46	65	12
2	Le	99	81	57	53	6
3	Ln	118	96	68	65	8

Source: Field Survey, 2022

Where:

Ld= A-weighted sound pressure level measured in the daytime

Le= A-weighted sound pressure level measured in the evening time

Ln= A-weighted sound pressure level measured in the nighttime

Table 2 shows the level of noise as measured with the decibel meter based on the time of the day, distance from the airport in meters (M) and the four different areas from which the measurement were done (777 Housing Estate, Ngomeri, 1000 Housing Estate and Shuwari), from the table it can be seen that 777 housing estate with the distance of 1,500 meters from the airport has a noise level of 87dB for the day time, 99dB for the evening time and 118dB for the night time, similarly, Ngomari area with a distance of 2,000 meters from the airport has a measured noise level of 72dB for the day time, 81 dB for the evening time and 96dB for the night time also, 1,000 housing estate with a distance of 3,000 meters from the airport has a measured noise level of 46dB for morning time, 57 dB for evening time and 68 dB for night time while with a distance of 3,000 meters from the airport, Shuwari has a noise level of 44 dB for the morning time, 53 dB for the evening time and 655dB for the night time.

Table 3: Analysis of variance for distance from airport

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4537.500	2	2268.750	16.203	.001
Within Groups	1260.167	9	140.019		
Total	5797.667	11			

Source: Field Survey, 2022

Table 4: Duncan test for noise level and distance from airport

DISTANCE	N	Subset for alpha = 0.05	
		1	2
3000M	6	55.50	
2000M	3		83.00
1500M	3		101.33
Sig.		1.000	.067

Source: Field Survey, 2022

From Table 4, the level of noise around the residential areas of the airport was assessed using analysis of variance (ANOVA) statistical technique. A one way between subjects ANOVA was conducted to assess whether there is a significance difference between level of noise and the distance of the property from the airport. The result of the analysis revealed that there is a significance in differences in the level of noise and the distance of the property to the airport at the $p < 0.05$ level for the three distance (1500M, 2000M and 3000M) $F(2, 9) = 16.203$, $p = 0.001$. Table 4 also shows the post hoc comparisons using Duncan test which indicates that the mean score for the distance 1500M (mean = 101.33) was significantly higher followed by the mean score for the distance 2000M (mean = 83.00) and the distance 3000M with the mean score of 55.50 has the least level of noise. This indicates that the closer the property is to the airport, the higher the noise level and vice versa.

Table 5: Analysis of variance for location of the property

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4551.000	3	1517.000	9.735	.005
Within Groups	1246.667	8	155.833		
Total	5797.667	11			

Source: Field Survey, 2022

Table 6: Duncan test for noise level and location of the property

LOCATION	N	Subset for alpha = 0.05	
		1	2
Shuwari	3	54.00	
1000 Housing Estate	3	57.00	
Ngomari	3		83.00
777 Housing Estate	3		101.33
Sig.		.776	.110

Source: Field Survey, 2022

The result from the analysis in Table 6 revealed that there is a significance difference in the noise level and the location of the property to the airport at the $p < 0.05$ level for the four locations (Shuwari, 1000 Housing Estate, Ngomeri and 777 Housing Estate) $F(3, 8) = 9.735$, $p = 0.005$. Also, the post hoc analysis test in Table 6 revealed that the mean score for the 777 Housing Estate (mean = 101.33) is significantly higher. The Ngomari location has the second highest mean score of 83.00 which was followed by 1000 housing estate with a mean score of 57.00 and the Shuwari has the least mean score of 54.0.

Table 7: ANOVA for noise level and the time of the day

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1211.167	2	605.583	1.188	.348
Within Groups	4586.500	9	509.611		
Total	5797.667	11			

Source: Field Survey, 2022

Table 8: Duncan test for noise level and time of the day

TIME	N	Subset for alpha = 0.05
		1
Day (6am - 6 pm)	4	62.25
Evening Time (6pm - 11 pm)	4	72.50
Night(11 pm - 6 am)	4	86.75
Sig.		.176

Source: Field Survey, 2022

Table 8 shows the analysis of variance for noise level and the time of the day and revealed that there is statistically no significant difference in the noise level and the time at which it was measured (Day time 6am – 6 pm), (evening time 6pm – 11 pm) and (Nighttime 11pm – 6 am). However, the Duncan test in table 16 shows the mean score for nighttime 86.75 is higher than the mean score for evening time (72.50) and Day time (62.25).

