Research Article
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Impact of airport noise on the health situation of host communities: a case study of Obong victor Attah international airport, Akwa Ibom state, Nigeria

Abstract

Air transport has generated negative impacts; one of such impact is Aircraft noise. An increased use of air transportation has overtime resulted into a corresponding increase in aircraft noise which has placed the health of residents of the airport vicinity at great risk. All these notwithstanding, negative activities like noise generation from airports generate impacts of great concern. These impacts have been the major concern of residents at the airport vicinity. Interestingly, this research work measured the impacts of airport noise on the health situation of host communities of Uruan, Okobo and Nsit-Atai. LGA's in Akwa-Ibom State. Health is the major parameters used in measuring these impacts. A buffer was used to demarcate the study into zones and a systematic sampling technique was employed in selecting the households to be sampled. The sample size composed of 400 respondents and this was determined from the population of the host communities using the Taro Yamane formula. Data needed for this study was obtained from questionnaires administered to the 400 respondents. Secondary data was collected from Obong Victor Attah International Airport Development Company. A sound meter was also used to determine the noise levels within the buffer distance. Data collected were analysed using; percentages, charts, maps and simple linear regression statistical tools. The hypothesis formulated was tested using simple linear regression analysis; the null hypothesis which stated that airport does not significantly impact health was rejected. Results from the analysis indicated that the major health issue resulting from the airport noise were annoyance (43.8%), sleep disturbance (37.9%), increased heart beat (12%) and hearing loss (5%). From this result it is inferred that, Obong Victor Attah International Airport influences negatively on the health of the host communities in the study area. It is recommended that the members of the host community should be enlightened and educated about the dangers of the airport noise on their health. Also, citizen advocacy should be intensified and encouraged on the health impact of noise. it is also imperative that residential buildings should not be approved too close to the Airport this would reduce the severity of these health issues associated with Airport noise.

Keywords: citizen advocacy, impact, noise, health situation, measure of harm, Akwa Ibom State

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Raimi Morufu Olalekan,[1] Ihuoma Blossom ADINDU[2]
[1]Department of Community Medicine, Niger Delta University, Nigeria
[2]Department of Geography and Natural Resources Management, University of Uyo, Nigeria

Correspondence: Raimi Morufu Olalekan, Department of Community Medicine, Environmental Health Unit, Faculty of Clinical Sciences, Niger Delta University, Wilberforce Island, Bayelsa State, Nigeria, Email ola07038053786@gmail.com, morufu.raimi@waldenu.edu

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Introduction

Despite this obvious positive impact of air transport, air transport has also generated negative impacts. One of such impact is Aircraft noise. An increased use of air transportation has overtime resulted into a corresponding increase in aircraft noise which has placed the health of residents of the airport vicinity at great risk. –for community noise[1] to include; hearing impairment, speech intelligibility, sleep disturbance, physiological functions, increased stress hormones level, etc. A number of researches have also exposed the health challenges resulting from airport noise exposure suffered by residents of airport vicinity.[2–5] ATAG[6] & Price[7] have summarized the typical impacts of airports to include; employment generation, wealth creation, world trade contribution, and tourism stimulation. Amongst all these enormous impacts posed by airports on its host communities, this research was focused on assessing employment, income, tourism and the health-related challenges suffered by the host communities as a result of airport noise. All these notwithstanding, negative activities like noise generation from airports generate impacts of great concern. These impacts have been the major concern of residents at the airport vicinity. Various studies have looked at various aspects of airports and its contribution to development. For example, Morgan[8] looked at the benefits and cost of Economic Development process like airports in the U.S.A. These benefits were looked at from the qualitative and quantitative aspects Luke & Jackie[9] also researched on the economic impact of South Africa International airports. Anofofun Zakaree & Iluno[10] also looked at Air transportation development and Economic growth in Nigeria. Fu & Zhang[11] looked at the Effect of Airport Revenue on Social Welfare in London. Blair & Diechert & Drozd[12] looked at the Influence of small airports and air transportation on local Economic Development in Nebraska Nwogbe et al.,[13] looked at the Impact of Air Transport Sector on Economic Development in Nigeria. Related researches have been carried out in different parts of the world on airports to assess the health implication of airport noise on host communities.[2-5] However; it would seem that since the Ibom international Airport is a recent development, little or no research has been carried out on the airport. This has necessitated this research, to assess the socio-economic impact of the airport on host communities.

Negative impact of airport

It is quite glaring that the impact of noise is adverse on the quality of life, health and psychological wellbeing of those exposed to it, contributing to physical problems like cardiovascular problems, sleep difficulties and annoyance. These impacts occur from traffic noise, rail noise, aircraft noise, and wind turbine noise. Obviously, policy

makers and the public are ignorant of the major impact of noise in the residential environment.[14] Most recently, a number of researches have shown that the impact of airport noise on health ranges from hearing loss, sleep disturbance, communication distortion, annoyance and high blood pressure. Greiser E & Greiser C & Jahnsen[15] (published a research concerning the risk increase of cardiovascular diseases and impact of aircraft noise in the Cologne-Bonn airport study. Previously, research had shown that there was an increase in the amount of cardiac medication prescribed with increasing aircraft noise exposure. Haines & Stansfeld & Job[16] conducted a study to investigate the effect aircraft noise exposure has cognitive impairments, annoyance and stress responses in school children. The study also examined whether those children exposed to high levels of social disadvantage are at greater risk of the effects of noise. The participant sample consisted of children attending ten schools in a high aircraft noise urban area compared to children from ten matched low aircraft noise urban areas. The results from this study established that there was an association between noise exposure and some cognitive impairments and annoyance in children, but did not find an association with reading impairments, memory, attention and self-reported stress. There was a weak association between airport noise exposure and hyperactivity and psychiatric morbidity. The results indicated that aircraft noise exposure was associated with annoyance after adjustment for age and social deprivation. The study also found that annoyance had an effect on health but there was no evidence of its long-term effect on general health.[16]