There is a semi negative effect of aircraft noise on residential property rental value in the study area, the study conducted a simple linear regression analysis. The result revealed thus, R= -.193 which indicated that there is a weak negative relationship between aircraft noise and rental values in the study area. $R^2 = 0.37$ which indicated the variance in the data that can be explained by the variable, aircraft noise is significant statistically. What this implies is that aircraft noise is a predictor of rental values in the study area.

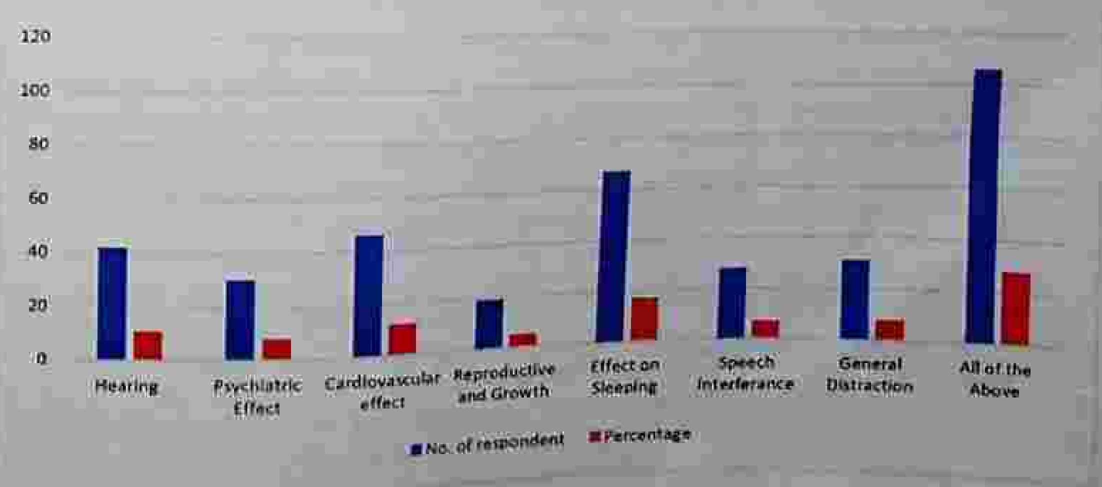

Figure 2: Effects of Noise on Residents
Source: Field Survey, 2022

It has been found that in residential areas, aircraft induced noise levels go up to 60 decibels in the day and 45 decibels at night. Constant exposure to such high levels of noise can lead to several health problems like hypertension, hearing impairment, heart problems, sleep disturbance and irritation. This results tally and agrees with the findings of Aliyu, et al (2016) and Babisch (2014) which also affirm that airport operations may cause a variety of effects such as noise, visual impairment, pollution, traffic, emotional, and health-related challenges.

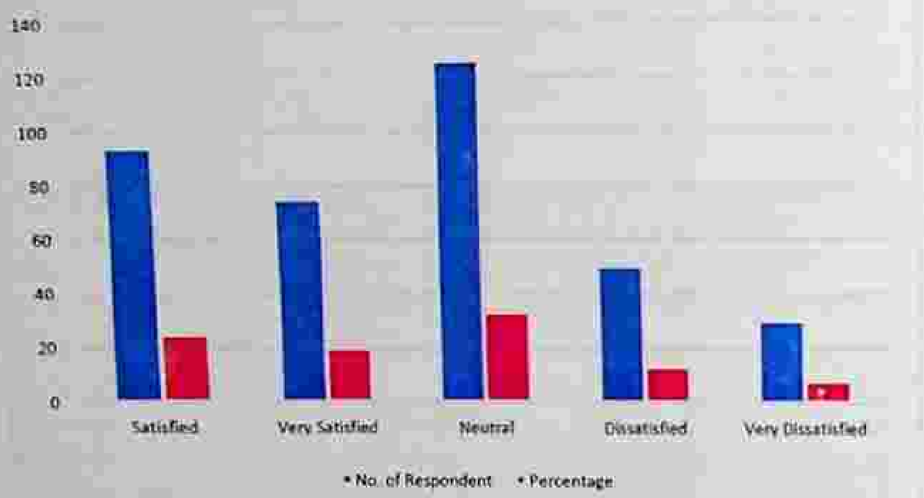

Figure 3: Level of Satisfaction of Residents on the Neighbourhood

Source: Field Survey, 2022

The threat level in Northeast Nigeria including Maiduguri metropolis was increasing and peaked particularly around transport hubs, religious areas, and large gatherings. This made people to reside in the airport area with proximity to the Airforce base perceived to be safer. The result of this study as shown in Figure 3 indicates how some residents felt concerning their stay within the area. While some are satisfied (23%), some felt very satisfied (19%) and majority (30%) of these residents were neutral as to their level of satisfaction with the noise level within the area. 10% of the respondents and less than 5% respectively were dissatisfied and very dissatisfied respectively. This is in tandem with the assertion of Aliyu (2012) which states that not only one factor, but a combination of several factors can lead to ones' choice of residential property development in an area.

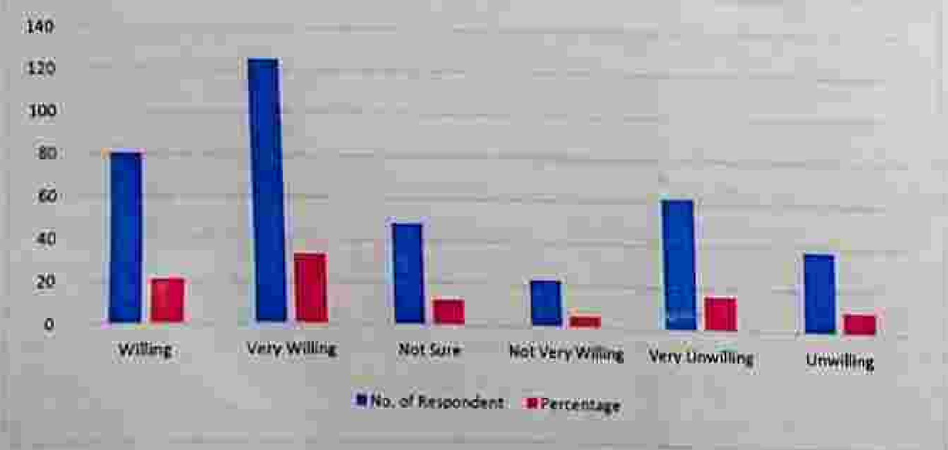

Figure 4: Willingness of Residents to live with Noise in the Neighbourhood

Source: Field Survey, 2022

To every neighbourhood each person lives there are reasons, the residents showed how (un)willing they are to live in the neighbourhood. Some reasons which are considered for safety and not minding the effect of living around airport has on them. In Figure 4, 20% said that they are willing to stay in the neighbourhood regardless of the noise, over 30% of the respondents said that they are very willing to live in the area, 10%, of the respondents said they are not sure, 4% on their part said that they are not very willing and 6% said that they are unwilling to live within the neighbourhood and this could be attributable to other reasons of security.