Relatedly & Sondakh et al.,[2] in measuring and evaluating noise levels arising from the operation of Saniratulangi International Airport on the surrounding environment used Standard measurement using sound level meter (SLM) and perception of the people who lived around the airports using a Questionnaire. They employed survey, observation, and documentation in order to obtain the data and information required. Based on perception, 20 people were collected from each of the 3 villages, where the noise level measurement was carried out. The Noise impact of health was thus; 58%, had (sleeping Disturbance), 11% experienced disturbance in communication. From the results, it could be deduced, that airport noise had a significant impact on physical health of people living around the Airport. Accordingly, Rosenlund et al.,[5] studied the relationships of Hypertension and community exposure to aircraft noise in the vicinity of Ananda Airport. In achieving their objectives, they carried out a random sample of 266 residents in noise exposed areas in the airport surrounding and another 2,693 living in other parts of the area. In the questionnaire distributed, the history of hypertension was taken into account, after adjusting for confounders, (age, gender, smoking, and education). The ratio for hypertension was found to be 1.6 for residents exposed to energy averaged noise levels, above 55 DB(A) and 1.8 for those with noise levels exceeding 72 DB(A). From their deductions, Aircrafts noise may increase the risk of hypertension and therefore might be a risk factor for cardiovascular diseases.

Similarly, Jarup et al.,[3] assessed the relation of Aircraft and road traffic noise respectively and hypertension by analyzing blood pressure, health, and lifestyle data of 4,861 residents near six European airports. Results from their survey showed that the risk of hypertension is related to long term noise exposure especially night- time aircraft noise exposure. Furthermore, Dirk et al.,[4] studied aircraft noise and the quality of life around Frankfurt Airport. Quality of life was divided into health –related quality of life and Environmental related quality of life. The field studies were carried out in communities 40km distance from Frankfurt Airport. The subject was sampled using a stratified random sampling method. Sixty-six residential areas were selected according to aircraft noise exposure in 2003, with equivalent sound level contours for day time, within the selected areas, a total of 3,795 randomly selected residents were engaged in a face to face interview which lasted for 45 minutes of which 2312 took part in the study. With respect to the health-related quality of life, mostly annoyance and disturbances due to noise in particular to aircraft noise was suffered by residents. The exposure to noise from aircraft, railway, and road traffic noise was calculated for the address of each participant. In addition, a sub- sample of 200 persons assessed on 4 successive days for the address of each participant. Aircraft noise, exposure was modelled on the base of the flight moment of the six busiest months of the year 2005 this was achieved using German aircraft noise calculation procedure as proposed by the German Federal Environment agency. They also employed descriptive statistics to show the health situation of residents living near the airport. From their results, aircraft noise generally affected environmental quality of life but to a small extent. Health quality of life was associated with aircraft noise, annoyance, noise sensitivity and partly with airport noise exposure, especially in the multi- morbid residents. The results suggest recursive relationship between noise and health. This cannot be tested in cross sectional studies but with longitudinal studies as this would help create more insight between casual paths underlying the noise- health relationship.

Beutel, Jünger & Klein Wild & Lackner et al.[17] determined the correlation of noise annoyance to anxiety and depression and discovered the influence of different environmental sources to overall noise annoyance. The result was gotten by investigating a cross-sectional data of n=15.010 participants of the Gutenberg Health Study (GHS), a population-based, prospective, single-center cohort study in Mid-Germany (age 35 to 74 years). Noise annoyance was measured separately for road traffic, aircraft, railways, industrial, neighborhood indoor and outdoor noise ("during the day"; "in your sleep") on 5-point scales ("not at all" to "extremely"); depression and anxiety were assessed by the PHQ-9, resp. GAD-2. Result from the assessment revealed that Depression and anxiety increased with the degree of overall noise annoyance. Compared to no annoyance, prevalence ratios for depression, respectively anxiety increased from moderate (PR depression 1.20; 95%CI 1.00 to 1.45; PR anxiety 1.42; 95% CI 1.15 to 1.74) to extreme annoyance (PR depression 1.97; 95%CI 1.62 to 2.39; PR anxiety 2.14; 95% CI 1.71 to 2.67). Compared to other sources, aircraft noise annoyance was prominent affecting almost 60% of the population. They, however concluded that Strong noise annoyance was correlated to a two-fold higher prevalence of depression and anxiety in the general population and that aircraft noise was the major source of annoyance in the sample, exceeding the other sources.

Conversely, Tamini & Pak[18] employed comparative analysis in investigating the effect of aircraft noise on emotional states between airport neighboring and city residents in Zahedan City, Iran. The sample size of this study comprised 200 residents of Zahedan City (100 city residents and 100 residents from airport neighboring) that were selected through the convenience sampling method. Depression, Anxiety, and Stress Scale-21 (DASS-12) was used in collecting the data. Data collected were analyzed by one-way MANOVA using SPSS version 16. Results revealed that there were significant differences vis-à-vis anxiety, stress and overall scores of DASS between airport neighboring and city residents in Zahedan city. However, there was no significant difference between the two groups regarding depression.

From the findings of this study they concluded that, aircraft noise has a negative effect on the level of emotional states and it increases the amount of anxiety, stress, and overall scores of DASS among the neighboring residents of International Airport of Zahedan.