Discussion

As was presented earlier, the noise level was measured using Decibel meter for in which *Ld* is the average A-weighted sound pressure level measured in the day-time, *Le* is the average A-weighted sound pressure level in the evening-time, *Ln* is the average A-weighted sound pressure level measured in the night-time and *Lden* is A-weighted sound pressure level measured within 24hours, the noise level was measured around the four residential areas surrounding the airport that is 777 housing estate with a distance of 1,500 meters from the airport, Ngomari with distance of 2,000 meters from the airport, 1000 housing estate with a distance of 3,000 meters and Shuwari with a distance of 3000 meters from the airport . The addition of 10 dB during the evening-time and night-time reflects the fact that people are more sensitive to noise during the night. This is mainly because the background noise level is reduced at night which causes aircraft events to be more noticeable. The result shows that at day time the noise level is at 87dB (777 housing estate) 72 dB (Ngomari) 46dB (1,000) 44dB (shuwari) housing estate during the takeoff and landing of the aircraft, two of the finding in the locations that is noise level from 777 housing estate and Ngomari are similar to the findings of Uyeno, Hamilton & Biggs (2013) who reported that in "quiet setting" around Amsterdam airport, during the day, noise level is greater than 70 dB and in "loud setting" where the background noise level is high the sound levels is less than 85 dB. The noise level for the evening-time was measured at 99dB (777 housing estate) 81 dB (Ngomari) 57dB (1,000) 53dB (shuwari), this noise level is high and goes beyond the level of noise exposure expected in most countries, especially in developed countries, a decibel level of 50 is the maximum level for residential areas during the evening time (Berglund *et al.* 1999). If the maximum decibel level is exceeded, it is considered a negative externality to the surrounding area. These negative effects are reflected in property prices through the impact on the area's serenity and the significant contribution to stress levels (Berglund, 1999; Korfali & Massoud, 2003). For the night-time the noise level was found to be at 118dB (777 housing estate) 96 dB (Ngomari) 68dB (1,000) 65dB (Shuwari) all of which exceed hearing threshold, this according to More (2011) is because when background noise level is reduced in the evening and at night which causes aircraft events to be more noticeable. In the 2000"s, Katz, et al. (2002) selected three airports in USA and measured the sound output using a decibel meter. They found that the range of sound output at take-off and landing was 93 to 108 dBA. They concluded, that there can be no doubt that these units have the potential for inducing a permanent bilateral sensor neural hearing loss, affect sleep and hinder comfort for residence living around the airport, this was reflected in the low rental level of the residential properties around the airports as compared to similar properties around non noisy areas .With all the high level of noise and still people reside in those locations, one may tend to believe that having been exposed to the noise for a long time, they are either adapted to it or felt reluctant to complain since nothing has been done about it over the years.

ANOVA was used to test if proximity to airport as a predictor variable is a significant predictor of the outcome variable (noise level). revealed that there is a significance difference in the level of noise and the distance of the property to the airport at the $p < 0.05$ level for the three distance (1500M, 2000M and 3000M) $F(2, 9) = 16.203$, $p = 0.001$. The post hoc comparisons using Duncan test indicates that the mean score for the distance 1500M (mean = 101.33) was significantly higher followed by the mean score for the distance 2000M (mean = 83.00) and the distance 3000M with the mean score of 55.50 has the least level of noise. This indicates that the closer the proper to the airport, the higher the noise level and vice versa. This is like study carried out by Wolfe, Malina, Barrett and Waitz (2016) in Geneva Switzerland on the impact of noise on Geneva Rent, it was found that there was a drop in rental value of the property by 1.17% for properties closer to the airport they found out that the closer the property is to the airport the lesser the rents it commands. Also, the analysis revealed that there is statistically no significance difference in the noise level and the time at which it was measured (Day time 6am – 6 pm), (evening time 6pm – 11 pm) and (Night time 11pm – 6 am). However, the mean score for nighttime 86.75 is higher than the mean score for evening time (72.50) and Day time (62.25). This implies that the time of the day also determines the level of the noise that is been emitted by the aircraft.

Conclusion and Recommendations

In conclusion, the study revealed that proximity to airport has produced serious disturbance and a source of noise and the menace caused by aircraft during landing and take-off results to psychological stress, noise pollution, disturbance to sleep, interference with speech and other forms of communication, lack of comfort at home, interference with viewing television, temporary hearing loss, reduced opportunity for privacy, disturbance to rest, nuisance, annoyance, and vibration to buildings.

Going by the outcome of the study, the following recommendations are therefore proposed. There is a need on the part of the investors and property developers to take into consideration the effect of noise pollution on residents and the environment before embarking on building construction. Since tenants' willingness to live in the neighbourhood to some extent depends on the presence of Airforce Base which provides relative security and safety in the area from the incidences of insurgency, particularly Boko Haram, there is a need for addressing these issues holistically. The upgrading of the sound insulation of buildings will be a useful technique for reducing the negative impact of aircraft noise. In many countries, sound insulation programs have been carried out to improve the sound insulation of homes, schools, and hospitals near airports. Government through urban development board should ensure proper land use planning which is an obvious and almost universally accepted technique for minimizing the negative effect of airport noise in areas adjacent to airports. Land use planning near airports should provide for division of land areas near airports into zones according to noise levels and the choice of acceptable uses in each of these zones. Nigerian Civil Aviation Authority (NCAA), and other relevant authorities should regulate and monitor air transport services and ensure compliance with specifications and standards, including aircraft airworthiness in Nigeria. Highways should be improved and expanded by so doing the intensity of the use to which the airport is used will be reduced and in turn the noise will drastically drop.

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