Kyeong Min Kwak[19] in assessing the effect of aircraft noise on sleep disturbance among the residents near a civilian airport employed a cross sectional study. They investigated the relationship between sleep disturbance and exposure to aircraft noise on the residents who are living near an airport. There were 3308 residents (1403 in the high exposure group, 1428 in the low exposure group, and 477 in the non-exposure group) selected as the subjects for this study. The Insomnia Severity Index (ISI) and Epworth Sleepiness Scale (ESS) was the major tool used. In evaluating sleep disturbance, questionnaires were also used. From the results, the mean ISI and ESS scores were 6.9±6.4 and 5.5±3.7, correspondingly, and the average scores were considerably greater in the aircraft noise exposure group, as matched to the non-exposure group. The percentage of the abnormal subjects, which were classified according to the results of the ISI and ESS, was also considerably greater in the noise exposure group, as compared to the control group. The odd ratios for insomnia and daytime hypersomnia were approximately 3 times higher in the noise exposure group, as compared to the control group. The study concluded that the occurrence of insomnia and daytime hypersomnia was higher in the aircraft noise exposure group, as compared to the control group. Additionally, Holt & Croft[20] considered Airport Noise and Self-Reported Sleep Insufficiency, United States, 2008 and 2009. They majorly assessed the relationship between airport noise exposure and insufficient sleep in the United States by using data from the Behavioral Risk Factor Surveillance System (BRFSS). Data on the number of days without enough rest or sleep for approximately 750,000 respondents to the 2008 and 2009 BRFSS were allied with data on noise exposure modeled using the US Federal Aviation Administration's (FAA's) Integrated Noise Model for 95 major US airports for corresponding years. Noise exposure data were categorized into three (3) groups depending on noise levels. Residents outside airport noise exposure zones were included as a reference category. Results revealed 8.6 mean days of insufficient sleep in the previous 30 days among 745,868 adults; 10.8% reported insufficient sleep for all 30 days; and 30.1% reported no days of insufficient sleep. After adjusting for individual socio-demographics and ZIP Code-level socioeconomic status, no significant differences was found between sleep insufficiency the 3 noise exposure zones and the zone outside.

Evrard & Bouaoun & Champelovier[21] also studied the relationship between airport noise exposure and mortality from cardiovascular disease, coronary heart disease, myocardial infarction, and stroke. Ecological study was done on 161 communes (commune being the smallest administrative unit in France) close to; Paris-Charles de Gaulle, Lyon the Saint-Exupéry, and Toulouse-Blagnac being the three major French airports. Mortality data were provided by the French Center on Medical Causes of Death for the period 2007-2010. According to the data provided by the French Civil Aviation Authority, a weighted average exposure to aircraft noise (L_{den} AEI) was computed at the commune level. To investigate the link between mortality rates and $L_{den,}$ a Poisson regression model with commune-specific random intercepts, adjusted for potential confounding factors including air pollution, AEI was used. Results indicated a positive link between L_{den} AEI and mortality from cardiovascular disease [adjusted mortality rate ratio (MRR) per 10 dB(A) increase in L_{den} AEI=1.18; 95% confidence interval (CI): 1.11-1.25], coronary heart disease [MR=1.24 (1.12-1.36)], and myocardial infarction [MRR=1.28 (1.11-1.46]. Stroke mortality was more weakly associated with L_{den} AEI [MRR=1.08 (0.97-1.21]. These significant relations were not offset after the adjustment for air pollution. This ecological study however, supports the hypothesis of a link between aircraft noise exposure and mortality from cardiovascular disease, coronary heart disease, and myocardial infarction. Though, the potential for ecological bias and the likelihood that this link could be due to residual confounding cannot be debarred.

Noise level quality and standards

In view with the alarming increase in environmental noise pollution, most countries have come up with permissible noise standards. According to the United States Federal Highway Administration (FHWA) in April, 1972 published interim noise standards for various land uses as for park and open places: 60 decibel (exterior limit). Residential area, Hotels, Schools, Libraries, Hospital 70 decibel (exterior limit). Developed areas: 75 decibels, Residential areas and Hotels 55 decibel (interior limit). According to WHO[22] noise level standards for land uses in decibels are as follows; in door dwelling areas (35); Bedrooms (30); Educational (55); Commercial (60); Industrial (70); Religious (45). Furthermore, the US Environmental Protection Agency (2004) have also set noise quality zones as follows; 55<60dB (Risky); 60-65dB (moderately Risky); 65<70dB (Highly Risky); 70<75Db (Dangerous); 75<80dB (Extremely dangerous). The following objectives were the targets of this paper; to examine the impact of the Airport noise on the health situation of the host community.

Research questions

I. How has noise from the Obong Victor Attah International Airport affected the health of host communities?

Hypothesis

The following null hypothesis would be tested.

H_O=Obong Victor Attah International Airport does not significantly impact on health.

Materials and methods

Study Area: location

The Obong Victor Attah International Airport is an Airport in Akwa Ibom State, Nigeria, this Airport is hosted by three (3) local governments which constitute the study area. They are Okobo, Nsit Atai, and Uruan local governments. The area is located within the coordinates 8.00E-8.50E and 4.500N and 4.550N.

People and population

The people are mainly Ibibio's, with Ibibio language as the major spoken language. Ibibio constitute the largest ethnic group in Akwa Ibom state. According to projected population of 2015 by the Ministry of Economic Development Uyo, Akwa Ibom State, Nsit-Atai has a population of 99,164, with 50,242 males and 48,922 females. Okobo has a population of 138,828; made up of 70,790 males and 68,038 females. Uruan has a population of 95,576 this is composed of 48,920 males and 46,656 females. Population of the study area was vital to the study because population is pivotal to the development of any region (Figure 1).

Vegetation

The region belongs to the tropical rainforest zone. The natural vegetation is as a result of the interaction of climate, humidity, rainfall and soils.[23] Due to prolonged human occupation and resource exploitation, the forest cover has been removed or modified and converted in line with the needs and socio-economic activities of inhabitants. Akwa Ibom state according to CRBDA of 1978, the study area belongs to bush fallowing with forest vegetation and land- use class. Bush fallowing with secondary forest is different from bush fallowing due to the presence of secondary forest. Fallow periods here range from 5-15 years. The vegetation is characterized by mosaic of fields, scrub and secondary forest. These refer to the plant cover. Its distribution is controlled by climate, soil, altitude and human activities. Consequently, two distinct vegetation types abound in the study area they are mangrove and the fresh water swamp. These vegetation types influenced the location of this Airport.

Climate

Two major types of rainfall are prevalent in the area. They are the convectional and the frontal rainfall. The convectional rainfall varies with season and is common during dry season when the intensity of insolation is high. Though this type of rainfall is intense it last for a short duration. The frontal type of rainfall is mostly prevalent in the area. These types of rainfall are associated with lightening and thunders and usually occur late in the afternoon, at the beginning and the end of raining season when maritime air mass is less deep. These areas receive frontal rainfall in all months of the year at least on the average even though it varies in quantity. The remarkable seasons in the area are majorly the dry and the rainy season. The dry season usually starts from November and last till March. The dry seasons is usually characterized by prevailing influences of the dry and dusty North West wind commonly known as "Harmattan". While the wet or rainy season begins from March and ends in October. The average annual rainfall totals 2500mm.[24] Atmospheric temperatures within these areas are continually high and changes slightly within the year. The highest temperatures are recorded between February and April and do not usually exceed 37°C. The temperature variations in these areas are not much. Generally, the mean annual temperature is above 23°C and does not exceed 29°C. However, the mean annual temperature ranges between 27°C and 28°C. Humidity is generally known as the dampness of the atmosphere which is largely a function of temperature. The highest values of temperature are recorded in the morning when the temperature is low, usually between 90-95% and the lowest in the afternoon when the temperature increases and is usually between 50-60%. The relative humidity is highest in April and lowest in January. Climate was an important factor that influenced the location of Ibom Airport in the host LGA's.

Sampling procedures and methods of data collection

Sampling procedures

Table 1.

Sample Size: The Taro Yamane Formula was used

$$\mathbf{n} = \frac{\mathbf{N}}{1+\mathbf{N}(\mathbf{e})2}$$

$$\mathbf{n} = \frac{91{,}822.92}{1+91{,}822.92(0.05)2}$$

$$\mathbf{n} = \frac{91{,}822.92}{1+91{,}822.92(0.0025)}$$

$$\mathbf{n} = \frac{91{,}822.92}{959.17}$$

$$\mathbf{n} = \mathbf{399.6} \approx \mathbf{400}$$

Table 1 Sample population

Local Governments	Projected Population (2017)	Percentage represented (%)	Villages projected population (2017)
Okobo	134, 264	35%	Egbghi Eta 1,848 NungAtai 7, 232 Ammong 20,534 Total 29614.
Uruan	153,101	39.9%	EkpeneUkim 14,774 IshietEkim 4,657.12 NdonEbom 17,046 Esukinwang 2,199 Total 38676.
NsitAtai	95,903	25.02%	Ikotlnyang 948 Idibia 21,299 NdonEkpe 698 Ikotmkpo 587w Total 23,533.48
Total	383, 268	99.9%	91,822.92

Source: 2017 Population projected from 2006 National population census (NPC, 2006)

Citation: Olalekan RM, Blossom IA. Impact of airport noise on the health situation of host communities: a case study of Obong victor Attah international airport, Akwa Ibom state, Nigeria. *MOJ Public Health.* 2019;8(2):74–83. DOI: 10.15406/mojph.2019.08.00288

Based on this a total of 400 respondents was the sample size. Table 2 shows the percentage of questionnaire administration. In administrating the questionnaire, quota system was used. The LGA's were given questionnaires based on their percentage contribution to the total population. Okobo was given 32.25 % (129) of the questionnaires, Uruan was given 42.11% (168) and Nsit Atai was given 25.6% (103) of the questionnaires respectively. A systematic sampling technique was employed in selecting households to be sampled. Table 3 presents the communities where the respondents were drawn. A five kilometres (5km) buffer was drawn around the Ibom International airport and all the communities were listed according to buffers (1km, 2km, 3km, 4km, 5km). A buffer was used to delimit the study area to enable the research study the distance decay in the area of tourism income, employment, education and noise level. Ten percent of the communities were selected at random from each of the buffer levels. Ten percent is the minimum level for any sample to considered valid.[25] The buffer map is presented in Figure 2.

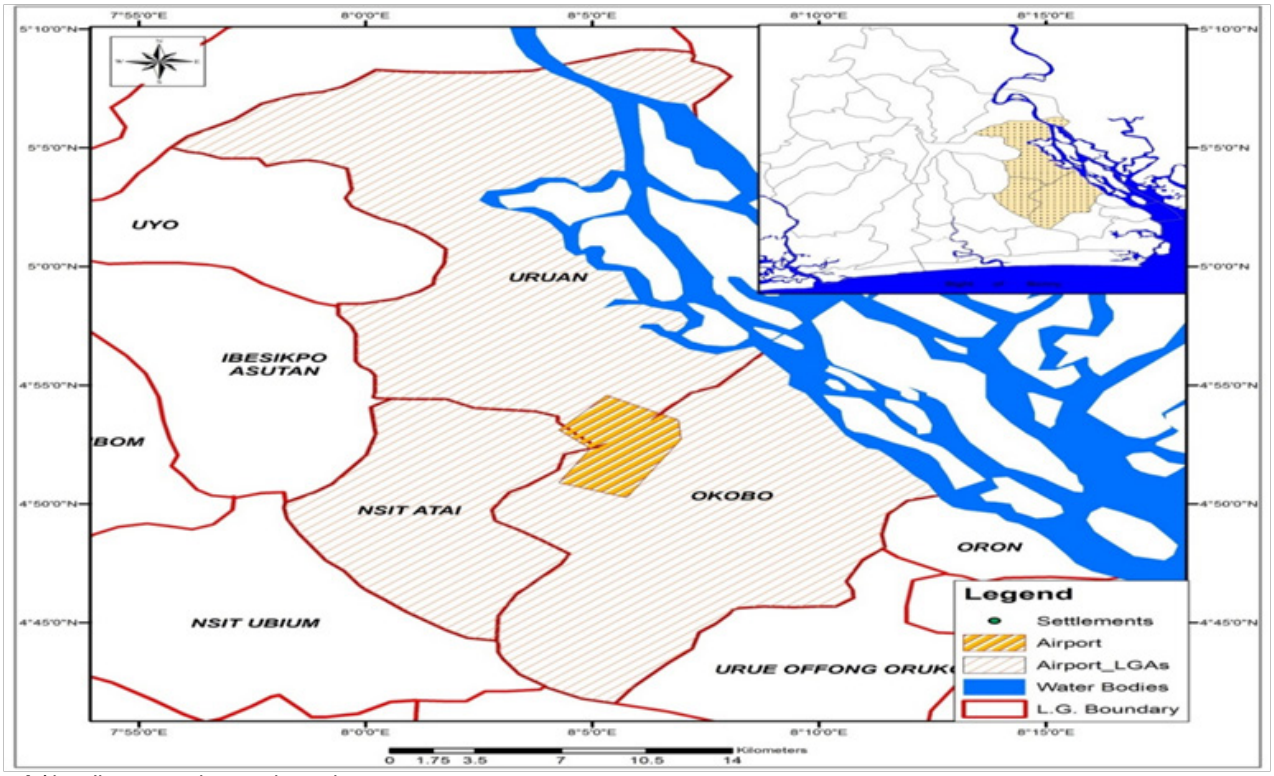

Figure 1 Akwa Ibom state showing the study area.

Table 2 Questionnaire administration

LGA	Percentage (%)	Sample size
Okobo	32.25	129
Uruan	42.11	168
NsitAtai	25.6	103
TOTAL	100	400

Method of data collection

The following variables were sought for socio-economic information using structured questionnaires; socio-demographic information on health (Table 4 & Table 5).

Method of data analysis

Descriptive and inferential statistics were the major method of analysis used. Percentages and charts and maps were used to describe the extent of impact the airport has on employment, income local tourism and health of the airport host communities. Data collected on each of the variables were mapped to indicate their strength with distance.

Table 3 Community residence of respondents

Community of residence	Number of respondents
Amammong	88
EbighiEtai	9
EkpeneUkim	64
EsukInwang	7
Idiabia	90
IkotInyang	4
Ikotmkpo	4
Ishiet	22
NdonEbom	74
NdonEkpe	4
NungAtai	33
TOTAL	400

Source: Field data (2017).

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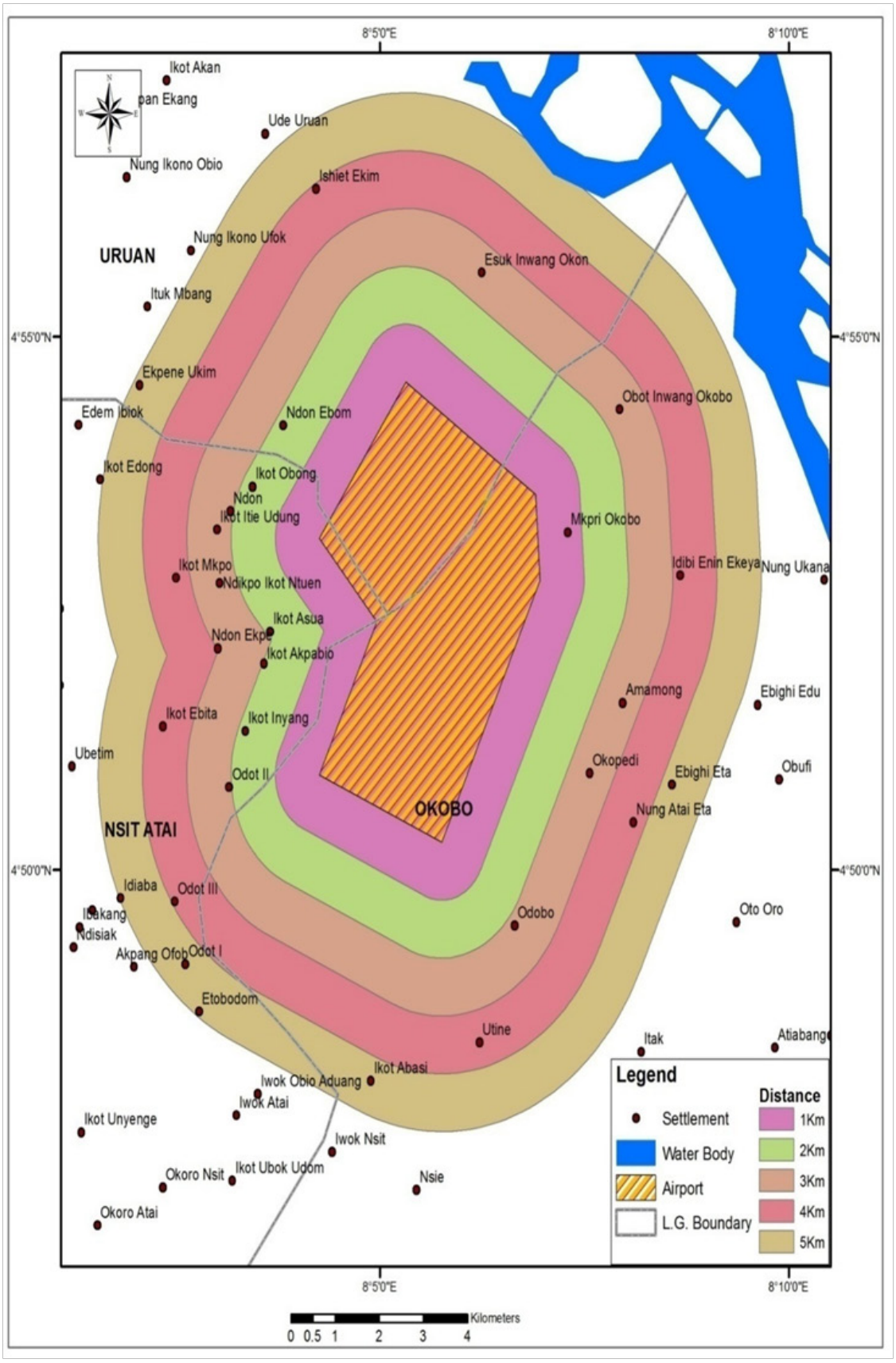

Figure 2 Buffer maps of communities 5km from the Airport.

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Table 4 Data set and method of collection

Variable	Method of data collection
Gender	Structured Questionnaire
Marital status	Structured Questionnaire
Levels of education	Structured Questionnaire
Religion	Structured Questionnaire
Community	Structured Questionnaire
Employment Status	Structured Questionnaire
Family Size	Structured Questionnaire

Socio-demographic information

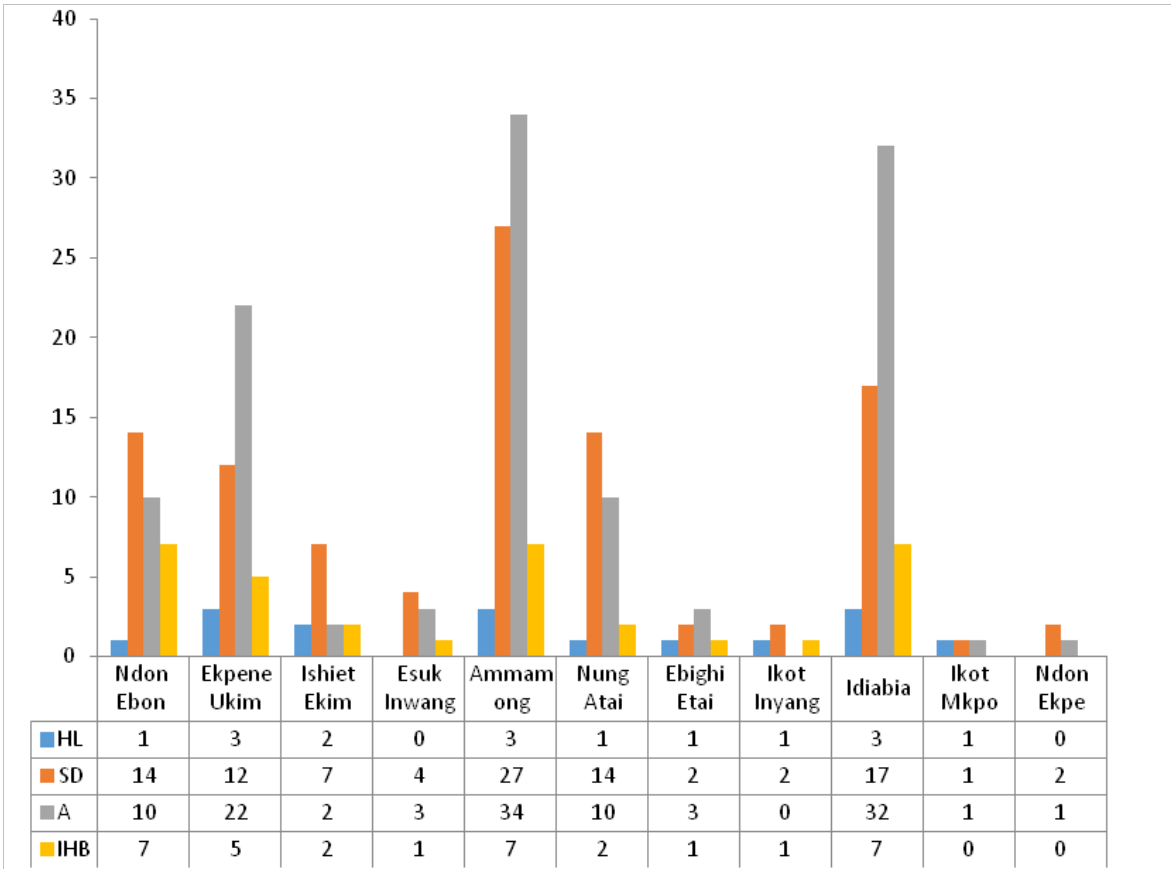
Result and discussion

Impact of airport noise on health status of people

The study also assessed the impact of Airport noise on the health status of the people in the study area. Figure 3 shows that the major health issue associated with the Airport noise were; annoyance (43.8%), sleep disturbance (37.9%), increased heart beat (12%) and hearing loss (5%). Ammamong, Ekpene Ukim and Idiabia suffered more from annoyance, Sleep disturbance as a result of airport noise. Ammamong, Idiabia and Ndon Ebom. Ndon Ebom, Ammamong and Idiabia suffered more from increased heartbeat. Ammamong, Ekpene Ukim and Idiabia suffered more from hearing loss. It could be inferred that Ammamong suffered the most from the health issues reported in the study. Noise levels at different distances from the study area were measured. The readings show that, whereas, Ndon - Ebom and Ikot Inyang which are found at 2km buffer distance had the highest Noise level in decibels, Ekpene Ukim and Idiabia at 5km, had the lowest noise level in decibels. These readings are presented in Figure 4 & Figure 5 further showed that the noise levels increased with distance. Communities closer to the Airport (Ndon Ebom, Ikot Inyang, Esuk Inwang Okon) had higher noise level than those ones farther from the Airport (Ekpene Ukim, Idiabia). This is in accordance with the distance decay model. The noise levels were classified based on US Environmental Protection Agency (Table 6).[26]

Table 5 Health

Variable	Indicators	Method of data collection	Method of data analysis
Health consequences of airport noise	Increased number of patients with hearing loss, sleep disorder, annoyance and others	Questionnaire was used to collect data on health situation of residents	Descriptive statistics; percentage was employed to present the percentages of residents who report various health implications of airport noise. Maps were used to show these health implications with distance



	Ndon Ebon	Ekpene Ukim	Ishiet Ekim	Esuk Inwang	Ammamong	Nung Atai	Ebighi Etai	Ikot Inyang	Idiabia	Ikot Mkpo	Ndon Ekpe
HL	1	3	2	0	3	1	1	1	3	1	0
SD	14	12	7	4	27	14	2	2	17	1	2
A	10	22	2	3	34	10	3	0	32	1	1
IHB	7	5	2	1	7	2	1	1	7	0	0

Figure 3 Health issues associated with airport noise.

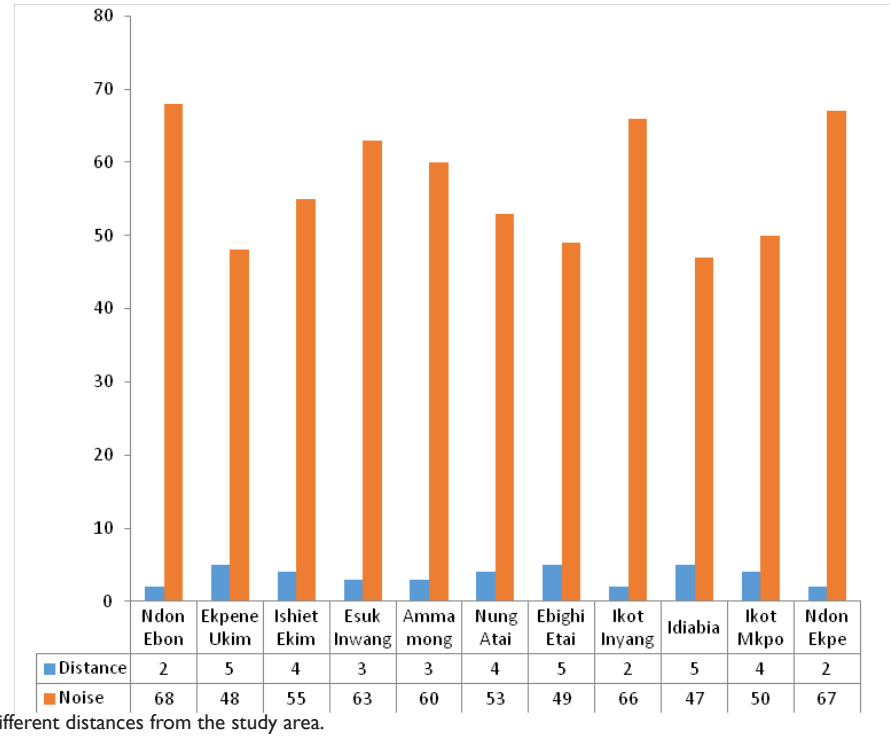


Figure 4 Noise levels at different distances from the study area.
Source: Field Data (2017)

Table 6 Noise Qualities Zones

dB(A)	Quality
55<60	Risky
60<65	Moderately Risk
65<70	Highly Risky
70<75	Dangerous
75<80	Highly dangerous
Higherthan80	Extremely dangerous

Source: US Environmental Protection Agency, (2004).

Test of hypothesis

A certainty in the study was needed to affirm if Obong Victor Attah International Airport contributed significantly to employment, income, and tourism and health status of the selected host communities. Hence this hypothesis was tested H_o =Airport does not significantly impact health (Table 7).

Information on the relationship between Airport and employment, income, tourism and health impact of Airport noise were subjected to simple linear regression using SPSS version 20. The results indicated that the R which was the correlation between the observed (Airport) and predicted dependent variables (Health) and high for Health (97.8%) and the R-Square or coefficient of determination indicated that the Airport contributed poorly and greatly to noise as it concerns health (95.6%). The magnitude and influence of these variables are shown by the B values. The negative B values for the variables (health) indicates that airport does not make any positive contribution to health. The proportion of variance in the dependent variable (health) which was explained by the independent variable (Airport as represented by the distances from the Airport) is 95.1% respectively. Based on the high (strong) correlation indicated by the R coefficient for Health, it was concluded that Obong Victor Attah International Airport was an important factor in noise generation in the host communities (Uruan, Okobo and Nsit-Atai LGA's of Akwa Ibom State).[27,28]

The impact of the airport noise on the health situation of the host community

The study established that Obong Victor Attah International Airport had a negative impact on the health status of the host communities this is shown by the negative B value (-.978) of the linear regression analysis. This result aligns with noise level readings which declined with distance from the airport. An assessment of the major health issues resulting from the Airport revealed that annoyance (43.8%), sleeping disturbance (37.9%), increased heart beat (12%) and hearing loss were mostly suffered by these communities. This is in line with the study by Haines et al.,[16] which was conducted to investigate whether aircraft noise exposure had an effect on cognitive impairments, annoyance and stress responses in school children. The study also examined whether those children exposed to high levels of social disadvantage are at greater risk of the effects of noise. The participant sample consisted of children attending ten schools in a high aircraft noise urban area compared to children from ten matched low aircraft noise urban areas. The results from this study established that there was an association between noise exposure and some cognitive impairments and annoyance in children, but did not find an association with reading impairments, memory, attention and self-reported stress. There was a weak association between airport noise exposure and hyperactivity and psychiatric morbidity. The results indicated that aircraft noise exposure was associated with annoyance after adjustment for age and social deprivation. The study also found that annoyance had an effect on health but there was no evidence of its long-term effect on general health.[16] This result also supports that airport noise has a significant impact on the physical health of people living around the Airport.[2]

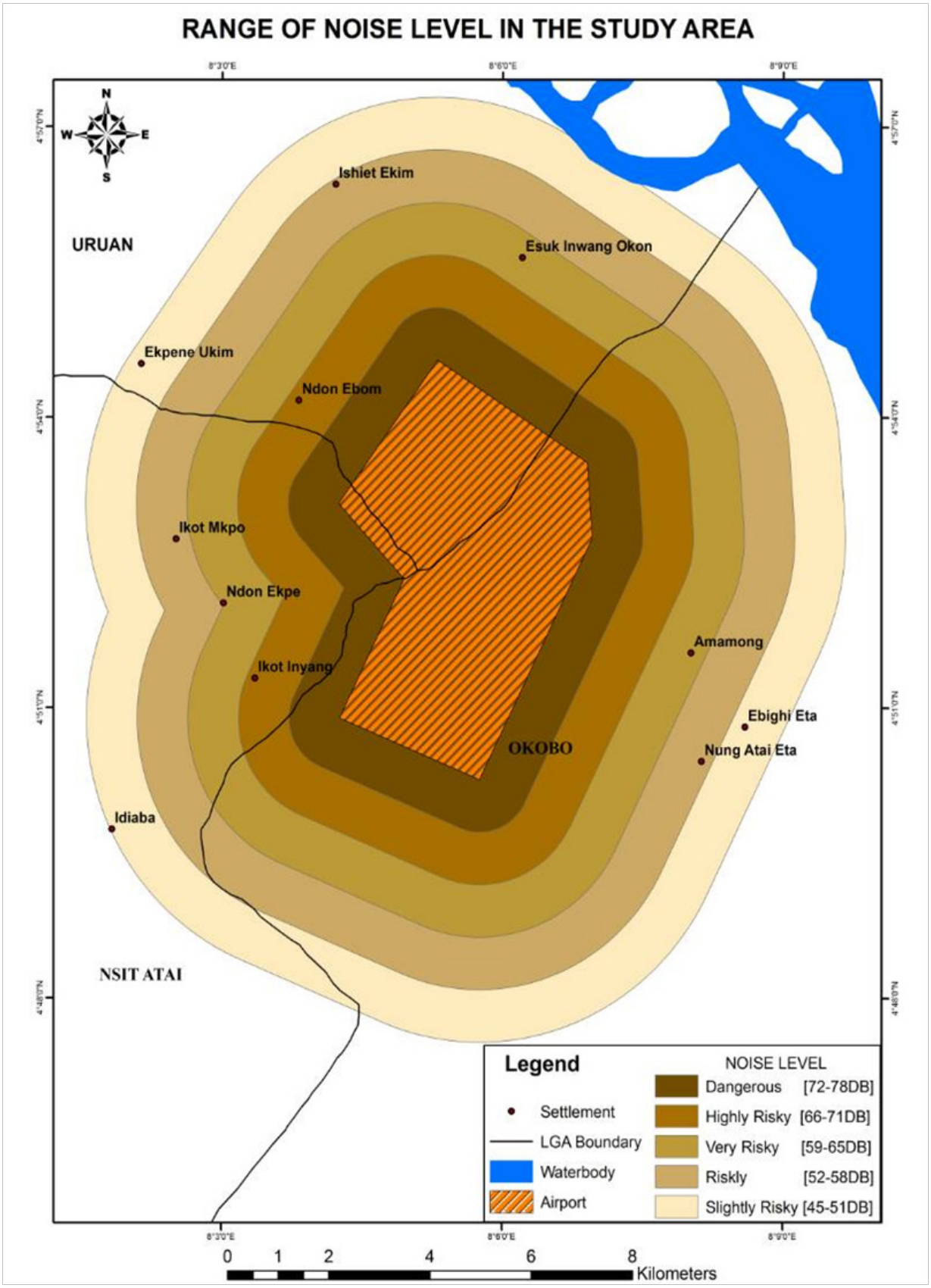


Figure 5 Buffer map of noise level with distance.

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Table 7 Summary of Simple Linear Regression Analysis of the Impact of the Obong Victor Attah International Airport on Health

Indicator	R	R^2	ADJ R^2	STD ERR	SIG	B	F
Health	.978	.956	0.951	1.801	0.000	-978	197.765

Conclusion

Conclusively, the findings of the study showed that host communities suffer annoyance, sleeping disorder, hearing loss and increased heart beat as a result of the Airport noise. This also implies that there may be other health issues associated with the Airport noise, which are not easily discerned by the respondents.

Recommendations

Based on these findings, recommendations are suggested in order to increase the impact of the Obong Victor Attah International Airport on the host communities as follows. The findings of the study showed that the major health issue that resulted from the airport noise was annoyance and sleeping disorder. This also implies that there may be other health issues associated with the airport noise which may not be able to be discerned by the respondents. It is recommended that the members of the host community should be enlightened and educated about the dangers of the airport noise on their health. This is to reduce money spent on health matters. The study showed that noise level and the corresponding health issues decreased with distance, it is recommended that residential buildings should not be approved too close to the Airport this would reduce the severity of these health issues associated with Airport noise.

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Conflicts of interest

Author declares that there is no conflict of interest.

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